Bridgwater and Pawlett Water Level Management Plan
Parrett Internal Drainage Board
Approved June 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 Bridgwater and Pawlett 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	Bridgwater and Pawlett (Parrett IDB)		
SSSI(s) covered	Pawlett Hams (part of Bridgwater Bay SSSI)		
Region / Area	Somerset Levels and Moors, Severn Estuary		
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). WLMPs are a means of balancing and integrating water level management for a range of land uses and activities within an area, including agriculture, angling, 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. This 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.

The Pawlett Hams part of Bridgwater Bay SSSI (450ha of the SSSI) is a priority WLMP site. In 2004, 24% of the Pawlett Hams part of the SSSI (2 out of 7 site units) was in favourable condition and changes to water level management were considered necessary to achieve and maintain favourable condition for all seven site units. Therefore, one of the aims of this WLMP is to identify the water management necessary to bring all parts of the SSSI into favourable or recovering condition.

Bridgwater Bay SSSI forms part of the Severn Estuary Special Protection Area (SPA) and Ramsar site. The Parrett IDB recognises its 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 and/or possible SAC. The IDB also recognises its 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 (NERC) 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 WLMP 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 area covered by this WLMP lies to the east of the River Parrett between Dunwear in the south and West Huntspill in the north, all in the Sedgemoor District of Somerset. It includes parts of the parishes of Bawdrip, Woolavington, Westonzoyland, West Huntspill. Puriton, East Huntspill, Cossington, Pawlett, Chedzoy, Bridgwater Without and Bridgwater. The location and extent of the Plan area is shown on Map 1.

The Parrett IDB is responsible for and maintains a network of arterial watercourses in its area which drain into Main Rivers maintained by the Environment Agency. These arterial watercourses are known as "Viewed Rhynes" and are taken into view or out of view by resolution of the Board.

The WLMP area covers 6303 acres (2551 hectares) and is bounded by Black Rock Rhyne and Black Ditch to the north, the River Parrett to the west, Walpole Rhyne and Park Wall Rhyne to the east and Park Wall Rhyne to the south. The locations of the arterial watercourses are shown on Map 2.

There are 166 drainage rate payers in the WLMP area, the smallest holding being 1 acre (0.4 hectares) and the largest being 362 acres (146.7 hectares).

2.3. Responsibility for preparation and implementation of the Plan

The Parrett IDB 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 and Sedgemoor 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 to the Parrett IDB 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 March 2009 and was endorsed in principle for the express purpose of consulting others. Consultation with Statutory Bodies, other bodies and organisations, and with 170 drainage ratepayers, took place over a four week period in April 2009 and was based on the contents of the First Draft Plan.

Responses to the consultation exercise were considered by the Parrett IDB WLMP Committee when they met to consider the Second Draft of the Plan in May 2009. The Second Draft, which included amendments arising from the consultation process, was recommended by the Committee for approval by the Full Parrett Board at their meeting in June 2009.

On the 2 June 2009 the Full Parrett Board considered the Committee's recommendations and adopted the WLMP for Bridgwater and Pawlett in full. The actions contained in Sections 9 – 15 of the Approved WLMP will be implemented over the five years of the Plan in accordance with the Timetable of Actions in Section 16.

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 estuarine alluvium bordering the River Parrett. The land surface varies from levels of 7m AOD near the river to 6m AOD further inland. High tides are prevented from inundating the low lying land by tidal embankments along the side of the River Parrett with crest levels between 7.8m and about 9.5m AOD. The Environment Agency maintains a minimum defence level of 8.4m AOD through Bridgwater.

3.2. Water supply

The mean annual rainfall for the Plan area is 740 mm a year. This figure has been calculated using data from four Environment Agency rain gauges located within and around the Bridgwater and Pawlett catchment area collected from 1994 to 2007.

There is virtually no catchment to provide a supply of summer water in the Pawlett Hams area except for the small island of Pawlett Hill and reliance was, at one time, on surface drainage accumulated in ditches and storage ponds. The area is now supplied from the Cannington Brook to the west of the River Parrett via twin 200mm (8”) diameter pipes laid under the river.

There is no highland run-off into East Bridgwater but some run-off from the impervious areas of development and the M5 motorway helps to maintain penned water levels.

3.3. Drainage

The only outlets for water from the Plan area are tidal outfalls to the River Parrett. Where the Viewed Rhynes drain through the tidal embankments, the majority of the outfalls are owned and maintained by the Environment Agency and operated by the Drainage Board. The outfalls have non-return flaps which allow drainage to flow out but stop the tide from coming in. These are checked on a regular basis by the Environment Agency.

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 pen level in winter to maintain the conservation interests and reduce frost damage and erosion of banks.

During the summer months, the emphasis changes from drainage to irrigation, except during periods of heavy rainfall which might bring the undesirable risk of flooding. From around 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 for the penning season. The higher summer levels are required to:

- Provide wet fences around the fields and the watering of livestock;
- Maintain an appropriate water table in the ground during the growing season;
- Maintain the conservation interest of the watercourses.

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 its management.

There are three FRM Systems which geographically cover the Bridgwater and Pawlett area:

- FR14S026 Parrett in Bridgwater RB (High)
- FR14S024 King's Sedgemoor Drain (High Environmental)
- FR124S117 Parrett Estuary RB (High Environmental)

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 urgency thereof. Performance Specifications are given to each System and to the individual assets within to guide maintenance standards. The 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 using a risk based approach.

The Parrett IDB manages its assets in the Plan area using a comparable 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* – the final Plan will be available in due course.
- *Surface Water Management Plan* – A new concept which DEFRA is considering. The context for this Plan which is provided by each of these over-arching strategies is outlined below.
- *Bridgwater Bay to Bideford Bay Shoreline Management Plan* – Published in 1998 and currently being reviewed by Halcrow Ltd with a completion date of Autumn 2010.
- *Severn Estuary Flood Management Strategy* – A new document in the early stages of being written which will outline a strategy for flood risk management for the Severn Estuary. Due for public consultation late 2009.
- *Parrett Estuary Flood Management Strategy* – New document due for completion 2009 which sets out the Environment Agency's proposed approach to flood risk management between Bridgwater and Burnham-on-Sea for the next 100 years.
- *Catchment Abstraction Management Strategies (CAMS)* - These documents are currently being revised for re-release in 2011.

3.5.1. Catchment Flood Management Plans

The new Catchment Flood Management Plan (CFMP) for the River Parrett provides an overview of flood risk management in the catchment for the next 100 years, reviewed every 6 years. The CFMP is intended to guide investment and flood risk management in the catchment carried out by the Environment Agency and other bodies with flood risk management responsibilities and powers.

The Environment Agency is proposing to adopt Policy Option 4 for the urban area of Bridgwater. This would involve taking further action to sustain the current scale of flood risk in response to predicted changes over the next 100 years. It appears that the current level of investment regarding flood risk management in these areas is low but, given the high density of properties in the town, the Environment Agency expects that it will be possible to direct further investment to these areas in response to increasing risks due to climate change.

3.5.2. Surface Water Management Plan

Surface water flooding occurs when high rainfall events exceed the drainage capacity in an area. Such events can also lead to serious flooding of property and possessions where surface water flows and collects.

Existing institutional arrangements mean that surface water drainage is not managed in an integrated way. As a result, drainage investment (capital and maintenance), land use planning and emergency plans are not necessarily targeted to maximise reduction in flood risk. In his report following the floods in 2007, Sir Michael Pitt recommended improved co-ordination between the different bodies involved in surface water drainage.

