West Sedgemoor and Wick Moor Water Level Management Plan

Parrett Internal Drainage Board

Approved November 2009

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Maps

1. Approval of the Water Level Management Plan

This Water Level Management Plan has been prepared by the Parrett Internal Drainage Board for the West Sedgemoor and Wick Moor area of the Drainage Board District. Contributions to the WLMP have been received from the Environment Agency, Natural England and others.

Water Level Management Plan – General details	
Plan area	West Sedgemoor and Wick Moor (Parrett IDB)
SSSI(s) covered	West Sedgemoor SSSI
Region / Area	Somerset Levels and Moors
IDB Lead officer	Philip Brewin, Ecologist

Approval of the Water Level Management Plan			
"I agree with the proposals and actions set out in this Water Level Management Plan and confirm the Plan will help achieve favourable condition for the Sites of Special Scientific Interest covered by the Plan."			
Position & Organisation	**Name**	**Signature**	**Date**
Chairman – Parrett Drainage Board	Peter Maltby		
Area Manager – Environment Agency	Nick Gupta		
Area Manager – Natural England	Mark Watson		

2. Introduction

2.1. Purpose of the Plan

Water Level Management Plans (WLMPs) are required for all areas which have a conservation interest and where the control of water is important for the maintenance or rehabilitation of that interest. Priority is given to WLMPs for Sites of Special Scientific Interest (SSSIs), particularly those of international importance (e.g. Special Protection Areas, Ramsar Wetlands of international importance). The Plans are a means of balancing and integrating water level management for a range of land uses and activities within an area, including agriculture, recreation, flood risk and conservation.

The Government has established a Public Service Agreement (PSA) target to ensure that 95% of all SSSIs are in a favourable condition (or in an unfavourable but recovering condition) by December 2010. The PSA target is being applied to Natural England and to the Drainage Authorities operating within the WLMP area. In 2004, English Nature (now Natural England) carried out a review of wetland SSSIs in unfavourable condition and identified a number of priority sites where achieving appropriate water level management was critical to securing favourable condition. One of the priority sites identified is within the area covered by this WLMP:

- West Sedgemoor SSSI, with 43% of the area being in an unfavourable condition due to inappropriate water management. Therefore, one of the aims of this WLMP is to implement changes in water management in order to bring this SSSI into favourable or recovering condition.

West Sedgemoor SSSI forms part of the Somerset Levels and Moors Special Protection Area (SPA) and Ramsar site. The Parrett IDB recognises it's status as a 'Competent Authority' for the purposes of the Conservation (Natural Habitats etc) Regulations 1994 when considering any plan or project which is likely to have a significant effect on features of European importance in the SPA. The IDB also recognises it's duty to further conservation as part of its statutory obligations under relevant legislation including the Land Drainage Act 1991, the Countryside and Rights of Way Act 2000 and the Natural England and Rural Communities Act 2006.

The WLMP will assist the Drainage Authorities, such as the Parrett IDB and the Environment Agency, to carry out their nature conservation duties across the Plan area. In addition, the Plan will help the Drainage Authorities to ensure that the investment in infrastructure is appropriate and maintenance of these assets continues in the future.

2.2. Plan area

The Plan area covers 3894 acres (1576 hectares) of what was the old West Sedgemoor Drainage Board District. This drainage district is now part of the area managed by the Parrett IDB and is illustrated on Map 1.

The Plan area lies between the Stoke St Gregory ridge and the River Parrett to the north and the Fivehead/Curry Rivel ridge to the south. The River Parrett (near Langport Bridge) forms the eastern boundary and the former Chard Canal lies to the west.

2.3. Responsibility for preparation and implementation of the Plan

The Parrett Internal Drainage Board is responsible for the preparation, overall monitoring and review of this WLMP on behalf of the Drainage Authorities operating in the area, namely the Parrett IDB, the Environment Agency, Somerset County Council, Taunton Deane Borough Council and South Somerset District Council. Each Drainage Authority has contributed information to enable the WLMP to be produced by the Drainage Board, and the end result is a collaborative effort by all the Authorities.

Each Drainage Authority is responsible for implementing and monitoring their own actions within the WLMP, and for reporting on these matters to the Drainage Board as appropriate.

The Parrett IDB will adopt and implement the WLMP in accordance with the criteria set out in Box 1.

2.4. Consultation and Plan approval

The First Draft of the Water Level Management Plan was considered by the Parrett IDB WLMP Committee in May 2009 and was endorsed for purposes of consultation with drainage ratepayers, Statutory Bodies and other organisations. Consultation on the WLMP took place during a four week period in July and August 2009.

After consultation, the WLMP Committee will consider the responses to the Draft WLMP, and any amendments to the Plan arising from the consultation responses, before recommending the WLMP for approval by the Full Parrett Board in November 2009.

Following approval by the Full Board, the Plan will be known as the Approved WLMP and the actions it contains in Sections 9 will be implemented over the five years of the Plan.

Box 1: The approval and implementation of Water Level Management Plans

The following criteria will be used by the Parrett IDB when considering WLMPs for approval and when implementing actions relating to:

a. Making recommendations regarding the approval of a WLMP as a plan of action;
b. The construction of a capital improvement scheme as proposed within the approved WLMP;
c. Changing water levels as proposed within the approved WLMP.

A. Continuation of existing good practices

Where the WLMP includes proposals to '*continue the current good practices regarding water level management, watercourse maintenance and operational procedures'*, the Parrett IDB will satisfy itself that the current practices:

- Are technically sound;
- Satisfies the drainage and water level management needs of the area;
- Are environmentally sound;
- Are within the financial capacity of the Board to achieve;
- Will fulfil all the legal obligations of the Board, including those related to achieving favourable condition and biodiversity.

B. Undertake a capital improvement scheme

Where the WLMP includes a '*proposal to carry out a capital improvement scheme'*, the Parrett IDB will satisfy itself that the proposed scheme:

- Is technically sound;
- Satisfies the drainage and water level management needs of the area;
- Is environmentally sound;
- Is within the financial capacity of the Board to achieve;
- Has been agreed in principle with the occupier(s) and owner(s) of the land where the capital scheme is to be built;
- Is within the legal power of the Board to implement.

C. Change water level management

Where the WLMP includes proposal is to '*change the water level management, watercourse maintenance or operational procedures'*, the Parrett IDB will satisfy itself that the proposed change:

- Is technically sound;
- Satisfies the drainage and water level management needs of the area;
- Is environmentally sound;
- Is within the financial capacity of the Board to achieve;
- Is supported by the owners and occupiers of a significant majority of the land that would be affected by the proposed change being considered (see note below);
- Will fulfil all the legal obligations of the Board, including those related to achieving favourable condition and biodiversity;
- Does not carry a significant risk that the Board may face a legal claim for damages incurred by a third party as a consequence of its decision to change its current practice.

Notes: When considering a proposal to change water levels, the Parrett IDB will use the uptake of agri-environment scheme agreements (including proposals by the occupiers to upgrade their agreements), in the area likely to be affected by the proposed change, as an initial indication of the measure of compatibility of the farm holding/land management unit with the proposed change in water levels. Actual changes in water levels thereafter will be sought through the negotiation of appropriate land management agreements between the owners/occupiers of the land and the relevant authority (i.e. Higher Level Stewardship agreements between farmers and Natural England).

3. Hydrology, watercourses and infrastructure

3.1. Topography and soils

The land drained by the watercourses is low lying alluvium and surface peat bordering the left bank of the tidal River Parrett. The land surface varies from levels of about 10m above Ordnance Datum Newlyn (ODN) at the western edge of the Plan area to about 4.5m ODN on the lowest parts of the moor. High tides are prevented from inundating the low lying land by tidal embankments along the left bank of the River Parrett.

3.2. Water supply

The mean annual rainfall recorded for West Sedgemoor from 2000 - 2008 is 833 mm.

The River Parrett is the principal watercourse supplying water to the Plan area via three inlets. The Environment Agency owns and operates two of these inlets - Oath Farm Inlet (or Oath Bridge Inlet) and Twenty Acre Clyse Inlet, which are the main inlets to Wick Moor and West Sedgemoor respectively. The Parrett IDB owns and operates one inlet - Stuckey's Clyse. Stuckey's Clyse can be used to provide a second feed to Wick Moor. Details of these inlets can be found in Section 3.7.1 and the location of these structures is shown on Map 3.

3.3. Drainage

West Sedgemoor receives runoff from a relatively small catchment (approx. 41km^2), with the majority of this water entering the moor from the west via Widness Rhyne and Sedgemoor Old Rhyne. Other sources of runoff include the North Curry and Stoke St Gregory ridge, which drains directly to the Sedgemoor Old Rhyne and the West Sedgemoor Main Drain, and Wick Moor and Curry Rivel ridge, which drains to Wickmoor Rhyne and the Middle Drain.

The only outlet for water from the Plan area is to the River Parrett via the West Sedgemoor Pumping Station which is operated by the Environment Agency. Details of this outlet can be found in Section 3.7.2.

Water levels are lowered in winter months to allow better drainage and to reduce the risk of overland flooding. However, most watercourses still retain a low pen level in winter to maintain the conservation interests and reduce frost damage and erosion of banks.

In parts of West Sedgemoor SSSI (the West Sedgemoor Raised Water Level Areas), the watercourses are currently penned at higher levels in the winter and spring months to maintain the conservation interests of wet grassland habitats and provide suitable conditions for overwintering migratory wildfowl and waders. Details of these areas with seasonally higher water levels are given in Table 8 and are shown on Map 4.

During the summer months, the emphasis changes from drainage to irrigation, except during periods of heavy rainfall, when there is a risk of flooding. From early April to the end of November, sluice gates or penning boards are generally operated to raise water levels in the rhynes and ditches to higher levels. The higher summer levels are required to:

a) Provide wet fences around the fields and the watering of livestock;

b) Maintain an appropriate groundwater table during the growing season;

c) Maintain the conservation interest of the watercourses.

Summer water levels are maintained on Wick Moor by the operation of Owl Street Sluice and on West Sedgemoor by the Black Smock Sluice and the Pumping Station. The West Sedgemoor Pumping Station controls levels in the Main Drain and across large parts of the moor. The Black Smock Sluice is used to maintain levels in the Middle Drain and feed water along Middle Drain towards the west. Two IDB rhynes connect the Middle Drain to the North Drove Rhyne at the western end of the moor. Penning bays at the eastern end of the North Drove Rhyne, and between the Back Ditch and the Main Drain, can be used to maintain higher summer levels on the north-eastern section of the moor, but are generally ineffective and difficult to operate. A culvert at Helland Penning Bay (at Sedgemoor Corner) allows water to flow under the road and into North Drove Rhyne. However, this pipe is partially blocked and therefore restricts flow, and may increase upstream levels during periods of heavy rainfall. A number of other significant restrictions exist throughout the Viewed Rhyne system, which includes blocked culverts and high silt levels in the North Drove Rhyne, Southside and Eastern Rhyne, and overgrown trees on Sedgemoor Old Rhyne. The impact of these blockages, combined with the difficulties caused by inflexible and inadequate water level control structures, can cause problems in maintaining the desired water level, especially during dry or wet summer periods when flows are also restricted by channel vegetation.

3.4. Asset management systems

The Environment Agency Flood Risk Management (FRM) department manages its assets using a "System" approach introduced in 2005. A FRM System is defined as "*a group of assets that work together to reduce the flood risk to the people, infrastructure and environment within the system*". Each System has its own specific Management Plan, which describes the system and highlights the management for the system.

