

# North Drain Water Level Management Plan

## Lower Brue Drainage Board and Upper Brue Drainage Board

Approved April 2010

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## 1. Approval of the Water Level Management Plan

This Water Level Management Plan has been prepared by the Upper Brue and Lower Brue Drainage Boards for the North Drain area of the Drainage Board Districts. Contributions to the WLMP have been received from the Environment Agency, Natural England and others.

<b>Water Level Management Plan – General details</b>			
Plan area	North Drain area (Lower Brue and Upper Brue Drainage Boards)		
SSSI(s) covered	Tealham & Tadham Moors SSSI Westhay Moor SSSI		
Region / Area	Somerset Levels and Moors		
IDB Lead officer	Philip Brewin, Ecologist		
<b>Approval of the Water Level Management Plan</b>			
"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."			
<b>Position &amp; Organisation</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
Chairman – Lower Brue Drainage Board	Jeff Fear		
Chairman – Upper Brue Drainage Board	Martin Watts		
Area Manager – Environment Agency	Nick Gupta		
Area Manager – Natural England	Mark Watson		

## **2. Introduction**

### **2.1. Purpose of the Plan**

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

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

- Tealham and Tadhams Moors SSSI (917 ha; notified in 1985). Currently, 80% of the site is in unfavourable condition due to low water levels and the restricted availability of splash conditions in winter and spring. Therefore, one of the aims of this WLMP is to identify the water management necessary to bring this SSSI into favourable or recovering condition.
- Westhay Moor SSSI (513 ha; notified in 1985). Currently, 54% of the area being in an unfavourable condition due to inappropriate water management. Therefore, one of the aims of this WLMP is to identify the water management necessary to bring this SSSI into favourable or recovering condition.

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

The WLMP will assist the Drainage Authorities, such as the Upper Brue and Lower Brue Drainage Boards 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 Plan area covers 9900 acres (4023 hectares) of the Brue Valley which is influenced by the North Drain which flows through areas managed by the Upper Brue and Lower Brue Drainage Boards. The location and extent of the Plan area is shown on Map 1.

The drainage area is bounded to the south by the River Brue. To the north-west lies the slightly higher land around Mark, and to the north lies the higher ground that makes up the Isle of Wedmore, from Westham in the west to Panborough in the north east. To the east lies Godney and the boundary then sweeps south towards the outskirts of Glastonbury and re-joins the River Brue.

### **2.3. Responsibility for preparation and implementation of the Plan**

The Upper Brue and Lower Brue Drainage Boards are responsible for the preparation, overall monitoring and review of this WLMP on behalf of the Drainage Authorities operating in the area, namely the Drainage Boards, the Environment Agency, Somerset County Council, Mendip District Council and Sedgemoor District Council. Each Drainage Authority has contributed information to enable the WLMP to be produced by the Drainage Boards, and the end result is a collaborative effort by all six Authorities. Each Drainage Authority is responsible for implementing and monitoring their own actions within the WLMP, and for reporting on these matters to the Drainage Board as appropriate.

The Drainage Boards 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 Upper Brue and Lower Brue Drainage Boards at their respective meetings in October 2009 and endorsed for purposes of consultation with drainage ratepayers, Statutory Bodies and other organisations. Consultation on the WLMP will take place during a four week period in November and December 2009.

Consultation responses, and any amendments to the WLMP arising from the consultation, were considered by the Boards in March 2010, before recommending the WLMP for approval by the Boards at their respective meetings.

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

The following criteria will be used by the Lower Brue and Upper Brue Boards 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 Lower Brue and Upper Brue Boards will satisfy themselves 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 Boards to achieve;
- Will fulfil all the legal obligations of the Boards, 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 Lower Brue and Upper Brue Boards will satisfy themselves 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 Boards 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 Boards 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 Lower Brue and Upper Brue Boards will satisfy themselves 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 Boards 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 Boards, including those related to achieving favourable condition and biodiversity;
- Does not carry a significant risk that the Boards 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 Lower Brue and Upper Brue Boards 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 upland regions of the Brue catchment are characterised by the Polden Hills to the south, the Wessex Vales to the east and the Isle of Wedmore to the north, and water from these areas drains into the low lying Somerset Levels and Moors. The Polden Hills are characterised by Lias, whilst the eastern scarplands are characterised by Cornbrash, Oolitic limestones and the Kellaway Beds of impermeable clay. The coastal Levels are a wide belt of deep and stoneless calcareous clay soils over marine alluvium.

The inland Moors consist of deep organic peat soils derived from raised bog and fen peat over the last 6000 years. The land surface varies from levels of 8m above Ordnance Datum Newlyn (ODN) near the River Brue to 2m ODN further inland. Some flood water is prevented from inundating the low lying land by embankments along both banks of the River Brue.

#### **3.2. Water supply**

The average annual rainfall for the Brue Valley catchment area from 1999 to 2007 is 773 mm. This figure has been calculated using five Environment Agency observer rain gauges located within and around the Brue Valley catchment area.

The River Sheppey is the principal watercourse supplying water in the North Drain Plan area. To a lesser degree, water may also be supplied from the River Axe catchment area and Panborough Relief Channel Rhyne, although these watercourses are principally for drainage. The Sheppey divides at North Drain Inlet; one part into North Drain which flows west through Westhay, Tealham and Tadhams Moors before discharging into the River Brue at the North Drain Pumping Station. The other part of the Sheppey flows along the southern edge of the Plan Area into Decoy Rhyne or James Weir River before joining Division Rhyne and discharging into the Brue.

The area of land on the left bank of the River Axe, between Cocklake and Panborough including Wedmore Moor, Yeo Moor and Panborough Moor, drains into the Panborough Drain via Wedmore Moor Rhyne and through what is sometimes referred to as the 'Panborough Gap' i.e. a lowering in the Wedmore ridge at Panborough. The area of land that drains this way represents approximately 15% of the whole Upper Axe Drainage Board catchment area. This water feeds the Panborough Drain which flows west along the upper part of the plan area. In extreme conditions, the Panborough Drain may overflow into the Panborough Relief Channel. The Panborough Relief Channel feeds Chine Drove to the north west of Westhay Moor before joining the North Drain west of the Plan area. The Panborough Relief Channel is also fed by water from the North Drain at Lewis Sluice.

The River Brue originates in the Wessex Vales, near Bruton, flowing westwards through the low-lying peaty Moors and the slightly higher clay Levels before discharging to the Bristol Channel at Highbridge. A tidal sluice at Highbridge excludes the sea, thereby protecting the low-lying land from tidal inundation.

The Brue Valley has some of the lowest lying land in Somerset, with some land lying four metres below the highest tide levels in the nearby Bristol Channel. Where the Brue crosses the peaty Moors it acts as a 'high-level carrier' conveying the water from the upland catchments at levels which are higher than the adjacent land. Most of the water in the Moors lies in a network of man-made channels (known locally as 'rhynes') often running in parallel to the river, but at a lower level. The rhynes provide a dual role of irrigating the Moors (acting as wet fences and to

supply water for livestock) and draining the areas after periods of high rainfall. The water from these inland rhyne is lifted up to river level by pumping stations.

Details of these supply channels and inlets can be found in Section 3.7.1 and the locations of these structures are shown on Map 3.

### 3.3. Drainage

The principal outlets for water from the Plan area are from the North Drain to the Brue in the west (via the Pumping Station), and from Division Rhyne to the Brue in the south east. Division Rhyne forms part of the southern boundary of the Plan area. It starts south of Upper Crannel Farm, where the Hartlake turns into Division Rhyne, and ends at its discharge point with the Brue. Division Rhyne drains also water from Decoy Rhyne and James Wear River into the Brue.

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

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

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

- a) Provide wet fences around the fields and to allow the watering of livestock;
- b) Maintain an appropriate groundwater table during the growing season;
- c) Maintain the conservation interest of the watercourses.

The private ditches in some parts of the Plan area are maintained at a lower level by the landowner by means of private drainage schemes consented by the Drainage Board.

### 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.

There are three FRM systems which geographically cover the North Drain Plan Area:

- **FR/14S017 North Drain** (High)
- **FR/14/S114 Sheppey Lower** (Medium)
- **FR/14/S018 Division Rhyne** (Low)

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

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

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

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

The Drainage Boards manage their assets in the Plan area under comparable asset management systems.

### **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 Catchment Flood Management Plan* - A summary version is available on the Environment Agency website.
- *Catchment Abstraction Management Strategies (CAMS)* - These documents are currently being revised for re-release in 2011.
- *Water Framework Directive and South West River Basin Management Plan* - The plan is available on the Environment Agency website.

#### **3.5.1. Catchment Flood Management Plan**

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

The Environment Agency proposes to adopt Policy Option 3 for the floodplains of the Brue catchment. The Environment Agency, and others, must continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase over time).

#### **3.5.2. Catchment Abstraction Management Strategy**

To ensure water resources are managed in a sustainable way the Environment Agency has developed Catchment Abstraction Management Strategies (CAMS) to assess the water availability in catchments in England and Wales. The Parrett CAMS (published in March 2006) and the Brue, Axe and North Somerset Streams CAMS (published in May 2006) are the current

documents in circulation. 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 (BALANSS)

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 Brue). 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 that 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. There are eight Main Rivers within the Plan area; the River Brue, North Drain, Panborough Drain, Panborough Relief Channel, the River Sheppey, Decoy Rhyne, James Wear Rhyne and Division Rhyne. The River Brue flows through the southern boundary of the Plan area.

The eight Main Rivers within the Plan area are summarised in Table 1. The locations of the Main Rivers are illustrated on Map 2. The control structures on these watercourses are listed in Tables 2 - 4.