DEFRA has endorsed this recommendation and has been developing the idea of Surface Water Management Plans as a tool to improve co-ordination of activities between stakeholders involved in surface water drainage. Through the new Floods and Water Bill (draft published in spring 2009) , Government has indicated that Upper Tier Local Authorities (e.g. Somerset County Council) are likely to be required to lead the local response to flood risk management and to produce Surface Water Management Plans for the urban areas most vulnerable to flooding. In March 2009, DEFRA published its initial guidance on the production of Surface Water Management Plans, indicating that such Plans should:

a) Map and quantify surface flows and drainage with sufficient detail to enable local as well as strategic flooding problems to be tackled;

b) Produce a delivery plan that clarifies responsibilities and then directs resources at tackling surface water, giving priority to those areas at greatest risk;

c) Influence local planning policy such that new development occurs primarily in areas of low risk of surface water flooding, or where the flood risk can be managed effectively, making use of sustainable drainage solutions where appropriate;

d) Be periodically reviewed, possibly including independent scrutiny of planning and resource decisions to gauge progress in tackling the most serious problems.

The Parrett Drainage Board will have a significant interest in a Surface Water Management Plan for Bridgwater and will work closely with Somerset County Council in the production of this new and critically important Plan. A large number of domestic and commercial properties in the eastern part of Bridgwater lie within a Flood Zone 2 and 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.

3.5.3. Shoreline Management Plan

A Shoreline Management Plan (SMP) is a non-statutory document which sets out a general strategy for coastal management, taking account of natural coastal processes and human and other environmental influences and needs. The SMP is intended to provide a strategic framework for the management of the coast with the overall aim of reducing the risks to people, property and the historic and natural environment. In doing so, it is an important part of the Government's strategy for managing flooding and coastal erosion.

The Bridgwater Bay to Bideford Bay SMP was published in 1998 and is currently being reviewed by Halcrow Ltd in consultation with the Environment Agency and the North Devon and Somerset Coast Advisory Group. It is due for completion in Autumn 2010. It covers the coast from Anchor Head near Western-Super-Mare in the east to Hartland Point in the west. Pawlett Hams lies adjacent to the Hinkley Point to River Brue Management Unit and is currently protected from the risk of coastal flooding by the tidal embankments along the right (east) bank of the River Parrett.

'Hold the line' is currently the preferred option for the right (east) tidal banks of the River Parrett adjacent to the WLMP area.

3.5.4. Severn Estuary Flood Management Strategy

This Strategy is a new document that geographically covers the coast from Gloucester to Lavernock Point near Cardiff and from Gloucester to Hinkley Point in Somerset. It has three main objectives:

- To decide where new intertidal habitat should be created to compensate for coastal squeeze;
- To define a 100 year plan of investment for flood defences by the EA and local authorities;
- To prioritise all flood risk management measures such as advice to utility companies, abandonment of defences, development control advice and flood warning investment.

When the Strategy is presented and approved by the Environment Agency's Board, DEFRA and the Welsh Assembly Government in 2010, it will guide much of the work the Agency will do in the Severn Estuary. Whilst the Strategy primarily covers land outside the Plan area, it has identified Pawlett Hams as prime land to be considered for new intertidal habitat.

3.5.5. Parrett Estuary Flood Management Strategy

This Strategy aims to provide flood protection even if sea levels rise as expected, to safeguard important environmental resources and support other plans for economic development. It is likely that in the short term the Environment Agency will need to re-engineer banks including minor realignment, and have an ongoing phased programme of bank work as banks deteriorate and sea level rises. In around 20 years time the Environment Agency will need to decide whether to create a Parrett Surge Barrier after considering costs and benefits of future actions, ongoing monitoring of sea level rise, deterioration of defences and estuary dynamics and provision of compensatory habitat.

3.5.6. Catchment Abstraction Management Strategy (CAMS)

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.

3.6. Watercourses

3.6.1. Main Rivers

The Environment Agency has permissive powers to manage designated Main Rivers to reduce the risk of flooding of property and risk to human life. Watercourses in the Plan area flow into Main Rivers which lie outside the Plan area. The River Parrett flows just outside the western boundary, and the King's Sedgemoor Drain, within the King's Sedgemoor area, flows between the Pawlett and Bridgwater areas. Some watercourses in the Stretcholt area flow north to the Huntspill River (e.g. Black Ditch Rhyne). East Bridgwater drains into the King's Sedgemoor Drain (via the Motorway East and Motorway West Ditches). Some land to the east of the motorway drains eastwards into Chedzoy New Cut and from there into the King's Sedgemoor Drain. The extent and locations of the Main Rivers are illustrated on Map 2. The control structures on these watercourses are listed in Tables 2 - 5.

3.6.2. IDB watercourses

The Parrett IDB maintains and controls a network of watercourses (known as "Viewed Rhynes") within the Plan area which drain into the Main Rivers. These key watercourses extend to over 45 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 - 5.

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 Bridgwater & Pawlett

No.	Name of watercourse	Operating Authority	Length (m)	Locations and connections	Maintenance regime	Control structures (see Tables 2 – 5)
1	Black Rock Rhyne	IDB	948	Drains the area north of Stretcholt Lane to its outfall into the R. Parrett.	(to be added after review)	Black Rock Clyce
2	Cobb's Leaze Rhyne	IDB	2206	Outfall to Cobb's Leaze into River Parrett	(to be added after review)	Cobb's Leaze Clyce 50m upstream of outfall
3	Supply Rhyne	IDB	2759	Summer water supply beneath R. Parrett from Cannington Brook.	(to be added after review)	Inlet structure from Cannington Brook. (Supply Pumping Station)
4	Burlingham Rhyne	IDB	527	Drains to Cobb's Leaze Rhyne	(to be added after review)	None
5	White House Loop / Rhyne	IDB	3807	Drains to the Supply Rhyne which then joins Cobb's Leaze Rhyne	(to be added after review)	None
6	New Close Rhyne	IDB	783	Connects to Supply Rhyne but has its own outfall to the R.Parrett	(to be added after review)	West Clyce Outfall, but pen level ultimately controlled by Cobb's Leaze Clyce.
7	Gaunt's Rhyne	IDB	609	Has its own outfall to the R. Parrett	(to be added after review)	Gaunts Clyce, Penstock (Not operated).
8	Brickyard Rhyne	IDB	5658	Outfall into R. Parrett. Summer supply from Pawlett Hams Supply Rhynes.	(to be added after review)	Brick Yard Clyce Penning gate at Pawlett Mead. BP003 (removed 2005?) & BP004
9	Link Rhyne	IDB	600	Connects Walpole Drove Rhyne to Brickyard Rhyne	(to be added after review)	None
10	Walpole Drove Rhyne	IDB	1804	Level controlled at Brickyard Outfall.	(to be added after review)	Penning structure at 700m. Top of penning gate gives a level of 5.06, with the downward sliding weir gate provides a range of 4.76 – 5.06m AOD. BP005
11	Black Ditch Rhyne	IDB	2861	Drains the northern part of Pawlett Hams through the Lower Brue area via Brent Rhyne to the Huntspill River.	(to be added after review)	Penning structure in the area at Puriton Road Outfall (Lower Brue DDB – H05).
12	Walpole Rhyne	IDB	1804	Drains land NE of Walpole Farm to the Motorway ditches (Lower Brue)	(to be added after review)	Fixed penning by dam at 1300m.
13	Dunball Drove Rhyne	IDB	630	Outfall into Kings Sedgemoor Drain	(to be added after review)	Free, not penned (Inlet pipes BP016 & BP017)
14	Summerway Rhyne / Bristol Road Rhyne	IDB	407	Drains to Horsey Rhyne West.	(to be added after review)	None
15	Horsey Rhyne West	IDB	716	Drains to Motorway Ditch West Rhyne.	(to be added after review)	None
16	Motorway Ditch West Rhyne	IDB	4999	Drains land to west of the motorway in Horsey Level into the King's Sedgemoor Drain.	(to be added after review)	Tilting weir at outfall to King's Sedgemoor Drain. Tilting weir by the motorway footbridge.
17	Bath Road Rhyne	IDB	556	Drains to Motorway Ditch West Rhyne.	(to be added after review)	BP019, protective chamber, gas main