There are two FRM Systems which geographically cover the West Sedgemoor and Wick Moor WLMP area:

- FR/14/S123 Parrett Left Bank Langport to Oath (Low)
- FR/14/S032 West Sedgemoor (High)

The Environment Agency has adopted four maintenance categories to identify and prioritise risk for the Systems, these are:

- **High** – Generally urban areas with high population, or areas containing Flood Storage Reservoirs where failure could cause risk to life. Watercourses and structures require highest level of maintenance.
- **Medium** – Urban to rural areas with relatively low population densities. Watercourses and structures require moderate too high level of maintenance.
- **Low** – Rural areas and agricultural land which is sparsely populated.

Performance specifications are given to each System and to the individual assets, to guide maintenance standards. The maintenance works are then carried out by the Environment Agency's Operations Delivery Team. This process is used to direct the highest standards of maintenance to where they are most needed (i.e. people, property and environment) using a risk based approach.

Each Environment Agency owned asset is listed in the National Flood and Coastal Defence Database (NFCDD). This provides a definitive store for all data on flood and coastal defences. It records inspections, identifies asset condition, residual life and recommends any works required and their urgency.

The Parrett IDB manages its assets in the Plan area under a comparable asset management system.

3.5. The strategic context for water management

There are a number of strategic plans and documents which provide the context for this Water Level Management Plan, including:

- *The River Parrett Catchment Flood Management Plan* - A summary version is available on the Environment Agency website.
- *Catchment Abstraction Management Strategies (CAMS)* - These documents are currently being revised for re-release in 2011.
- *Mid Parrett, Isle & Yeo Study* - Completed in March 2007.
- *Lower Parrett & Tone Flood Management Strategy* - Working Draft prepared in February 2005.
- *Parrett and Tone Channel Monitoring Project 2008-09.*
- *Water Framework Directive* and *South West River Basin Management Plan* - The plan is available on the Environment Agency website.

3.5.1. Catchment Flood Management Plan

The CFMP for the River Parrett provides an overview of flood risk management in the catchment for the next 100 years. The final Plan was produced in 2008 and will be reviewed every six years. The CFMP is intended to guide Flood Risk Management (FRM) investment in the catchment by the Environment Agency and other bodies with FRM responsibilities and powers.

The Environment Agency proposes to adopt Policy Option 6 for the floodplains of the Parrett catchment. This would involve the Environment Agency, and others, taking action to increase the frequency of flooding. It appears that by redistributing floodwater - primarily from upstream of Langport to the King's Sedgemoor Drain, the overall damage and disruption from flooding will be reduced. Work will also be required to maintain the safety of existing embankments and infrastructure.

3.5.2. Catchment Abstraction Management Strategy

To ensure water resources are managed in a sustainable way the Environment Agency has developed Catchment Abstraction Management Strategies (CAMS) to assess the water availability in catchments in England and Wales. The Parrett CAMS, published in March 2006 and the Brue, Axe and North Somerset Streams CAMS, published in May 2006 are the current documents in circulation. However, these do not cover the Levels and Moors as the water availability assessment can only be used on flowing rivers, rather than those which are managed by control structures. However, as part of the Environment Agency's future CAMS, the current CAMS will be reassessed and the impact of the Somerset Levels and Moors will be included. There are two new documents which are in the process of being written, and will be completed by February 2011; they are:

- Parrett, Brue and West Somerset Streams CAMS (PBWSS)
- Bristol Avon, Little Avon, Axe and North Somerset Streams CAMS (BALAANSS)

Whilst the majority of the Somerset Levels and Moors will be covered in the PBWSS, there are some areas that affect the River Axe and so are covered in the BALAANSS.

The aim is to set an appropriate abstraction licensing policy for those rivers that are influenced by the inlets and pumping stations that control water levels within the Moors. The new CAMS will not assess or change the water levels held across the Levels and Moors. Instead, they will assume that the water levels stated in the Water Level Management Plans are appropriate. They will use the information held within the WLMPs to determine how much water will be taken from

and pumped into the Main River carriers that flow through the Levels and Moors (e.g. River Parrett). The Strategy will assess if these water inputs/outputs have the potential to compromise the ecology within these Main River carriers. If the Strategy identifies there is surplus water available in the catchment, then it will also consider how much of this water is available for new abstraction licences from the rivers.

3.5.3. Mid Parrett, Isle & Yeo Study

This study considers reaches of the Rivers Parrett, Isle and Yeo which flow through the southern area of the Somerset Levels and Moors upstream of Langport. It was commissioned to consider whether there is scope for improvements to the flood management infrastructure operating in the area and to guide proactive and reactive maintenance in the future. Aspects considered were flood management practices, impact on flood risk elsewhere, review of embankments and pumping stations and finally methods of optimising the system to reduce flood risk.

3.5.4. Lower Parrett & Tone Flood Management Strategy

This draft report looks at the long term flood management of the lower River Parrett and River Tone downstream of Taunton and Langport. The strategic aim is to achieve sustainable flood management within the area whilst minimising impact on communities, and maximising opportunities for wildlife and other local interests. Most of the area is at significant risk of flooding from fluvial or tidal sources, or both. Embankments provide most of the flood protection in the area and there is an increasing risk of breaching due to bank condition and climate change. Various options have been recommended for further study.

3.5.5. Parrett and Tone Channel Monitoring Project

The Environment Agency is currently undertaking a study on the River Parrett and Tone to monitor and assess the success of previous dredging work that was carried out between 2002 and 2005. New bathymetric surveys will be undertaken to gauge the current profile of the river channel. This data can then be meshed together with current LiDAR data in order to obtain accurate cross sections. Once these cross sections are in place, the Environment Agency intends to reuse the existing Parrett/Sowy hydraulic model to replicate the current profile of the River Parrett and Tone. The Environment Agency will then model alternative scenarios, to inform a programme of de-silting to maximise flood alleviation and optimise the performance and sustainability of the channel.

A long-term channel management strategy will be developed and implemented, with de-silting to follow. The study area on the Tone is from the Parrett confluence to New Bridge and on the Parrett from Oath Lock downstream to the M5 flyover.

3.6. Watercourses

3.6.1. Main Rivers

The Environment Agency has permissive powers to manage designated Main Rivers to reduce flooding of property and risk to human life. There are three Main Rivers in the Plan area; West Sedgemoor Main Drain, Wickmoor Rhyne and the River Parrett.

The River Parrett forms the northern boundary of the Plan area, with the West Sedgemoor Main Drain forming part of the western boundary. The Main Rivers within the Plan area are maintained and controlled by the Environment Agency. Summary details of these watercourses are set out in Table 1. The locations of the Main Rivers are shown on Map 2. The control structures on these watercourses are listed in Tables 2 – 4.

3.6.2. IDB watercourses

The Parrett IDB maintains and controls a network of watercourses (known as “Viewed Rhynes”) within the Plan area which take water from and drain into the Main Rivers. These arterial watercourses extend to over 46 kilometres. Summary details of the Viewed Rhynes maintained by the Parrett IDB are set out in Table 1. The locations of the Viewed Rhynes are shown on Map 2. The control structures on these watercourses are listed in Tables 2 – 4.

3.6.3. Private ditches

In addition to the Main Rivers and Viewed Rhynes, private ditches occur throughout the Plan area and are maintained by the riparian owner. This network of ditches is an integral part of the drainage and water supply network in the Plan area. They are particularly important as wet fences, to supply drinking water for grazing animals and support a substantial part of the overall biodiversity interest of the Plan area.

Table 1: Schedule of arterial watercourses in West Sedgemoor and Wick Moor

Asset No.	Watercourse	Operating Authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Table 5)
	River Parrett	EA	10110	Follows the northern boundary of Plan area, the Parrett flows in a westerly direction from Langport to Stathe.	The Parrett is split into sections and maintained once a year using F2 (FB) specification between Burrowbridge and Oath Sluice, and W7 (FB) specification between Oath Sluice and Huish Bridge. Some small-scale de-silting works are carried out as needed.	Stuckey's Clyse Twenty Acre Clyse Oath Farm Inlet
	West Sedgemoor Main Drain	EA	2760	The Main Drain starts at Pincombe Bridge near Woodhill and runs in a north easterly direction to West Sedgemoor Pumping Station.	Two Bradshaw cuts are taken each year in July and September. Banks are flailed if not grazed. Specification W3 is used.	West Sedgemoor Pumping Station
	West Sedgemoor Back Ditch	EA	2760	This ordinary ditch runs parallel to the Main Drain for its entire length. This is not technically Main River but is always included.	Two Bradshaw cuts are taken in July and September annually. Banks are flailed as required. Specification W2 is used.	Back Ditch Penning Bay Back Ditch Structure A Back Ditch Structure B Back Ditch Structure C
	Wickmoor Rhyne	EA	3290	This rhyne takes a winding, westerly course from Wickmoor Drove, around Oath Farm then north, under the railway line and along the road towards the Pumping Station.	Two Bradshaw cuts are taken in July and September annually. Banks are flailed as required. Specification W2 is used.	Oath Hill Sluice
21	Sedgemoor Old Rhyne	IDB	5412	Part of the western boundary of the SSSI, Pincombe Bridge to Newport Mill	W2	None
22	Widness Rhyne	IDB	3890	Bowdish Farm through Newport	W2	Hellend Penning Bay
1	North Drove Rhyne	IDB	5989	Follows south side of North Drove Rhyne from Widness Rhyne in the west to Middle Drain in the east	W2	North Drove Penning Bay
36	Middle Drain	IDB	5332	From the Main Drain at the Pumping Station through the central part of the Moor, connecting to, North Drove Rhyne, Wickmoor Rhyne, the Southside Rhyne and the Turn Rhynes.	W2	Black Smock Sluice
17 & 19	Turn Rhynes - cross connections between Middle Drain and North Drove Rhyne	IDB	1332	Rhynes to the south of North Drove Rhyne, connecting the Middle Drain to North Drove Rhyne	W2	None
2, 4, 6, 8 & 10	Lateral connections to North Drove Rhyne	IDB	1101	Rhynes to the north of North Drove Rhyne, connecting North Drove Rhyne to the Main Drain	W2	None

Table 1 (continued): Schedule of arterial watercourses in West Sedgemoor and Wick Moor

Asset No.	Watercourse	Operating Authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Table 5)
12, 16, 18 & 20	Lateral connections to North Drove Rhyne	IDB	925	Rhynes to the north of North Drove Rhyne, connecting North Drove Rhyne to Sedgemoor Old Rhyne	W2	None
3, 5, 7, 9, 11, 13,14 & 15	Lateral connections to North Drove Rhyne	IDB	3076	Rhynes to the south of North Drove Rhyne, connecting only to the North Drove Rhyne with no formal connection to the Middle Drain	W2	None
23	Broad Mead Rhyne	IDB	1400	Rhyne to the north of Sedgemoor Old Rhyne.	W2	None
24 & 25	Park Meads Rhyne	IDB	994	Rhynes to the north of the West Sedgemoor Main Drain	W2	None
26	Road side ditch (Black Smock to railway bridge)	IDB	445	From Railway Bridge downstream to the Black Smock, connecting to the Middle Drain	W2	None
27 & 29	Eastern Rhyne alongside Ridley Road	IDB	1042	From the Railway Bridge to Ridley Corner, along west side of Ridley Road	W2	None
28	Oath Supply Rhyne from Oath Farm Inlet	IDB	520	From Oath Farm Inlet to Eastern Rhyne and Wickmoor Rhyne	W2	Oath Farm Inlet
30	Curry Rivel Allotment Rhyne	IDB	980	Connects Eastern Rhyne with Middle Drain	W2	None
31 & 33	Southside Rhyne	IDB	3517	Through south side of SSSI, connecting to Middle Drain, Curry Rivel Allotment Rhyne and Swell Drove Rhyne	W2	None
32	Broadway Drove Rhyne	IDB	1092	Ledgenham Farm to Middle Drain	W2	None
34	Swell Drove Rhyne	IDB	687	Eastwood Farm to Middle Drain	W2	None
35	Fivehead Rhyne	IDB	768	Rhynes to the south of Middle Drain, connecting to Middle Drain.	W2	None
37 & 39	Wick Moor Main Loop	IDB	3390	Connects Twenty Acre Clyse to Wickmoor Rhyne.	W2	Twenty Acre Clyse
38 & 41	Wick Meads Rhyne	IDB	1760	Wickmoor Drove to Wickmeads Drove	W2	Lake House Penning Bay
40	Port Moor Rhyne	IDB	2340	Oath Road to Stuckey's Clyse	W2	Stuckey’s Clyse

3.7. Structures

3.7.1. Structures controlling inflows

A number of structures are currently operated to supply water to the Plan area, as set out in Table 2. Any proposed changes to these arrangements are set out in Section 9.

