

# Brue Valley Stage 1 Water Level Management Plan 2006 - 2011

Consultation Draft [Revised 01 November 2006]

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# Brue Valley Stage 1 Water Level Management Plan 2006 – 2011

## Executive Summary

This Water Level Management Plan covers the areas managed by the Upper Brue and the Lower Brue Drainage Boards in the Brue Valley, Somerset (9619 ha and 9117 ha respectively). This area can be considered as a single hydrological unit with several sub-catchments. Much of the land within the Plan area lies below 8 metres AOD, with the majority lying below the level of the high tide in the Bristol Channel (approx. 6.5 metres AOD).

Eight Sites of Special Scientific Interest (SSSIs) lie wholly or partly within the Plan area. Five of these SSSIs form part of the Somerset Levels Special Protection Area (SPA), as designated under the EU Birds Directive in 1997. These five SSSIs are also part of the Somerset Levels Ramsar Wetland of International Importance. The Plan area also includes part of the Severn Estuary SSSI within its coastal boundary.

**The Stage 1 Water Level Management Plan represents a radical change** in the approach to water management which the Drainage Boards intend to adopt for the Brue Valley over the next five years. In particular, it contains a number of recommendations, objectives and clear proposals to change water management on nationally and internationally important wetland sites in the Brue Valley.

**The Stage 1 Plan establishes the principles** that will be adopted by the Drainage Boards to meet their statutory duties and legal obligations, with particular regard being paid to the Land Drainage Act, the Habitat Regulations and the Water Framework Directive.

**The Drainage Boards propose to take the lead role** in deciding, developing and implementing the changes in water level management set out in the adopted Water Level Management Plans.

The proposed **objectives of water management set out in the Stage 1 Plan are different** from those that were in place when the current systems of drainage and irrigation were established. In order that the new objectives for water management can be achieved, the Drainage Boards will need to change the custom and practice they have adopted in the past when implementing their powers. The Boards recognise that water management is likely to be more sustainable in the long-term if it reflects the local hydrology and topography, takes advantage of gravity drainage rather than pumping, and harnesses natural processes and events for environmentally beneficial purposes.

This approach would result in the areas of **higher water levels** being determined by the local hydrology and topography rather than by the ownership of land. Schemes of this nature are likely to require less engineering work and maintenance, as they would tend to be working with natural processes rather than against them.

However, such schemes may go against the wishes of individual landowners who may then choose to seek compensation from the Drainage Boards. In this event, it is appropriate that compensation is paid from the national purse rather than by the local rate payers, as the management of water is being changed to achieve the national target of favourable condition for the SSSIs.

At the heart of the Stage 1 Plan is the objective that the Drainage Boards implement a programme of improvement works to ensure that the management of water helps to secure, or makes significant progress towards achieving, the **favourable condition of the eight SSSIs by 2010**. This will ensure that the special habitats and features of the SSSIs are in a healthy state and are being conserved for the future by the appropriate management of water.

Government has set a target that 95% of all SSSIs should be in favourable (or unfavourable recovering) condition by 2010. Currently less than 50% of the SSSI area in the Brue Valley is achieving this target. Three SSSIs are not in a favourable condition due to water management in the Brue Valley, and these have been identified in this Stage 1 Plan as being **priorities for action by the Drainage Boards**. These are Catcott, Edington and Chilton Moors SSSI, Tealham and Tadham Moor SSSI and Westhay Moor SSSI.

**The Plan sets out the intended actions** (regarding the management of water) which will be carried out by the Drainage Boards and the Environment Agency in the Brue Valley so that the Government's target regarding the favourable condition for SSSIs can be achieved. The Plan also includes a number of proposed changes in water management and infrastructure which are intended to benefit land outside designated wildlife sites.

The availability of **financial support to farmers** in the Plan area through the **Environmental Stewardship** scheme will also be a key factor in achieving favourable condition on the SSSIs. By adopting the new Plan, the Drainage Boards will be assisting all parties to target the higher levels of Environmental Stewardship to the most appropriate areas related to the management of water. In particular, by implementing the changes proposed in the Draft Plan, the Drainage Boards will be assisting rate payers to apply for the Higher Level Stewardship wet grassland options in the SSSIs.

In order to achieve favourable condition on these three priority SSSIs, **the management of water needs to be changed over the next four years** so that:

- An additional 900 ha of these SSSIs are made wetter each winter (December to February inclusive) for wintering wildfowl and waders;
- An additional 300 ha of these SSSIs are in a better condition for breeding waders in the spring and early summer each year (March to early June);
- The peat soils in 60 – 70% of the SSSI's area are conserved and protected from shrinkage by allowing them to become saturated during the winter months, and keeping them wetter during the rest of the year. This will also be of direct benefit to conservation of the wet grassland flora and fauna;
- The aquatic flora and fauna in 80% of the SSSI's area are safeguarded by the appropriate management of the watercourses and by suitable ditch water levels throughout the year;
- Farming operations can continue to provide the wet grassland and aquatic habitats which allows the wetland wildlife to thrive and prosper.

The outline proposals set out in the Stage 1 Plan identify the likely extent and possible locations of those areas which will benefit from the proposed changes in water level management and maintenance operations. When the Stage 1 Plan is adopted by the Drainage Boards, the outline proposals will be worked up in more detail in the Stage 2 Plan by summer 2007.

# **Brue Valley Stage 1 Water Level Management Plan 2006 – 2011**

## **Recommendations**

### **Recommendation 1 – Preparing the Water Level management Plan**

The Drainage Boards adopt a two stage process for the development of a Water Level Management Plan for the Brue Valley.

- Stage 1 Plan – establishes the principles, objectives and outline proposals for water level management for the period 2006 – 2011;
- Stage 2 Plan – sets out the detailed proposals for water management, based on the outline adopted in the Stage 1 Plan.

### **Recommendation 2 - Timetable**

Following consultation with others, the Drainage Boards seek to adopt the Stage 1 Plan by the end of December 2006, and the Stage 2 Plan by summer 2007.

### **Recommendation 3 – Consultation**

The Drainage Boards consult other parties by means of the adopted Consultation Draft Stage 1 Plan during autumn 2006, and by means of the Consultation Draft Stage 2 Plan during spring 2007.

### **Recommendation 4 – Drainage Boards lead the water management planning process**

The Drainage Boards take the lead role in deciding, developing and implementing the changes in water level management set out in the adopted Plans.

### **Recommendation 5 – Achieving water management for favourable condition on SSSIs**

The Drainage Boards take the lead role in changing water level management in the SSSIs in order contribute towards the Government's targets for favourable condition of these areas.

### **Recommendation 6 – Adopting the Consultation Draft Stage 1 Water Level Management Plan**

The Drainage Boards adopt this document as the Consultation Draft of the Stage 1 Plan for the purposes of consultation with other parties.

# 1. Purpose and context of the Water Level Management Plan

## 1.1 Purpose

Water Level Management Plans set out to balance and integrate the water level requirements for a range of land uses and activities within a defined area which contains one or more Sites of Special Scientific Interest (SSSIs) of national and international importance. These activities include farming, flood risk management and conservation.

This Stage 1 Plan for the Brue Valley:

- Describes the land use, biodiversity and heritage features of interest, the hydrological regime and the current maintenance practices in the Brue Valley;
- Outlines the proposed changes in water level management and maintenance operations which will be implemented by the Drainage Boards (and others) in order to achieve and maintain favourable condition on the eight SSSIs which are wholly or partly within the Plan area;
- Outlines proposed changes in water level management which will be implemented by the Drainage Boards (and others) in order to achieve the other water level management objectives;
- Will assist the flood management operating authorities (the Environment Agency, Internal Drainage Boards and Local Authorities) to fulfil their duties to nature conservation.

The outline proposals in the Stage 1 Plan identify the likely extent and possible locations of those areas which will be affected by the proposed changes in water level management and maintenance operations. When the Stage 1 Plan has been adopted by the Drainage Boards, the outline proposals will be worked up in more detail in the Stage 2 Plan.

The Stage 2 Plan will:

- Define the land and watercourses which will be affected by the proposed improvement schemes leading to the changes in water level management and maintenance operations agreed in the Stage 1 Plan;
- Identify the best practicable option, at a reasonable cost, for each of the proposed schemes to change water management set out in the Stage 1 Plan;
- Reassess the actions required during flood and drought events in the light of the proposed changes in water level management and maintenance operations;
- Estimate the likely costs of implementing the proposed changes in terms of capital and revenue costs;
- Identify the sources of funding which may be available to contribute towards the implementation of the individual schemes of improvement.

Following the adoption of the Stage 2 Plan by the Drainage Boards, details of the individual improvement schemes will be drawn up for the purposes of applying for capital grant aid to implement the agreed schemes.

## The Appendices

All the Appendices will be compiled in a separate volume that will mainly contain descriptions and 'matters of fact'. These will be used to support both the Stage 1 and the Stage 2 Plans, and to develop and achieve effective water level management measures. They will include:

- Designations
- Layout and function of network
- Water level regime
- Operating procedures and contingencies
- Maintenance programme
- Capital improvements programme
- Policy statements and guidance

## 1.2 Context

### 1.2.1 Favourable Condition

Special habitats and features of a SSSI are in a healthy state and are being conserved for the future by appropriate management.

2010 Target - 95% of all SSSIs in favourable or unfavourable recovering condition. Currently less than 50% of the 8,000 ha of wetland SSSI in Somerset is achieving this target.

Defra High Level Target 4 – Review WLMPs for priority SSSIs and prepare a costed action plan by April 2007, for water level management measures to achieve favourable condition by 2010.