Table 1 (continued): Schedule of arterial watercourses in Bridgwater & Pawlett

No.	Name of watercourse	Operating Authority	Length (m)	Locations and connections	Maintenance regime	Control structures (see Tables 2 – 5)
18	Crow Lane Rhyne	IDB	203	Drains to Motorway Ditch West Rhyne	(to be added after review)	None
19	Bower Lane South Rhyne	IDB	247	Drains to Motorway Ditch West Rhyne	(to be added after review)	Penning controlled by the EA tilting weir in Summerway Rhyne at Park Wall. BP002 & BP021
20	Motorway Ditch East Rhyne	IDB	5106	Drains land to East of the motorway in Horsey Level into the King's Sedgemoor Drain. The southern end drains into Summerway Rhyne and into the Chedzoy area.	(to be added after review)	Tilting weir at outfall to King's Sedgemoor Drain. Tilting weir by the motorway footbridge (operates as fixed weir). BP001 & BP012
21	Horsey Rhyne East	IDB	684	Drains to Motorway Ditch East Rhyne.	(to be added after review)	None
22	Bath Road Rhyne east of motorway	IDB	1592	Drains to Motorway Ditch East Rhyne & King's Sedgemoor Drain.	(to be added after review)	None
23	Summerway Drove Rhyne	IDB	643	Drains into Summerway Rhyne.	(to be added after review)	None
24	Summerway Rhyne	IDB	333	Main drainage route for the area between the motorway and Park Wall. Connects under the motorway to Motorway Ditch West Rhyne.	(to be added after review)	EA Tilting weir, BP020
25	Summerway Rhyne South & Park Wall Rhyne South	IDB	2530	Drains to Summerway Rhyne.	(to be added after review)	EA tilting weir upstream of the Park Wall Drove culvert.
26	Park Wall Middle Rhyne	IDB	950	Does not connect directly to Summerway Rhyne, but drains southwards to Summerway South Rhyne.	(to be added after review)	BP020
27	Park Wall North Rhyne	IDB	950	Drains to Summerway Rhyne.	(to be added after review)	BP020
28	Park Wall to River Lane / Upper Dunwear Farm Rhyne	IDB	288	Drains north to Park Wall South Rhyne	(to be added after review)	None
29 & 30	Dunwear Rhyne	IDB	1165	To east of Dunwear Lane	(to be added after review)	Dunwear penning structure, BP023
31	Motorway Side Ditch	IDB	1290	Drains land to west of the motorway into the Huntspill River.	(to be added after review)	None
32	Meadway Farm Rhyne	IDB	114	Connects Chedzoy Lane to Motorway Ditch East	(to be added after review)	BP020
33	Bower Lane Rhyne	IDB	465	West of Bower Lane, connecting to Bower Lane South	(to be added after review)	BP022
34	Somerset Bridge Rhyne	IDB	148	Connects Dunwear Ponds to the tidal River Parrett	(to be added after review)	BP013, Dunwear Ponds Outlet, penning boards and screen

3.7. Structures

3.7.1. Structures controlling inflows

In summer the Pawlett Hams area is fed by gravity from the Cannington Brook in the Cannington and Wembdon area via twin pipelines under the River Parrett (close to Stallington's Clyce). There is a sluice arrangement at the western edge of Pawlett Hams to control the flow which is operated by the Drainage Board as necessary. This gravity connection is augmented by a tractor-driven pump at the sluice during dry conditions. The structures controlling the inflows to the Bridgwater and Pawlett area are listed in Table 2.

Table 2: Structures controlling inflows to Bridgwater & Pawlett

Asset No.	Inlet Structure	Grid Ref.	Owned by	Operated by
BP008	Summer supply & Pumping Station for Pawlett Hams: Summer water supply through twin 200mm pipelines beneath River Parrett from Cannington Brook	ST 2771 4109	IDB	IDB

3.7.2. Structures controlling outflows

A number of structures owned by the Environment Agency and operated jointly by the EA and IDB are used to control water leaving the Plan area. These include outfalls located in the tidal embankment of the River Parrett, and tilting weirs in the Motorway Ditches draining to the King's Sedgemoor Drain. Details are provided in Table 3.

The Environment Agency inspects the outfalls regularly for leaks, damage and blockages. Extra inspections are carried out before high spring tides, and during flooding conditions.

Table 3: Structures controlling outflows from Bridgwater & Pawlett

Asset No. NFCDD (IDB)	Outlet Structure	Grid Ref.	Owned by	Operated by
1122585500101R15002 (BP006)	Brick Yard Clyce Outfall (into the River Parrett)	ST 2968 4203	EA	EA
1122585500101R15001 (BP007)	Gaunt's Clyce (into the River Parrett)	ST 2860 4253	IDB	Not operated
1122585500101R09001 (BP009)	West Clyce (into the River Parrett): Cast Iron Penning gate and outfall flap (IDB)	ST 2693 4183	IDB	IDB
1122585500101R05001 (BP010)	Cobb's Leaze Clyce (into the River Parrett): Cast Iron Penning gate (IDB) and outfall flap (Environment Agency)	ST 2772 4374	EA	EA
1122585500101R03001 (BP011)	Black Rock Clyce (into the River Parrett): Cast Iron Penning gate (IDB) and outfall flap (Environment Agency)	ST 2839 4423	EA	EA
1122585500104R09001 (BP013)	Dunwear Ponds Outfall (into the River Parrett): Penning gate at outfall	ST 3109 3572	EA	EA
1122585910101L04001 (KS054)	Motorway Ditch East tilting weir (into the King's Sedgemoor Drain):	ST 3143 4094	EA	EA
1122585910101L02002 (KS055)	Motorway Ditch West tilting weir (into the King's Sedgemoor Drain)	ST 3151 4092	EA	EA
1122586120101B01001	Chedzoy Clyce (into the King's Sedgemoor Drain)	ST 3576 3650	EA	EA

3.7.3. Structures controlling water levels within the area

Water levels within the Plan area are controlled by numerous structures located on the network of arterial watercourses, the majority of these being owned and operated by the Drainage Board. These control structures are summarised in Table 4, and their locations are shown on Map 3.