Table 2: Structures controlling inflows to West Sedgemoor and Wick Moor

Inlet	Grid Ref.	Owned by	Operated by
Twenty Acre Inlet	ST 4044 2774	EA	EA
Oath Farm Inlet	ST 3858 2765	EA	EA
Stuckeys Clyse	ST 4156 2684	IDB	IDB

3.7.2. Structures controlling outflows

The West Sedgemoor Pumping Station is the only structure which is currently operated to control the water leaving the Plan area, as set out in Table 3. Any proposed changes to these arrangements are set out in Section 9.

Table 3: Structures controlling outflows from West Sedgemoor and Wick Moor

Outfall	Grid Ref.	Owned by	Operated by
West Sedgemoor Pumping Station	ST 3757 2857	EA	EA

3.7.3. Structures controlling water levels within the area

Water levels within the Plan area are currently controlled by several structures located on the network of arterial watercourses. These are summarised in Table 4. Any proposed changes to these arrangements are set out in Section 9.

There are numerous structures on private watercourses in the Raised Water Level Areas which affect water levels in the nearby locality.

Table 4: Schedule of control structures affecting water management in West Sedgemoor and Wick Moor

Asset No.	Control structure	Grid Ref.	Owned by	Operated by	Watercourse (see Table 1)	Description	Dimensions & operating range
11225894101 01B01001	West Sedgemoor Pumping Station	ST 3757 2857	EA	EA	Main Drain and River Parrett	Pumping Station	Three automated, electrical pumps, two within the pump house and one within the compound. Gravitation possible if levels are suitable.
11225894201 01B02005	Black Smock Sluice	ST 3780 2810	EA	EA	Middle Drain	Penstock and sluice gate	2.3m wide sluice gate adjacent to 0.85m wide penstock.
11225894201 01B05001	Oath Hill Sluice / Owl Street Sluice	ST 3870 2680	EA	EA	Wickmoor Rhyne	Stoplogs, penstock and sluice gate	Sluice gate is approx 2m wide, stoplogs and penstock are 500mm wide. The sluice and penstock are manually operated.
WS005	North Drove Penning Bay	ST 3776 2835	IDB	EA	North Drove Rhyne	Stoplogs	Concrete headwall with stoplog rebates. Penning structure ineffective.
WS006	Back Ditch Penning Bay	ST 3760 2856	IDB	EA	Back Ditch	Stoplogs	Concrete headwall with stoplog rebates. Penning structure ineffective.
WS004	Back Ditch Structure A	ST 3686 2764	IDB	Not operated	Back Ditch	Stoplogs	Sheet metal headwall with stoplog rebates. Penning structure ineffective.
WS003	Back Ditch Structure B	ST 3643 2728	IDB	Not operated	Back Ditch	Stoplogs	Sheet metal headwall with stoplog rebates. Penning structure ineffective.
WS002	Back Ditch Structure C	ST 3591 2681	IDB	Not operated	Back Ditch	Stoplogs	Sheet metal headwall with stoplog rebates. Penning structure ineffective.
WS001	Helland Penning Bay	ST 3334 2451	IDB	IDB	Widness Rhyne	Stoplogs	Wooden headwall with stoplog rebates.
WS007	Lake House Penning Bay	ST 4002 2720	IDB	Not operated	Wickmoor Drove to Oath Road	Stoplogs	Concrete headwall with stoplog rebates.
11225875004 02L01001	Oath Farm Inlet / Oath Hill Footbridge Inlet	ST 3858 2765	EA	EA	River Parrett	Penstock	600mm wide manually operated penstock.
11225875004 02L01002	Twenty Acre Inlet	ST 4044 2774	EA	EA	River Parrett	Penstock	New sheet-steel pile and concrete structure with a 600mm penstock and 600mm rigid plastic pipe through the bank. New trash screen and improved operator access. Invert Level 4.7m
11225875004 05L01001	Stuckey's Clyse (Langport Lock)	ST 4156 2684	IDB	IDB	River Parrett	Penstock	Steel/iron penstock in concrete headwall.

3.7.4. Gauge boards

The principal gauge boards within the West Sedgemoor and Wick Moor area are summarised in Table 5. All gauge boards are metric and are levelled to metres above Ordnance Datum Newlyn (ODN) relative to local Ordnance Survey benchmarks. Known differences between gauge board reading and ODN are detailed in Table 5.

Table 5: Gauge boards operated in West Sedgemoor and Wick Moor

Location of gauge board	Grid reference	Notes	Operator	Reading on board (m)	ODN (m)	Difference in height[1]
West Sedgemoor Pumping Station	ST 3759 2862 ST 3757 2857	Main River Main Drain	EA EA	5.995	6.000	- 5 mm
Black Smock Sluice	ST 3780 2810	Main River	EA	5.944	6.000	- 56 mm
Ridley Road	ST 3819 2703	Main River	EA	5.958	6.000	- 42 mm
Fosse Bridge (Helland Road)	SR 3329 2469	Off Main River	EA	5.895	6.000	- 115 mm
Oath Hill Sluice (Owl Street) U/S	ST 3870 2680	Main River	EA	No data	No data	No data
Oath Hill Sluice (Owl Street) D/S	ST 3870 2680	Main River	EA	No data	No data	No data
Lake House	ST 4000 2720	Off Main River	EA	No data	No data	No data

Notes: **[1]** Gauge boards with negative values read high relative to ODN.

3.7.5. Water level telemetry

The Environment Agency has installed telemetry where there is an operational need to be kept informed of current water levels, and to alert staff to changes in water levels which are communicated as alarms.

The telemetry site at the West Sedgemoor Pumping Station monitors water levels remotely in both the Main Drain and the River Parrett. The Pumping Station has agreed summer and winter level ranges, and a series of alarms alert staff when water levels go outside of the predetermined range. Alarms have also been created for weed screens, pump failure, mains failure and telemetry failure. Alarms are received 24 hours a day, seven days a week by a National Incident Communication Service. The alarms are then passed on immediately to the most appropriate duty officer in the local area.

Proposed changes to the operation of the West Sedgemoor Pumping Station and alarm settings are set out in Section 9.

3.8. Abstraction and other hydrological management issues

There are no known significant, ongoing water resource issues which directly influence, or are influenced by, water level management within this catchment.

The Water Act (2003) has introduced a new statutory framework for managing water resources. Under the Act the abstraction of up to and including 20 cubic metres per day (approximately 4,400 gallons per day) from surface water or groundwater does not require a licence from the Environment Agency regardless of the purpose for which the abstracted water will be used.

Abstractions above 20 cubic metres per day require a licence, issued by the Environment Agency. The Water Act (2003) also removes a range of exempt activities that currently do not require an abstraction or transfer licence. However, this section of the legislation has not yet been enacted (see the EA website for further information on licensing requirements under the Water Act (2003)).

The Environment Agency will consult the Parrett IDB and Natural England regarding its consideration of applications for an abstraction licence.

There are two abstraction licences within the Plan area and one outside on higher ground which may affect the Plan area. These are summarised in Table 6.

Table 6: Abstraction licences in or near West Sedgemoor and Wick Moor

Licence No	Point Name	Description	Max Daily Vol. (m^3)	Max Annual Vol. (m^3)
16/52/004/S/038	Feeder ditch adjacent to Swell Drove (ST 354 247)	Remedial river / wetland support	4147	100000
16/52/003/G/174	Borehole (ST 412 267)	General farming and domestic	32	11500
16/52/001/G/028	Well at Fivehead (ST 348 233)	Spray irrigation - storage	4.5	114

3.9. Water quality

There have been 20 years of steady water quality improvements across the Somerset Levels and Moors catchments; however, phosphate levels remain a concern. There are some local water quality issues in the Plan area related to diffuse and point sources of pollution. Diffuse pollution is primarily caused by high phosphate levels from nutrient enrichment (fertilisers) and private septic tank overflows. Point sources of pollution mainly occur at sewage treatment works.

The Environment Agency and Natural England are currently developing 'Diffuse Water Pollution from Agriculture' plans that aim to reduce nutrient enrichment of watercourses and promote good agricultural practice through the Catchment Sensitive Farming Programme. The Environment Agency has also undertaken nutrient modelling to identify the relative importance of diffuse and point sources to nutrient enrichment in the catchment and is working with the water companies to reduce nutrient discharges from sewage treatment works.

Weed-cutting activities can also cause significant drops in dissolved oxygen (DO) levels on most watercourses. The Environment Agency's Operations Delivery team take DO readings before and during weed cutting to ensure water quality does not deteriorate rapidly. If DO levels drop below 20%, all operations stop immediately, including the operation of Pumping Stations, especially in summer. This practice helps to prevent fish kill and unnecessary damage to the aquatic environment.

It is illegal to discharge raw sewage or trade effluent directly into any controlled watercourse. Controlled discharge of treated effluent requires consent to discharge, which must be obtained from the Environment Agency. The Environment Agency should be informed of any water pollution problems, particularly septic tank discharges, to allow investigation and improvement. In the event of a pollution incident being noted, assistance should be sought immediately from the Environment Agency's incident pollution hotline on 0800 80 70 60.

4. Agriculture and other land uses

4.1. Agriculture

Agriculture is the important land use within the Plan area. Most of the land is divided into small fields which are separated mostly by watercourses or a combination of hedge and watercourse. The watercourses are used to provide drinking water for livestock and as wet fences. The Parrett IDB recognises the importance of agriculture within the Plan area and the key role that the effective management of water has to play in enabling this land use to prosper within the area. The Board also recognises that additional investment in the water management system will be required in the years to come in order to achieve the combined objectives of conservation and farming in the Plan area.

Livestock farming is the primary land use, with improved, semi-improved and unimproved grassland used for grazing and for winter fodder covering about 80% of the farmed area. Withies (willows) are grown on West Sedgemoor and on Wick Moor for making baskets, hurdles and furniture. The withy beds are harvested after leaf-fall in the late autumn or winter, and vehicular access to the beds is important for harvesting the crop at this time of year.

Food security, and the growing demand for quality food to supply the increasing population of the UK and elsewhere, is likely to stimulate additional investment in agriculture in the coming years. However, the Parrett IDB acknowledges that there is little opportunity to increase agricultural productivity within West Sedgemoor SSSI because of its importance for nature conservation, the risk of flooding and the vulnerability of peat soils.