### 1.2.2 EU Water Framework Directive

The European Union's Water Framework Directive (2000/60/EC) came into force in December 2000 and member states were required to transpose the Directive into domestic law by December 2003. The Directive is a set of guidelines for managing large bodies of water. Its main aims are to improve water quality while reducing any danger a water body poses, such as flooding. It is also designed to stop the deterioration of wetlands and improve aquatic habitats for wildlife.

The main objectives of the Water Framework Directive are to:

- Enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands - there is a requirement for nearly all inland and coastal waters to achieve 'good status' by 2015;
- Promote the sustainable use of water;
- Reduce pollution of water, especially by 'priority' and 'priority hazardous' substances;
- Lessen the effects of floods and droughts;
- Rationalise and update existing water legislation and introduce a co-ordinated approach to water management based on the concept of river basin planning.

The Environment Agency is the Competent Authority for the implementation of the Water Framework Directive in England and Wales. 'Competent Authorities' must:

- Characterise River Basin Districts;
- Identify bodies of water used for the abstraction of drinking water;
- Prepare, review and keep up to date a register of protected areas for each River Basin District (RBD);
- Establish monitoring programmes to establish an overview of water status within each River Basin District;
- Prepare and submit to the 'Appropriate Authority' for approval a draft River Basin Management Plan (RBMP) for each River Basin District. These draft RBMPs will contain proposed environmental objectives for water bodies and proposed programmes of measures;
- These draft RBMPs must note the process used during their development and ensure proper consultation publicity and take account of the views of interested parties;
- Supplementary plans must also be submitted to the 'Appropriate Authority'.

### **1.2.3 Habitat Regulations**

The Conservation (Natural Habitats &c.) Regulations 1994, commonly known as the Habitats Regulations, implement the Habitats Directive and the Birds Directive in Great Britain. The Operating Authorities for flood management have a duty to comply with these Regulations when carrying out their functions. The Drainage Boards, the Environment Agency and the County and District Councils are Operating Authorities for flood management, and are also regarded as Competent Authorities under the terms of the Habitats Regulations. Defra, the Rural Development Service and English Nature are also regarded as Competent Authorities under the terms of the Habitats Regulations

In particular, the Operating Authorities have a key role to play in managing Sites of Special Scientific Interest and the Natura 2000 sites, which are underpinned by SSSIs. In this regard, the Government's Public Service Agreement with Defra requires that 95% of all nationally important wildlife sites (SSSIs) are in a favourable condition by 2010.

This Plan, therefore, sets out those actions (regarding the management of water) which will be carried out by the Operating Authorities for flood management in the Brue Valley so that the Government's target regarding the favourable condition for SSSIs may be achieved.

### **1.2.4 Brue and Axe Catchment Flood Management Plan**

The Environment Agency is currently preparing a Catchment Flood Management Plan for the Brue and Axe Catchments in Somerset. When completed, this Plan will provide a strategic overview regarding flood risk management in the Brue Valley.

### 1.2.5 Brue and Axe Catchment Abstraction Management Strategy

The Environment Agency has recently prepared a Catchment Abstraction Management Strategy (CAMS) for the Brue and Axe Catchments in Somerset (2006) which provides a strategic overview regarding abstraction in the upper reaches of the catchment (surrounding the Levels and Moors). The Environment Agency's Brue and Axe CAMS must ensure an adequate quantity and quality of water is available in main river to irrigate and safeguard wetland habitats on the Levels and Moors and to comply with the Habitat Regulations and Water Framework Directive.

### 1.2.6 Local Plans and the emerging Development Framework

The Mendip Local Plan, Sedgemoor Local Plan and the County Minerals Local Plan are relevant to flood risk management in the Brue Valley. The two District Local Plans identify areas for new development which may affect water management in the area. The Minerals Local Plan sets out policies regarding peat extraction in the Brue Valley, including the opportunities for the restoration of disused workings.

### 1.2.7 Summary of Relevant Conservation legislation

In exercising their functions, IDBs are required to minimise harm to environmental interests, or enhance those interests. Legislation that gives conservation duties to Operating Authorities:

- **Land Drainage Act 1991:** general duties with respect to the environment, and recreation and public access.
- **Wildlife and Countryside Act 1981:** (as amended by **Countryside and Rights of Way Act 2000**): duty on IDBs to take reasonable steps to *further* the conservation and enhancement of designated sites and notify English Nature if IDB actions are likely to damage a SSSI and before granting permission for activities which at may affect the site. The Act also provides protection for named species and habitats.
- **Habitats Regulations 1994:** requires IDBs to assess whether a proposed project (or existing consent) is likely to have a significant effect on the environment. Specific provision is made that allow IDBs to undertake works within European sites to aid conservation management.
- **The Environmental Impact Assessment (Land Drainage Improvement Works) 1999** (amended **2005 & 2006**): prohibit IDBs from carrying out certain improvement works unless specified procedures have been undertaken.

## 2 Description of Plan Area

This Plan covers the whole area of two Drainage Boards in the Brue Valley, Somerset which can be considered as a single hydrological unit with sub-catchments.

The Lower Brue Drainage Board has an area of 9619 ha (23,768 acres). It extends from Catcott, Westhay and Mudgley in the east to the coast of the Bristol Channel at Burnham-on-sea. The Polden Hills lie to the south, with the Isle of Wedmore to the north east. Its eastern boundary coincides with the western boundary of the Upper Brue Drainage Board area. The Upper Brue Drainage Board has an area of 9117 ha (22,525 acres). The majority of the Board's area lies to the west of Glastonbury, bounded by the Polden Hills to the south and the Panborough ridge to the north. The area extends east of Glastonbury following course of the River Brue to the south, and the Whitelake, Redlake and Sheppey to the north. Its western boundary coincides with the eastern boundary of the Lower Brue Drainage Board area

Much of the land within the Plan area lies below 8 metres AOD, with the majority lying below the level of the high tide in the Bristol Channel (6.5 metres AOD approx). Significant parts of the inland moors lie as low as 2.5 metres AOD, some four metres below the level of a high tide.

### 2.1 Land uses

**Settlements:** - The coastal towns of Burnham (and Highbridge are the largest settlements within the Plan area. Small parts of Glastonbury, Street and Wells lie within the Plan area. The majority of the many and scattered settlements in the Brue Valley lie on the higher ground and 'islands' and so are outside the boundaries adopted by the Drainage Boards.

**Agriculture:** - Farming is the primary land use within the Plan area. Beef and dairy farms dominate the inland moors, while more arable and mixed farming is found on the coastal clay levels. Most of the fields in the inland moors are divided by water-filled ditches which act as wet fences, provide water for grazing stock and help to drain the area during periods of high rainfall or during flood events. These ditches also occur on the clay levels but here they are often lined with single or double hedges.

**Peat Extraction:** - This activity 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 current area of peat extraction is about 500 ha, with future development of the industry in the area being determined by the Somerset Minerals Local Plan (2004).

The depth of peat in the area varies but is usually 2 - 3 metres deep. The workings are pumped drained while the peat is extracted over a 10 – 20 year period down to the underlying clay (around zero metres AOD). The sites are then reclaimed in line with the policies of the Mineral Local Plan, with water levels being restored to the summer pen level adopted for that area.

**Future development:** - The Sedgemoor Local Plan indicates significant areas as being suitable for business and residential development within the Plan area around Burnham and near Highbridge.

The Mendip Local Plan indicates significant areas as being suitable for business and residential development close to the Plan area at Glastonbury, Street and near Wells.

The Water Level Management Plan needs to take account of these proposals for new development, and the accompanying infrastructure required, to ensure that they do not adversely affect the hydrological management of the area.

## **2.2 Conservation**

The Somerset Levels and Moors are the largest area of lowland wet grassland remaining in the UK and supports internationally important numbers of wintering wildfowl and waders and nationally important assemblages of plants insects and breeding birds. It is also an area of outstanding importance for its landscape, historical and wetland heritage. A wide range of wetland habitats occur on the Levels and Moors that are dependant on the sensitive management of watercourses to sustain their conservation value, including: grazing marshes, hay meadows, reedbeds, open water, fens, wet woodland, rivers, rhynes and ditches. The activities of land managers contribute significantly to maintaining many of these wetland habitats. Extensive farming practices and sensitive water level management are key elements in sustaining the wildlife and landscape features of the Levels and Moors.

Eight Sites of Special Scientific Interest (SSSIs) lie wholly or partly within the Plan area. Five of these SSSIs form part of the Somerset Levels Special Protection Area (SPA), as designated under the EU Birds Directive in 1997. These five SSSIs are also part of the Somerset Levels Ramsar Wetland of International Importance. The Plan area also includes part of the Severn Estuary SSSI within its coastal boundary. The Severn Estuary SSSI has been designated as a Special Protection Area (SPA), under the EU Birds Directive, and as a Ramsar Wetland of International Importance.

In addition to the above, the Plan area contains two SSSIs of national importance, Street Heath SSSI and Sharpham Moor Plot SSSI.

Details of these SSSIs are given in Table 1 below. A summary of the conservation features of these sites is given in Tables 2 below, and full details of these sites can be found in the Appendix. A summary of the conservation objectives of these SSSIs is set out in Table 3, the targets for achieving favourable condition are in Table 4 and the condition of the SSSIs (as reported by English Nature, May 2006) is given in Table 5 below.

Three SSSIs are currently not in favourable condition due to water management, and these have been identified in this Stage 1 Plan as being priorities for action by the Drainage Boards. These are Catcott, Edington and Chilton Moors SSSI, Tealham and Tadham Moor SSSI and Westhay Moor SSSI.