#### **3.6.2. IDB watercourses**

The Drainage Boards maintain and controls a network of watercourses (known as "Viewed Rhynes") within the Plan area which drain into the Main Rivers. These arterial watercourses extend to over 105 kilometres in the Plan area. Summary details of the Viewed Rhynes maintained by the Drainage Boards are set out in Table 1 below. The locations of the Viewed Rhynes are shown on Map 2. The control structures on these watercourses are listed in Tables 2 – 4 below.

#### **3.6.3. Private ditches**

In addition to the Main Rivers and Viewed Rhynes, ordinary watercourses 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 the North Drain area of the Brue Valley**

No.	Watercourse	Operating authority	Length (m)	Location & connections	Typical maintenance regime	Control structures (see Tables 2 - 4)
7531	North Drain	EA	10170	North Drain flows from the Sheppey in the east, through the centre of the Plan Area and joins the River Brue in the west of the area.	W3 specification on all three sections of the river, cut once or twice between July and October depending on review. Some poor access in one section.	North Drain Pumping Station North Drain Outfall (gravity) North Drain Inlet (Hurn Weir) Lewis Drove Tilting Weir
7533	Panborough Drain	EA	7500	From Panborough village to the west of the Plan area where it joins North Drain south of Tealham Moor Drove.	W3 specification at Tealham and Tadham SSSI, cut twice in July and October. W2 specification at Westhay Moor SSSI, cut twice between July and October, poor access on right bank.	Panborough Boards
7532	Panborough Relief Channel	EA	830	This drain flows from North Drain at Lewis Drove Tilting Weir, towards the Panborough Drain, and into Chine Drove Rhyne.	W3 specification. Cut twice in July and October.	Panborough Relief Channel Weir
7471	River Brue	EA	36650	The Brue enters to Plan area to the south at Westhay village and flows westward, leaving the Plan area upstream of Huntspill.	Split into 3 section this river is maintained using W6 (FB) specifications. The river is cut once or twice (between July and October) depending on conditions.	Hackness Sluice Totney Drove Inlet 1 Totney Drove Inlet 2 Totney Drove Inlet 3
7563	River Sheppey	EA	8680	The Sheppey forms the most eastern boundary of the Plan area before heading west to Lower Godney.	W1 specification twice a year, in June and August. Flail both banks, Bradshaw all submerged and emergent weed on both banks.	Hurn Boards Highbeech Boards (Lower Godney Boards) Fenny Castle Gauging Station
7561	Decoy Rhyne	EA	2650	From Lower Godney this rhyne splits from the Sheppey for 2650m before joining Division Rhyne.	W3 and W6 (FB) twice yearly, in August or June, and October or September	Ham Boards
7562	James Wear River	EA	2000	From Lower Godney this river splits from the Sheppey for 200m before joining Division Rhyne.	W3 and W6 (FB) twice yearly, in August or June, and October or September	James Boards
7602	Division Rhyne	EA	6210	Originating on the river Hartlake, this rhyne forms the southern most boundary of the Plan area until its confluence with the Brue near Westhay village.	W6 (FB) twice annually in June and August. Both banks are flailed, although there are access problems from the right bank.	Upper Crannel Farm Sluice (Foundation Wall Clyse)

**Table 1 (continued): Schedule of arterial watercourses in the North Drain area of the Brue Valley**

No.	Watercourse	Operating authority	Length (m)	Location & connections	Typical maintenance regime	Control structures (see Tables 2 - 4)
W 1	Little Rhyne	LB IDB	2016	Mr Duckett's gate to Sand Drove.		
W 2	Little Rhyne	LB IDB	1979	The Bungalow to Jacks Drove.		
W 3	Bounds Rhyne	LB IDB	1188	North Drain to River Brue.		
W 4	Blakeway Rhyne	LB IDB	472	East side of road from Panborough Drain to North Drain.		
W 5	Totney Drove Rhyne	LB IDB	1934	South side from Blakeway to Sand Drove + new section of Rhyne from Totney Drove to Little Rhyne (running north from White Railings).		W05
W 6	Totney Drove Rhyne	LB IDB	3039	Each side from Sand Drove to Bounds Rhyne.		
W 7	Totney Drove Rhyne	LB IDB	3191	Kid Gate Drove each side from Bounds Rhyne to Tealham Moor Drove.		W03
W 8	Aller Moor Drove Rhyne	LB IDB	839	South side of North Chine Drove from Bounds Ditch to Blakeway and length from this to North Drain.		
W 9	Aller Moor Drove Rhyne	LB IDB	1484	North side towards Jacks Drove for approximately 390 metres then turning through 90° to Old Rhyne. On south side towards Jacks Drove for approximately 590 metres then turning through 90° to North Drain.		
W 10	Burnt Drove Rhyne	LB IDB	1586	South side from Blakeway to Sand Drove.		
W 11	Burnt Drove Rhyne	LB IDB	1576	North side from Sand Drove towards Jacks Drove for approximately 57 ropes (350 metres) turning through 90° to North Drain. South side from Sand Drove to Jacks Drove.		
W 12	Yellow Batches Rhyne	LB IDB	1391	Rhynes each side of Drove from Jacks Drove to Bounds Rhyne.		
W 13	Sand Drove Rhyne	LB IDB	2641	Rhynes each side from Totney Drove to Old Rhyne.		
W 14	Jacks Drove Rhyne	LB IDB	1949	Rhynes each side from Totney Drove to Old Rhyne.		
W 15	Tealham Moor Drove Rhyne	LB IDB	2489	Rhynes each side from Jacks Drove to Kid's Gate Drove.		
W 22	Boundary Ditch	LB IDB	761	From North Drain in a southerly direction to Rose Cottage		

**Table 1 (continued): Schedule of arterial watercourses in the North Drain area of the Brue Valley**

No.	Watercourse	Operating authority	Length (m)	Location & connections	Typical maintenance regime	Control structures (see Tables 2 - 4)
UB 1	North Chine Drove North	UB IDB	2409	Along north side of North Chine Drove, from Panborough Relief Channel west to Boundary Rhyne.		
UB 2	North Chine Drove South	UB IDB	1502	Along south side of North Chine Drove, from Panborough Relief Channel west to Parsons Drove.		
UB 3	London Drove	UB IDB	1219	Both sides of London Drove from North Chine Drove south to the North Drain.		London Drove Outfall
UB 3	Parsons Drove	UB IDB	1020	Both sides of Parsons Drove from North Chine Drove south to the North Drain.		Parsons Drove Outfall
UB 4	Oak Drove	UB IDB	1296	Both sides of Oak Drove from North Chine Drove south to the North Drain.		Oak Drove Outfall
UB 4	Daggs Lane Drove	UB IDB	1215	Both sides of Daggs Lane Drove from North Chine Drove south to the North Drain.		Daggs Lane Drove Outfall
UB 5	Lewis Drove Rhyne	UB IDB	2208	In two parts: (a) along the east side of Lewis Drove from Westhay Morr Drove northwards to connect with the North Drain, (b) to the west of Section (a) and now known as Dog Leg Ditch.		Lewis Drove Rhyne Inlets
UB 6	Galtons Canal	UB IDB	2162	From the confluence of Decoy Rhyne/River Brue in the south, up to the North Drain.		Peacock Farm Penning Boards
UB 6	Whites Drove Rhyne	UB IDB	1451	North side of Westhay Moor Drove and then east side of Whites Drove, to connect with the North Drain.		Whites Drove Inlet
UB 7	Leaze Rhyne & Branch	UB IDB	3833	From the River Sheppey near Hurn Farm, north westwards to the Panborough Drain.		Leaze Rhyne Inlet
UB 9	Yeaps Drove Rhyne	UB IDB	1129	In two parts on the south side of Leaze Rhyne & Branch.		
UB 10	Hurn Drove Rhyne & Straight Drove Rhyne	UB IDB	2232	Network of rhyne in the Hurn Drove area, connected to the River Sheppey.		Hurn Drove Inlet, Hurn Drove Straight Drove Inlet
UB 11	Tilleys Drove Rhyne	UB IDB	1443	Connects with the upstream end of Westhay Moor Drove Rhyne.		
UB 11	Tripps Drove Rhyne	UB IDB	1592	Along the north side of Tripps Drove.		Godney Crossroads
UB 12	Godney Middle Rhyne	UB IDB	2548	Eastwards through Godney Moor to connect with Hurn Drove Rhyne Straight Drove Rhyne.		Browns Bank, Godney Crossroads, Godney Middle Rhyne Hatch

**Table 1 (continued): Schedule of arterial watercourses in the North Drain area of the Brue Valley**

No.	Watercourse	Operating authority	Length (m)	Location & connections	Typical maintenance regime	Control structures (see Tables 2 - 4)
UB 15	Westhay Moor Drove Rhyne	UB IDB	2698	South side of Westhay Moor Drove, with connection to Lewis Drove Rhynes.		Lewis Drove Rhyne Inlets, SWT Site Feed Hatch, Westhay Moor Drove Hatch
UB 18	Course Ditch Godney	UB IDB	2019	South of Decoy Rhyne, connecting at its western end.		
UB 20	Butter Ditch	UB IDB	2081	South of the River Sheppey, connected to Godney Middle Rhyne.		Browns Bank, Butter Ditch Cut-off , Butter Ditch Inlet
UB 21	Pits Rhyne	UB IDB	1309	Connects with the western end of Division Rhyne.		Pits Rhyne Outfall
UB 22	Black Ditch, Meare	UB IDB	1925	Through West Waste, connecting with Pits Rhyne, Waste Rhyne and Division Rhyne to the north.		
UB 23	Waterleaze Rhyne & Ashton Rhyne	UB IDB	2966	Connects with the Millstream to feed water into East and West Waste.		Waterleaze Inlet Boards, Ashton Inlet
UB 24	Waste Rhyne	UB IDB	3795	Through East and West Waste, and connects to Black Ditch, Ashton Rhyne and to Division Rhyne in the north.		Waste Rhyne Outfall
UB 26	Godney Road Rhynes	UB IDB	4514	Both sides of Godney Road.		
UB 29	Great Withy Rhyne	UB IDB	2292	West side of Great Withy Drove, starting at the Millstream.		Great Withy Rhyne Inlet
UB 35	Moggs Rhyne, Crannel	UB IDB	2388	South from the River Sheppey towards Crannel Farm, connecting to Division Rhyne.		Moggs Rhyne Crannel Inlet
UB 37	Moggs Rhyne, Godney	UB IDB	1104	South and east from Godney Farm to Division Rhyne.		Moggs Rhyne Godney Outfall
UB 39	Shotts Rhyne & Frogmore Rhyne	UB IDB	2970	Through North Moor west to the River Sheppy.		
UB 41	Ashmoor Rhyne	UB IDB	1441	Through Ash Moor, north of the River Sheppey.		