4.2. Built development, services and transport

A number of domestic and commercial properties in the Plan area depend, either directly or indirectly, on the effective flood protection and water level management. Low lying properties and minor roads (which provide essential transport links) would suffer from flooding or waterlogging without the appropriate maintenance of flood defences, Main Rivers and IDB Viewed Rhynes.

The provision of adequate land for housing and employment is a national priority and Local Planning Authorities are charged with ensuring that sufficient land is made available though the new Local Development Frameworks. However, the low lying nature of the Plan area, and its known risk of flooding, means that it is vulnerable to the adverse effects of development.

The Local Authorities consult the Environment Agency and the Parrett IDB on strategic plans, such as the new Local Development Frameworks, and on individual applications of significance. Planning Policy Statement 25 (PPS25, December 2006) sets out Government policy on development and flood risk. It aims to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk.

In the exceptional cases where new development is necessary in areas of flood risk, the policy aims to make it safe, without increasing flood risk elsewhere. Where possible, developers are encouraged to work with the Planning Authority and the Drainage Authorities to use opportunities for new development to reduce flood risk overall.

4.3. Recreation

The Environment Agency has a role to create a quality of environment that people will be able to enjoy as well as a statutory duty to consider recreation on or near water. The vision is to conserve and improve the quality of the river environment whilst balancing recreational interests on the water (e.g. canoeists, rowers, anglers and boaters) and on banksides (e.g. cyclists, horse-riders, walkers and bird watchers).

The River Parrett Trail is a nationally recognised walk and draws a number of tourists to the area. This is expected to grow as demand for bankside, and on the water, recreation increases nationally each year.

4.4. Fisheries

The Environment Agency has a duty to maintain freshwater and Eel fisheries, both of which play an important role in the wildlife interest of the Plan area. The fisheries are a major part of the wildlife interest especially Eels which are widely distributed and are the favourite food of Otters and a staple food of fish-eating birds. Planned works to improve water level management will have to consider fisheries improvements and any new structures should allow for the free movement of Eels and Elvers. The Environment Agency's fisheries officers can provide advice to ensure that fisheries are safeguarded and that the Environment Agency's duty to fisheries is not prejudiced.

Some of the watercourses in the catchment area are de-silted and weed-cut for flood risk management purposes. As these practices can disturb spawning fish, remove spawn or reduce cover for fry, the method and timing of weed cutting and de-silting must be carefully considered to avoid these impacts. In some watercourses, excessive build up of duckweed at penned structures can be a problem in summer that can result in de-oxygenation. Removal of this duckweed is difficult and is only effectively controlled by floating booms across the watercourse, which can help prevent complete coverage of the water surface.

5. Nature conservation and archaeology

5.1. Nature conservation interests

The Plan area contains:

a) An essential part of the largest area of lowland wet grassland remaining in England (the Somerset Levels and Moors), supporting an important assemblage of breeding waders and wetland birds, notably Snipe, Curlew, Redshank, Lapwing and Yellow Wagtail.

b) Part of a large wetland of international importance for its overwintering and migratory populations of waterfowl, and in particular Golden Plover, Teal, Wigeon, Shoveler and Lapwing.

c) Part of a large wetland of international importance for its outstanding assemblage of rare invertebrates, particularly water beetles.

d) Part of a wetland of national importance for:

- Botanically rich, unimproved wet meadows and mires;
- Ditch flora, including species which are nationally scarce, and relict fen species on ditch banks;
- Ditch fauna, including species which are nationally rare or scarce;
- Meadow fauna, including species which are nationally rare or scarce;
- Breeding wetland birds, such as Sedge and Reed Warblers, ducks and rails/crakes.

The Plan area includes:

a) West Sedgemoor Site of Special Scientific Interest (1016 hectares / 2511 acres) designated in 1983 under the Wildlife and Countryside Act 1981;

b) West Sedgemoor SSSI is part of the Somerset Levels and Moors Special Protection Area which was designated under the European Community's Directive on the Conservation of Wild Birds in June 1997;

c) West Sedgemoor SSSI is also part of the Somerset Levels and Moors Ramsar Wetland of International Importance, which was designated under the terms of the Ramsar Convention in June 1997;

d) West Sedgemoor includes a substantial nature reserve owned and managed by the RSPB (about 530 hectares, 1300 acres).

The locations of the nature conservation sites are shown on Map 5.

Box 2: Favourable condition for wetland SSSIs in Somerset

An SSSI is considered to be in favourable condition when the special habitats and features of an SSSI are in a healthy state and are being conserved for the future by appropriate management. The Government's Public Service Agreement with DEFRA requires that 95% of all nationally important wildlife sites (SSSIs) are in a favourable (or unfavourable recovering) condition by the end of 2010.

Water management requirements for wetland SSSIs in Somerset

The following information summarises Natural England's advice to the Parrett IDB on the water management requirements needed for wetland SSSIs in Somerset to achieve favourable condition.

For ditch and grassland interests in winter:

- At least 30cm of water in the bottom of rhynes and ditches except in those around the margins of the SSSI where the ground levels are slightly higher.
- Summer water level at not more than 30cm below mean field level from 1 April to 30 November.

For wintering birds:

In early winter (from mid November):

- Gradual rising water levels to create extensive pools providing surface water covering 20 to 50% of the majority of fields with the lowest lying fields being close to 50%.

In mid winter (1 December to 28 February):

- Extensive areas of splashy conditions and shallow pools up to 25cm deep covering at least 50% of the majority of the fields;
- Deeper water roosts of at least 60ha, with water 25 to 75cm deep.

In late winter and early spring (to end of March):

- Gradual lowering of mid winter levels with some splashy conditions and shallow pools remaining through late February and into March in the lowest fields.

For breeding waders in spring (ideally blocks 50ha or more in size):

In early spring (1 March to 30 April):

- Extensive pools providing surface water covering up to 25% of the majority of fields with the lowest lying fields being close to 25%.
- On higher fields and species-rich fields, limited surface water covering less than 10% of the field.

In mid spring (May):

- Some pools in the lower lying fields covering up to 15% of surface area with soft ground and damp soils elsewhere;
- Low intensity grazing from mid-May in those fields not being laid up for hay.

In late spring (June):

- A few surface pools present in the lowest lying fields towards the end of this period and into July.

5.1.1. West Sedgemoor's importance for water birds

West Sedgemoor SSSI is of international conservation importance for its assemblage of wintering wetland birds. This is recognised in its designation as part of the Somerset Levels & Moors Special Protection Area and Ramsar site ('the European Site'). West Sedgemoor regularly supports over 60 000 wintering wetland birds, c.75% of the SPA total assemblage.

West Sedgemoor SSSI is also internationally important for several wintering species. It regularly supports over half the SPA's internationally important wintering populations of Wigeon, Teal, Shoveler and Lapwing and over half the nationally important wintering population of Pintail and Golden Plover. West Sedgemoor also regularly supports over 60% of the SPA's wintering Snipe population.

West Sedgemoor SSSI supports an outstanding population of breeding waders. It is the most important site on the Somerset Levels, with an assemblage of approximately 110 pairs, c.51% of the total Somerset Levels population. It is the most important site on the Somerset Levels for breeding Snipe and Curlew, supporting over 60% of the total population of each (c.60 pairs and c.25 pairs respectively).

West Sedgemoor SSSI is, therefore, of critical importance to the SPA and Ramsar site and to the Somerset Levels & Moors breeding wader assemblage. Appropriate water level management, particularly in the winter and spring, is essential to the maintenance and enhancement of this interest.

The Raised Water Level Areas (RWLAs) have become critically important for maintaining this interest and the integrity of the Somerset Levels & Moors Special Protection Area (SPA) and Ramsar site.

5.1.2. The importance of Raised Water Level Areas

Raised Water Level Areas on West Sedgemoor are critically important for wintering wetland birds. The Hambridge and Hatch blocks (collectively known as the Southside roost) regularly support 90-100% of Wigeon, Teal, Shoveler and Pintail within the SSSI. The populations of Wigeon, Teal and Shoveler using the Southside roost are internationally important in their own right, and the number of Pintail is nationally important.

The RWLAs support 90-95% of the SSSI's breeding Snipe, and all the breeding Lapwing and Redshank. In addition, the RWLAs support the vast majority of the SSSI's breeding Yellow Wagtails and all ducks and rail species that form part of the SSSI assemblage.

The West Sedgemoor RWLAs are of critical importance for the SPA and Ramsar site and the SSSI. The future security of the current water level management regime of the RWLAs is therefore of critical importance to the integrity of the European Site.

5.2. Biodiversity Action Plans

The floodplain grazing marsh found within the West Sedgemoor and Wick Moor area are considered to be a habitat of primary importance in the UK Biodiversity Action Plan (1996). Furthermore, the 46 km of Main Rivers and Viewed Rhynes in the Plan area, and the associated network of ditches and ponds, are a rich source of biodiversity interest, supporting good populations of Water Vole and are regularly used by Otters.

The Parrett IDB and the Environment Agency acknowledge that they have a duty to further the conservation and enhancement of biodiversity, as public bodies under the Land Drainage Act 1991 and the Natural Environment and Rural Communities Act 2006. The Implementation Plan

of the DEFRA Internal Drainage Board Review commits every IDB to producing its own Biodiversity Action Plan (BAP) by April 2010. Guidance has been produced by the Association of Drainage Authorities, DEFRA and Natural England to assist the Parrett IDB meet this commitment.

Through their water level management activities, the Parrett IDB and the Environment Agency already achieve much for conservation and biodiversity. By introducing Biodiversity Action Plans for all IDBs, it is hoped that the conservation and enhancement of biodiversity, particularly outside the boundaries of Sites of Special Scientific Interest (SSSI), can be better integrated into IDB planning and work programmes. In addition, Biodiversity Action Plans will provide IDBs with a formal mechanism to better demonstrate and record the contribution to biodiversity that they already make.

By setting objectives and targets to conserve and enhance wetland species and habitats, IDB Biodiversity Action Plans will help to link the ongoing conservation work of IDBs to the national and local BAP targets and actions. It will also facilitate the recording of BAP habitat gain to be set against the DEFRA flood risk management Outcome Measures target for UK Biodiversity Action Plan habitat creation. The Parrett IDB proposes to complete the BAP for its area by April 2010.

5.3. Conservation management

The current practices adopted by the Parrett IDB and the Environment Agency for the maintenance of watercourses help to maintain the conservation and biodiversity interest of these wetland habitats in balance with the need for effective drainage and irrigation throughout the Plan area.

The Environment Agency follows strict local guidelines for weed cutting and general vegetation management that have been developed through best practice and with the expertise of specialist teams. The Environment Agency is currently developing national guidelines.

Financial support for the conservation management of land is available from Natural England who administers the Environmental Stewardship scheme on behalf of DEFRA.

5.4. Archaeology

The wetlands of the Somerset Levels and Moors contain a wealth of archaeological information often hidden under layers of peat and clay that have built up over many millennia. This has had three significant effects:

a) Organic remains such as wood and leather are preserved because the waterlogging excluded oxygen and prevented the normal types of decay which destroy these materials on normal archaeological sites;

b) The waterlogged conditions also preserve pollen grains, plant material, insects, snails and even macroscopic plant and animal remains. These constitute a unique record of the past natural and man-made environment stretching back over the last 6,000 years. They can also provide information concerning human activity on the neighbouring dry land, and past changes in climate and sea levels;

c) The normal methods of archaeological detection do not work well in wetland areas where sites can be deeply buried. The number of known archaeological sites is therefore only a small fraction of the existing total. It is extremely likely that all the river valley wetlands in Somerset contain a wealth of important archaeological sites. In addition there are several types of sites such as fisheries, medieval flood defences and small river ports of which we know very little, but may exist in considerable numbers.