Three of the remaining SSSIs still have some shortfalls due to water management, and again these have been identified for action in this Stage 1 Plan. These are Shapwick Heath SSSI (regarding breeding waders and aquatic flora and fauna), Westhay Heath SSSI (regarding breeding waders and aquatic flora and fauna), and the Severn Estuary SSSI (regarding aquatic flora and fauna).

**Table 1 - Site details: Sites of Special Scientific Interest within Plan area**

<b>SSSI name (Grid Ref)</b>	<b>Area (ha)</b>	<b>Date notified</b>	<b>Additional conservation designations</b>	<b>Operating Authorities, Local Authorities</b>
Catcott, Edington & Chilton Moors (ST390420)	1085.17	24/01/1986	Part of Somerset Levels Special Protection Area and Ramsar site	Operating Authority – Lower Brue IDB  Local Authorities - Somerset, Sedgemoor
Shapwick Heath (ST430403)	397.44	23/06/1995	Part of Somerset Levels Special Protection Area and Ramsar site	Operating Authority – Lower Brue IDB  Local Authorities - Somerset, Sedgemoor
Sharpham Moor Plot (ST465389)	0.58	14/08/1986		Operating Authority – Upper Brue IDB  Local Authorities - Somerset, Mendip
Street Heath (ST464394)	12.72	25/03/1983		Operating Authority – Upper Brue IDB  Local Authorities - Somerset, Mendip
Tealham & Tadham Moors (ST420450)	917.02	06/02/1985	Part of Somerset Levels Special Protection Area and Ramsar site	Operating Authority – Lower Brue IDB  Local Authorities - Somerset, Sedgemoor
Westhay Heath (ST415422)	26.39	27/07/90	Part of Somerset Levels Special Protection Area and Ramsar site	Operating Authority – Upper Brue IDB  Local Authorities - Somerset, Mendip
Westhay Moor (ST455445)	521.75	17/12/1985	Part of Somerset Levels Special Protection Area and Ramsar site	Operating Authorities – Lower and Upper Brue IDBs  Local Authorities - Somerset, Sedgemoor Mendip
Severn Estuary				

**Table 2 - Key conservation features of the SSSIs in the Brue Valley**

	<b>Catcott Edington &amp; Chilton Moors</b>	<b>Shapwick Heath</b>	<b>Sharpham Moor Plot</b>	<b>Street Heath</b>	<b>Tealham &amp; Tadham Moors</b>	<b>Westhay Heath</b>	<b>Westhay Moor</b>	<b>Severn Estuary</b>
<b>SPA Features</b>	Annex 1 populations of European importance  Migratory populations of European importance  Waterfowl assemblage of European importance	Annex 1 populations of European importance  Migratory populations of European importance  Waterfowl assemblage of European importance			Annex 1 populations of European importance  Migratory populations of European importance  Waterfowl assemblage of European importance	Annex 1 populations of European importance  Migratory populations of European importance  Waterfowl assemblage of European importance	Annex 1 populations of European importance  Migratory populations of European importance  Waterfowl assemblage of European importance	Annex 1 populations of European importance  Migratory populations of European importance  Waterfowl assemblage of European importance
<b>Additional Ramsar features</b>	Assemblage of aquatic invertebrates, especially water beetles	Assemblage of aquatic invertebrates, especially water beetles			Assemblage of aquatic invertebrates, especially water beetles	Assemblage of aquatic invertebrates, especially water beetles	Assemblage of aquatic invertebrates, especially water beetles	<i>[to be added]</i>
<b>Additional SSSI habitat features</b>	Wet grassland with rhynes and ditches  Swamp and fen, open water, marginal and inundation communities	Wet grassland with rhynes and ditches  Swamp and fen, open water, marginal and inundation communities	Swamp and fen, open water, marginal and inundation communities	Swamp and fen, open water, marginal and inundation communities	Wet grassland with rhynes and ditches  Swamp and fen, open water, marginal and inundation communities	Swamp and fen, open water, marginal and inundation communities	Wet grassland with rhynes and ditches  Swamp and fen, open water, marginal and inundation communities	<i>[to be added]</i>
<b>Additional SSSI species features</b>	Otter  Assemblage of breeding birds	Otter  Assemblage of breeding birds		Otter	Otter  Assemblage of breeding birds	Otter  Assemblage of breeding birds	Otter  Assemblage of breeding birds	<i>[to be added]</i>

**Table 3 - Summary of conservation objectives for SSSIs in the Brue Valley**

<b>Catcott Edington &amp; Chilton Moors</b>	<b>Shapwick Heath</b>	<b>Sharpham Moor Plot</b>	<b>Street Heath</b>	<b>Tealham &amp; Tadham Moors</b>	<b>Westhay Heath</b>	<b>Westhay Moor</b>	<b>Severn Estuary</b>
Maintain species rich grasslands	Maintain species rich grasslands	<i>[to be added]</i>	Enhance mire communities	Maintain species rich grasslands		Maintain and enhance mire communities	<i>[to be added]</i>
Enhance ditch communities	Enhance ditch communities			Enhance ditch communities	Enhance swamp communities	Enhance ditch communities	
Enhance wintering bird interest, by providing feeding areas	Enhance wintering bird interest, by providing roosting areas			Enhance wintering bird interest by providing feeding areas	Enhance wintering bird interest, by providing roosting areas	Enhance wintering bird interest, by providing roosting areas	
Enhance populations of breeding birds, particularly lapwing	Enhance populations of breeding birds			Enhance populations of breeding birds, particularly snipe	Enhance populations of breeding birds	Enhance populations of breeding birds	
Maintain otter population	Maintain otter population		Maintain otter population	Maintain otter population	Maintain otter population	Maintain otter population	

**Table 4 - Summary of favourable condition targets relevant to water management for SSSIs in the Brue Valley**

<b>Catcott Edington &amp; Chilton Moors</b>	<b>Shapwick Heath</b>	<b>Sharpham Moor Plot</b>	<b>Street Heath</b>	<b>Tealham &amp; Tadham Moors</b>	<b>Westhay Heath</b>	<b>Westhay Moor</b>	<b>Severn Estuary</b>
325 ha of winter splash (30%)		<i>[to be added]</i>	<i>[to be added]</i>	275 ha of winter splash (30%)			<i>[to be added]</i>
65-260 ha of shallow winter water (5-25%)	155 ha of shallow winter water (40%)			90-230 ha of shallow winter water (10-25%)			
20 ha of deeper winter water	155 ha of deeper winter water (40%)			10 ha of deeper winter water	13 ha of deeper winter water (50%)	255 ha of deeper winter water (50%)	
Water in 80% of winter ditches > 20cm deep	Water in 80% of winter ditches > 20cm deep			Water in 80% of winter ditches > 20cm deep	Water in 80% of winter ditches > 20cm deep	Water in 80% of winter ditches > 20cm deep	
Year round water levels to avoid peat shrinkage	Year round water levels to avoid peat shrinkage			Year round water levels to avoid peat shrinkage	Year round water levels to avoid peat shrinkage	Year round water levels to avoid peat shrinkage	
Water quality	Water quality			Water quality	Water quality	Water quality	
80% of rhyne maintenance practices sympathetic to conservation	80% of rhyne maintenance practices sympathetic to conservation			80% of rhyne maintenance practices sympathetic to conservation	80% of rhyne maintenance practices sympathetic to conservation	80% of rhyne maintenance practices sympathetic to conservation	

**Table 5 – Summary of SSSI condition assessments in the Brue Valley (from English Nature, May 2006)**

<b>SSSI</b>	<b>% of area meeting PSA target</b>	<b>% of area favourable</b>	<b>% of area unfavourable recovering</b>	<b>% of area unfavourable no change</b>	<b>% of area unfavourable declining</b>	<b>% of area destroyed</b>	<b>Comments on unfavourable conditions related to water</b>
Catcott, Edington & Chilton Moors (1085 ha)	5%	5%	0%	95% 33/36 units 1030 ha	0%	0%	Inappropriate water levels related to peat extraction(2/36units) Drainage (30/36 units) Water pollution – agriculture/runoff (30/36 units)
Shapwick Heath (397 ha)	94%	70%	24%	6% 1/21 units 24 ha	0%	0%	Inappropriate ditch management (1/21 units) Water pollution - agriculture/run off (1/21 units)
Sharpham Moor Plot (0.6 ha)	100%	0%	100%	0%	0%	0%	None
Street Heath (13 ha)	81%	0%	81%	19% 2/6 units 2 ha	0%	0%	Drainage related to peat extraction (2/6 units)
Tealham & Tadham Moors (917 ha)	19%	13%	6%	81% 17/21 units 743 ha	0%	0%	Inappropriate water levels (1/21units) Drainage (15/21 units) Water pollution – agriculture/runoff (16/21 units)
Westhay Heath (26 ha)	100%	86%	14%	0%	0%	0%	None
Westhay Moor (522 ha)	27%	24%	3%	73% 18/25 units 381 ha	0%	0%	Inappropriate ditch management (3/25units) Inappropriate water levels (7/25units) Drainage (8/25 units) Water pollution – agriculture/runoff (5/25 units)
Severn Estuary	<i>[to be added]</i>	<i>[to be added]</i>	<i>[to be added]</i>	<i>[to be added]</i>	<i>[to be added]</i>	<i>[to be added]</i>	<i>[to be added]</i>

## 2.3 Archaeology and heritage

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 archaeology in the area remains hidden from the normal forms of archaeological detection. In areas where peat extraction has been carried out in recent times the knowledge of archaeology is much greater due to increased exposure of archaeological sites and their partial excavation. However, these sites were largely, or in some cases totally, destroyed by the peat cutting and now they only survive as a paper record of the excavations. Where little peat cutting has been carried out in recent years the known archaeology recorded on the Sites and Monument Record represents only a fraction of the total archaeological resource that lies below the surface.