### 3.7. Structures

#### 3.7.1. Structures controlling inflows

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

**Table 2: Structures controlling inflows to the North Drain area of the Brue Valley**

Asset no.	Inlet	Grid ref.	Owned by	Operated by
1122475310117 B02008	North Drain Inlet (from the River Sheppey into the North Drain)	ST 4929 4396	EA	EA
1122475630104 B01001	Hurn Weir (from the Sheppey to North Drain, or to James Wear and Decoy Rhyne)	ST 4936 4377	EA	EA

#### 3.7.2. Structures controlling outflows

A number of structures are currently operated to control the water leaving the Plan area, as set out in Table 3. Any proposed changes to these arrangements are set out in Section 9.

**Table 3: Structures controlling outflows from the North Drain area of the Brue Valley**

Asset no.	Inlet	Grid ref.	Owned by	Operated by
1122475310104 B01001	North Drain Pumping Station	ST 3990 4485	EA	EA
1122475310102 B01001	North Drain Outfall	ST 3992 4482	EA	EA

#### 3.7.3. Structures controlling water levels within the area

A large number of structures are currently operated to control water flows and water levels in the network of arterial watercourses within the Plan area. These are summarised in Table 4. Any proposed changes to these arrangements are set out in Section 9. The current water level management regime at key control structures is shown in Table 7.

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

**Table 4: Schedule of control structures affecting water management in the North Drain area of the Brue Valley**

Control structure	Grid ref.	Owned by	Operated by	Watercourse (see Table 1)	Description	Dimensions & operating range
North Drain Pumping Station	ST 3990 4485	EA	EA	North Drain	Pumping Station	This station contains one variable electric pump and two diesel pumps, with a capacity of 5.52 cumecs. Telemetry is situated on the u/s and d/s faces of this structure.
North Drain Outfall	ST 3992 4482	EA	EA	North Drain	Tidal Flap plus 3 tilting weirs	Recently upgraded, this structure now consists of three tilting weirs 1.07m high on the u/s face, and three tide flaps 1.83m high x 1.40m wide on the d/s face. All the tilting weirs are electronically operated. The total headwall structure size is 7.0m wide, 1.7m thick and 3.2m high with 150mm x 150mm stoplog rebates on the upstream. Arrangement prior to improvements in 2009: Three culverts each had a cast iron tidal flap, 1.83m high, 1.40m wide, at the downstream face. The two outer waterways had penstocks at the upstream face and the central waterway contains a tilting weir 1.07m high. Both the penstocks and the tilting weir were electronically operated.
North Drain Inlet	ST 4929 4396	EA	EA	North Drain	Fixed weir and penning boards	Concrete headwall: 2.6m wide, 0.5m deep and 300mm thick, with 600mm long, 390mm deep rebates to accommodate penning boards.
Hurn Weir	ST 4936 4377	EA	EA	River Sheppey	Penning boards	Concrete headwall 9.30m long, 1.83m wide, with two central penning bays (2.74m) to accommodate timber penning boards. These boards are dropped into 90 x 90mm rebates.
Lewis Drove Sluice/TW	ST4679 4467	EA	EA	North Drain	Tilting weir	3.05m wide, 1.22m high tilting weir, contained in a 3.5m long, 7.3m wide, 2.0m high concrete headwall. The weir is a manually operated electrically controlled structure. 300mm x 150mm stoplog rebates are situated either side of the weir.
Panborough Relief Channel Weir	ST4692 4542	EA	EA	Panborough Relief Channel	Fixed weir	4.6m long, 690mm wide concrete headwall with a 2.13m long 0.86m deep lowered central section with acts as a weir. 150mm x 150mm rebates accommodate penning boards to alter the level of the weir.
Panborough Boards (Blakeway Boards)	ST 4414 4528	EA	EA	Panborough Drain	Stoplogs	600mm high vertical metal channels fixed to the bridge abutments which accommodate 2.3m long timber penning boards.
Hackness Sluice	ST 3323 4621	EA	EA	River Brue	Large penstock	The twin gates are 7.6m wide and consist of a 2.4m vertical lifting section and a 1.2m top tilting section. The vertical lifting gates have counterweights with chain suspension whilst the tilting crests have wire rope operation. The structure is 31.4m long, 19.5m wide and 10.8m high.
Highbeech Boards (Lower Godney Boards)	ST 4713 4269	EA	EA	River Sheppey	Penning boards	Concrete block headwall with two penning bays side by side with metal channels to accommodate 2.20m long timber penning boards, 1.7m boards high.
Fenny Castle Gauging Station	ST 4983 4385	EA	EA	River Sheppey	Gauging station – weir.	350mm high, 2m wide triangular profile weir which extends approximately 6m across the channel with a crest height of 5.79m.
Ham Boards	ST 4696 4282	EA	EA / Farmer	Decoy Rhyne	Penning boards	Concrete headwall structure with adjacent penning bays 1.63m long, with rebates for timber stoplogs.
James Boards	ST 4551 4248	EA	EA / Farmer	James Wear River	Penning boards	1.6m high, 5m long and 1.1m thick concrete headwall structure with metal channels to accommodate 1.95m long timber penning boards.

**Table 4 (continued): Schedule of control structures affecting water management in the North Drain area of the Brue Valley**

Control structure	Grid ref.	Owned by	Operated by	Watercourse (see Table 1)	Description	Dimensions & operating range
Tealham RWLA S1	ST 4083 4504	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA S2	ST 4114 4526	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA S3	ST 4125 4544	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA S4	ST 4096 4451	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA S5	ST 4116 4465	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA SL1	ST 4148 4562	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA SL2	ST 4091 4557	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA SL3	ST 4078 4535	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA SL4	ST 4022 4534	EA	EA	Non Main River	Penning boards	Trench sheet dam stop-log structure.
Tealham RWLA SP1	ST 4089 4435	EA	EA	Brue Inlet	Culvert & penstock	300mm culvert with Penstock valve mounted midway along the culvert
Totney Drove Inlet No 1	ST 4244 4338	EA	EA	River Brue	Penstock	18" culvert with penstock.
Totney Drove Inlet No 2	ST 4292 4315	EA	EA	River Brue	Penstock	18" culvert with penstock.
Totney Drove inlet No 3	ST 4337 4281	EA	EA	River Brue	Penstock	18" culvert with penstock.
W03Totney Drove Penstock	ST 3994 4546	LBIDB	LBIDB	Totney Drove	Penstock	600mm undershot penstock
W05Totney Drove Trench Sheet Dam	ST 4323 4415	LBIDB	LBIDB	Totney Drove	Trench Sheet Dam with circular flap	Ineffective – to be replace by tilting weir in 2010.
W04	ST 3985 4518	LBIDB	LBIDB	Private ditch	Trench Sheet Dam	Potential feed to western end of plan area.
Browns Bank	ST 4798 4276	UB IDB	UB IDB	Butter Ditch Godney Middle Rhyne	Syphon with upstream inlet	Inverted syphon under River Sheppy with inlet penstock from Butter Ditch and secondary inlet from river on downstream side of siphon. Outfall culvert under public highway to G M Rhyne.
Butter Ditch Cut-Off	ST 4755 4262	UB IDB	UB IDB	Butter Ditch	Flap valve	Flap valve operated by local farmers to control flow of water.
Butter Ditch Inlet	ST 4746 4274	UB IDB	UB IDB	Butter Ditch feed from Sheppy	Flap valve & penstock	Flap valve manually raised on chain to admit water from River Sheppy. Penstock closed manually to retain water in Butter Ditch; Operated by local farmers.
Daggs Lane Drove Outfall	ST 4590 4482	UB IDB	UB IDB	Daggs Lane Drove Rhyne	Penning hatch	Not in use.
Godney Crossroads	ST 4742 4348	UB IDB	UB IDB	Tripps Drove Rhyne, Godney Middle Rhyne	Penning hatch	Hinged grate doubles as operating platform.
Godney Middle Rhyne Hatch	ST 4802 4315	UB IDB	UB IDB	Godney Middle Rhyne	Penning hatch	
Great Withy Rhyne Inlet	ST 4908 3976	UB IDB	UB IDB	Great Withy Rhyne Millstream	Flap valve	Cast iron flap valve on masonry headwall operated

**Table 4 (continued): Schedule of control structures affecting water management in the North Drain area of the Brue Valley**