The organic archaeological remains from the Somerset Levels and Moors depend for their continued survival on an anaerobic waterlogged burial environment. If the surrounding peat or clay dries out the organic material will shrink considerably and crack apart. The presence of oxygen will also allow bacterial and fungal decay to resume and eventually completely destroy the artifacts.

The peat itself, and the precious information contained within it, are also adversely affected by desiccation. Where field water tables are below ground level for long periods of time, the shrinkage and chemical breakdown of peat soils can be significant, and can gradually destroy all the archaeological information contained within them. In this regard the summer is the crucial period, as that is when in field water tables are generally at their lowest and therefore peat wastage highest.

All the known archaeology in the area is contained in the County Sites and Monuments Record (SMR) which is kept in map form and on computer at County Hall, Taunton. This represents information collected from aerial photographs, excavations, chance finds, observations of drainage ditches and other sources. However in the Somerset Levels and Moors the deep deposits of clay and peat that have built up over thousands of years mean that much of the local archaeology in the area remains hidden from the normal forms of archaeological detection. Therefore the known archaeology recorded on the SMR represents only a fraction of the total archaeological resource that lies below the surface.

West Sedgemoor has largely escaped peat cutting and ploughing, so very little is known about the archaeology that survives on the moor. This should not be taken to mean that there is little archaeological interest in the area. Rather it is due to the fact that archaeology is essentially "threat led", and on West Sedgemoor there has been little visible surface threat to the archaeology.

The main archaeological potential on West Sedgemoor can be summarised as follows:

a) The Area of High Archaeological Potential at the north east end of the Moor, which is likely to contain historic prehistoric trackways running between the "dry lands" at Oath and Stathe;

b) Other prehistoric communication features running from the uplands to the "island" in the peat at the south end of the moor;

c) Wetland settlement sites, log boats, bog oaks, fish traps and chance finds. The location of these is impossible to predict at this time;

d) The peat over the entire moor: The very deep peat on West Sedgemoor contains pollen, and the remains of plants, beetles, snails and insects, which together form a vital record of the past environment over many thousands of years, not just about the moor itself, but also informing us about activity on the dry land, and changes in climatic conditions and sea levels. Such information is vital to our understanding of past human activity in the area.

A water management system beneficial to the preservation of wetland archaeological is a key objective of the WLMP. The locations of the archaeological sites in the Plan area are shown on Map 6.

6. Constraints and impacts on adjacent ground

6.1. Works adjacent to Main River

Any work proposed in, over, under or adjacent to Main River requires Flood Defence Consent (FDC) from the Environment Agency. Land Drainage Byelaws require third parties to apply for consent for any alterations or new works within an eight metre strip on either side of the Main Rivers. Where consent is applied for on land which forms part of an SSSI or other designated sites, the applicant is obliged to consult Natural England, and the Environment Agency will only consider giving consent on the basis that there is no objection to the proposal from Natural England.

This condition will also apply to proposals that lie outside the boundary of an SSSI or designated site but which may impact on them.

6.2. Works adjacent to IDB rhynes

Under the Land Drainage Act 1991, the Parrett IDB has administrative responsibility for all the Viewed Rhynes and ordinary watercourses within the Plan area for the purposes of consenting activities as set out in the Board's Byelaws. The Drainage Board exercises this administrative control using a series of policy documents adopted by the Board for this purpose.

The Parrett IDB Byelaws require third parties to apply for consent for any alterations or new works within a nine metre strip on either side of a Viewed Rhyne. Where consent is applied for on land within an SSSI, the Drainage Board consults Natural England before arriving at its decision. The form of consent given by the Board states that such consent does not override the necessity of obtaining other statutory consents (including that of Natural England).

7. Current water management practices

7.1. Current water level management regime

In general, water levels are maintained at a relatively high level during the summer months to provide wet fences and, to a certain extent, to keep water tables high to promote the growth of grass and other crops. During the winter periods, water levels are lower in order to accommodate increased rainfall and runoff, and to reduce the risk or severity of flooding.

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 Parrett 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 Drainage Board will seek the views of Natural England on this proposal.

7.1.1. Contingency measures for drought

During a drought situation the Environment Agency will encourage the public and industry to practice water efficiency and conserve water, whilst all abstraction licence holders will be encouraged to minimise water abstraction. There will be close liaison with between the Environment Agency and IDBs to conserve what water is available and to ensure its fair distribution between all occupiers so far as possible.

Drought permits or orders may be issued if there is an exceptional shortage of rain, and a serious deficiency in the supply of water, or a deficiency in flows or low water levels that threatens flora or fauna. Drought permits are applied for by the Water Companies and issued by the Environment Agency to enable companies to take water from new sources or to alter restrictions on existing abstractions. Drought orders, issued by the Secretary of State, go further and restrict the non-essential use of water.

Close liaison will be maintained between the Parrett Drainage Board and the Environment Agency to conserve what water is available and to ensure its fair distribution between all occupiers so far as possible.

7.1.2. Arterial system

The current water management at key control structures is shown in Table 7. The Parrett IDB will consult Natural England if they are considering changing the water levels at a structure so that it falls outside the range given in the Plan.

Target water levels have been adjusted for gauge board errors and related to metres above Ordnance Datum Newlyn (ODN).

Table 7: Current water levels in West Sedgemoor and Wick Moor

Water level control structures	Grid Ref.	Operated by	Summer level (m ODN)	Winter level (m ODN)	Flood operation
West Sedgemoor Pumping Station – small duty pump – large pumps (No. 2)	ST 3757 2857	EA	4.65	4.20	Pumping when conditions allow
Oath Farm Inlet / Oath Hill Footbridge Inlet	ST 3858 2765	EA	Open	Closed	Closed
Twenty Acre Inlet	ST 4044 2774	EA	Open	Closed	Closed
Stuckey's Clyse (Langport Lock)	ST 4156 2684	IDB	Open	Closed	Closed
Black Smock Sluice	ST 3780 2810	EA	4.80	Not penned ~4.20	Not penned
Oath Hill Sluice (Owl Street)	ST 3870 2680	EA	5.30	Not penned ~4.70	Not penned
Helland Penning Bay	ST 3334 2451	IDB	~4.95	Not penned ~4.50	Not penned
North Drove Rhyne Penning Bay	ST 3776 2835	IDB	~4.70[1]	Not penned ~4.20	Not operated
Back Ditch Penning Bay	ST 3760 2856	IDB	~4.70[1]	Not penned ~4.20	Not operated
Back Ditch Structure A	ST 3686 2764	IDB	Infrequently operated (~4.70)[2]	Not penned ~4.20	Not operated
Back Ditch Structure B	ST 3643 2728	IDB	Infrequently operated (~4.70)[2]	Not penned ~4.20	Not operated
Back Ditch Structure C	ST 3591 2681	IDB	Infrequently operated (~4.70)[2]	Not penned ~4.20	Not operated
Lake House Penning Bay	ST 4002 2720	IDB	~5.50	Not penned ~4.90	Not penned

Notes: **Summer season:** Aim to achieve summer pen levels from 1 April.

Winter season: Aim to achieve winter pen levels by 1 December.

[1] Ineffective – summer level usually determined by Pumping Station.

[2] Ineffective and therefore infrequently operated – summer level determined by Pumping Station.

7.1.3. Raised Water Level Areas

There are currently 552 ha (1364 acres) of Raised Water Level Areas on West Sedgemoor in which ditch water levels are kept seasonally higher by means of privately owned and operated water management schemes. Details of these areas are set out in Tables 8 and 9 and are shown on Map 4.

The RSPB operates a pump irrigation scheme to supply water to blocks between Swell and Hambridge Drove areas. The pump is used to maintain higher levels in April, May and June for breeding waders and botanical communities and to help establish higher water levels in the Southside RWLA from the end of October.

Table 8: Current areas with seasonally higher water levels in West Sedgemoor and Wick Moor

Raised Water Area	Name of Occupier	Area in hectares	Area in acres
Various	RSPB	435	1074
Huntham	Messrs Hembrow and Gothard	86	211
Oath Farm	Mr D Perrin	24	60
Helland	Mr A Denman	7	17

Table 9: Current target water level regime in existing RWLA blocks

Hydrological block	Mar 15th	April 1st	May 1st	June 1st	July 1st - Oct 1st	Nov 1st	Dec 1st - Mar 1st
11	4.95	4.95	4.90	4.85	Summer pen	Summer pen	4.95
12	4.85	4.85	4.85	4.70	Summer pen	Summer pen	4.85
14	4.90	4.90	4.90	4.85	Summer pen	Summer pen	5.00
15 & 16	4.80	4.80	4.80	4.80	Summer pen	Summer pen	4.90
17	4.85	4.85	4.85	4.85	Summer pen	Summer pen	4.95
22 & 23	4.90	4.90	4.90	4.85	Summer pen	Summer pen	5.05
24, 25 & 26	5.05	5.05	5.00	4.95	Summer pen	Summer pen	5.15
27	4.95	4.95	4.88	4.83	Summer pen	4.85	5.00
29 & 32	4.85	4.80	4.80	4.78	Summer pen	4.85	5.00
30	4.90	4.90	4.90	4.80	Summer pen	Summer pen	4.90
Huntham	4.65	4.55[1]	4.45[1]	4.40[1]	4.35	4.35	4.65
Oath Farm	4.90[1]	4.85[1]	4.80[1]	4.80[1]	Summer pen	Summer pen	4.90[1]
Helland	4.95[1]	4.95[1]	4.90[1]	4.85[1]	Summer pen	Summer pen	4.95[1]

Notes: **[1]** Water level unknown (to be determined by trial).

Private pump drainage schemes are operated by landowners on a seasonal basis to lower water levels in the ditches around their fields. There are currently three areas where the water table is kept seasonally lower than the general level in the moor by isolating their watercourses from the Drainage Board's drainage system. In these areas the desired water levels are maintained by means of privately owned and operated pumps. The total area in such schemes is 32 hectares (78 acres). Details of these areas are given in Table 10.

Table 10: Current areas with seasonally lower water levels in West Sedgemoor and Wick Moor

Lower Water Area	Name of Occupier	Area in hectares	Area in acres
7	Mr H M Patten	11	27
2B	Mr G A Venn	19	47
2C	Mr N R H Parker	2	4

7.2. Current flood management regime

The Environment Agency has permissive powers to carry out works to reduce flood risk on Main Rivers. Within the Plan area the primary defences are raised earth embankments on the left bank of the River Parrett. There are sections of "harder" engineering embankments, which take the form of steel piles or masonry walls where space is at a premium. These defences are inspected regularly to ensure they provide the flood risk management benefit that they were designed for. The Environment Agency also undertakes regular maintenance i.e. weed cutting, tree pruning and removal. Emergency repair and maintenance works are also carried out when necessary. Environment Agency staff are deployed to actively monitor high tides on the tidal section of the Parrett up to Oath Lock Sluice.