Table 4: Structures penning water levels in Bridgwater & Pawlett

Asset No. NFCDD (IDB)	Water level control structure	Grid Ref.	Owned by	Operated by	Summer level (m AOD)	Winter level (m AOD)
BP001	Summerway Rhyne Tilting Weir: Summerway Rhyne	ST 3236 3702	IDB	IDB	3.63	Not penned
BP002	Bower Lane South Tilting Weir: Bower Lane South	ST 3230 3703	IDB	IDB	Penned (level unknown)	Not penned
BP004	Pawlett Mead Drove Sluice: Brickyard Rhyne	ST 3088 4273	IDB	IDB	Penned (level unknown)	Not penned
BP006	Brick Yard Clyce Penning Structure Brickyard Rhyne	ST 2968 4207	IDB	IDB	3.88	Not penned
BP009	West Clyce: New Close Rhyne	ST 2693 4183	IDB	IDB	5.42	Not penned
1122585500 101R05001 (BP010)	Cobb's Leaze Clyce: Cobb's Leaze Rhyne	ST 2769 4372	EA	IDB	5.42	Not penned
1122585500 101R03001 (BP011)	Black Rock Clyce: Black Rock Rhyne	ST 2850 4431	EA	IDB	Penned (level unknown)	Not penned
1122585500 104R09001 (BP013)	Dunwear Ponds Outfall:	ST 3105 3583	EA	IDB	Penned (level unknown)	Not penned
1122586120 103R02001 (BP020)	Park Wall Tilting Weir: Junction of Summerway, Park Wall Middle and Park Wall North Rhynes	ST 3276 3682	EA	IDB	3.63	Not penned
BP023	Dunwear penning structure: Dunwear Rhyne	ST 3187 3656	IDB	IDB	4.82	Not penned
KS054	Motorway East Ditch penning structure: Motorway East Ditch	ST 3143 4094	Highways Agency	EA	Penned (level unknown)	Not penned
KS055	Motorway West Ditch penning structure: Motorway West Ditch	ST 3151 4092	Highways Agency	EA	Penned (level unknown)	Not penned
Private	Whitehouse Hams tilting weir (Viridor)	ST 2710 4230	Private	Private	Not penned	5.80 – 6.00

Table 5: Schedule of control structures affecting water management in Bridgwater & Pawlett

Asset No. NFCDD (IDB)	Control Structure	Grid Ref.	Owned by	Operated by	Rhyne or Main River (Table 1)	Description (function)	Dimensions & operating range	Summer operation	Winter operation	Flood operation
BP001	Summerway Rhyne Tilting Weir	ST 3236 3702	IDB	IDB	Summerway Rhyne & Motorway Ditch East	Tilting weir set in concrete structure	Unknown	Raised to provide pen level	Lowered	Lowered
BP002	Bower Lane South Tilting Weir	ST 3230 3703	IDB	IDB	Bower Lane South & Motorway Ditch West	Tilting weir set in concrete structure	Unknown	Raised to provide pen level	Lowered	Lowered
BP004	Pawlett Mead Drove Sluice	ST 3088 4273	IDB	IDB	Brickyard Rhyne	Penning gate	Penning gate 600w x 1200h with sliding weir gate 900w x 400h	Raised to provide pen level	Lowered	Lowered
BP005	Walpole Drove Rhyne Penning Gate	ST 3040 4180	IDB	IDB	Walpole Drove Rhyne	Penning structure upstream from Walpole Clyce to maintain water levels	Unknown	Raised to provide pen level	Lowered	Lowered
BP006	Brick Yard Clyce Penning Structure	ST 2968 8420	IDB	IDB	Brick Yard Rhyne	Penning gate at outfall is in two parts so that the upper part can be raised with the lower part penning to a level of 3.88m AOD A weedscreen on the D/S side of the penning gate is cleaned by the DB	Penning gate at outfall 3000w x 1300h	Raised to provide pen level	Lowered	Lowered
11225855001 01R15002 (BP006)	Brick Yard Clyce Outfall (Pawlett Outfall)	ST 2968 4203	EA	EA	Brick Yard Rhyne	Two tide flaps from the two penning structures	Flap 1 1500x1500 Flap 2 300x300	n/a	n/a	EA check flaps on Tidewatch
BP007	Gaunt's Clyce	ST 2860 4253	IDB	Not operated	Gaunt's Rhyne	Outfall and penstock	Unknown	Not operated	Not operated	Not operated
BP008	Supply Pumping Station	ST 2771 4109	IDB	IDB	Supply Rhyne	Summer water supply through twin 200mm pipelines beneath River Parrett from Cannington Brook	Penning level in Cannington Brook is 5.61m AOD	Operated	Not operated	Not operated
BP009	West Clyce	ST 2693 4183	IDB	IDB	New Close Rhyne	Cast Iron Penning gate and outfall flap	Unknown	Open	Open	Open
112GDS7354 001C10001	Cobb's Leaze Outfall	ST 2772 4314	EA	EA	Cobbs Leaze Rhyne	Cast Iron Penstock and outfall flap to Parrett	Unknown	Open	Open	EA check flap on Tidewatch

Table 5 (continued): Schedule of control structures affecting water management in Bridgwater & Pawlett

Asset No. NFCDD (IDB)	Control Structure	Grid Ref.	Owned by	Operated by	Rhyne or Main River (Table 1)	Description (function)	Dimensions & operating range	Summer operation	Winter operation	Flood operation
BP010	Cobb's Leaze Clyce	ST 2773 4374	IDB	IDB	Cobbs Leaze Rhyne	Tiliting weir maintains levels on Pawlett Hams	1000w x 1000h	Raised to provide pen level	Open	Lowered
112GDS7354 001C08001 (BP011)	Black Rock Clyce	ST 2839 4423	EA	IDB	Black Rock Rhyne	Cast Iron Penning gate (IDB) and outfall flap (EA)	Gate 1000x1000 Flap 900x900	Open	Open	EA check flap on Tidewatch
BP012	Westonzoyland Road Tilting Weir	ST 3220 3640	IDB	IDB	Motorway Ditch East	Tilting weir to pen water in Motorway Ditch East	Unknown	Raised to provide pen level	Lowered	Lowered
11225855001 04R09001 (BP013)	Dunwear Ponds Outlet	ST 3105 3583	EA	IDB	B & P Rhyne 34	Outlet pipe, with facility for stop logs	Weed screen at outfall, 820w x 1270h	Open	Open	Open
11225861201 03R02001 (BP020)	Park Wall Tilting Weir	ST 3276 3683	EA	IDB	Park Wall Rhyne	Tilting weir at the upstream end of Park Wall Drove culvert provides a level of 3.63m AOD.	Not actively operated, acts as fixed weir. Retains residual winter levels to west	Raised to provide pen level	Lowered	Lowered
BP023	Dunwear penning structure	ST 3187 3656	IDB	IDB	Dunwear Rhyne	Dam boards in penning structure (crest level 4.82m	Unknown	Raised to provide pen level	Lowered	Lowered
	White House Outfall	ST 2630 4240	IDB	Not operated	River Parrett	Unknown	Unknown	Open	Open	Open
KS054	Motorway East Ditch tilting weir	ST 3143 4094	Highways Agency	EA	Motorway East Ditch	Unknown	Unknown	Raised to provide pen level	Lowered	Lowered
KS055	Motorway West Ditch tilting weir	ST 3151 4092	Highways Agency	EA	Motorway West Ditch	Unknown	Unknown	Raised to provide pen level	Lowered	Lowered
11225861201 01B01001	Chedzoy Clyce (into the King's Sedgemoor Drain)	ST 3576 3650	EA	EA	Chedzoy New Cut	Tilting weir	3.05m wide tilting weir	Raised to provide pen level	Not penned	Not penned
Private	New Close Clyce	ST 2800 4180	Private	Not operated	River Parrett	Outfall to Parrett	Unknown	Not operated	Not operated	Not operated
Private	Whitehouse Hams - Wyvern Waste	ST 2710 4230	Private	Private	None	Tilting weir (RWLA structure)	Unknown	Open	Raised to provide pen level	Not operated

3.7.4. Gauge boards

The gauge boards maintained and commonly used by the Environment Agency within the North Drain area are summarised in Table 6. All gauge boards are metric and levelled to metres Above Ordnance Datum (m AOD). The gauge boards are read on an "as required" basis and generally more often in the summer months.