Control structure	Grid ref.	Owned by	Operated by	Watercourse (see Table 1)	Description	Dimensions & operating range
Hurn Drove Inlet	ST 4933 4380	UB IDB	UB IDB	Hurn Drove Rhyne	Flap valve	Submerged chain-operated flap valve on end of culvert feeding water from River Sheppy into Hurn Rhyne via culvert under gateway. Operated by local farmer.
Hurn Drove Straight Drove Inlet	ST 4909 4313	UB IDB	UB IDB	Hurn Drove Straight Drove		
Leaze Rhyne Inlet	ST 4930 4415	UB IDB	UB IDB	Leaze Rhyne	Flap valve	Submerged chain-operated flap valve on end of culvert feeding water from River Sheppy into Leaze Rhyne via culvert under highway. Operating platform on bank of River Sheppy.
Lewis Drove Rhyne Inlets	ST 4651 4373	UB IDB	UB IDB	Westhay Moor Drove Rhyne	Flap valve / disk valve	Double control valves.
London Drove Outfall	ST 4528 4471	UB IDB	UB IDB	London Drove Rhyne	Penning hatch	Not in use.
Moggs Rhyne Crannel Inlet	ST 4915 4279	UB IDB	UB IDB	Moggs Rhyne Crannel River Sheppy	Disk valve	
Moggs Rhyne Godney Outfall	ST 4822 4209	UB IDB	UB IDB	Moggs Rhyne Godney Division Rhyne	Culverted outfall	Headwall on culvert outfall.
Oak Drove Outfall	ST 4634 4477	UB IDB	UB IDB	Oak Drove Rhyne	Penning hatch	Operated by local horticultural site for water supply.
Parsons Drove Outfall	ST 4470 4465	UB IDB	UB IDB	Parsons Drove Rhyne	Penning hatch	Not in use.
Peacock Farm Penning Boards	ST 4445 4314	UB IDB	UB IDB	Galtons Canal	Penning hatch	Not in use.
Pits Rhyne Outfall	ST 4638 4203	UB IDB	UB IDB	Pits Rhyne	Tilting weir	Penning boards on upstream end of culvert lifted manually by climbing down watercourse bank. Downstream flap valve chain-operated by ground-mounted lever.
SWT Site Feed Hatch	ST 4464 4315	UB IDB	UB IDB	Westhay Moor Drove Rhyne	Feed hatch	
Waste Rhyne Outfall	ST 4798 4201	UB IDB	UB IDB	Waste Rhyne Division Rhyne	Penning boards	Penning boards installed by IDB after RWLA scheme implemented on end of 600mm corrugated steel access culvert (gateway).
Westhay Moor Drove Hatch	ST 4664 4370	UB IDB	UB IDB	Westhay Moor Drove Rhyne	Penning hatch	
Whites Drove Inlet	ST 4693 4362	UB IDB	UB IDB	Whites Drove Rhyne	Feed hatch	
Waterleaze Inlet Boards	ST 4848 4033	UB IDB	UB IDB	Waterleaze Rhyne	Tilting weir	

### 3.7.4. Gauge boards

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

**Table 5: Gauge boards operated in the North Drain area of the Brue Valley**

Location of gauge board	Grid reference	Notes	Operator
<b><i>River Brue</i></b>			
Hackness Sluice	ST 3324 4621	Upstream and downstream	EA
Westhay Bridge	ST 4377 4268	Upstream (no longer used)	EA
<b><i>North Drain</i></b>			
North Drain Pumping Station	ST 3990 4485	Upstream and downstream	EA
Blakeway Bridge	ST 4403 4481	Upstream	EA
Lewis Drove Tilting Weir	ST 4680 4468	Upstream	EA
Jack's Drove	ST 4151 4540	Downstream	EA
<b><i>Panborough drain</i></b>			
Panborough Boards	ST 4416 4529	Upstream	EA
Wedmore Rhyne Sluice	ST 4732 4557	Upstream	IDB
<b><i>River Sheppey</i></b>			
Highbeech Boards	ST 4713 4270	Upstream	EA
Nine Acre Bridge	ST 4915 4280	Upstream	EA
North Drain Inlet	ST 4929 4397	Upstream	EA
Fenny Castle GS	ST 4984 4386	Upstream	EA
Hurn Sluice	Currently there is only a backing board downstream of the sluice but no gauge board		
<b><i>Decoy Rhyne</i></b>			
Ham Boards	ST 4697 4282	Upstream	EA
<b><i>Division Rhyne/ Hartlake</i></b>			
Godney Road Bridge	ST 4865 4215	Upstream	EA
<b><i>RWLAs Tealham Moor</i></b>			
RWLA Structure S1	ST 4083 4504	Upstream	EA
RWLA Structure S2	ST 4114 4526	Upstream	EA
RWLA Structure S3	ST 4125 4544	Upstream	EA
RWLA Structure S4	ST 4096 4451	Upstream	EA
RWLA Structure S5	ST 4116 4465	Upstream	EA
RWLA Structure SL1	ST 4148 4562	Upstream	EA
RWLA Structure SL2	ST 4091 4557	Upstream	EA
RWLA Structure SL3	ST 4078 4535	Upstream	EA
RWLA Structure SL4	ST 4022 4534	Upstream	EA

### **3.7.5. Water level telemetry**

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

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

Water level telemetry is also located on the upstream and downstream faces of Hackness Sluice, and river flow telemetry is situated at Fenny Castle (ST 4984 4385) on the Sheppey, and at Westhay on the River Brue (ST 4377 4268), although this station is no longer used. There are non-telemetry Met Office rain gauges at Merryfield (Westhay), Theale and Burton, which are used to give an indication of rainfall in the upstream catchment. The nearest telemetry rainfall intensity gauge is at Priddy to the north of this catchment area.

### **3.8. Abstraction and other hydrological management issues**

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

The Water Act (2003) has introduced a new statutory framework for managing water resources. Under the Act the abstraction of up to and including 20 cubic metres per day (approximately 4,400 gallons per day) from surface water or groundwater does not require a licence from the Environment Agency regardless of the purpose for which the abstracted water will be used. Abstractions above 20 cubic metres per day require a licence, issued by the Environment Agency. The Water Act (2003) also removes a range of exempt activities that currently do not require an abstraction or transfer licence. However, this section of the legislation has not yet been enacted (see the EA website for further information on licensing requirements under the Water Act (2003)).

The Environment Agency will consult the Drainage Boards and Natural England regarding its consideration of any application for an abstraction licence.

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

**Table 6: Abstraction licences in or near the North Drain area of the Brue Valley**

Licence no.	Point name	Description	Max daily vol. (m <sup>3</sup> )	Max annual vol. (m <sup>3</sup> )	Comments
16/52/01 1/S/047	Panborough Rhyne (Point A ) ST 410459	Environmental/ Wetland support			<ul style="list-style-type: none"> <li>• Period of abstraction from 1<sup>st</sup> September – 30<sup>th</sup> June each year.</li> <li>• During period 1<sup>st</sup> September to 30<sup>th</sup> November inclusive: - 2500 cubic meters, at maximum rates of 23 cubic meters per hour and 184 cubic meters per day.</li> <li>• During the period 1<sup>st</sup> December to 31<sup>st</sup> March inclusive: - 30,000 cubic meters, at maximum rates of 81 cubic meters per hour and 650 cubic meters per day.</li> <li>• During the period of 1<sup>st</sup> April to 30<sup>th</sup> June inclusive: - 500 cubic meters, at maximum rates of 23 cubic meters per hour and 184 cubic meters per day.</li> <li>• During the period 1<sup>st</sup> July to 31<sup>st</sup> August inclusive: - No water shall be abstracted.</li> <li>• Water shall be abstracted only at such times as there is an overflow of the North Drain water level control weir at the Agency's North Drain Pumping Station. The Licence Holder will be advised by the Agency when no such overflow occurs and shall cease abstraction until further notice is given that it may be resumed.</li> </ul>
16/52/01 1/S/047	Panborough Rhyne (Point B) ST 412459	Environmental/ Wetland support			
16/52/01 1/S/047	Panborough Rhyne (Point C) ST414458	Environmental/ Wetland support			
16/52/01 1/S/047	Panborough Rhyne (Point D) ST 423458	Environmental/ Wetland support			
16/52/01 1/S/047	Panborough Rhyne (Point E) ST 425458	Environmental/ Wetland support			
16/52/01 1/S/047	North Drain (Point F) ST 408456	Environmental/ Wetland support			
16/52/01 1/S/047	North Drain (Point G) ST 421453	Environmental/ Wetland support			
16/52/01 1/G/050	Borehole at Wedmore ST 430490	Spray irrigation	50	10,000	2 part tariff
16/52/01 2/G/131	Ashton Farm (outside plan area) ST 414497	General Farm and Domestic	24	8,760	
16/52/01 2/G/129	Borehole (outside plan area) ST 430490	Spray Irrigation	60	9,300	2 part tariff

### 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.

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 predominant, most extensive 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 Drainage Boards recognise 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 Boards also recognise that additional investment in the water management system will be required in the years to come in order to achieve the combined objectives of conservation and farming in the Plan area.

Livestock farming is the primary land use, with improved, semi-improved and unimproved grassland used for grazing and for winter fodder covering about 80% of the farmed area. Livestock farming systems not only produce food but the wider land management they provide is crucial in delivering conservation outcomes, for example through agri-environment agreements. Farm businesses need continual re-investment to survive if their food production and conservation land management are to continue.

The growing need for food security, and the growing demand for quality food to supply the increasing population of the UK and elsewhere, may stimulate additional investment in agriculture on some farms in the area in the coming years. The larger units in the area in particular have invested in productive capacity over the years and will continue to do so in line with market signals. Many will also continue to deliver environmental outcomes alongside food production. Within the SSSIs in the plan area, appropriate balances will be sought between agriculture, nature conservation value, flood risk and the vulnerability of peat soils.