Much of the top peat in this area has been removed, possibly since Roman Times. The main archaeological potential in this 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. A possible trackway was seen in the peat cut field to the south of Burnt Drove and the lack of examples elsewhere may be due to the lack of modern disturbance to the peat in the rest of the area. The area further to the east around the medieval Meare Pool appears to have been too wet to allow passage across the moor in that area. A Neolithic brushwood trackway, the 'Blakeway track', was recorded in 1944 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.
- Unknown sites - Wetland settlement sites, log boats, bog oaks, fish traps and other chance finds may exist within the Plan area. 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.

## 2.4 Geology 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, which all drain 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. Further inland the Moors consist of deep organic peat soils derived from raised bog and fen peat over the last 6000 years. The Polden Hills comprises

shallow, well-drained brashy calcareous clayey soils over limestone. The Isle of Wedmore to the north has deeper but more slowly permeable calcareous clayey soils.

## **2.5 Hydrology**

Rainfall varies across the catchment, with the upland Mendip Hills typically receiving over 1000mm annually, while the low-lying Somerset Levels and Moors receive 700-800mm annually.

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 land levels up to 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 above the adjacent land. Most of the water in the Moors lies in a network of man-made channels (known locally as 'ryhnes') often running in parallel to the river but at a lower level. The ryhnes provide a dual role of irrigating the Moors (acting as wet fences and to supply water for livestock) and to drain the areas after periods of high rainfall. The water from these inland ryhnes is lifted up to river level by pumping stations.

There is some drainage by gravity into the lower reaches of the Brue that cross the coastal clay Levels, where ground levels are typically two metres higher than the inland Moors.

The Drainage Boards and the Environment Agency operate a 'penning system' in the Plan area. During the summer months (April to November inclusive), the summer pen system holds water at a higher level to irrigate the watercourses, so they may act as wet fences and provide water for grazing animals. During the winter months the water levels are lower to provide additional storage capacity which can then accommodate rainfall and minor flood events.

The majority of the older infrastructure for water management in the Plan area was designed for the purposes of holding the summer pen level and for not obstructing the flow during the winter months.

## **2.6 Water quality**

*[to be added]*

## **2.7 Fisheries, access and recreation**

The Environment Agency has a duty to maintain freshwater fisheries and eel fisheries both of which are well represented within the Plan area. Routine fish surveys on approximately five years cycle using netting and electric fishing are carried out in the River Brue. The North Drain and the Panborough Rhyne have also been surveyed. The Environment Agency's fisheries section can provide advice to ensure that fisheries are safeguarded and that the Environment Agency's duty to fisheries is not prejudiced.

No particular water level problems affecting fisheries have been reported in the Plan area, but hot weather, low water levels, both winter and summer, and poor circulation can all impact on fisheries and can often be related to water level management . For example, low water depth can reduce the numbers of species and the impact is more severe in cold weather. This does not normally lead to problems providing fish have access to deeper areas under critical conditions.

If works are planned to improve water level management there may be opportunities to incorporate fisheries improvements in addition to any benefit ensuing from raised water levels and improved connectivity and water circulation within the system.

Fishing takes place on both the River Brue and North Drain where the rights are leased to various local clubs. The Environment Agency itself own and leases the fishing rights on the North Drain.

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 stable food of fish eating birds.

## **2.8 Flood conditions**

*[to be added]*

## **2.9 Drought conditions**

*[to be added]*

### **3. Need for change**

#### **3.1 Achieving favourable conditions on SSSIs**

The Government's Public Service Agreement with Defra requires that 95% of all nationally important wildlife sites (SSSIs) are in a favourable condition by 2010.

This Plan, therefore, needs to set out those actions (regarding the management of water) which will be carried out by the Drainage Boards and the Environment Agency (i.e. Operating Authorities for flood management) in the Brue Valley so that these bodies can each play their part in contributing to the achievement of the Government's target regarding the favourable condition for SSSIs.

Currently three SSSIs are not in a favourable condition due to water management, and these have been identified in this Stage 1 Plan as being priorities for action by the Drainage Boards. These are Catcott, Edington and Chilton Moors SSSI, Tealham and Tadham Moor SSSI and Westhay Moor SSSI.

In order to achieve favourable condition on these three priority SSSIs, the water management needs to be changed over the next four years so that:

- A larger part of these SSSIs are wetter each winter (December to February inclusive) for wintering wildfowl and waders;
- A larger area is in a better condition for breeding waders in the spring and early summer each year (March to early June);
- Peat soils are conserved and protected from shrinkage by keeping them wetter throughout the year. This will also be of direct benefit to conservation of the wet grassland flora and fauna;
- Aquatic flora and fauna are safeguarded by the appropriate management of the watercourses and suitable ditch water levels throughout the year;
- Farming operations can continue to provide the wet grassland and aquatic habitats which allows the wetland wildlife to thrive and prosper.

Three of the remaining SSSIs still have some shortfalls due to water management, and again these have been identified for action in this Stage 1 Plan. These are Shapwick Heath SSSI (regarding breeding waders and aquatic flora and fauna), Westhay Heath SSSI (regarding breeding waders and aquatic flora and fauna), and the Severn Estuary SSSI (regarding aquatic flora and fauna).

#### **3.2 Other water management improvement schemes outside SSSIs**

The Drainage Boards have identified a number of other improvement schemes outside SSSIs which it would like to implement over the period of the Plan in order to overcome the current difficulties managing water in the Plan area. These improvement schemes are of strategic significance in the Plan area and include:

- Restoration of South Drain Back Ditch structures;
- North Drain improvements (restore tilting weir at North Drain PS);
- General improvements to irrigation system and winter water level control;
- Strategic flood water storage areas etc.

### 3.3 Development pressures

The Water Level Management Plan needs to develop a strategic approach to flood management issues which may arise from future development pressures in the Brue Valley. These pressures are outlined in the adopted Local Plans and the Drainage Boards, working with the Environment Agency, need to ensure that appropriate development can be accommodated within the area and that it does not adversely affect the hydrological management of the Brue Valley.

### 3.4 Adapting to climate change

The predicted changes in climate and sea level rise are likely to have a profound effect on the Somerset Levels and Moors, including the Plan area, in the mid to long term. The box below sets out a summary of the recent scenarios put forward for climate change in the UK.

**Box: Potential climate change and sea level rise scenarios for the Brue Valley**

**Sea level rise**

Anticipated sea level rise by 2020 60 - 70 mm	Anticipated sea level rise by 2050 140 - 180 mm	Anticipated sea level rise by 2080 230 - 360 mm
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**Climate change**

Season	Anticipated climate around 2050	Anticipated climate around 2080
Spring	Warmer by 1.0 to 2.0° C Precipitation totals similar to present	Warmer by 1.0 to 2.0° C Precipitation totals similar to present
Summer	Warmer by 1.5 to 3.5° C Drier by 15 to 30%	Warmer by 2.0 to 5.5° C Drier by 25 to 55%
Autumn	Warmer by 1.5 to 3.0° C Drier by 0 to 10%	Warmer by 2.0 to 5.0° C Drier by 5 to 15%
Winter	Warmer by 1.0 to 2.0° C Wetter by 5 to 15%	Warmer by 1.5 to 3.5° C Wetter by 10 to 30% Snowfall less by 70 to 90%

**Additional changes anticipated:**

- A: Higher sea levels and tides (also increases the period of 'tide lock')
- B: Longer growing season and reduced frosts
- C: Increased risk of flooding
- D: Potentially increased winds and storms (e.g. greater risk of extreme rainfall events, or surge tides)

Source: South West Region Climate Change Scoping Study (2003)

The Drainage Boards need to consider how they will take account of the implications of climate change when they determine the appropriate forms of water management for the Brue Valley. This is particularly relevant to the management of flood and drought.

## **4. Proposed objectives for water level management**

### ***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 SSSIs in the Plan area helps to secure, or makes significant progress towards achieving, those SSSIs being in favourable condition by 2010.

### ***Objective 5 - Peat soils and archaeology***

Maintain a stable, year round (fresh) water table that avoids desiccation and oxidation of the peat soils, supplemented by saturation of the inland moors as a result of retaining incident rainfall or flood events for suitable periods each winter.

### ***Objective 6 - Settlements and highways***

Ensure the proposed changes in water management do not have a significant adverse effect on settlements, property, highways or rights of way.

### ***Objective 7 - Peat extraction***

Seek to provide water levels in the vicinity of the peat workings that enable permitted extraction to take place, and to facilitate the reclamation of the worked out sites to an appropriate wetland after-use.

### ***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 freshwater 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 freshwater 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 on the Moor).

***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 peat soils, biodiversity, archaeology and agricultural interests of the Plan area.

## 5. Issues to consider

This section sets out relevant points for the Drainage Boards to take into account when considering the changes in water management which are required to achieve the management objectives set out in Section 4 above.

### 5.1 Extent of surface water for wildfowl and waders in winter

The populations of migratory wildfowl and waders using the Brue Valley in winter months are a primary feature for the five SSSIs which are included within the Somerset Levels SPA and Ramsar site. These populations require extensive areas of surface water on these SSSIs, between December and February each year, for roosting and feeding.

Approximately 300 ha (10%) of the SSSI area in the Brue Valley provide suitable conditions for wintering wildfowl and waders at present. The target is to provide 1200 ha of these habitat conditions in the Brue Valley (40% of the SSSI area). Therefore a further 900 ha of surface water will be required on the three priority SSSIs in the Brue Valley (30% of the SSSI area) each winter if they are to achieve the Government's targets for favourable condition by 2010. Table 6 below summarises the management of surface water required to achieve favourable condition during the winter months for the SSSIs in the Brue Valley (December to February inclusive).