Table 6: Gauge boards in Bridgwater & Pawlett

Location of gauge board	Grid Reference	Notes, location etc	Operator
Dunball Sluice	ST 3076 4088	u-s of Sluice	EA
West Quay	ST 3001 3722	Bridgwater Town Centre	EA
Town Bridge	ST 3005 3711	d-s side of Town Bridge, Bridgwater	EA

3.7.5. Water level telemetry

The only Environment Agency telemetry site within the Plan area is at Dunball Sluice on the King's Sedgemoor Drain. Water levels are remotely monitored at this site and a series of alarms alert staff when water levels go outside of the agreed summer and winter level range. Alarms are received 24 hours a day, seven days a week by the National Incident Communication Service. The alarms are then passed on immediately to the most appropriate duty officer in the local area.

3.8. Abstraction and other hydrological management issues

Dry summer conditions can cause water resource issues in the Pawlett Hams area, which has almost no direct water feed from the local catchment. To compensate for these impacts, the Parrett IDB operates a supply pipe and irrigation pumps from the Cannington Brook on the opposite site of the River Parrett.

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)).

There is one Abstraction Licence (from ground water sources) in the catchment area as shown in Table 7. However, this abstraction licence is not known to have an effect on the ground water levels (and water level management) because of the geology of the area and the depth of abstraction.

Table 7: Abstraction licences in or near Bridgwater & Pawlett

Licence No	Description	Point Name	Max Daily Vol. (m^3)	Max Annual Vol. (m^3)
165/206/G/015	Industrial use	Borehole at ST 307 361	238	

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 and semi-improved grassland used for grazing and for winter fodder covering about 70% of the farmed area. The remaining 30% of the farmed area is arable, often in mixed farms with livestock.

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 Bridgwater Bay SSSI because of its importance for nature conservation and the risk of flooding.

4.2. Built development, services and transport

A large number of domestic and commercial properties in the eastern part of Bridgwater are at risk of flooding and lie within Flood Zone 3 (1 in 100 chance) as defined by the Environment Agency Flood Map. These properties and the infrastructure that serves them, depend on effective flood protection and water level management in both Main Rivers and Viewed Rhynes. Low lying properties and minor roads (which provide essential transport links) would suffer from flooding or water-logging without the appropriate maintenance of flood defences, Main Rivers and IDB Viewed Rhynes. Most of East Bridgwater ultimately drains to the King's Sedgemoor Drain and so the management of this Main River, and the operation of Dunball Sluice, is critical to flood risk management in the area.

The provision of adequate land for housing and employment is a national requirement and Local Planning Authorities are charged with ensuring that sufficient land is allocated through their new Local Development Frameworks. The Regional Spatial Strategy has identified Bridgwater as an area for future growth due to its status as a "Strategically Significant City or Town". However, the low lying nature of the Plan area, and its known risk of flooding, means that it is more vulnerable than others to the adverse effects of development. These risks include increased peak surface water flows from development, degradation of water quality and the difficulties in maintaining watercourses in urban areas.

Sedgemoor District Council consults 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. The Environment Agency is actively engaged in such work via its input to the Bridgwater Challenge initiative by Sedgemoor District Council.

4.3. Recreation

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

The River Parrett is used by sailors with the River Parrett Trail attracting walkers to the area. The River Parrett Trail is a nationally recognised walk which draws tourists to the area. The number of people using the trail is expected to grow as demand for recreation increases each year.

4.4. Fisheries

The Environment Agency has a duty to maintain freshwater and eel fisheries. These fisheries are a major part of the wildlife interest and ecology of the Plan area; especially eels, which are widely distributed and are a favoured food for both otters and fish-eating birds. 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.

Limited information is known on the fisheries resource within this catchment area and no significant or specific water level management problems affecting fisheries have been identified in the Plan area. Angling takes place in several coarse fishing lakes in the catchment including Pawlett Ponds, Summerhayes Pond, Dunwear Ponds, Beeches Pond and Sedges Pond.

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 during the summer that can result in de-oxygenation. Removal of the duckweed is difficult, although the use of floating booms across the watercourse can help to prevent the duckweed from completely covering the water surface.

5. Nature conservation and archaeology

5.1. Nature conservation interests

The primary nature conservation interest in the Plan area is Pawlett Hams, 455ha of which forms part of Bridgwater Bay Site of Special Scientific Interest. This SSSI also lies with the Severn Estuary Special Protection Area, Ramsar Wetland of International Importance and the possible Special Area for Conservation. The location of the nature conservation sites are shown on Map 5.

Pawlett Hams is included in Bridgwater Bay SSSI as it is:

a) An essential part of the coastal grazing marsh of the Severn Estuary which is of international importance for its overwintering and migratory populations of waterfowl, and in particular Bewick's Swan, European White-fronted Geese, Shoveller and Wigeon;

b) Of national importance for its network of ditches and ponds with aquatic fauna, including nationally rare or scarce aquatic invertebrates and water voles;

c) Of local importance for its network of ditches and ponds with notable aquatic flora.

The White House Hams covers about 60ha in the centre of the SSSI. This has been developed into a wetland nature reserve by Viridor Waste Management, in partnership with a local tenant farmer, Natural England, Somerset County Council, RSPB and the IDB. Ongoing land and water management on the site is supported by a Higher Level Stewardship agreement. The wetland reserve provides an excellent example of the restoration of arable fields, on coastal clay soils, to wet grassland and of their management for wintering and breeding birds and other wetland species.

The coastal grazing marshes found within the Bridgwater and Pawlett area, with its associated network of ditches and ponds, is considered to be a habitat of primary importance in the UK Biodiversity Action Plan (1996).

There are several County Wildlife Sites within the Plan area as listed below:-

a) Puriton Rhynes – ditch network with semi-improved grassland and legally protected fauna;

b) Pawlett Mead Drove Fields – unimproved neutral grassland;

c) Black Ditch Bridge Ponds – reed beds, marshy grassland and pond;

d) Cellophane Pits – mesotrophic ponds with scrub/grassland;

e) Dunwear Brick Pits – open water, reedbed, scrub;

f) Somerset Bridge Ponds – open water, reedbed;

g) Upper Dunwear Brick Pits – legally protected fauna and swamp community

In addition, the 45 km of watercourses in the Plan area are a rich source of biodiversity interest, supporting good populations of Water Vole and are regularly used by Otters.

An effective water management system which is beneficial to the maintenance and possible enhancement of the conservation and biodiversity interests of the area is a key objective of the WLMP.

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.

5.2. Biodiversity Action Plans

The Parrett IDB and the Environment Agency acknowledges that it has a duty to further the conservation and enhancement of biodiversity, as a public body 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 regarding the maintenance of watercourses.

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 affects:

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.

A water management system beneficial to the continued 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 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. This condition will also apply to proposed developments that lie outside the boundary of an SSSI but which may impact on the SSSI.

6.2. Works adjacent to IDB rhynes

Under the Land Drainage Act 1991, the Drainage Board 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 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 Parrett IDB consults Natural England before arriving at its decision. The form of consent given by the Parrett IDB 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 Parrett IDB will seek the views of Natural England on this proposal.

The current water management at key control structures is shown in Tables 2-5. 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.

There are currently 80 hectares (197 acres), under two ownerships, in which the ditch water levels are kept seasonally higher than the general level in the moor by isolating the watercourses from the Drainage Board system. In these Raised Water Level Areas the desired water levels are maintained by means of privately owned and operated water management systems. In the Raised Water Level Areas on Pawlett Hams, the winter levels are currently raised from 1 December through to 1 May. Details of these areas are given in Table 8 and are shown on Map 4.