### **4.2. Built development, services and transport**

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

The provision of adequate land for housing and employment is a national priority and Local Planning Authorities are charged with ensuring that sufficient land is made available through the new Local Development Frameworks. 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.

The Local Authorities consult the Environment Agency and the Drainage Boards on strategic plans, such as the new Local Development Frameworks, and on individual applications of significance. Planning Policy Statement 25 (PPS25, December 2006) sets out Government policy on development and flood risk. It aims to ensure that flood risk is taken into account at all

stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk.

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

### **4.3. Peat extraction**

Peat extraction takes place within defined areas of the Brue Valley to the west of Glastonbury, supplying about 8-10% of the UK domestic market for horticultural peat each year. The future development of the peat extraction industry is determined by the Somerset Minerals Local Plan (2004). The existing Minerals Plan is being reviewed by the County Council, as part of the Minerals Development Framework, and is likely to be replaced by a new Minerals Core Strategy for Somerset in 2011.

The current area of active peat extraction within the Plan area is about 97 ha. The depth of peat in the area varies but is usually 2 - 3 metres deep. The management of water in the active extraction sites is determined by the conditions attached to the planning permission for the site. The active workings are usually pumped drained while the peat is extracted over a 10 – 20 year period down to the underlying clay (around zero metres ODN). They do not receive irrigation water from the pen system.

In addition to the active sites, the Plan area contains about 190 ha of previous extraction sites which have been, or are in the process of being, reclaimed in line with the relevant planning permission and the policies of the Mineral Local Plan, with water levels being restored to the summer pen level adopted for that area.

The operators of peat extraction works must apply to the Drainage Boards or to the Environment Agency for consent to pump water from their workings into the Main River or into Viewed Rhynes as appropriate. As the peat excavation is excavated the water levels may be reduced to as low as - 1m ODN. When peat excavation is completed the water level is normally left to rise naturally and then fluctuates with the nearest ditch level.

### **4.4. Recreation**

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

### **4.5. Fisheries**

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

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

## **5. Nature conservation and archaeology**

### **5.1. Nature conservation interests**

#### ***The Plan area contains:***

- a) An essential part of the largest area of lowland wet grassland remaining in England (the Somerset Levels and Moors), supporting an important assemblage of breeding waders and wetland birds, notably Snipe, Curlew, Redshank, Lapwing, Yellow Wagtail, Cetti's warbler, Water rail and Bittern.
- b) Part of a large wetland of international importance for its overwintering and migratory populations of waterfowl, and in particular Bewick's Swan, Golden Plover, Teal and Lapwing.
- c) Part of a large wetland of international importance for its outstanding assemblage of rare invertebrates, particularly water beetles.
- d) Part of a wetland of national importance for:
  - Botanically rich, unimproved wet meadows and mires;
  - Ditch flora, including species which are nationally scarce, and relict fen species on ditch banks;
  - Ditch fauna, including species which are nationally rare or scarce;
  - Meadow fauna, including species which are nationally rare or scarce;
  - Breeding wetland birds, such as Sedge and Reed Warblers.

#### ***The Plan area includes:***

- a) Tealham and Tatham Moors Site of Special Scientific Interest (917 ha) notified in 1985;
- b) Westhay Moor Site of Special Scientific Interest (513 ha) notified in 1985;
- c) Tealham and Tatham Moors SSSI and Westhay Moor SSSI are part of the Somerset Levels and Moors "Special Protection Area" which was designated under the European Community's Directive on the Conservation of Wild Birds in June 1997.
- d) Tealham and Tatham Moor SSSI are also part of the Somerset Levels and Moors Ramsar Wetland of International Importance which was designated under the terms of the Ramsar Convention in June 1997.
- e) Tealham and Tatham Moors SSSI and Westhay Moor SSSI contain part of the Somerset Levels National Nature Reserve, owned by Natural England;
- f) Westhay Moor SSSI contains the Westhay Moor National Nature Reserve, owned by the Somerset Wildlife Trust.

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

## **Box 2: Favourable condition for wetland SSSIs in Somerset**

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

### **Water management requirements for wetland SSSIs in Somerset**

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

#### **For ditch and grassland interests in winter:**

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

#### **For wintering birds:**

In early winter (from mid November):

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

In mid winter (1 December to 28 February):

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

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

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

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

In early spring (1 March to 30 April):

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

In mid spring (May):

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

In late spring (June):

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

## **5.2. Biodiversity Action Plans**

The floodplain grazing marshes found within the North Drain area of the Brue Valley are considered to be a habitat of primary importance in the UK Biodiversity Action Plan (1996). Furthermore, the 105 km Main Rivers and Viewed Rhynes in the Plan area, and the associated network of ditches and ponds, are a rich source of biodiversity interest, supporting good populations of Water Vole and are regularly used by Otters.

The Drainage Boards and the Environment Agency have a duty to further the conservation and enhancement of biodiversity, as public bodies under the Land Drainage Act 1991 and the Natural Environment and Rural Communities Act 2006. The Implementation Plan of the DEFRA Internal Drainage Board Review commits every IDB to producing its own Biodiversity Action Plan (BAP) by April 2010. Guidance has been produced by the Association of Drainage Authorities, DEFRA and Natural England to assist the Drainage Boards meet this commitment.

Through their water level management activities, the Drainage Boards 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 BAP habitat creation. In April 2010, the five Somerset Drainage Boards published an IDB Biodiversity Action, which will be implemented over the same five year period as this WLMP. Progress on the implementation of all IDB WLMPs in Somerset will be reported through the Somerset IDB BAP.

## **5.3. Conservation management**

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

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

Financial support for the conservation management of land is available to farmers and landowners from Natural England who administer the Environmental Stewardship scheme on behalf of DEFRA. Such agri-environment schemes operate on the principle that the landowner or farmer voluntarily enters into an agreement, whereby payment is made in return for following land management practices which benefit the environment. Farmers can join Entry Level Stewardship (ELS) where a basic payment is made for 5 years for basic environmental management, or Higher Level Stewardship (HLS), which is more targeted and provides higher payments for more demanding conservation management over 10 year agreements. Many farmers in the area have still to complete their agreements under the preceding Somerset Levels & Moors Environmentally Sensitive Area (ESA) Scheme.

## 5.4. Brue Valley Living Landscapes Project

The Brue Valley Living Landscape Project is a landscape scale conservation project covering 12500Ha of land in the Brue Valley. The project area stretches from Glastonbury in the east towards the M5 in the west, covering the floodplain between the Polden and Mendip Hills.

The project will work in the following ways:

- Mapping, modelling and research: The project will provide an up to date habitat map of the entire project area, not just the SSSIs. This will feed into targeting and research on how land use and habitats may change under different climate change scenarios. The project will work with conservation partners to create a biodiversity vision for the project area that will plan the process of building a Living Landscape.
- Building a Living Landscape: The project will work on Nature Reserves and with landowners to restore, recreate and reconnect wildlife habitats. The project will provide a free advisory service to landowners to enable a smooth transition from the old Environmentally Sensitive Area scheme to Environmental Stewardship.
- Community engagement. The project will use the research commissioned in the Mapping, Modelling and Research phase to work with stakeholders and the local community to create a 50 year Local Vision for the project area.

To achieve a Living Landscape in this area, it is essential that relevant organisations and individuals work together and play to their own strengths in contributing to the vision. In such a time of change for the landscape and land use sector, this project aims to provide the capacity and energy for that partnership work to happen. Key partner organisations include Natural England, Somerset County Council, RSPB, Environment Agency, Internal Drainage Boards, Hawk and Owl Trust, Wessex Water and European partners through the WAVE project.

## 5.5. Archaeology

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

- a) Organic remains such as wood and leather are preserved because the waterlogging excluded oxygen and prevented the normal types of decay which destroy these materials on normal archaeological sites;
- b) The waterlogged conditions also preserve pollen grains, plant material, insects, snails and even macroscopic plant and animal remains. These constitute a unique record of the past natural and man-made environment stretching back over the last 6,000 years. They can also provide information concerning human activity on the neighbouring dry land, and past changes in climate and sea levels;
- c) The normal methods of archaeological detection do not work well in wetland areas where sites can be deeply buried. The number of known archaeological sites is therefore only a small fraction of the existing total. It is extremely likely that all the river valley wetlands in Somerset contain a wealth of important archaeological sites. In addition there are several types of sites such as fisheries, medieval flood defences and small river ports of which we know very little, but may exist in considerable numbers.

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

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

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

Much of the top peat in the Plan area has been removed, possibly since Roman Times. The main archaeological potential in the Plan area can be summarised as follows:

### ***Prehistoric trackways***

It is likely that throughout the prehistoric period wooden trackways were constructed to allow travel across the moor between the Wedmore ridge and the 'islands' of Westhay and Burtle, although few examples have been found in the North Drain area are limited. A possible trackway has been found in a peat cut field to the south of Burnt Drove. A Neolithic brushwood trackway, the 'Blakeway track', was recorded in 1944 in the area shown on Map 3 but it is uncertain how much of its length survives today. Another slightly later trackway was seen in peat cuttings near the Toll House and probably followed a similar route but its survival north of Westhay Moor Drove is uncertain. The area further to the east around the Medieval Meare Pool may have been too wet to allow passage across the moor in that area.

### ***Unknown sites***

Wetland settlement sites, log boats, bog oaks, fish traps and other chance finds may exist within the area by analogy with the area to the south of Westhay. The location of these is impossible to predict at this time.