**Table 6 – Summary of surface water requirements in the winter months for wildfowl and waders on the SSSIs in the Brue Valley.**

	<b>Splash conditions</b> Surface water from field level up to 10cm deep	<b>Shallow water</b> Surface water from 10–30cm deep	<b>Deeper water</b> Surface water 25-75cm deep.
<b>Catcott, Edington &amp; Chilton Moors</b> SPA & Ramsar site	325 ha (30%) Achieved - none	65-260 ha (5-25%) Achieved – 43 ha	32 ha (3%) Achieved – 20 ha
<b>Shapwick Heath</b> SPA & Ramsar site	No reference	155 ha (40%) Achieved – 155 ha	155 ha (40%) Achieved – 155 ha
<b>Sharpham Moor Plot</b> SSSI	Not required	Not required	Not required
<b>Street Heath</b> SSSI	Not required	Not required	Not required
<b>Tealham &amp; Tadham Moors</b> SPA & Ramsar site	275 ha (30%) Achieved - 90 ha	90-230 ha (10-25%) Achieved – 18 ha	10 ha Achieved – 10ha
<b>Westhay Heath</b> SPA & Ramsar site	Not required	Not required	13 ha (50%) Achieved – 13 ha
<b>Westhay Moor</b> SPA & Ramsar site	Not required	Not required	255 ha (50%) Achieved – 255 ha
<b>Severn Estuary</b> SPA & Ramsar site	Not required	Not required	Not required

Issues for the Drainage Boards to consider include:

- The location of the areas to be kept wetter with surface water each winter, and how these fit with the local topography and hydrology of the area;
- How these wetter areas can be irrigated in order to achieve the desired amount and depth of surface water during the winter months;
- The implications for the management of flood risk as a result of more water being kept on the SSSIs during the winter months;
- The implications of the proposed changes on the maintenance programmes for rhynes and ditches.

The Drainage Boards recognise that the areas covered by SSSIs designation must remain available for floodwater storage during natural events, and that this role in flood management does not compromise the aim to achieve favourable condition.

## 5.2 Water management for breeding waders in spring

The populations of breeding waders in the spring and early summer are a primary feature for the designation of five of the eight SSSIs in the Brue valley. These populations of breeding waders require extensive areas of wet grassland, with damp or wet soils, and scattered surface pools and other wetland features, between March and early June each year. A larger area (approx 300 ha more) of the wet grasslands on the three priority SSSIs in the Brue Valley will need to be managed for breeding waders each spring if they are to achieve the Government's targets for favourable condition by 2010.

**Table 7 – Summary of water requirements in the spring for breeding waders on SSSIs in the Brue Valley.**

	<b>Splash conditions</b> Surface water from mean field level up to 4cm deep	<b>Surface pools</b> Surface water up to 10cm deep	<b>Suitable ditch margins and other features</b>
<b>Catcott, Edington &amp; Chilton Moors</b>	160-200 ha (15-20%)	1.5 ha	10% of ditch lengths
<b>Shapwick Heath</b>	20 ha (5%)	Not required	Not required
<b>Sharpham Moor Plot</b>	Not required	Not required	Not required
<b>Street Heath</b>	Not required	Not required	Not required
<b>Tealham &amp; Tadham Moors</b>	135-180 ha (15-20%)	1.0 ha	10% of ditch lengths
<b>Westhay Heath</b>	Not required	Not required	Not required
<b>Westhay Moor</b>	50 ha (10%)	0.5 ha	10% of ditch lengths
<b>Severn Estuary</b>	Not required	Not required	Not required

Issues for the Drainage Boards to consider include:

- The location of the areas to be kept wetter during the spring and early summer, and how these fit with the local topography and hydrology of the area;
- How these damp or wet areas can be irrigated in order to achieve the desired amount of soil moisture and the extent of surface water pools during the spring months.

### 5.3 Water management for the conservation of peat soils, wet grassland flora and fauna

The conservation of the peat soils and their protection from shrinkage is essential for the well-being of the habitats and species which are primary features of seven SSSIs in the Brue Valley. These measures are also required for the conservation of the wet grassland flora and fauna. Changes in water level management are required on three of these SSSIs, as shown in Table 8 below. The peat soils require saturation for small periods each winter, to remain damp during the spring, and to be irrigated at summer pen levels throughout the summer and autumn. Ditch spacing is also an important aspect of maintaining the peat soils in an appropriately damp condition during the summer months.

**Table 8 – Summary of water requirements for the conservation of peat soils, wet grassland flora and fauna in the SSSIs of the Brue Valley.**

	<b>Spring</b> Water table 10-30cm below mean field level	<b>Summer and autumn</b> Ditches at summer pen level (SPL)	<b>Winter</b> Surface water up to 10cm deep for two periods of one week
<b>Catcott, Edington &amp; Chilton Moors</b> SPA & Ramsar site	760 ha (70%)	All SSSI (where SPL available)	760 ha (70%)
<b>Shapwick Heath</b> SPA & Ramsar site	No special measures required	All SSSI (where SPL available)	No special measures required
<b>Sharpham Moor Plot</b> SSSI	No special measures required	All SSSI (where SPL available)	No special measures required
<b>Street Heath</b> SSSI	No special measures required	All SSSI (where SPL available)	No special measures required
<b>Tealham &amp; Tadham Moors</b> SPA & Ramsar site	560 ha (60%)	All SSSI (where SPL available)	560 ha (60%)
<b>Westhay Heath</b> SPA & Ramsar site	No special measures required	All SSSI (where SPL available)	No special measures required
<b>Westhay Moor</b> SPA & Ramsar site	200 ha (60% of grassland)	All SSSI (where SPL available)	200 ha (60% of grassland)
<b>Severn Estuary</b> SPA & Ramsar site	Not required	Not required	Not required

Issues for the Drainage Boards to consider include:

- The location of the areas of vulnerable peat soils which should be saturated each winter and kept damp each spring, and how these fit with the local topography and hydrology of the area;
- How these damp or wet areas can be irrigated in order to achieve the desired amount of soil moisture to protect the peat soils from shrinkage;
- How the target areas can be saturated by natural events during the winter months, for example during times of high rainfall or as a result of flooding.

#### 5.4 Water management for aquatic flora and fauna in the watercourses

The aquatic flora and fauna are primary features for the designation of six of the eight SSSIs in the Brue Valley. Populations of aquatic flora and fauna require an extensive network of watercourses (rivers, rhyes and ditches), which is kept irrigated with water of an appropriate quality, depth and flow throughout the year. These watercourses also need to be maintained, on rotation and in an appropriate manner, so as to provide a range of habitat types across the area and maintain connectivity within the rhyne and ditch system. Water levels should be managed to maintain at least 50cm of water in summer and to protect banks from frost and erosion in winter (within 30cm of summer pen level).

**Table 9 – Summary of water requirements for aquatic flora and fauna in the SSSIs of the Brue Valley.**

	<b>Spring, summer &amp; autumn</b> Ditches at summer pen level (SPL)	<b>Winter</b> Water in ditches > 20cm deep	<b>Maintenance practices</b> Appropriate for special interest
<b>Catcott, Edington &amp; Chilton Moors</b> SPA & Ramsar site	All SSSI (where SPL available)	80% of SSSI	80% of SSSI
<b>Shapwick Heath</b> SPA & Ramsar site	All SSSI (where SPL available)	80% of SSSI	80% of SSSI
<b>Sharpham Moor Plot</b> SSSI	No special measures required	No special measures required	No special measures required
<b>Street Heath</b> SSSI	No special measures required	No special measures required	No special measures required
<b>Tealham &amp; Tadham Moors</b> SPA & Ramsar site	All SSSI (where SPL available)	80% of SSSI	80% of SSSI
<b>Westhay Heath</b> SPA & Ramsar site	No special measures required	No special measures required	No special measures required
<b>Westhay Moor</b> SPA & Ramsar site	All SSSI (where SPL available)	80% of SSSI	80% of SSSI
<b>Severn Estuary</b> SPA & Ramsar site	All SSSI (where SPL available)	80% of SSSI	80% of SSSI

Issues for the Drainage Boards to consider include:

- The location of IDB maintained watercourses and how these fit with the local topography and hydrology;
- The location, function and operation of control structures;
- The adoption of water level management practices that maintain ground water tables, ditch water levels and water quality;
- The adoption of maintenance practices for IDB watercourses that help safeguard the aquatic flora and fauna, and protect rhyne banks from erosion.

## **5.5 Farming practices**

Farming is the primary land use within the Plan area, and so is the basis of the livelihoods for many of the Drainage Boards' ratepayers. Changes in water management are also likely to require changes in farming practices. For example, mechanical operations may need to be delayed in the spring when the fields are likely to be damper and softer, and stocking rates may need to change to provide the appropriate conditions for wintering waterfowl and breeding waders.

The availability of financial support to farmers in the Plan area through the Environmental Stewardship scheme will also be a key factor in achieving favourable condition on the SSSIs. By adopting the new Plan, the Drainage Boards will be assisting all parties to target the higher levels of Environmental Stewardship to the most appropriate areas related to the management of water. In particular, by implementing the changes proposed in the Draft Plan, the Drainage Boards will be assisting rate payers to apply for the Higher Level Stewardship wet grassland options in the SSSIs.

Issues for the Drainage Boards to consider include:

- How to involve the farming ratepayers in the decision making process, both collectively and individually;
- How areas can be irrigated to maintain wet fencing and water quality in ditches;
- Provide water levels that enable appropriate farming operations;
- The grants for land management now available to farmers through the Environmental Stewardship scheme.