The Environment Agency regularly inspects and operates the main inlet structures into the Plan area. These are closed when water levels in the River Parrett rise in order to minimise risk of flooding from the river. During flooding conditions in the moor, the Pumping Station is operated by the Environment Agency to drain the moor until high river levels stop effective evacuation of water. At this point, the pumps are manually switched off, and operatives monitor the situation until they can resume pumping. Power to site can be isolated to prevent devices shorting out and risk to the network.

The Environment Agency also commissions studies regarding flood risk management within the Plan area and is currently developing the Parrett Catchment Flood Management Plan, and associated Flood Management Strategies, which will look at flood defence, land management and climate change impacts on the catchment over the next 100 years.

7.2.1. Contingency measures for flooding

The Environment Agency will carry out active monitoring of raised flood banks during high flows, and ensure that outfall structures are kept clear of debris to allow evacuation of flood water as safe working conditions allow. The Environment Agency will also carry out emergency works as required to protect people and property.

The Environment Agency and the Parrett Drainage Board are currently discussing the benefits of pre-emptive lowering of Main Rivers. In the event of extreme weather conditions, especially in summer, it has been suggested that early action at certain control structures may reduce the severity of damage caused by overland flooding at critical times of the year. This joint work is currently in the early stages of investigation.

The Parrett IDB will ensure that all weed-screens on Viewed Rhynes are cleared on an 'as required basis' and that watercourses are running freely to assist the evacuation of flood water as soon as is reasonably possible.

Box 3: Flood Zones

The Flood Map shows areas across England and Wales that could be affected by flooding from rivers and/or the sea. It has been produced by the Environment Agency to raise awareness among the public, local authorities and other organisations of the likelihood of flooding and to encourage people living and working in areas prone to flooding to find out more and take appropriate action. The Flood Zones in the Plan area are shown in Map 8.

Flood Zones are also known as floodplains which could be affected by flooding from rivers and the sea. There are three zones which are defined in the Government's planning policy for England. They ignore the presence of existing flood defences as these can be overtopped and even fail in an extreme event.

Zone 1 - is shaded white and shows areas with the lowest probability of flooding from rivers or the sea and where the chance of flooding in any one year is less than 0.1% (i.e. less than a 1 in 1000 chance).

Zone 2 - is shaded turquoise and shows areas where the chance of flooding in any one year is between 0.1% and 1% for flooding from rivers (i.e. a 1 in 1000 to a 1 in 100 chance), or 0.5% for flooding from the sea (i.e. 1 in 200 chance). The outer edge of this zone is referred to as the 'Extreme Flood Outline' (EFO).

Zone 3 - is shaded blue and shows areas with the highest probability of flooding where the chance of flooding in any one year is greater than 1% for flooding from rivers (i.e. a 1 in 100 chance), or 0.5% flooding from the sea (i.e. a 1 in 200 chance).

It is important to understand that a 1 in 100 chance of flooding in any one year does not mean that level of flood will happen once every 100 years, nor does it mean that if the flood hasn't happened for the last 99 years, it will happen this year. In fact, a flood of this magnitude may occur more than once in a year.

7.3. Current watercourse maintenance regimes

7.3.1. Environment Agency maintenance practices

The Environment Agency assesses all maintenance works on the basis of flood risk to people and property, and whether the management system is rated as high, medium or low risk. As a result, annual maintenance is targeted towards high risk systems.

The Environment Agency operates a flexible, annual weed cutting programme during the summer months. The Main Rivers are inspected prior to starting, and the programme can be changed to accommodate urgent cuts or abnormal weather and vegetation conditions. It is normal practice to provide good access for weed-cutting machinery, which consists of culverting side ditches and providing gates and side fencing so that travel across field boundaries is unrestricted.

As a riparian owner, the Environment Agency maintains its own access at West Sedgemoor Main Drain and Wickmoor Rhyne, which includes access gates, culverts and a small amount of associated side fencing. There are several bridges crossing the West Sedgemoor Main Drain, including Pincombe Bridge, Meads Bridge, Shires Bridge and Sedgemoor Old Rhyne Accommodation Bridge. Eastern Drove Bridge crosses Wickmoor Rhyne, and the Environment Agency has some responsibility for their maintenance.

The tidal River Parrett lies adjacent to the western boundary of the Plan area and receives water from the West Sedgemoor Pumping Station. The Parrett carries a heavy load of estuarine silt on

each tide and the merits and cost effectiveness of de-silting the tidal Parrett has been debated by drainage engineers for many years. Various studies and investigations are being carried out by the Environment Agency on Main Rivers at present to look in to siltation and channel conveyance. When these studies are complete, and monitoring has been carried out, the current approach to intermittent maintenance will be reviewed by the Environment Agency and the Drainage Board.

The left and right banks of the River Parrett are flailed annually where no regular grazing takes place. This is done to control weed growth and reduce the risk of animal infestation which could destabilise the banks. The Environment Agency does not typically use herbicides in the Plan area.

Trees, branches and bushes within the channel area are trimmed, coppiced or pollarded to allow maximum flow whilst retaining as much shade as possible to reduce weed growth. Tree removal will take place in exceptional circumstances where blockage of the channel has occurred or is likely to occur. The Environment Agency expects riparian landowners to maintain trees and vegetation that could cause flood risk. Where necessary, the Environment Agency will serve notice on landowners to ensure works are completed as requested. Where the Environment Agency owns land, it will carry out any required tree maintenance.

Intermittent maintenance is not normally carried out by the Environment Agency without prior consultation with the Parrett IDB and with Natural England. The Environment Agency will inform Natural England of any repairs or maintenance affecting designated sites required during emergency situations as soon as is practically possible.

7.3.2. Parrett IDB maintenance practices

The Parrett IDB maintains the majority of Viewed Rhynes in the West Sedgemoor area once a year in late summer. A few minor rhynes are weedcut on an ‘as necessary’ basis, the situation being re-assessed each year. Viewed Rhynes are occasionally de-silted to prevent their condition from deteriorating and to sustain the required water depth and flow. Aquatic herbicides are not routinely used by the IDB, but may be used to control invasive plants. The use of aquatic herbicide in any watercourse requires consent from the Environment Agency and from Natural England when used within the SSSI.

The maintenance of watercourses adjoining Viewed Rhynes is the responsibility of the riparian occupiers. The Board has powers under its Byelaws to require occupiers to fulfil their obligations in this respect where they fail to do so.

Water control structures are inspected by the Parrett IDB on a regular basis and repaired as necessary. The Board does not accept any liability for the maintenance of bridges and culverts over Viewed Rhynes, however it is prepared to consider making an *ex gratia* contribution of a share of the cost of such maintenance, approximately in proportion to its usage by the IDB. The Parrett IDB does not accept any liability for the maintenance of droves, and only carries out such maintenance, or contributes to the cost of maintenance, where droves are essential to the Board for gaining access to a channel, or where damage has been caused by works carried out on behalf of the IDB.

The two of the three inlets for West Sedgemoor open directly into sections of Viewed Rhynes which then flow into the Wickmoor Rhyne (Main River). These sections are not cut by the Parrett IDB in summer, and so do not carry optimum flows into the Moor when the inlets are opened. The Environment Agency has recommended that the IDB cuts weed growth around Twenty Acre Inlet, Wickmoor Rhyne and Oath Hill Footbridge – Wickmoor Rhyne, in conjunction with the Environment Agency’s maintenance programme, to ensure continuity of fluvial flow.

8. Objectives for water level management in the future

The Water Level Management Plan is based on the following objectives which have been adopted by the signatories to the Plan. The signatories acknowledge that not all the objectives can be achieved on each and every occasion or location.

Objective 1 – Balance of interests
Firstly, ensure that all legal obligations and responsibilities are met, and secondly to balance different interests by managing water in a way that reflects the local hydrology and topography of the area and which best serves the owners and farmers of the majority of the land within each sub-catchment.

Objective 2 – Agriculture
Maintain seasonal water levels that provide wet fences, stock watering and drainage appropriate for the principal land management and farming practices in each sub-catchment.

Objective 3 – Biodiversity
Maintain and enhance, when suitable opportunities arise, wet grassland, wetland and freshwater aquatic habitats and species throughout the Plan area, with particular attention being given to those protected by law or designated in some way.

Objective 4 – Favourable condition of SSSIs
Implement a programme of improvement works to ensure that the management of water that affects the SSSI in the Plan area helps to secure, or makes significant progress towards achieving, this SSSI being in favourable condition by December 2010.

Objective 5 – Organic soils and archaeology
Maintain a stable, year round water table that avoids desiccation and oxidation of the organic soils.

Objective 6 – Settlements and highways
Ensure the proposed changes in water management do not increase the flood risk to settlements, property, highways or rights of way.

Objective 8 – Watercourse maintenance operations
Maintain the watercourses in the Plan area on rotation and in a sympathetic manner, so as to maintain an adequate flow of water around the sub-catchments, and to enhance the diversity of ditch habitats and their associated flora and fauna.

Objective 9 – Water quality
Sustain the ditch flora and fauna in the Plan area through the provision of an adequate supply of water of high quality (defined as having water in a ditch at a given season of sufficient chemical quality and volume to sustain the full diversity, abundance and distribution of all aquatic plants and animals recorded in the area).

Objective 10 – Flood management
Avoid prolonged and deep flooding where this is damaging to the biodiversity and agricultural interests of the Plan area.

Objective 11 – Drought management
Avoid prolonged drought where this is damaging to the soils, biodiversity, archaeology and agricultural interests of the Plan area.

8.1. West Sedgemoor Water Level Management Plan Review 2007

The Parrett IDB carried out a review of water level management on West Sedgemoor in 2007 that identified a range of land and water management issues affecting the condition of the West Sedgemoor SSSI. The review recommended that the IDB develop and maintain a more functional and flexible water management system for West Sedgemoor that meets the requirements of farming and conservation, without increasing flood risk to local houses and roads. These principles have been incorporated into the new WLMP for West Sedgemoor.

8.1.1. Issues identified by West Sedgemoor WLMP Review

Farming Practices

- How to involve the farming ratepayers in the decision making process, both collectively and individually;
- How areas can be irrigated in summer to maintain wet fencing and good water quality in ditches;
- Water level management practices that provide suitable ditch water levels for appropriate farming operations in summer (the location, function and operation of control structures);
- Watercourse maintenance practices that help sustain the condition and water level management function of IDB viewed rhyne system;
- How appropriate access to the moors can be maintained;
- Suitability and availability of funding for land management through Environmental Stewardship.

Wintering Birds: Extent of surface water for wildfowl and waders in winter

- Location of the areas to be kept wet with surface water each winter and how these fit with the local topography and hydrology of the area;
- How these wetter areas can be irrigated to achieve the desired area and depth of surface water during the winter months;
- Implications for the management of flood risk as a result of more water being kept on the SSSI during the winter months;
- Implications of the proposed changes on the maintenance programme for rhynes and ditches.

The Drainage Board recognised that the areas covered by the SSSI designation must remain available for floodwater storage during natural events and that this role in flood management should not compromise the achievement of favourable condition.

Ditch Habitats: Water management for aquatic flora and fauna

- Water level management practices that maintain ditch water levels in summer and winter, and promote good water quality (the location, function and operation of control structures);
- Watercourse maintenance practices that help safeguard the aquatic flora and fauna and protect banks from erosion;
- Control of alien invasive plants.

Breeding Birds: Water management for breeding waders in spring

- Location of the areas to be kept wet during the spring and early summer (from mid-March to mid-June), and how these fit with the local topography and hydrology of the area;
- How these damp or wet areas can be irrigated to achieve the desired amount of soil moisture and extent of surface water during the spring months.