### ***The peat over the entire area***

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

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

## **6. Constraints and impacts on adjacent ground**

### **6.1. Works adjacent to Main River**

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

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

### **6.2. Works adjacent to IDB rhynes**

Under the Land Drainage Act 1991, the 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 Byelaws of the Drainage Boards 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 Boards consult Natural England before arriving at its decision. The form of consent given by the Boards states that such consent does not override the necessity of obtaining other statutory consents (including that of Natural England).

### **6.3. Private ownership of land and property rights**

Most of the land within the Plan area is under private ownership and either occupied by the owner or by tenants, licensees, graziers etc. For the WLMP to be sustainable and succeed, any works or proposals to vary water levels must respect all legal obligations and responsibilities including property rights. As mentioned at 4.1, the predominant land use across the Plan area is agriculture and changes in water levels can potentially have a significant impact on agricultural activities carried out by owners and/or occupiers. Varying of water levels to achieve conservation objectives (e.g. within SSSI areas) will most sustainably be achieved through negotiation of individual agri-environment agreements under the HLS scheme, whereby farmers receive an appropriate payment in return for their management which delivers the public benefit (in terms of favourable SSSI condition).

## **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 Drainage Boards to advance or delay these seasonal operations. Should these requests require operations to be advanced or delayed by more than the two weeks either side of the 'normal operating dates', then the Drainage Boards will seek the views of Natural England on this proposal. Requests requiring relevant site operations are recorded. A situation report detailing requests and Environment Agency actions will be issued to associates at regular intervals in order to strengthen the working partnership.

#### **7.1.1. Contingency measures for drought**

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

#### **7.1.2. Current target water levels**

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

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

**Table 7: Current target water levels for the North Drain area**

Water level control structures	Grid ref.	Operated by	Summer level (m ODN)	Winter level (m ODN)	Flood operations
North Drain Pumping Station	ST 3990 4485	EA	1.85	1.68	Pumping when conditions allow
North Drain Outfall	ST 3992 4482	EA	1.85	1.68	Not operational
North Drain Inlet	ST 4929 4396	EA	Fixed weir 5.35	Fixed weir 5.35	Fixed weir 5.35
Hurn Weir	ST 4936 4377	EA	5.35	Not penned 4.70 approx	Not penned
Lewis Drove Sluice/TW	ST 4679 4467	EA	2.6	Not penned 2.10 approx	Not penned
Panborough Relief Channel Weir	ST 4692 4542	EA	Fixed weir 3.57	Fixed weir 3.57	Fixed weir 3.57
Panborough Boards (Blakeway Boards)	ST 4414 4528	EA	1.98	Not penned 1.80 approx	Not penned
Hackness Sluice	ST 3323 4621	EA	1.60 – 1.95	Not penned	Not penned
Highbeech Boards (Lower Godney Boards)	ST 4713 4269	EA	4.22	Not penned 3.50 approx	Not penned
Fenny Castle Gauging Station	ST 4983 4385	EA	Fixed weir 5.79	Fixed weir 5.79	Fixed weir 5.79
Ham Boards	ST 4696 4282	EA / Farmer	Level unknown	Not penned	Not penned
James Boards	ST 4551 4248	EA / Farmer	Level unknown	Not penned	Not penned
Totney Drove Rhyne Penstock	ST 3994 4545	IDB	Closed	Not penned	Not penned
Totney Drove Penning Hatch	ST 4322 4415	IDB	Level unknown	Not penned	Not penned
Upper Crannel Sluice (Foundation Wall Clyse)	ST 4994 4144	IDB	4.08	Not penned	Not penned
Totney Drove Inlet No 1	ST 4244 4338	EA	Closed	Closed	Closed
Totney Drove Inlet No 2	ST 4292 4315	EA	Closed	Closed	Closed
Totney Drove Inlet No 3	ST 4337 4281	EA	Closed	Closed	Closed

**Notes:**

- **Summer season:** Aim to achieve summer pen levels in the Main Drain from 1 April.
- **Winter season:** Aim to achieve winter pen levels in the Main Drain by 1 December.
- **ODN:** Ordnance Datum Newlyn.

### 7.1.3. Raised Water Level Areas

There are several areas in which 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 water management systems operated by the Environment Agency and Natural England. In the Raised Water Level Areas on Tealham and Tatham Moors SSSI, the winter levels are raised from 1 December through to 1 May. Details of these areas are given in Tables 8 and 9, and the locations are shown on Map 4.

**Table 8: Current areas with seasonally higher water levels in the Plan area**

Raised water area	Name of occupier	Area in hectares	Area in acres
Tealham – operated EA	Multiple	97	240
Tadham – operated NE	Multiple	20	49
East & West Wastes	Multiple	43	106

**Table 9: Current water levels for Tealham and Tadham Moors Raised Water Level Areas.**

Control structure	Winter water level (m ODN)	Summer water level (m ODN)
S1 (Block E)	2.30	All blocks open to summer level in the North Drain
S4 (Block E)	2.30	
S5 (Block F)	2.15	
S2 (Block C)	2.15	
SL3 (Block C)	2.15	
S3 (Block G)	2.03	
SL1 (Block A)	2.10	
SL2 (Block B)	2.10	
SL4 (Block D)	2.05	
SP1 (Block D)	Open gate valve as conditions permit when level in River Brue is > 2.0m	Open gate valve as conditions permit when level in River Brue is > 2.0m.
Non Return Valves [NRVs]	All NRVs closed	All NRVs open

A number of private pump drainage schemes are operated by landowners on a seasonal basis to lower water levels in the ditches around their fields for agriculture, or within peat voids for the purposes of peat extraction. The total area in such schemes is currently unknown. Details of these areas will be added to Table 9 below, as the Boards establish their extent and operation.

## 7.2. Current flood management regime

The Environment Agency has permissive powers to carry out works to reduce flood risk on Main Rivers. Within this Plan area the primary flood defences are raised earth embankments located on either side of the River Brue. There are sections of “harder” engineering embankments, which take the form of steel piles or masonry walls where space is at a premium. These defences are inspected regularly to ensure they provide the flood risk management benefit that they were designed for. The Environment Agency also undertakes routine maintenance i.e. weed cutting, tree pruning and removal. Emergency repair and maintenance works are also carried out when necessary.

The Environment Agency regularly inspects and operates the main inlet structures into the Plan area. Where possible these are closed when water levels in the Main Rivers rise in order to minimise risk of flooding from the river.

During a flood, water spills over the right bank of the River Brue downstream of Westhay Bridge and flows over Tealham and Tatham Moors. In due course, the floodwater enters the North Drain and is evacuated by the North Drain Pumping Station. The Pumping Station is operated by the Environment Agency to drain the Moor until high river levels stop the evacuation of water. At this point, the pumps are manually switched off, and operatives monitor the situation until they can resume pumping. Power to site can be isolated to prevent devices shorting out and risk to the network.

### **7.2.1. Contingency measures for flooding**

The Environment Agency carries 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. The Environment Agency will also carry out emergency works as required to protect people and property.

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

#### **Box 3: Flood Zones**

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

Flood Zones are 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 rated as high, medium or low risk. As a result, annual maintenance is targeted towards high risk systems.

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

Various studies and investigations are being carried out by the Environment Agency on Main Rivers at present to assess siltation and channel conveyance. When these studies are complete, and monitoring has been carried out, the current approach to de-silting Main Rivers will be reviewed jointly by the Environment Agency and the Drainage Board.

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

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

The majority of the watercourses in the Plan area receive a high level of maintenance due to their potential flood risk and critical conveyance requirements. The North Drain is being studied in preparation for de-silting works to be carried out in the winter months of 2009-10. This work is being done to improve the ecological condition of the Drain and its ability to convey flood water, to improve water quality and to maintain fish populations more effectively in the long term. The Environment Agency will reconsider its intermittent maintenance practices based on the outcome of the de-silting works undertaken in 2009-10.

#### **7.3.2. Drainage Board maintenance practices**

The Drainage Boards maintain all Viewed Rhynes in the North Drain 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 Boards, 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 Boards have powers under their Byelaws to require occupiers to fulfil their obligations in this respect where they fail to do so.

Water control structures are inspected by the Drainage Boards on a regular basis and repaired as necessary. The Boards do 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 Boards. The Drainage Boards do 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 Boards for gaining access to a channel, or where damage has been caused by works carried out on behalf of the Boards.

## **8. Objectives for water level management in the future**

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

### ***Objective 1 – Balance of interests***

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

### ***Objective 2 – Agriculture***

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

### ***Objective 3 – Biodiversity***

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

### ***Objective 4 – Favourable condition of SSSIs***

Implement a programme of improvement works to ensure that the management of water that affects the SSSI(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 by the Upper Brue and Lower Brue Drainage Boards, and by the Environment Agency, are meeting the needs of both farming and conservation. These good practices will continue, as set out below.

**Proposal 1: The current summer and winter penning levels, as set out in Table 13, will continue to be maintained by the Drainage Boards and the Environment Agency.**

Reason: The current target water levels in Westhay Moor SSSI and parts of Tealham and Tadham Moors SSSI outside the areas being targeted for seasonally raised water levels are considered suitable for farming and nature conservation. The current summer and winter penning levels that will continue to be maintained by the Drainage Boards and the Environment Agency are set out in Table 13 (see proposal 6).

**Proposal 2: Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Drainage Boards.**

Reason: The Drainage Boards will continue to maintain the existing Viewed Rhyne network, as shown on Map 2, and are of the opinion that their current maintenance procedures help to achieve favourable condition and further conservation and biodiversity in the Tealham and Tadham Moors SSSI and Westhay Moor SSSI. The Drainage Boards will keep their maintenance procedures under review. See Proposal 12 for actions regarding the de-silting of Viewed Rhynes.