## **5.6 Peat extraction**

Peat extraction is a significant industry in a small part of the Plan area to the west of Glastonbury. It has different requirements for water management during the extraction, reclamation and after-use phases which need to be taken into account when considering water management in the areas affected by extraction.

Issues for the Drainage Boards to consider include:

- How to involve the peat industry in the decision making process, both collectively and individually;
- The different requirements which are required during the extraction, reclamation and after-use phases of the industry.

## 5.7 Collaborative management of infrastructure

There are likely to be opportunities for more collaborative management of infrastructure during routine operations and during emergencies. By working together more frequently, the Drainage Boards and the Environment Agency would be more effective in achieving the common objectives set out in the Water Level Management Plan.

## 5.8 Pace and nature of the proposed changes

The changes in water level management proposed in this Plan are probably some of the most substantial seen in the Brue Valley during the last forty years, and will affect a significant area of land and its owners. Due to the nature of the area, its topography and complex hydrology, and the additional effect of natural events, it may not be possible to be precise in defining the area that will be affected by each of the proposed changes.

In order to achieve the objectives of water management, the Drainage Boards could adopt a process of 'trial and error' in the first instance to test out the proposed changes in water management, rather than being too prescriptive in the early stages. In time this approach would allow the Drainage Boards to refine and optimise the management of water to achieve the stated objectives, and the overall targets of favourable condition.

Issues for the Drainage Boards to consider include:

- How to test out the practicality of the proposed changes without being too prescriptive in the first instance.

## 5.9 Constraints and possible impacts on other areas

Possible **environmental constraints** include:

- Flat and low-lying nature of the area – large areas lie below high tide level and so can be difficult to drain;
- Tide-lock and limited channel capacity – the Brue Valley can act as a floodplain, with floodwater being stored if it is unable to reach the sea in the main channels;
- SPAs, Ramsar sites and SSSIs – obligation to achieve favourable condition;
- Protected species present – including otters, water vole;
- Peat soils – vulnerable to desiccation, oxidation and shrinkage;
- Buried archaeology – vulnerable to desiccation and loss;
- Climate change and sea level rise – the low-lying nature of land and proximity to the coast makes the area very vulnerable.

Possible **economic constraints** include:

- Agriculture viability – requires land to be seasonally drained to permit grass and crop growth, access by animal and machinery;
- Peat extraction – workings need to be pump drained during extraction phase and restored to summer pen level when reclaimed;
- Capital costs of carrying out improvement works – substantial grant aid required to supplement local funding;
- Drainage rates – need to be kept affordable and providing good value for money.

Possible **social constraints** include:

- Risk of flooding – risk may increase in some areas if less space is available for flood storage;
- Rights of way –some rights of way may become less accessible due to increased winter wetness in some parts of the Plan area.

Possible **impacts on adjacent areas**:

- Minimal impacts on areas outside the Plan boundary are anticipated.

**Table 10A – Summary of water management *by conservation feature* to achieve favourable conditions on SSSIs in the Brue Valley**

<b>Conservation feature of SSSIs</b>	<b>Spring conditions March – early June</b>	<b>Summer conditions June – September</b>	<b>Autumn conditions October – November</b>	<b>Winter conditions December – February</b>
<b>Wintering wildfowl &amp; waders</b>	No special measures required	<b>Ditches</b> at summer pen level	<b>Ditches</b> at summer pen level	<b>Splash conditions</b> Surface water from field level up to 10cm deep  <b>Shallow water</b> Surface water from 10–30cm deep  <b>Deeper water</b> Surface water 25-75cm deep.
<b>Breeding waders</b>	<b>Splash conditions</b> Surface water from mean field level up to 4cm deep  <b>Surface pools</b> Surface water up to 10cm deep  <b>Ditch margins</b> and other features	<b>Ditches</b> at summer pen level	<b>Ditches</b> at summer pen level	No special measures required
<b>Peat soils, wet grassland flora &amp; fauna</b>	<b>Water table</b> no more than 10-30cm below mean field level	<b>Ditches</b> at summer pen level	<b>Ditches</b> at summer pen level	<b>Surface water</b> up to 10cm deep for two periods of one week
<b>Aquatic flora and fauna</b>	<b>Ditches</b> at summer pen level	<b>Ditches</b> at summer pen level	<b>Ditches</b> at summer pen level  <b>Maintenance-sympathetic</b>	<b>Ditch levels</b> within 30cm of summer pen level  <b>Maintenance-sympathetic</b>
<b>Farming practices</b>	<b>Grazing</b> Application of <b>manure</b>	<b>Grazing</b> <b>Mowing</b>	<b>Grazing</b> <b>Topping</b>	No special measures required

**Table 10B – Summary of water management *by activity* to achieve favourable conditions on SSSIs in the Brue Valley**

<b>Water management feature (activity)</b>	<b>Spring conditions March – early June</b>	<b>Summer conditions June – September</b>	<b>Autumn conditions October – November</b>	<b>Winter conditions December – February</b>
<b>Ground water table</b>	<p><b>For breeding waders</b> no more than 10cm below mean field level</p> <p><b>For peat soils, wet grassland flora &amp; fauna</b> no more than 10-30cm below mean field level</p>	<p><b>For farming, peat soils, wet grassland flora &amp; fauna</b> no more than 10-30cm below mean field level</p>	<p><b>For farming, peat soils, wet grassland flora &amp; fauna</b> no more than 30-60cm below mean field level</p>	<p><b>For wintering wildfowl &amp; waders</b> Water table that maintains surface water conditions</p> <p><b>For peat soils, wet grassland flora &amp; fauna</b> no more than 10-30cm below mean field level</p>
<b>Ditch water levels</b>	<p><b>For breeding waders</b> ditch levels that maintain wet ditch margins, areas of splash (from mean field level up to 4cm deep) and surface pools (up to 10cm deep)</p> <p><b>For aquatic flora &amp; fauna, peat soils and wet grassland flora &amp; fauna</b> ditches at summer pen level</p>	<p><b>For farming, ditch flora &amp; fauna, peat soils and wet grassland flora &amp; fauna</b> ditches at summer pen level</p>	<p><b>For farming, ditch flora &amp; fauna, peat soils and wet grassland flora &amp; fauna</b> ditches at summer pen level</p>	<p><b>For wintering wildfowl &amp; waders</b> ditch levels that maintain surface water conditions either directly or in combination with rainfall or flooding</p> <p><b>For peat soils, wet grassland flora &amp; fauna</b> ditch levels that maintain surface water up to 10cm deep for two periods of one week, either directly or in combination with rainfall or flooding</p> <p><b>For aquatic flora &amp; fauna</b> ditch levels no lower than 30cm below summer pen level</p>
<b>Watercourse maintenance</b>	<b>Avoid maintenance where possible</b>	<b>Maintenance</b> sympathetic to breeding birds, aquatic flora & fauna	<b>Maintenance</b> sympathetic to aquatic flora & fauna	<b>Maintenance</b> sympathetic to wintering wildfowl, aquatic flora & fauna

## **6. Options for water management**

There are a number of ways that the management of water in the Brue Valley can be determined. These vary depending on the amount of intervention by man. The current system of water management has evolved over several decades and is almost entirely engineered or man-made. However, the system can still be overwhelmed by natural events such as flood or drought. This section examines the options for water management in the Brue Valley in the light of the proposed objectives set out in Section 4 of the Plan.

### **6.1 Water management determined by natural processes and events**

The River Brue is a sub-estuary of the Bristol Channel, with a tidal barrier at Highbridge. The Brue is a high-level carrier where it flows through the low-lying inland Moors, with substantial embankments keeping the water in channel during normal conditions.

Theoretically it would be possible for parts of the Brue Valley to become a tidal inlet of the Bristol Channel (e.g. by removing the tidal barrier at Highbridge), but this would not achieve the proposed objectives for water management.

Likewise, it would be possible to remove, lower or breach some of the embankments that contain the high-level carriers in the Brue Valley so that fluvial water could spread across the Valley on the basis of gravity and the local topography. Whilst this system would be a better reflection of the natural processes operating in the area, and thus could be regarded as being more sustainable in the long-term, such a system would not achieve the proposed objectives of water management.

However, any engineered or man-made system of water management may be overwhelmed by natural events and the forces of nature, and the Brue Valley is no exception in this respect. The optimum system of water management, i.e. one which achieves specific objectives, is likely to be a combination of an engineered system that can also harness natural processes and events so they can contribute positively to the environmental well-being of the area.

### **6.2 Water management led by the wishes of individual land owners**

Although the hydrology of the Brue Valley is complex, it is possible for individual landowners to determine the management of water on their own land, with the appropriate consent of the Drainage Boards. Some parts of the Brue Valley have private pump-drainage schemes, for the purposes of agriculture or peat extraction, while others hold higher water levels in winter under the ESA Tier 3 Raised Water Level Area scheme. These private initiatives are led by the landowners concerned and the land affected is, to some extent, isolated from the Drainage Boards' penning system.

These private systems of water management may meet the immediate needs of individual landowners, but they add to the complexity of water management in the Brue Valley and are often highly engineered and so difficult or expensive to create and maintain.

### **6.3 Water management determined by the Drainage Boards**

The Drainage Boards have the statutory powers to determine and manage water levels throughout their area. They have implemented these powers for more than a century and the result is the drainage and irrigation system currently operating in the Brue Valley.

However, the proposed objectives of water management are now different from those that were in place when the current system of drainage and irrigation was established. In order that the new objectives for water management can be achieved, the Drainage Boards will need to change the custom and practice they have adopted in the past when implementing their powers.