Table 8: Areas with seasonally raised water levels in Bridgwater & Pawlett

Raised Water Area	Name of Owner/ Occupier	Area in hectares	Area in acres
1	Wyvern Waste (Pawlett Hams)	53.2	131.5
2	D Watts (Pawlett Hams)	26.9	66.5

The Drainage Board is unaware of any significant private pump drainage schemes in the Plan area that are operated by landowners to lower water levels in the ditches around their fields.

Table 9: Areas with seasonally lower water levels in Bridgwater & Pawlett

Lower Water Area	Name of Owner/Occupier	Area in hectares	Area in acres

7.2. Current flood management

The Environment Agency has permissive powers to carry out works to reduce flood risk on main rivers. Within the Bridgwater and Pawlett Plan area the primary defences are raised earth banks. These run along the right bank of the Parrett protecting against tidal surge and inundation. The defences are continued through Bridgwater town (Parrett right bank) as masonry walls. These defences are inspected regularly to ensure they provide the flood risk management benefit that they were designed for. The Environment Agency also undertakes routine maintenance i.e. weed cutting, tree pruning and removal. Emergency repair/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.

Dunball Sluice is the main Environment Agency structure that evacuates flood water from the Plan area. In times of high river flow the gates in Dunball Sluice are opened, during low tide, to release water from the King's Sedgemoor Drain into the River Parrett. However, high levels and high flows in the King's Sedgemoor Drain can cause flooding in adjacent areas and so the operation of Dunball Sluice is critical at these times. The Drainage Board and the Environment Agency will review the operation of Dunball Sluice and consider opportunities to lower water levels in the King's Sedgemoor Drain in advance of floodwater arriving at the Sluice.

The Environment Agency also commissions studies regarding flood risk management within the Plan area and has recently developed a strategy for future flood risk management on the Parrett Estuary (Flood Management Strategy), which looks at flood defence, land management and climate change impacts on the catchment over the next 100 years. One long term option discussed in this strategy is whether Bridgwater would benefit from the construction of a tidal surge barrage.

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 areas 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 defences 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 and the sea, where the chance of flooding in any one year is less than 0.1% (i.e. a 1 in 1000 chance).

Zone 2 - is shaded turquoise and shows the area between Zone 1 and Zone 3. This represents an area with the chance of flooding in any one year between 0.1% and 1% fluvial or 0.5% tidal (i.e. between a 1 in 1000 and a 1 in 100 fluvial chance, or 1 in 200 tidal 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. The chance of flooding in any one year is greater than or equal to 1% (i.e. a 1 in 100 chance) for river flooding and greater or equal to 0.5% (i.e. a 1 in 200 chance) for coastal and tidal flooding.

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 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 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.

The left and right banks of the Parrett Estuary 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.

Tide flaps and outfalls are checked regularly throughout the year and prior to high tides, for damage and blockages. Blockage removal is rarely required in the River Parrett as the channel is large enough to flush through most obstructions. Blockages in the King's Sedgemoor Drain are only removed if they pose a flood risk or if they might adversely affect the operation of Dunball Sluice.

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.

Non-routine 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 required during emergency situations as soon as is practically possible.

7.3.2. Parrett IDB maintenance practices

The Parrett IDB maintains all Viewed Rhynes in the Bridgwater and Pawlett area once a year in late summer or during the winter. 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.

The majority of non-arterial rhynes (private ditches) on Pawlett Hams are also maintained by the Drainage Board, typically on a three to four year rotation. This practice was established by the former Bridgwater and Pawlett IDB and has been continued by the Parrett IDB, but is subject to review and availability of Board resources. The Board has powers under its Byelaws to require occupiers to fulfil their obligations to maintain their watercourses in a reasonable condition.

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.

8. Objectives for water level management

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(s) in the Plan area helps to secure, or makes significant progress towards achieving, these SSSIs 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.

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 and these good practices will continue, as set out below.

Proposal 1: The current summer penning levels in the watercourses in the Pawlett Hams part of Bridgwater Bay SSSI will continue to be maintained by the Drainage Board.

Reason: The current target water levels in spring, summer and autumn are known to be achieving favourable condition for the Pawlett Hams part of Bridgwater Bay SSSI. These target water levels in spring, summer and autumn for Pawlett Hams are set out in Table 10. The Parrett IDB proposes to change the winter water management of the SSSI as set out in Proposals 6 and 7.

Summer season: Aim to achieve summer pen levels from 1 April. In a dry season or year this might be brought forward by two weeks, in a wet season or year this may be delayed by a week.

Table 10: Current target water level in summer for Pawlett Hams

Control Structures	Summer level (m AOD)
Cobb's Leaze Tilting Weir	5.42m (no change from current level)

Notes:
1. Cobb's Leaze Tilting Weir was built in 2008 to replace Cobb's Leaze Penstock.
2. The water level range follows the principle established in Proposal 9 that a 'normal water level' lies within 50mm of the level specified within the Plan.
3. The Environment Agency and the IDB have agreed to meet three weeks before the normal operating date to confirm summer/ winter penning dates based on catchment conditions.

Proposal 2: The current summer and winter penning levels in the other watercourses of the Plan area outside the designated sites will continue to be maintained by the Drainage Board.

Reason: The current target water levels in watercourses outside the designated wildlife sites appear to be favourable to the farming and wider biodiversity interests of the area. These target water levels in summer and autumn for the areas outside Pawlett Hams are set out in Table 11.

Summer season: Aim to achieve summer pen levels from 1 April. In a dry season or year this might be brought forward by two weeks, in a wet season or year this may be delayed by a week.

Winter season: Aim to achieve winter pen levels by 30 November. In a dry season or year this might be delayed by two weeks, in a wet season or year this may be brought forward by a week.

Table 11: Current target water levels in summer and in winter for Bridgwater & Pawlett

Water level control structure	Grid Ref.	Summer level (m AOD)	Winter level (m AOD)
Summerway Rhyne Tilting Weir Summerway Rhyne	ST 3236 3702	3.63	Not penned
Bower Lane South Tilting Weir Bower Lane South	ST 3230 3703	Unknown	Not penned
Pawlett Mead Drove Sluice Brickyard Rhyne	ST 3088 4273	Unknown	Not penned
Brick Yard Clyce Penning Structure Brickyard Rhyne	ST 2968 4207	3.88	Not penned
Black Rock Clyce Black Rock Rhyne	ST 2850 4431	Unknown	Not penned
Dunwear Ponds Outfall	ST 3105 3583	Unknown	Not penned
Park Wall Tilting Weir Junction of Summerway, Park Wall Middle and Park Wall North Rhynes	ST 3276 3682	3.63	Not penned
Dunwear penning structure Dunwear Rhyne	ST 3187 3656	4.82	(to be added)
Motorway East Ditch penning structure Motorway East Ditch	ST 3143 4094	Unknown	(to be added)
Motorway West Ditch penning structure Motorway West Ditch	ST 3151 4092	Unknown	(to be added)

Notes:

1. The water level range follows the principle established in Proposal 9 that a 'normal water level' lies within 50mm of the level specified within the Plan.
2. The Environment Agency and the IDB have agreed to meet three weeks before the normal operating date to confirm summer/ winter penning dates based on catchment conditions.

Proposal 3: The current maintenance of the Main Rivers will continue to be undertaken by the Environment Agency.