### **9.2. Proposed changes to water control infrastructure**

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

The Environment Agency completed its capital works for favourable condition on Tealham and Tadham Moor in 2009. These consisted of:

- North Drain Pumping Station – installation of variable speed drive to existing electric pump;
- North Drain Gravity Outfall – upgrading the existing penstocks with tilting weirs;
- Lewis Drove Tilting weir – improving the telemetry and electrical equipment. Providing a new intermediate level measurement station near Sand Drove Bridge, between Lewis Drove and North Drain Pumping Station;
- Hurn Sluice and Boards – improving the arrangement for installing drop boards;
- Panborough Boards – improving operator access by constructing access steps.

**Proposal 3: Capital improvement works will be carried out by the Drainage Boards to help achieve favourable condition on Tealham and Tadham Moors SSSI.**

Reason: A number of capital improvement works to the water management infrastructure are proposed in order to help achieve the objective of favourable condition on Tealham and Tadham Moors SSSI. These proposed works are listed in Table 10.

**Table 10: Proposed capital improvement works for Tealham and Tadham Moors SSSI**

IDB action ref.	Description of the proposed capital works for Tealham and Tadham Moors SSSI	Works to be constructed (indicative date only)
Cap 1.1	Provide new efficient drainage route from Nut Tree Farm to North Drain – replace culverts and de-silt viewed rhynes.	2010-11
Cap 1.2	Construct tilting weirs on Totney Drove Rhyne at Ash Tree Farm and Rattling Bow (Block 7).	2010
Cap 1.3	Replace culverts on Whitehouse Drove.	2010
Cap 1.4	Construct tilting weir at Jacks Drove Rhyne near the North Drain (west of Jacks Drove, Block 7).	2010
Cap 1.5	Replace stop-log structure at junction of Comer's Drove and Totney Drove with tilting weir.	2011
Cap 1.6	Construct earth bunds to isolate Block 1 from Totney Drove Rhyne, include at least one non-return valve.	2011
Cap 1.7	Construct earth bunds and feed culverts with non-return valves to isolate Blocks 8 and 2 from the North Drain and the Panborough Drain.	2012
Cap 1.8	Construct tilting weirs to control levels within Blocks 8 and 2.	2012
Cap 1.9	Replace culverts on Tealham Moor Drove and Aller Drove.	2012
Cap 1.10	Construct tilting weir on Tealham Moor and Kid Gate Rhyne at outfall to North Drain (may also require 3 earth bunds to isolate ditches from the North Drain).	2012
Cap 1.11	Install telemetry outstations.	2010-12
Cap 1.12	Remove redundant RWLA infrastructure.	2012

**Proposal 4: Capital improvement works will be carried out by the Drainage Boards to help achieve favourable condition on Westhay Moor SSSI.**

Reason: A number of capital improvement works are proposed in order to help achieve the objective of favourable condition on Westhay Moor SSSI. These proposed works are listed in Table 11.

**Table 11: Proposed capital improvement works by the Drainage Boards for Westhay Moor SSSI will include:**

IDB action ref.	Description of the proposed capital works for Westhay Moor SSSI	Works to be constructed (indicative date only)
Cap 2.1	Construct tilting weir on outfall from SWT site to North Drain on London Drove (replace culvert and remove flap valve).	2010
Cap 2.2	Replace culverts on the south side of North Chine Drove, including culverts on eastern side of London, Dagg's Lane, Parson's and Oak's Doves.	2011
Cap 2.3	Construct culverts under Parsons Drove, London Drove, Dagg's Lane Drove and Oak Drove – at junctions with North Chine Drove.	2012
Cap 2.4	Replace culverts on Westhay Moor Drove Rhyne.	2011
Cap 2.5	Construct flow control at first culvert on North Chine Drove, west of Lewis Drove.	2011-12
Cap 2.6	Install telemetry outstation.	2011
Cap 2.7	Construct new culvert under Westhay Moor Drove at junction with Whites Drove Rhyne with penstock and NRV.	2011-12
Cap 2.8	Construct small controlled summer feed penstock from Panborough Relief Channel (or Leaze Rhyne) to North Chine Drove.	2011-12
Cap 2.9	Replace culvert under Dagg's Lane Drove (SWT Reserve).	2012
Cap 2.10	Construct adjustable flood overflow structure on existing culvert under Westhay Moor Drove to Dog Leg Ditch.	Depends on future peat workings
Cap 2.11	Construct new watercourse west of Lewis Drove (south of North Drain) with tilting weir at outfall to North Drain.	Depends on future peat workings

**Proposal 5: Additional gauge boards and telemetry stations will be installed by the Drainage Boards and the Environment Agency in the Plan area.**

Reason: To improve their capabilities regarding the management of water levels in the North Drain area, the Drainage Boards propose to install remote monitoring equipment and additional gauge boards at the locations set out in Table 12. Alarm settings will be established for each station, which will report directly to the Drainage Board Office in Highbridge. Stations may also be used to collect other relevant data such as rainfall or water quality information.

The Environment Agency has replaced gauge boards within the Plan area over the last few years. The Environment Agency proposes to install new telemetry stations within the Plan area in order to improve its water level management capabilities.

**Table 12: Proposed additional gauge boards and telemetry stations in the North Drain area**

Location	Grid ref.	Notes	Operator
Lewis Drove Bridge	ST 4677 4469	Telemetry outstation	EA
Sand Drove Bridge	ST 4248 4524	Telemetry outstation	EA
Stook House Bridge	ST 3913 4620	Telemetry outstation	EA
Bounds Rhyne 1	ST 4085 4472	Telemetry outstation	IDB
Bounds Rhyne 2	ST 4079 4536	Telemetry outstation	IDB
Jacks Drove Rhyne	ST 4152 4538	Telemetry outstation	IDB
Sand Drove Rhyne	ST 4249 4523	Telemetry outstation	IDB
Blakeway Bridge	ST 4402 4481	Telemetry outstation	IDB

### 9.3. Proposed changes to target water levels

**Proposal 6: The Drainage Boards and the Environment Agency will adopt the proposed changes in target water levels, as set out in Table 13, and trial these levels to ensure they meet the agreed objectives.**

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

The proposed improvements to the water control infrastructure outlined above will help the Drainage Boards and the Environment Agency to achieve and maintain the water levels required for favourable condition on the SSSIs. The proposed changes in target water levels are set out in Table 13. The locations of areas with seasonally higher water levels are shown on Maps 9 & 10 and target conditions and seasonal water levels are detailed in Box 2 and Table 14.

The Drainage Boards acknowledge that there may be potential to increase the area managed with raised water levels in the winter and/or the spring months on Tealham and Tadham Moors SSSI and the wider Plan area. The Drainage Boards would support Natural England in their work to secure the appropriate agri-environment agreements with farmers to increase the area managed for breeding waders in the spring during the five years of this WLMP. The improvements to the water management infrastructure in this Plan would support and not prejudice the realisation of these opportunities in future years.

**Table 13: Proposed target water levels for the North Drain area**

Water level control structures	Grid ref.	Operated by	Summer level (m ODN)	Winter level (m ODN)	Flood operations
North Drain Pumping Station	ST 3990 4485	EA	1.85	1.68	Pumping when conditions allow
North Drain Outfall	ST 3992 4482	EA	1.85	1.68	Not operational
North Drain Inlet	ST 4929 4396	EA	Fixed weir 5.35	Fixed weir 5.35	Fixed weir 5.35
Hurn Weir	ST 4936 4377	EA	5.35	Not penned 4.70 approx	Not penned
Lewis Drove Sluice/TW	ST 4679 4467	EA	2.6	Not penned 2.10 approx	Not penned
Panborough Relief Channel Weir	ST 4692 4542	EA	Fixed weir 3.57	Fixed weir 3.57	Fixed weir 3.57
Panborough Boards (Blakeway Boards)	ST 4414 4528	EA	1.98	Not penned 1.80 approx	Not penned
Hackness Sluice	ST 3323 4621	EA	1.60 – 1.95	Not penned	Not penned
Highbeech Boards (Lower Godney Boards)	ST 4713 4269	EA	4.22	Not penned 3.50 approx	Not penned
Fenny Castle Gauging Station	ST 4983 4385	EA	Fixed weir 5.79	Fixed weir 5.79	Fixed weir 5.79
Ham Boards	ST 4696 4282	EA / Farmer	Level unknown	Not penned	Not penned
James Boards	ST 4551 4248	EA / Farmer	Level unknown	Not penned	Not penned
Totney Drove Rhyne Penstock	ST 3994 4545	IDB	Closed	Not penned	Not penned
Totney Drove Penning Hatch	ST 4322 4415	IDB	Level unknown	Not penned	Not penned
Upper Crannel Sluice (Foundation Wall Clyse)	ST 4994 4144	IDB	4.08	Not penned	Not penned
Totney Drove Inlet No 1	ST 4244 4338	EA	Closed	Closed	Closed
Totney Drove Inlet No 2	ST 4292 4315	EA	Closed	Closed	Closed
Totney Drove inlet No 3	ST 4337 4281	EA	Closed	Closed	Closed

- Notes:**
- **Summer season:** Aim to achieve summer pen levels in the Main Drain from 1 April.
  - **Winter season:** Aim to achieve winter pen levels in the Main Drain by 1 December.
  - **[1]:** level unknown (to be determined by trial).
  - **ODN:** Ordnance Datum Newlyn

**Table 14: Proposed target summer and winter water levels for the principal hydrological blocks in Tealham and Tadham Moors SSSI**