Regarding water management, the obligation to achieve the Government's target for favourable condition on the SSSIs in the Brue Valley rests collectively with the members of the Drainage Boards. This obligation does not rest with individual landowners, unless they happen to be public bodies in their own right. The Drainage Boards can be helped to achieve these targets by the other Competent Authorities (e.g. the Environment Agency, English Nature, Rural Development Service, and Local Authorities), but decisions regarding water management for favourable condition in SSSIs lie firmly within the control of the Drainage Boards.

When considering these decisions to change water management, the Drainage Boards are well advised to assess the sustainability of the new proposals. Water management is likely to be more sustainable in the long-term if it reflects the local hydrology and topography, takes advantage of gravity drainage rather than pumping, and harnesses natural processes and events for environmentally beneficial purposes.

The adoption of this approach by the Drainage Boards would see a fundamental shift in the 'voluntary principle' that has been used in developing a suite of 'Raised Water Level Areas' as part of the Somerset Levels and Moors ESA scheme since the early 1990s. The voluntary principle remains, but in place of landowners volunteering to take part in a scheme that changes the management of water on that part of the Moor where they own land, they would be volunteering to take advantage of the financial support available through an agri-environment scheme (i.e. from the public purse).

By adopting the above approach to achieving favourable condition on the SSSIs, the Drainage Board(s) are more likely to be able to meet their legal obligations towards conservation compared with following the approach used previously for the establishment of Raised Water Level Areas under the ESA scheme.

This approach would result in the areas of higher winter water levels being determined by the local hydrology and topography rather than by the ownership of land. Schemes of this nature are likely to require less engineering work and maintenance, as they would tend to be working with natural processes rather than against them.

However, implementing these changes in water management may go against the wishes of individual landowners who may then choose to seek compensation from the Drainage Boards. In this event, it is appropriate that compensation is paid from the national purse rather than by the local rate payers, as the management of water is being changed to achieve the national target of favourable condition for the SSSIs.

## **6.4 Water management directed by the Minister**

The Secretary of State for Defra has the legal power to direct an Operating Authority (e.g. a Drainage Board, the Environment Agency, a Local Authority) to take a certain course of action regarding water and flood risk management. In the absence of an appropriate decision or action by an Operating Authority, the Secretary of State may direct that Authority to take a certain course of action.

This sanction is rarely applied by Defra, but it could be used if an Operating Authority is not meeting its legal obligations or Government targets. At this point decisions may be taken out of the hands of the Operating Authority and transferred to the Secretary of State. The Operating Authority is then obliged to implement the decision made by the Secretary of State.

## 7. Proposals in the Stage 1 Plan

### 7.1 Proposal 1 – Adopting the Stage 1 Plan

By adopting the Stage 1 Plan, the Drainage Boards agree to:

**Action 1:** Maintain the current water level management operations for those SSSIs which are assessed as being in favourable condition regarding their hydrological conditions, namely Sharpham Moor Plot and Street Heath.

**Action 2:** Confirm the preliminary location and extent of the ‘target areas’ within each of the three priority SSSIs where significant changes in water management are required in order to achieve favourable condition. These include:

- a) Target areas for splash, shallow and deeper water in the winter months for overwintering wildfowl and waders on Catcott, Edington and Chilton Moors SSSI on Tealham and Tatham Moors SSSI, and Westhay Moor SSSI;
- b) Target areas for breeding waders on the three priority SSSIs;
- c) Target areas to conserve peat soils, safeguard wet grassland flora and fauna, and aquatic their flora and fauna, on the three priority SSSIs.

**Action 3:** Confirm the preliminary location and extent of the ‘target areas’ within each of the three other SSSIs where changes in water management are required in order to achieve favourable condition. These include:

- a) Target areas for breeding waders on Shapwick Heath SSSI and Westhay Heath SSSI;
- b) Target areas to safeguard aquatic flora and fauna, on Shapwick Heath SSSI, Westhay Heath SSSI and the Severn Estuary SSSI.

**Action 4:** Take the lead in agreeing the preliminary location and extent of these ‘target areas’ with the other Competent Authorities (Environment Agency, Defra, Rural Development Service, English Nature, English Heritage and the County and District Councils)

**Action 5:** Carry out more detailed studies into other improvement schemes for water management in the Brue Valley, including:

- a) Restoration of South Drain Back Ditch structures;
- b) North Drain improvements (restore tilting weir at North Drain PS);
- c) General improvements to irrigation system and winter water level control;
- d) Strategic flood water storage areas etc..

**Action 6:** Press for adequate funding from public sources for:

- a) More detailed investigations into how the management of water in the target areas needs to be changed in order to achieve favourable conditions in the three priority SSSIs (i.e the preparation of the Stage 2 Plan);
- b) The capital improvements to the water management infrastructure which will be required in order to achieve favourable condition in the priority SSSIs.
- c) Appropriate agri-environment schemes which can provide financial support to those farmers and land-owners affected by the proposals to achieve favourable conditions;
- d) Other improvement schemes put forward in the Stage 2 Plan.

## **7.2 Proposal 2 – Achieving favourable splash and shallow conditions on SSSIs in winter**

The Drainage Boards propose to ensure that splash and shallow conditions for feeding and roosting areas will:

- Be achieved in the defined 'target areas' which are most suitable for this purpose on account of their natural topography and their hydrological position within the sub-catchment;
- Be required in the target areas during December, January and February each year;
- Have water levels between field level and 10cm deep for feeding areas and between 10cm and 30cm deep for roosting areas.
- Cover a minimum ('base') area of at least 40% of SSSIs in the Brue Valley, which form part of the Levels and Moors SPA.
- Extend by an additional area when natural conditions permit (such as rainfall or flood conditions), giving an 'optimum' target area of splash and shallow water for each SSSI.

Target areas for splash conditions for feeding areas on Catcott, Edington and Chilton Moors SSSI during winter months include:

- Catcott Grounds (60-100 ha);
- Edington Heath (60-100 ha);
- Chilton Moor, to the north of the South Drain (60-80 ha);
- Vicinity of Catcott Lows (50-70 ha).

Target areas for splash conditions on Tealham and Tadham Moors SSSI during winter months include:

- In the vicinity of the existing raised water level area near Westham (100-150 ha)
- East of Jack's Drove Heath (20-50 ha);
- South of Totney Drove (30-60 ha);
- South of Allermoor Drove (30-60 ha).

No additional splash conditions are required on Westhay Moor SSSI during the winter months.

Target areas for shallow water on Catcott, Edington and Chilton Moors SSSI during winter months include:

- Catcott Grounds (20-60 ha);
- Edington Heath (20-60 ha);
- Chilton Moor, to the north of the South Drain (20-60 ha);
- Vicinity of Catcott Lows (50-70 ha).

Target areas for shallow water on Tealham and Tadham Moors SSSI during winter months include:

- In the vicinity of the existing raised water level area near Westham (20-70 ha);
- East of Jack's Drove Heath (20-50 ha);
- South of Totney Drove (30-60 ha);
- South of Allermoor Drove (30-60 ha).

There are no additional target areas for shallow water on Westhay Moor SSSI

Splash and shallow conditions will be achieved by:

- The Drainage Board (and the Environment Agency, where required) irrigating field ditches in the target areas so that ditch water levels are at mean field level in late November and early December each year. [Note: for these purposes mean field level is taken to be the mean level of all the fields in the target area].
- Managing ditch levels throughout December, January and February to provide, in combination with rainfall and floodwater, the necessary range of water conditions.
- The target areas having the natural capacity (through their topography) to store rainfall and floodwater so that water levels can rise (and be held) up to 30 cm above mean field level during these natural events;
- The Drainage Board lowering ditch water levels to summer pen level in those parts of the target areas not specifically managed for breeding waders, from the end of February each year (in order to facilitate the growth of grass).

Requirements needed in order to achieve favourable splash and shallow conditions include:

- Drainage Board agreement (and Environment Agency, in some areas) on the location and extent of the target areas, the water levels
- to be achieved and the mechanisms of irrigation required to achieve these levels;
- Rainfall or natural flood events to provide sufficient water to achieve the water levels on the 'optimum' target areas at appropriate times during the winter months;
- Capital grant aid to fund changes to the existing infrastructure for water management in the target areas (and the installation of new structures, if necessary);
- Financial support for farmers and landowners in the target areas through suitable agri-environment schemes;
- Changes in the management of land and watercourses to take account of the target areas being significantly wetter during the winter months

### **7.3 Proposal 3 – Achieving deeper water conditions on SSSIs in winter**

The Drainage Boards propose that deeper water conditions will:

- Be achieved in the defined 'target areas' which are most suitable for this purpose on account of their topography. In the Brue Valley this will be predominantly old peat workings within the relevant SSSIs, as and when reclamation takes place;
- Have water levels between 25 and 75 cm deep, levels which may fluctuate in both level and extent during the winter season.
- The target areas having the capacity (through their topography) to store rainfall and floodwater so that water levels can rise (and be held) to mean field level during December, January and February each year.

Target areas for deeper water on Catcott, Edington and Chilton Moors SSSI during winter months include:

- Edington Heath (10 ha) [Note: none of this target has been achieved to date.];
- Catcott Heath (10 ha.) [Note: none of this target has been achieved to date.].

Target areas for deeper water on Tealham and Tadham Moors SSSI during winter months include:

- Blakeway (10 ha) [*Note: all this target has been achieved to date*].

Target areas for deeper water on Westhay Moor SSSI during winter months include:

- Westhay Moor ( 255 ha) [*Note: all this target has been achieved to date*];

Deeper water will be achieved by:

- The Drainage Board (and the Environment Agency, where required) irrigating the target areas for deeper conditions so that ditch water levels are between summer pen level and mean field mean field level in late November and early December each year;
- The target areas having the capacity (through their topography) to store rainfall and floodwater so that water levels can rise (and be held) to mean field level during December, January and February each year.