Reason: The Environment Agency has reviewed its procedures for maintaining designated Main Rivers within the Plan area. It believes that its current maintenance programme helps to achieve favourable condition and provides adequate water supply and evacuation as required in the watercourses throughout the area. The Environment Agency has no plans to change its programme in the immediate future, but its maintenance procedures are under periodic review. 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.

9.2. Proposed changes to water control infrastructure

Natural England has advised the Parrett IDB that the management of water in the winter months on the Pawlett Hams part of Bridgwater Bay SSSI has been, and currently remains, one of the principal reasons why the SSSI is not achieving favourable condition. Establishing as suitable winter penning level on the Pawlett Hams part of Bridgwater Bay SSSI is therefore a key objective of the new WLMP.

The main penning structure for the SSSI (Cobb's Leaze Penstock) is in poor condition and can no longer be relied on to maintain the desired summer level. Instead, levels have been maintained in recent dry summers by closing the sluice door in the main flood banks.
The outfalls at Cobb's Leaze Clyce and at West Clyce are open and free draining during winter, resulting in low water levels across the IDB system and the SSSI being recorded in an unfavourable condition.

A number of capital improvement works have recently been carried out on the Pawlett Hams part of Bridgwater Bay SSSI by the Parrett IDB (in winter 2008 – 2009) in order to help achieve the objective of favourable condition. These recent works are listed in Table 12.

Table 12: Recently completed capital improvement works by the Parrett IDB to help achieve favourable condition on Pawlett Hams

IDB Action	Description of the completed actions to help achieve favourable condition on Pawlett Hams (locations of structures are shown on Map 9)
A	**Cobb's Leaze Penstock - (ST 2769 4372):** Replace existing structure with new tilting weir. Remove the existing penstock, from the upstream face of the structure. Modify the upstream wing walls and extend the reinforced concrete apron to form a base to accept a new self contained tilting weir. Install new fencing and safety handrailing.
B	**West Clyce - (ST 2680 4177):** Install trench sheet dam across channel immediately upstream of West Clyce with small hand operated tilting crest incorporated.
C	Construct three new culverts to improve water distribution and conveyance.

Proposal 4: Capital improvement works will be carried out by the Parrett IDB in the Plan area for Health and Safety reasons.

Reason: The Parrett IDB need to undertake some capital improvement work on other water control structures so that they may be operated safely by IDB staff, and to ensure that these structures do not provide an unacceptable risk to the general public. These proposed capital improvements are set out in Table 13.

The Environment Agency has carried out site assessments using a national Public Safety Risk Assessment system. Substantial upgrades for improved public safety and operator safety have been undertaken since 2002. The majority of sites within the Plan area have been completed, with the remainder of identified sites to be finished by mid 2009.

Table 13: Proposed capital improvement works to Parrett IDB structures for health and safety reasons

Asset No.	Description of the proposed actions required for health and safety reasons (location of structure shown on Map 7)
BP001	**Location: Summerway Tilting Weir** Add mesh to handrails
BP002	**Location: Bower Lane Tilting Weir** Add mesh to handrails & warning signs
BP004	**Location: Pawlett Mead Drove Sluice** Add mesh to handrails
BP005	**Location: Walpole Rhyne Sluice** Provide safety handrails
BP006	**Location: Brickyard Clyce Penning Boards** Provide safety handrails
BP007	**Location: Gaunts Clyce** Provide safety handrails, add mesh to fencing and provide warning signs
BP008	**Location: Supply Rhyne Intake** Add guard to tractor PTO, improve fencing around site
BP009	**Location: West Clyce** Improve fencing, provide safety handrails and warning signs
BP010	**Location: Cobb's Leaze Clyce** Improve fencing, provide safety handrails and warning signs
BP012	**Location: Westonzoyland Tilting Weir** Add mesh to handrails
BP020	**Location: Parkwall Rhyne Tilting Weir** Improve fencing, add mesh to handrails
BP020	**Location: Summerway/Parkwall Tilting Weir** Provide safety handrails

Proposal 5: The additional gauge boards and telemetry stations recently installed in the Plan area will be operated by the Parrett IDB.

Reason: To improve its capabilities regarding the management of water levels in the Plan area, the Parrett IDB has recently installed additional gauge boards or telemetry stations in the locations set out in Table 14. These telemetry stations will record water levels, and alarms settings have been set up to report status directly to the Drainage Board Office.

Table 14: Recently installed gauge boards or telemetry stations in the Bridgwater & Pawlett

Location	Grid Reference	Notes	Operator
Cobb's Leaze Tilting Weir	ST 2769 4372	Telemetry upstream and downstream	Parrett IDB
West Clyce Tilting Weir	ST 2693 4183	Telemetry upstream	Parrett IDB
Whitehouse Culvert	ST 2750 4270	Telemetry upstream	Parrett IDB

9.3. Proposed changes to target water levels

Proposal 6: The Parrett IDB will trial the target winter water levels set out in Table 15 for a period of 2 – 5 years providing (a) these levels are agreed by the owners and occupiers of the significant majority of the land affected, and (b) these levels are compatible with any agri-environment scheme agreements that exist on the significant majority of the land affected.

Reason: The current winter water levels at the key control structures are not achieving water management for favourable condition in the Pawlett Hams part of Bridgwater Bay SSSI. The recently completed and the proposed improvements to the water control infrastructure outlined above will help the Parrett IDB to achieve water management for favourable condition in the SSSI during the winter months and throughout the year.

The optimum winter water levels for favourable condition at the key control structures in or affecting the Pawlett Hams part of Bridgwater Bay SSSI should be arrived at by a series of trials conducted over a number of years during this WLMP. The winter target water levels to be tested at the key control structures are shown in Table 15.

Winter season: Aim to achieve winter pen levels by 30 November. In a dry season or year this might be delayed by two weeks, in a wet season or year this may be brought forward by a week.

Table 15: Proposed target winter water levels at key control structures in Pawlett Hams

Structure	Current winter water levels (m AOD)	Proposed target winter water levels in the future (m AOD)
Cobb's Leaze Tilting Weir	Open, and no penning structure to hold a level.	Tilting weir holding 4.75m (usual range 4.70 – 4.80)
West Clyce Tilting Weir	Open, and no penning structure to hold a level.	4.75 (closed in dry conditions) (usual range 4.70 – 4.80)

Notes:
1. Cobb's Leaze Tilting Weir was built in 2008 to replace Cobb's Leaze Penstock.
2. The water level range follows the principle established in Proposal 9 that a 'normal water level' lies within 50mm of the level specified within the Plan.
3. The Environment Agency and the IDB have agreed to meet three weeks before the normal operating date to confirm summer/ winter penning dates based on catchment conditions.

9.4. Proposed changes to operational procedures

Proposal 7: The Parrett IDB will change the winter operation of key control structures to implement Proposal 6.

Reason: The current operation of key control structures in winter is not achieving water management for favourable condition in the Pawlett Hams part of Bridgwater Bay SSSI. The recently completed and the proposed improvements to the water control infrastructure outlined above should help the Parrett IDB to achieve water management for favourable condition in the SSSI during the winter months by adopting the operational procedures described below.

a) The new tilting weir at Cobb's Leaze will be lowered at the end of November to the new winter water level (4.75m) to allow drainage from the Pawlett Hams and provide capacity in the ditch system for winter rainfall and runoff.

b) During and after periods of heavy rainfall to may be necessary to fully lower the tilting weir at Cobb's Leaze.

c) West Clyse is normally closed during dry winter periods and this practice should continue. During and after periods of heavy rainfall it may be necessary to open West Clyse to allow drainage from the Pawlett Hams.