Structure	Target conditions – winter and spring	Current summer water levels (m ODN)	Current winter water levels (m ODN)	Proposed summer water levels (m ODN)	Proposed winter water levels (m ODN)
South of Totney Drove (Block 1)	Winter splash and spring splash	1.86	1.68	1.86	<b>2.20</b>
North of North Drain, east of Jacks Drove (Block 2)	Winter splash and spring splash	1.86	1.68	1.86	<b>2.10</b>
South of North Drain, east of Jacks Drove (Block 3)	Winter splash and spring splash	1.86	1.68	1.86	<b>2.10</b>
West of Kid Gate Drove (Block 6)	Secure ditch water levels	2.20 <sub>[1]</sub>	1.68	2.20 <sub>[1]</sub>	<b>1.90<sub>[1]</sub></b>
South of North Drain, west of Jacks Drove (Block 7)	Winter splash and spring splash	1.86	2.10	1.86	2.10
North of North Drain, west of Jacks Drove (Block 8)	Winter splash and spring splash	1.86	2.10	1.86	2.10

- Notes:**
- **Summer season:** Aim to achieve summer pen levels in the Main Drain from 1 April.
  - **Winter season:** Aim to achieve winter pen levels in the Main Drain by 1 December.
  - **In blocks managed for winter splash (Dec – Feb incl.):** Maintain water levels to provide splash conditions during core winter months
  - **In blocks managed for spring splash (Mar – May incl.):** Water levels gradually falling during April and May from target winter levels to target summer levels, dependant on the weather conditions.
  - **[1]:** level unknown (to be determined by trial).
  - **ODN:** Ordnance Datum Newlyn.

**Proposal 7: The Drainage Boards will support private water management schemes in the Plan area as set out in Table 15.**

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

The water levels in these privately managed schemes are set out in Table 15.

**Table 15: Proposed target winter, spring and summer water levels in private schemes holding seasonally higher water levels in Tealham and Tadham Moors SSSI**

Structure	Current summer water levels (m ODN)	Proposed target summer water levels in the future (m ODN)	Current winter water levels (m ODN)	Proposed target winter water levels in the future (m ODN)

**9.4. Proposed changes to operational procedures and responsibilities**

**Proposal 8: The Drainage Boards and the Environment Agency will adopt a flexible operating regime that allows variations in winter levels and seasonal penning dates in response to weather conditions.**

Reason: The Drainage Boards consider 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’.

The Drainage Boards and the Environment Agency propose to adopt the principle that:

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

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

If the season or local conditions require the Drainage Boards or the Environment Agency to operate outside these ‘normal’ parameters then consultation with Natural England will take place.

**Proposal 9: The Drainage Boards, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and ensure water level management meets the agreed objectives.**

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

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

**Table 16: Monitoring arrangements in the North Drain area**

Lead body	Topic of monitoring
Drainage Boards	<ul style="list-style-type: none"> <li>• Target water levels at key IDB control structures;</li> <li>• Maintenance of Viewed Rhynes;</li> <li>• Monitoring channel profiles and conveyance in Viewed Rhynes;</li> <li>• Maintenance of minor watercourses, farmers ditches etc;</li> <li>• Water quality.</li> </ul>
Environment Agency	<ul style="list-style-type: none"> <li>• Target water levels at key Agency control structures;</li> <li>• Maintenance of Main Rivers;</li> <li>• Monitoring channel profiles and conveyance in Main Rivers;</li> <li>• Catchment rainfall and weather events;</li> <li>• Water quality.</li> </ul>
Natural England	<ul style="list-style-type: none"> <li>• Plant, bird, invertebrate and mammal communities;</li> <li>• Land management;</li> <li>• Surface water and soil wetness conditions.</li> </ul>

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

**Proposal 10: The Environment Agency and Drainage Boards will work together to resolve operational issues regarding the North Drain and its Pumping Station in order to manage flood risk and to maintain appropriate water levels for farming and conservation.**

Reason: The operation of the North Drain Pumping Station is critical to holding the target water levels and to flood evacuation in the Plan area. The provision of new infrastructure at the Pumping Station, and in other parts of the Plan area, enables the Environment Agency and the Drainage Boards to review the operation of the Pumping Station (and the maintenance of the North Drain – see Proposal 12) so that the service standards regarding water management, conveyance and flood risk can be best achieve the agreed objectives for the area.

The Environment Agency and the Drainage Boards recognise that several issues need to be resolved regarding the operation of the North Drain Pumping Station including (a) greater flexibility when changing between summer and winter penning levels, and (b) the pre-emptive lowering of water levels in Main Rivers immediately prior to flood events. The latter is especially relevant in summer months for the Drainage Boards to avoid the flooding of farmland, and the Environment Agency to avoid undesirable environmental impacts.

**Proposal 11: The Drainage Boards and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.**

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

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

One possible option is for the Drainage Board to take over the ownership and management of these watercourses and structures, in order to continue a system of professional management and continuity for the benefit of land owners and wildlife. The structures identified for this proposal are listed in Table 17.

**Table 17: Proposed changes in ownership and responsibility of water control structures**

Structure	Current owner	Current operator	Proposed owner	Proposed operator
Panborough Boards (Blakeway Boards)	EA	EA	Upper Brue DB	Upper Brue DB
James Boards	EA	Riparian Owner	Upper Brue DB	Upper Brue DB
Ham Boards	EA	Riparian Owner	Upper Brue DB	Upper Brue DB
Upper Crannel Sluice	EA	EA	Upper Brue DB	Upper Brue DB

**9.5. Proposed changes to maintenance practices**

**Proposal 12: The Drainage Boards will de-silt selected Viewed Rhynes within Tealham and Tadham Moors SSSI and Westhay Moor SSSI where high silt levels are affecting ditch habitats.**

Reason: The Drainage Boards are aware of problems caused by high silt levels in some parts of the Viewed Rhyne system and therefore propose to establish a de-silting programme in order to restore and enhance the quality of ditch habitats in affected areas. High silt levels can restrict habitat quality and availability, and may prevent the conservation objectives for ditches from being achieved. Shallow water depths can also increase fluctuations in water temperature that can also adversely affect the conservation interests of ditches.

**Proposal 13: The Environment Agency will de-silt the North Drain in winter 2009-10 to ensure the watercourse provides the appropriate service standards for flood risk management, farming and conservation.**

Reason: There is a widespread view held locally that the North Drain does not convey water to the North Drain Pumping Station as effectively as it did in the past, and that the lack of de-silting in the last decade is to blame. The intermittent de-silting of the North Drain has now been reviewed by a joint working group of the Environment Agency and the Drainage Boards and they will continue to work together to find a satisfactory way forward regarding the management of the North Drain and its Pumping Station. A detailed method for de-silting sections of the North Drain is being developed by the joint working group, and a programme of work is expected to be underway by winter of 2009.

**Proposal 14: The Environment Agency will complete its review of the maintenance of Main Rivers, within and adjacent to the Plan area.**

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

**10. Unresolved matters**

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

**11. Amendments agreed during the period of the Plan**

Amendments to this Plan which are agreed by Drainage Boards, the Environment Agency and Natural England are set out in Table 18.

**Table 18: Amendments agreed during the period of the Plan**

No.	Date	Amendment	Agreed

**12. Review arrangements**

The Drainage Boards propose to review this WLMP in 2015, five years after it has been adopted. If any alterations to operating procedures or maintenance are required before 2015, these will be discussed by the Drainage Boards, the Environment Agency and Natural England and can agreed as interim measures pending the full review.

### 13. Timetable of actions: Brue Valley – North Drain area WLMP

<b>Proposed continuation of current good practice</b>		
1:	The current summer and winter penning levels, as set out in Table 13, will continue to be maintained by the Drainage Boards and the Environment Agency.	Ongoing
2:	Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Drainage Boards.	Ongoing
<b>Proposed changes to water control infrastructure</b>		
3:	Capital improvement works will be carried out by the Drainage Boards to help achieve favourable condition on Tealham and Tadham Moors SSSI.	Complete by end 2013
4:	Capital improvement works will be carried out by the Drainage Boards to help achieve favourable condition on Westhay Moor SSSI.	Complete by end 2013
5:	Additional gauge boards and telemetry stations will be installed by the Environment Agency and the Drainage Boards in the Plan area.	Complete by end 2012
<b>Proposed changes to target water levels</b>		
6:	The Drainage Boards and the Environment Agency will adopt the proposed changes in target water levels, as set out in Table 13, and trial these levels to ensure they meet the agreed objectives.	From 2010
7:	The Drainage Boards will support private water management schemes in the Plan area.	Ongoing
<b>Proposed changes to operational procedures and responsibilities</b>		
8:	The Drainage Boards and the Environment Agency will adopt a flexible operating regime that allows variations in water levels and seasonal penning dates in response to weather conditions.	Immediate
9:	The Drainage Boards, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and ensure water level management meets the agreed objectives.	Establish winter 2009
10:	The Environment Agency and Drainage Boards will work together to resolve operational issues regarding the North Drain and its Pumping Station in order to manage flood risk and to maintain appropriate water levels for farming and conservation.	Complete by end 2011
11:	The Drainage Boards and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.	Complete by end 2011
<b>Proposed changes to maintenance practices</b>		
12:	The Drainage Boards will de-silt selected Viewed Rhynes within Tealham and Tadham Moors SSSI and Westhay Moor SSSI where high silt levels are affecting ditch habitats.	Complete by end 2012
13:	The Environment Agency will de-silt the North Drain in winter 2009-10 to ensure that the watercourse provides the appropriate service standards for flood risk management, farming and conservation.	Complete by end 2009
14:	The Environment Agency will complete its review of the maintenance of Main Rivers, within and adjacent to the Plan area.	Complete by end 2010