Requirements needed in order to achieve favourable conditions of deeper water include:

- Rainfall or natural flood events to provide sufficient water to achieve the target water levels at appropriate times during the winter months;
- Drainage Board agreement (and Environment Agency, in some areas) on the location and extent of the target areas, the water levels to be achieved and the mechanisms for achieving these levels;
- Capital grant aid to fund changes to the existing infrastructure for water management in the target areas (and the installation of new structures, if necessary);
- Financial support for farmers and landowners in the target areas through suitable agri-environment schemes;
- Appropriate planning conditions for the extraction of peat, reclamation and after-use;
- Changes in the management of land and watercourses to take account of the target areas being significantly wetter during the winter months.

## **7.4 Proposal 4 – Achieving favourable conditions for breeding waders in spring**

The Drainage Boards propose that water management which supports favourable conditions for breeding waders will be provided in spring each year by:

- Irrigating defined 'target areas', covering at least 375 ha (15%) of the three priority SSSIs, between March and early June inclusive each year. Target areas are most suitable for this purpose on account of their natural topography and their hydrological position within the sub-catchment;
- Ensuring water levels are between field level and 4cm deep, levels which may fluctuate during the spring season;

Target areas for breeding waders on Catcott, Edington and Chilton Moors SSSI during the spring months include:

- Catcott Grounds (60-100 ha);
- Edington Heath (60-100 ha);
- Chilton Moor, to the north of the South Drain (60-80 ha);
- Vicinity of Catcott Lows (50-70 ha).

Target areas for breeding waders on Tealham and Tadham Moors SSSI during the spring months include:

- In the vicinity of the existing raised water level area near Westham (100-150 ha);
- East of Jack's Drove Heath (20-50 ha);
- South of Totney Drove (30-60 ha);
- South of Allermoor Drove (30-60 ha).

No additional target areas for breeding waders are required on Westhay Moor SSSI during the spring months.

Conditions suitable for breeding waders will be achieved by the Drainage Board (and the Environment Agency, where required) by:

- Irrigating field ditches in the target areas so that ditch water levels are at mean field level between late February and early May each year [Note: for these purposes mean field level is taken to be the mean level of individual fields in the target area];
- The target areas having the natural capacity (through their topography) to store rainfall and floodwater so that water levels can rise (and be held) up to 4 cm above mean field level during these natural events;
- Lowering ditch water levels to summer pen level in those parts of the target areas not specifically managed for breeding waders, from the end of May each year.

Requirements needed to achieve favourable conditions for breeding waders include:

- Drainage Board agreement (and Environment Agency, in some areas) on the location and extent of the target areas, the water levels to be achieved and the mechanisms for irrigating the area so as to achieve these levels;
- Capital grant aid to fund changes to the existing infrastructure for water management in the target areas (and the installation of new structures, if necessary);
- Financial support for farmers and landowners in the target areas through suitable agri-environment schemes;
- Changes in the management of land and watercourses to take account of the target areas being significantly wetter during the spring months.

## 7.5 Proposal 5 – Conserving peat soils, wet grassland flora and fauna

The Drainage Boards propose to reduce the likelihood of peat shrinkage in all practicable parts of the Plan area (i.e. where topography, highways and property permit) by:

- Allowing the saturation of the peat soils during the months of December, January and February when rainfall and flood conditions permit. These actions will also be of direct benefit to safeguarding wet grassland flora and fauna.
- Maintaining summer pen levels and irrigation system.

Target areas for reducing the likelihood of peat shrinkage during winter months should include all practicable parts of the three priority SSSIs (i.e. where topography, highways and property permit). Estimated to be approximately:

- 760 ha of Catcott, Edington and Chilton Moors SSSI (70% of the SSSI);
- 560 ha of Tealham and Tadham Moors SSSI (60% of the SSSI);
- 200 ha of Westhay Moor SSSI (60% of the SSSI grassland area).

Reducing the likelihood of peat shrinkage will be achieved by the Drainage Boards using one or more of the options below each winter:

- During periods of rainfall, the Drainage Board (and the Environment Agency, where required) permitting field water levels to rise up to 10 cm above field level on the SSSI for a week in December and for a week in late January or early February, before commencing any attempt to remove this surface water;
- During minor flood events in December, January or February, the Drainage Board (and the Environment Agency, where required) permitting field water levels to rise up to 10 cm above field level on the SSSI for a week, before commencing any attempt to remove this surface water;
- After a major flood event in December or January, the Drainage Board (and the Environment Agency, where required) ceasing to evacuate the flood water at the point where surface water levels are up to 10 cm above field level on the SSSI, holding these conditions for the period of a week, before completing the evacuation of the remaining surface water.

Requirements needed in order to achieve favourable conditions for conserving peat soils, wet grassland flora and fauna include:

- Drainage Board agreement (and Environment Agency, in some areas) on the location and extent of the areas most likely to be affected by this objective as a result of their topography and location within the sub-catchment, the most effective way to assess favourable conditions, the target water levels to be achieved and the mechanisms for irrigating the area in order to achieve these levels;
- Rainfall or natural flood events to provide sufficient water to saturate the peat soils at the appropriate time during the winter months;
- Capital grant aid to fund changes to the existing infrastructure for water management in the target areas (and the installation of new structures, if necessary);
- Financial support for farmers and landowners in the target areas through suitable agri-environment schemes;
- Changes in the management of land and watercourses to take account of the target areas being significantly wetter during the winter months.

## **7.6 Proposal 6 – Achieving favourable conditions for aquatic flora and fauna in watercourses**

The Drainage Boards recognise the importance of water level management and watercourse maintenance in sustaining the aquatic flora and fauna of ditches and propose to safeguard these interests by:

- Providing water level management that maintains suitable water levels throughout the year and promotes high water quality in ditches;
- Adopting and sustaining watercourse maintenance practices that are sympathetic to aquatic flora and fauna.

The Drainage Boards will ensure that winter ditch water levels appropriate to safeguard the aquatic flora and fauna:

- During winter, are provided in all practicable parts of the SSSI in winter (i.e. where topography, highways and property permit) by following the proposals set out for splash, shallow and deeper surface water, together with the conditions required to conserve peat soils, and safeguard wet grassland flora and fauna (as in Proposals 2 - 5 above);
- During spring, are held so as to provide water tables of 10-30cm below mean field level by means of irrigation (i.e. similar requirements to the conservation of peat soils, wet grassland flora and fauna);
- During the summer and autumn, are maintained no lower than the current summer pen levels.

## **7.7 Proposal 7 – Maintaining appropriate farming practices**

The Drainage Boards recognise the important role that farming practices have in maintaining the wet grassland and aquatic habitats for which parts of the Brue Valley are of international significance. The Boards propose to support those farming practices which maintain the conservation interest, and protect the peat soils, through the appropriate management of water in the Brue Valley.

## **7.8 Proposal 8 – Integrating water level requirements (see Tables 10 A & B)**

The Drainage Boards propose to integrate the water level management requirements of conservation and farming interests in SSSIs by:

- In winter, following the proposals set out for splash, shallow and deeper surface water in target areas (i.e. where topography, highways and property permit) and providing in all other practicable parts of the SSSI conditions required to conserve peat soils, and safeguard wet grassland flora and fauna;
- In spring, following the proposal set out for breeding waders in target areas (i.e. where topography, highways and property permit) and maintaining ditch levels no lower than the current summer pen levels in all other parts of the SSSI to provide conditions required to conserve peat soils, and safeguard wet grassland flora and fauna;
- In summer and autumn, maintaining ditch levels no lower than the current summer pen levels.

## **7.9 Proposal 9 – Changing water management and infrastructure outside SSSIs**

The Drainage Boards will investigate schemes to improve the management of water in the following areas in the Stage 2 Plan:

- Restoration of South Drain Back Ditch structures;
- North Drain improvements (restore tilting weir at North Drain PS);
- General improvements to irrigation system and winter water level control;
- Strategic flood water storage areas etc.

### **7.10 Proposal 10 – Other issues to be addressed in the Stage 2 Plan**

The Drainage Board, working with the Environment Agency, will develop a strategic approach to flood management issues which may arise from future development pressures in the Brue Valley.

The Drainage Board will consider how the implications of climate change should be taken into account in the planning water management for the Brue Valley.

### **7.11 Proposal 11 – Consultation with other parties**

The Environment Agency, English Nature, Rural Development Service, Defra, English Heritage, Somerset County Council, Mendip District Council, Sedgemoor District Council and other key organizations will be invited, by the Drainage Boards, to comment on the Consultation Draft of this Stage 1 Plan.

### **7.12 Proposal 12 – Preparing the Stage 2 Plan**

The Drainage Boards will prepare a Consultation Draft of the Stage 2 Plan, with help from the Competent Authorities and rate payers, by summer 2007.

## **8. Contingency measures**

### **8.1 Flood conditions**

*[to be added]*

### **8.2 Drought conditions**

*[to be added]*

## **9. Unresolved issues**

There are no unresolved matters in this Stage 1 Plan.

## **10. Other matters**

There are no other matters to be addressed in this Stage 1 Plan.

## **11. Monitoring and review**

There will be no requirement to formally monitor or review this Stage 1 Plan as the Consultation Draft of the Stage 2 Plan is due to be completed by the end of summer 2007.

## **12. Next steps**

Following the adoption of this Stage 1 Plan, the Drainage Boards intend to:

- Consult other Competent Authorities, and interested parties, to seek their comments on this Stage 1 Plan;
- Secure the resources to carry out the investigations required for the Stage 2 Plan;
- Carry out the further investigations, as set out in the proposals above, leading to the preparation of the Stage 2 Plan.