Grassland Habitats: Water management for grassland flora and fauna, and the conservation of peat soils

- Location of the areas of vulnerable peat soils and how these fit with the local topography and hydrology of the area;
- How these areas can be irrigated in summer to achieve the desired amount of soil moisture, sustain wet grassland communities and protect peat soils from shrinkage;
- How these areas can be saturated by natural events during the winter months, for example during times of high rainfall or as a result of flooding.

9. Proposed water management practices

9.1. Proposed continuation of current good practice

Many of the current management practices carried out by the Parrett Drainage Board and by the Environment Agency are meeting the needs of both farming and conservation. These good practices will continue, as set out below.

Proposal 1: The current summer penning levels at the key control structures, as set out in Table 11, will continue to be maintained by the Parrett IDB and Environment Agency.

Reason: The current summer target water levels throughout the Plan area are considered suitable for farming and nature conservation. The current summer penning levels that will continue to be maintained by the Parrett IDB and the Environment Agency are set out in Table 11.

Table 11: Current summer water levels in West Sedgemoor and Wick Moor,

Water level control structures	Grid Ref.	Operated by	Summer water level (m ODN)
West Sedgemoor Pumping Station – small duty pump – large pumps (No. 2)	ST 3757 2857	EA	4.65
Oath Farm Inlet / Oath Hill Footbridge Inlet	ST 3858 2765	EA	Open
Twenty Acre Inlet	ST 4044 2774	EA	Open
Stuckey's Clyse (Langport Lock)	ST 4156 2684	IDB	Open
Black Smock Sluice	ST 3780 2810	EA	4.80
Oath Hill Sluice (Owl Street)	ST 3870 2680	EA	5.30
Helland Penning Bay	ST 3334 2451	IDB	~4.95[1]
North Drove Rhyne Penning Bay	ST 3776 2835	IDB	4.70
Back Ditch Penning Bay	ST 3760 2856	IDB	4.70
Back Ditch Structure A	ST 3686 2764	IDB	4.70
Back Ditch Structure B	ST 3643 2728	IDB	4.70
Back Ditch Structure C	ST 3591 2681	IDB	4.70
Lake House Penning Bay	ST 4002 2720	IDB	~5.5[1]

Notes: **Summer season:** Aim to achieve summer pen levels from 1 April.
Winter season: Aim to achieve winter pen levels by 1 December.
[1] Water level unknown (to be determined by trial).

Proposal 2: Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Parrett IDB.

Reason: The Parrett IDB will continue to maintain the existing Viewed Rhyne network, as shown on Map 2, and is of the opinion that its current maintenance procedures help to achieve favourable condition and further conservation and biodiversity in the West Sedgemoor SSSI. The Parrett IDB will complete it's review of maintenance procedures (Proposal 10) and de-silt selected Viewed Rhynes (Proposal 11).

9.2. Proposed changes to water control infrastructure

Natural England has advised the Parrett IDB that the management of water in winter and in spring in some parts of West Sedgemoor SSSI do not allow the designated site to be recorded as being in a favourable condition for wildlife. Capital improvements to water control structures are required to enable the Parrett IDB to change the management of water levels in winter and spring in order to achieve favourable condition across the SSSI, and to help maintain favourable conditions in the future.

Proposal 3: Capital improvement works will be carried out by the Parrett IDB to help achieve favourable condition on West Sedgemoor SSSI.

Reason: A number of capital improvement works are proposed by the Parrett IDB in order to help achieve the objective of favourable condition on West Sedgemoor SSSI. These proposed works are listed in Table 12.

Table 12: Proposed capital improvement works by the Parrett IDB to help achieve favourable condition on West Sedgemoor SSSI (location of structures are shown on Map 9).

IDB Action Ref.	Description of the proposed capital works to help achieve favourable conditions on West Sedgemoor SSSI	Works to be constructed
Cap 1.1	Replacement of culvert under the road at Helland.	2009
Cap 1.2	Restoration of Viewed Rhyne system, dredging and habitat creation (5989m)	2009/10
Cap 1.3	Replacement of access culverts on North Drove Rhyne. 29 No. culverts.	2009/10
Cap 1.4	Restoration of North Drove to permit access for construction works. Approximately 2 km of the 6 km Drove requires work.	2010/11
Cap 1.5	Restoration of Viewed Rhyne system, dredging and habitat creation. Southside (7825m).	2010
Cap 1.6	Replacement of access culverts on Southside Rhyne. 5 No. culverts.	2010
Cap 1.7	Restoration of Viewed Rhyne system, dredging and habitat creation. Cross Connections (4950m).	2010
Cap 1.8	Replacement of North Drove and Back Ditch penning structures with small tilting weirs and a bund.	2011
Cap 1.9	Restoration of Viewed Rhyne through Wick Moor for Summer Feed (2500m).	2011
Cap 1.10	Replacement of access culverts through Wick Moor. 5 No. culverts.	2011
Cap 1.11	Restoration of Viewed Rhyne system, dredging and habitat creation. Middle Drain (5332m).	2011
Cap 1.12	Replacement of access culverts on Wick to Curry Rivel Drove connection. 5 No. culverts.	2011
Cap 1.13	Restoration of Viewed Rhyne system, dredging and habitat creation. Sedgemoor Old Rhyne D/S Foss Bridge (3250m).	2011
Cap 1.14	Restoration of Viewed Rhyne from Oath Inlet (1325m).	2011
Cap 1.15	Replacement of access culverts on Oath Inlet. 2 No. culverts.	2011
Cap 1.16	Replacement of Helland Boards with a new Tilting Weir.	2011
Cap 1.17	Reconstruct Black Smock Sluice to new Tilting Weir.	2011
Cap 1.18	Reconstruct Oath Hill Sluice to new Tilting Weir.	2011
Cap 1.19	Restoration of Viewed Rhyne system, dredging and habitat creation. Sedgemoor Old Rhyne U/S Foss Bridge. (2162m)	2012
Cap 1.20	Restoration of Viewed Rhyne system, dredging and habitat creation. Widness Rhyne (3890m).	2012
Cap 2.1	Construction of new penning structures adjacent to Middle Drain to control summer feed to Northside. 5 No. penstocks.	2011
Cap 2.2	Construction of new penning structure to hold summer feed to Northside. 1 No. Tilting Weir.	2011
Cap 2.3	Construction of new penning structures adjacent to North Drove Rhyne to control levels in Northside blocks. 5 No. Tilting Weirs.	2011
Cap 2.4	Restoration of Viewed Rhyne system, dredging and habitat creation. Cross Connections, Southside to Middle Drain (1600m).	2012
Cap 2.5	Replacement of access culverts on Cross Connections. 2 No. culverts.	2012
Cap 2.6	Construction of new penning structures on cross connections to control summer feed to Southside. 4 No. Tilting Weirs.	2012
Cap 2.7	New cut from Helland to Middle Drain adjacent to Thong Farm Hill.	2012

Proposal 4: Additional gauge boards and telemetry stations will be installed by the Parrett IDB in the Plan area.

Reason: To improve its capabilities regarding the management of water levels in the West Sedgemoor area, the Parrett IDB proposes to install remote monitoring equipment and additional gauge boards at the locations set out in Table 13. Alarm settings will be established for each station, which will report directly to the Drainage Board Office. Stations may also be used to collect other relevant data such as rainfall or water quality information.

The Environment Agency has replaced gauge boards within the Plan area over the last few years. The Environment Agency has no plans to install any new telemetry sites within the Plan area, though existing telemetry is regularly assessed and upgraded as deemed necessary for optimum management capability.

Table 13: Proposed additional gauge boards and telemetry stations in West Sedgemoor and Wick Moor

Location	Grid Ref.	Notes	Operator
Black Smock Tilting Weir	ST 379 282	Telemetry & gauge board (upstream & downstream)	IDB
Oath Hill Tilting Weir (Owl Street)	ST 387 268	Telemetry & gauge board (upstream & downstream)	IDB
Fosse Bridge	ST 333 246	Telemetry & gauge board	IDB
Helland Tilting Weir	ST 334 245	Gauge board	IDB
Middle Drain (Swell Drove Bridge)	ST 352 252	Telemetry & gauge board	IDB
Southside Rhyne (Beercrowcombe or Hambridge Drove)	(to be confirmed)	Telemetry & gauge boards	IDB
Pincombe Bridge	ST 357 266	Gauge board	IDB
North Drove Rhyne (various)	(to be confirmed)	Gauge boards	IDB

9.3. Proposed changes to target water levels

Proposal 5: The Parrett IDB and the Environment Agency will adopt the proposed changes in target water levels, as set out in Tables 14 and 15, and trial these levels to ensure they meet the agreed objectives.

Reason: Natural England has advised the Parrett IDB that some parts of West Sedgemoor SSSI require an increase in winter and spring water levels to provide a minimum depth of water in ditches for aquatic plants and invertebrates, splashy fields in winter for wintering water birds and wet ground conditions in spring for breeding waders. Therefore, the current and winter and spring water levels at some of the control structures need to be changed to help achieve the objective of favourable condition on West Sedgemoor SSSI.

The proposed changes in target water levels are set out in Tables 14 and 15. The locations of the areas with seasonally higher water levels are shown on Map 10 and the hydrological block reference numbers are shown on Map 11.

The proposed improvements to the water control infrastructure outlined in Proposals 3 and 4 will help the Parrett IDB and the Environment Agency to achieve and maintain the water levels required for favourable condition on the SSSI.

Table 14: Proposed target water levels in West Sedgemoor and Wick Moor

Water level control structures	Current summer water levels (m ODN)	Current winter water levels (m ODN)	Proposed target summer water levels in the future (m ODN)	Proposed target winter water levels in the future (m ODN)
West Sedgemoor Pumping Station – small duty pump – large pumps (No. 2)	4.65 (pumps switch on at 4.70m)	4.20 (pumps switch on at 4.25m)	4.65 (pumps switch on at 4.70m)	**4.45** (pumps switch on at 4.50m)
Oath Farm Inlet / Oath Hill Footbridge Inlet	Open	Closed	Open	Closed
Twenty Acre Inlet	Open	Closed	Open	Closed
Stuckey's Clyse (Langport Lock)	Open	Closed	Open	Closed
Black Smock Sluice	4.80	Not penned ~4.20[1]	4.80	**4.50**
Oath Hill Sluice (Owl Street)	5.30	Not penned ~4.70	5.30	Not penned ~4.70
Helland Penning Bay	~4.95[1]	Not penned ~4.50[1]	~4.95	Not penned ~4.50
North Drove Rhyne Penning Bay	4.70	Not penned ~4.20	4.70	**4.50**
Back Ditch Penning Bay	4.70	Not penned ~4.20	4.70	**4.50**
Back Ditch Structure A	4.70	Not penned ~4.20	4.70	**4.50**
Back Ditch Structure B	4.70	Not penned ~4.20	4.70	**4.50**
Back Ditch Structure C	4.70	Not penned ~4.20	4.70	**4.50**
Lake House Penning Bay	~5.50[1]	Not penned ~4.90[1]	~5.50	Not penned ~4.90

Notes: **Summer season:** Aim to achieve summer pen levels from 1 April.
Winter season: Aim to achieve winter pen levels by 1 December.
[1] Water level unknown (to be determined by trial).