Proposal 8: The Parrett IDB will change the operation of key control structures on the Pawlett Hams part of Bridgwater Bay SSSI to achieve the summer pen levels as described in Table 10.

Reason: The current target water levels in spring, summer and autumn are known to be achieving favourable condition for the Pawlett Hams part of Bridgwater Bay SSSI. However, the building of new infrastructure to provide winter water levels for favourable condition mean that different operational procedures are required to achieve the current summer water levels, as described below:

a) The new tilting weir at Cobb's Leaze will be lowered at the beginning of April to help establish and maintain the existing summer (5.42m). The tilting weir will be able to maintain the summer level without needing to close the sluice gate in the main flood banks.

b) West Clyse is normally closed during the summer and this practice should continue.

Proposal 9: The Parrett IDB will adopt the principle that (a) a 'normal operating date' lies within two weeks of the date given in the Plan, and (b) a 'normal water level' lies with 50mm the level specified within the Plan, unless the Plan indicates otherwise.

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 held both 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'.

In order to allow flexibility in the system so that it can better respond to the season, the Parrett IDB proposes to adopt the principle that a 'normal operating date' lies within two weeks of the date given in the Plan and a 'normal water level' lies within 50mm the level specified within the Plan, unless the Plan indicates otherwise. The Environment Agency and the IDB have agreed to meet three weeks before the 'normal operating date' 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, and those described in Section 12 – Contingencies, then consultation with Natural England will take place.

Proposal 10: The Environment Agency will complete its review of the operation of Dunball Sluice in consultation with the IDB, and will agree the conditions when water levels in the King's Sedgemoor Drain can be lowered in advance of floodwater arriving at the Sluice in order to reduce the risk of damage being caused by the anticipated flood.

Reason: The Environment Agency and the Parrett IDB are jointly looking at the feasibility of pre-emptive lowering of Main Rivers affecting the Plan area, in advance of extreme summer rainfall events. This work is currently in the early stages of investigation.

The operation of Dunball Sluice is recognised as being critical for flood risk management in the East Bridgwater area where it drains via Chedzoy Clyce. High levels and high flows in the King's Sedgemoor Drain can cause flooding in adjacent areas and so the operation of Dunball Sluice is critical during an extreme event, especially in summer.

9.5. Proposed changes to operational responsibilities

There are no changes in operational responsibilities currently planned within the Bridgwater and Pawlett area, but this matter will be kept under review by the Drainage Board and the Environment agency.

9.6. Proposed changes in maintenance practices

Proposal 11: The Drainage Board will review its maintenance of Viewed Rhynes with a view to changing some of these practices in order to further conservation and biodiversity of the watercourses in the Plan area.

Reason: The Parrett IDB will complete its review of the procedures for maintaining the Viewed Rhynes within the Pawlett Hams part of Bridgwater Bay SSSI, and the rest of the Plan area it is responsible for. In consultation with Natural England and ratepayers, the Parrett IDB proposes to change some of its current maintenance practices to further conservation and biodiversity in the watercourses in the Plan area. Where these proposed changes in maintenance involve watercourses in the SSSI, approval for the changes will be secured from Natural England before they are implemented.

Proposal 12: The Environment Agency, in consultation with the Parrett IDB, will review the non-routine maintenance of Main Rivers, including de-silting, within and adjacent to the Plan area so that the watercourses provide the conveyance that best meets the agreed objectives for the area and is compatible with environmental and other obligations.

Reasons: The Environment Agency and the Parrett Drainage Board are currently reviewing the non-routine maintenance of Main Rivers within 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 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 King's Sedgemoor Drain is not tidal but silt also accumulates in this Main River over time. The value of non-routine de-silting of Main Rivers is being studied by the Environment Agency.

10. Other proposed actions

It is anticipated that an ongoing monitoring programme of long-term changes in the plant and animal communities of the Levels and Moors 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.

11. Unresolved matters

The potential effects of climate change and sea level rise on the Bridgwater and Pawlett area are unclear at present. Current studies by the Environment Agency (Parrett Estuary Flood Management Strategy), and others, will inform the Parrett IDB on these matters and the mitigation or adaptation required in water management to accommodate these impacts.

There are no other unresolved matters regarding this Water Level Management Plan.

12. Contingency measures

12.1. 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.

12.2. 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.

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 or orders may be issued.

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.

12.3. Pollution

In the event of a pollution incident being noted, assistance will be sought immediately from the Environment Agency's incident pollution hotline on 0800 80 70 60.

13. Monitoring arrangements

Several organisations are involved in monitoring environmental information that is relevant to the Water Level Management Plan, as set out in Table 16.

Table 16: Monitoring arrangements for Bridgwater and Pawlett

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.
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; • Shoreline management and alignment.
Natural England	• Plant and animal communities; • Land management for conservation.

14. 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 17.

Table 17: Amendments agreed during the period of the Plan

No.	Date	Amendment	Agreed

15. 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.

16. Timetable of actions: Bridgwater and Pawlett WLMP

	Proposed continuation of current good practice	
1:	The current summer penning levels in the watercourses in the Pawlett Hams part of Bridgwater Bay SSSI will continue to be maintained by the Drainage Board.	**Ongoing**
2:	The current summer and winter penning levels in the other watercourses of the Plan area outside the designated sites will continue to be maintained by the Drainage Board.	**Ongoing**
3:	The current maintenance of the Main Rivers will continue to be undertaken by the Environment Agency.	**Ongoing**
	Proposed changes to water control infrastructure	
4:	Capital improvement works will be carried out by the Parrett IDB in the Plan area for Health and Safety reasons.	**Complete by end 2012**
5:	The additional gauge boards and telemetry stations recently installed in the Plan area will be operated by the Parrett IDB.	**Complete by end 2010**
	Proposed changes to target water levels	
6:	The Parrett IDB will trial the target winter water levels set out in Table 15 for a period of 2 – 5 years providing (a) these levels are agreed by the owners and occupiers of the significant majority of the land affected, and (b) these levels are compatible with any agri-environment scheme agreements that exist on the significant majority of the land affected.	**Winter 2009**
	Proposed changes to operational procedures	
7:	The Parrett IDB will change the winter operation of key control structures to implement Proposal 6.	**Winter 2009**
8:	The Parrett IDB will change the operation of key control structures on the Pawlett Hams part of Bridgwater Bay SSSI to achieve the summer pen levels described in Table 10.	**Summer 2009**
9:	The Parrett IDB will adopt the principle that (a) a 'normal operating date' lies within two weeks of the date given in the Plan, and (b) a 'normal water level' lies with 50mm the level specified within the Plan, unless the Plan indicates otherwise.	**Immediate**
10:	The Environment Agency will complete its review of the operation of Dunball Sluice in consultation with the IDB, and will agree the conditions when water levels in the King's Sedgemoor Drain can be lowered in advance of floodwater arriving at the Sluice in order to reduce the risk of damage being caused by the anticipated flood.	**Complete by end 2010**
	Proposed changes to operational responsibilities	
	No proposals	
	Proposed changes to maintenance practices	
11:	The Drainage Board will review its maintenance of Viewed Rhynes with a view to changing some of these practices in order to further conservation and biodiversity of the watercourses in the Plan area.	**Complete by end 2010**
12:	The Environment Agency, in consultation with the Parrett IDB, will review the non-routine maintenance of Main Rivers, including de-silting, within and adjacent to the Plan area so that the watercourses provide the conveyance that best meets the agreed objectives for the area and where it is compatible with environmental and other obligations.	**Complete by end 2010**