Table 15: Proposed target water level regime in new Northside RWLA blocks

Hydrological block	Mar 15th	April 1st	May 1st	June 1st	July 1st - Oct 1st	Nov 1st	Dec 1st - Mar 1st
Northside RWLA Blocks (including blocks 14,15,16 &17)	4.85	4.85	4.85	4.80	Summer pen	Summer pen	4.90

Proposal 6: The Parrett IDB will support private water management schemes in the Plan area as set out in Table 16.

Reason: Within the framework provided by the operation of the arterial watercourses and control structures, individual farmers may need to operate private structures on their land in order to achieve the winter and spring splash required for wintering waterfowl and breeding waders. The Parrett IDB will support the management of these areas where they do not adversely affect neighbouring land. Where conflict does occur the IDB will work with landowners to achieve the best water management solution.

The proposed seasonal water levels for private management schemes are set out in Table 16. The location of the areas with seasonally higher water levels is shown on Map 10 and the hydrological block reference numbers are shown on Map11.

Table 16: Current target water level regime in existing RWLA blocks

Hydrological block	Mar 15th	April 1st	May 1st	June 1st	July 1st - Oct 1st	Nov 1st	Dec 1st - Mar 1st
11	4.95	4.95	4.90	4.85	Summer pen	Summer pen	4.95
12	4.85	4.85	4.85	4.70	Summer pen	Summer pen	4.85
14	4.90	4.90	4.90	4.85	Summer pen	Summer pen	5.00
15 & 16	4.80	4.80	4.80	4.80	Summer pen	Summer pen	4.90
17	4.85	4.85	4.85	4.85	Summer pen	Summer pen	4.95
22 & 23	4.90	4.90	4.90	4.85	Summer pen	Summer pen	5.05
24, 25 & 26	5.05	5.05	5.00	4.95	Summer pen	Summer pen	5.15
27	4.95	4.95	4.88	4.83	Summer pen	4.85	5.00
29 & 32	4.85	4.80	4.80	4.78	Summer pen	4.85	5.00
30	4.90	4.90	4.90	4.80	Summer pen	Summer pen	4.90
Huntham	4.65	4.55[1]	4.45[1]	4.40[1]	4.35	4.35	4.65
Oath Farm	4.90[1]	4.85[1]	4.80[1]	4.80[1]	Summer pen	Summer pen	4.90[1]
Helland	4.95[1]	4.95[1]	4.90[1]	4.85[1]	Summer pen	Summer pen	4.95[1]

Notes: **[1]** Water level unknown (to be determined by trial).

9.4. Proposed changes to operational procedures and responsibilities

Proposal 7: The Parrett IDB and the Environment Agency will adopt a flexible operating regime that allows variations in water levels and seasonal penning dates in response to weather conditions.

Reason: The Parrett IDB considers that flexibility is a critical element in the management of water across the Somerset Levels and Moors. The timing of operations (e.g. setting pen levels, watercourse maintenance) and the water levels need to be responsive to the prevailing weather conditions at the time. The dates of operations and the water levels set out in this Plan are the product of many years experience and are most likely to be accurate for a 'normal season'.

The Parrett IDB and the Environment Agency propose to adopt the principle that:

- the timing of the normal seasonal changes in pen level can vary by up to two weeks from the date specified in the Plan;
- the normal water level can range up to 50 mm above the level specified in the Plan during dry conditions, unless the Plan indicates otherwise;
- the normal water level can range up to 100mm below the level specified in the Plan during wet conditions, unless the Plan indicates otherwise.

The Environment Agency and the Parrett IDB have also agreed to meet three weeks before the normal seasonal changeover date to confirm summer/winter penning dates based on catchment conditions. This will improve communication and flexibility surrounding the normal operating date.

If the season or local conditions require the Parrett IDB or the Environment Agency to operate outside these 'normal' parameters then consultation with Natural England will take place.

Proposal 8: The Parrett IDB, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and ensure water level management meets the agreed objectives.

Reason: Changes in water levels and operational practices will be monitored by the relevant authorities and assessed to determine their effects on conservation, agriculture and flood risk management. The Parrett IDB will report on the outcomes of this monitoring at least once a year for the first three years after the implementation of the Plan.

Several organisations are involved in monitoring environmental information that is relevant to the WLMP, as set out in Table 17.

Table 17: Monitoring arrangements for West Sedgemoor and Wick Moor

Lead body	Topic of monitoring
Parrett IDB	• Target water levels at key IDB control structures; • Maintenance of Viewed Rhynes; • Monitoring channel profiles and conveyance in Viewed Rhynes; • Maintenance of minor watercourses, farmers ditches etc; • Water quality.
Environment Agency	• Target water levels at key Agency control structures; • Maintenance of Main Rivers; • Monitoring channel profiles and conveyance in Main Rivers; • Catchment rainfall and weather events; • Water quality.
Natural England	• Plant, bird, invertebrate and mammal communities; • Land management; • Surface water and soil wetness conditions.

It is anticipated that an ongoing monitoring programme of long-term changes in the plant, bird, invertebrate and mammal communities of West Sedgemoor will be undertaken by Natural England and others and used in combination with Environment Agency and Parrett IDB environmental data, and local knowledge, to inform and refine decisions regarding suitable water levels in the future.

Proposal 9: The Parrett IDB and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.

Reason: There are merits in one Operating Authority managing a greater proportion of the smaller structures that control water levels within a defined system. The Environment Agency and the Parrett IDB are negotiating the handover of ownership and operational responsibility for some of the control structures currently owned and operated by the Environment Agency.

DEFRA and Government priorities with regards to flood risk management have been evolving over the past few years. This has resulted in the Environment Agency having to review its priorities and activities. The Environment Agency currently owns and operates many structures that provide essential land drainage and nature conservation benefits. It also manages and maintains Main Rivers that serve no critical flood defence benefit. In the future the Environment Agency may no longer be able to justify maintaining or operating these structures and watercourses.

One possible option is for the Drainage Board to take over the ownership and management of these watercourses and structures, to continue a system of professional management and continuity for the benefit of land owners and wildlife. The structures identified for this proposal are listed in Table 18.

Table 18: Proposed changes in ownership and responsibility of water control structures

Structure	Current owner	Current operator	Proposed owner	Proposed operator
Black Smock Sluice (reconstructed as a Tilting Weir)	Environment Agency	Environment Agency	Parrett IDB	Parrett IDB
Oath Hill Sluice (reconstructed as a Tilting Weir)	Environment Agency	Environment Agency	Parrett IDB	Parrett IDB

9.5. Proposed changes to maintenance practices

Proposal 10: The Parrett IDB will complete its review of routine maintenance of Viewed Rhynes.

Reason: The Parrett IDB will complete its review of the procedures for maintaining the Viewed Rhynes within Plan area, including West Sedgemoor SSSI. In consultation with ratepayers and Natural England, the Parrett IDB proposes to adopt the principle that all the Viewed Rhynes should be maintained each year, unless there is a good reason to adopt an alternative frequency. The aim of this approach is to improve the conveyance and circulation of water around the system while maintaining conservation and farming interests in the area. Approval for the proposed changes in maintenance in the SSSI will be secured from Natural England before they are implemented.

Proposal 11: The Parrett IDB will de-silt selected Viewed Rhynes within West Sedgemoor SSSI where high silt levels are affecting ditch habitats.

Reason: The Drainage Boards are aware of problems caused by high silt levels in some parts of the Viewed Rhyne system and therefore propose to establish a de-silting programme in order to benefit water circulation and to restore and enhance ditch habitats in affected areas. High silt levels and shallow water depths can restrict habitat availability and increase water temperature in summer, which may adversely affect the conservation interests of ditches.

Proposal 12: The Environment Agency will de-silt the West Sedgemoor Main Drain in winter 2009-10 to ensure the watercourse provides the appropriate service standards for flood risk management, farming and conservation.

Reason: In consultation with the Parrett IDB, West Sedgemoor Main Drain has been included in the first four trial rivers to be de-silted over the winter of 2009. A detailed method for de-silting the West Sedgemoor Main Drain is being developed by the joint working group, and a programme of work is expected to be underway by winter of 2009.

The Environment Agency will regularly review its annual and intermittent maintenance procedures, in accordance with national guidance and policy, to ensure a high level of flexibility and efficiency of funding and staffing allocation are achieved.

Proposal 13: The Environment Agency will complete its review of the maintenance of Main Rivers, within and adjacent to the Plan area.

Reasons: The Environment Agency, in consultation with the Drainage Boards, is currently reviewing the maintenance of Main Rivers within and adjacent to the Plan area in the response to changing priorities. This relates specifically to a national risk based approach where the highest standards of maintenance are directed to where they are most needed to protect people and property.

The River Parrett carries a heavy load of estuarine silt on each tide and the merits and cost effectiveness of de-silting the tidal Parrett has been debated by drainage engineers for many years. The findings of a study currently underway by the Environment Agency will identify the Agency's position will be for maintenance on the River Parrett and Tone in the years to come.

10. Unresolved matters

The potential effects of climate change and sea level rise on the Plan area are unclear at present. Current studies by the Environment Agency, and others, should inform the Parrett IDB on these matters and the mitigation or adaptation required in water management to accommodate these impacts.

11. Amendments agreed during the period of the Plan

Amendments to this Plan which are agreed by Drainage Board, the Environment Agency and Natural England are set out in Table 19.

Table 19: Amendments agreed during the period of the Plan

No.	Date	Amendment	Agreed

12. Review arrangements

The Parrett IDB proposes to review this WLMP in 2014, five years after it has been adopted. If any alterations to operating procedures or maintenance are required before 2014, these will be discussed by the IDB, the Environment Agency and Natural England and can agreed as interim measures pending the full review.

13. Timetable of actions: West Sedgemoor and Wick Moor WLMP

	Proposed continuation of current good practice	
1:	The current summer and winter penning levels at the key control structures as set out in Table 11 will continue to be maintained by the Parrett IDB and Environment Agency.	**Ongoing**
2:	Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Parrett IDB.	**Ongoing**
	Proposed changes to water control infrastructure	
3:	Capital improvement works will be carried out by the Parrett IDB to help achieve favourable condition on West Sedgemoor SSSI.	**Complete by end 2014**
4:	Additional gauge boards and telemetry stations will be installed by the Parrett IDB in the Plan area.	**Complete by end 2012**
	Proposed changes to target water levels	
5:	The Parrett IDB and the Environment Agency will adopt the proposed changes in target winter and spring water levels as set out in Tables 14 and 15, and trial these levels to ensure they meet the agreed objectives.	**From 2010**
6:	The Parrett IDB will support private water management schemes in the Plan area as set out in Table 16.	**Ongoing**
	Proposed changes to operational procedures and responsibilities	
7:	The Parrett IDB and the Environment Agency will adopt a flexible operating regime that allows variations in water levels and seasonal penning dates in response to weather conditions.	**Immediate**
8:	The Parrett IDB, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and ensure water level management meets the agreed objectives.	**Establish winter 2009**
9:	The Parrett IDB and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.	**Complete by end 2010**
	Proposed changes to maintenance practices	
10:	The Parrett IDB will complete its review of routine maintenance of Viewed Rhynes.	**Complete by end 2010**
11:	The Parrett IDB will de-silt selected Viewed Rhynes within West Sedgemoor SSSI where high silt levels are affecting ditch habitats.	**Complete by end 2014**
12:	The Environment Agency will de-silt the West Sedgemoor Main Drain in winter 2009-10 to ensure that the watercourse provides the appropriate service standards for flood risk management, farming and conservation.	**Winter 2009**
13:	The Environment Agency will complete its review of the maintenance of Main Rivers, within and adjacent to the Plan area.	**Complete by end 2010**