

A Strategy for the South Somerset Levels

Introduction

In 2013 the Somerset Levels were subjected to flooding which aroused strong feelings amongst the population who felt neglected since the formation of the Environment Agency and its decision to cease dredging on the Rivers Parrett and Tone. A request was made to recommence dredging but that was not implemented due to Treasury limits on revenue expenditure and lack of cost matching from the local agencies. Severe flooding, due to unprecedented rainfall, occurred in January 2014 and a 'blame game' was mounted on television and in the press. Government has made extra funds available and requested a strategy be produced for the levels by the beginning of March 2014.

The main problem area would appear to be the South Levels (Parrett and Tone Catchments), hence the concentration of this report on that area. Flooding in the lower levels is largely concentrated on land below the 5 meter contour. The upper levels, to the South of Langport lie between the 5 and 10 meter contours. The total flooded area covers some 60 km².

Background

The Somerset Levels, or the Somerset Levels and Moors as they are less commonly but more correctly known, is a sparsely populated coastal plain and wetland area of central Somerset, in South West England, running south from the Mendips to the Blackdown Hills.

The Levels occupy an area of about 160,000 acres (650 km²), corresponding broadly to the administrative district of Sedgemoor but also including the south-western part of the Mendip district. The Somerset Levels are bisected by the Polden Hills; the areas to the south are drained by the River Parrett, and the areas to the North by the rivers Axe and Brue. The Mendip Hills separate the Somerset Levels from the North Somerset Levels. The Somerset Levels consist of marine clay 'levels' along the coast, and inland (often peat-based) 'moors'; agriculturally, about 70 percent is used as grassland and the rest is arable. Willow and teazel are grown commercially and peat is extracted. In 1685, the Battle of Sedgemoor was fought in the Bussex area of Westonzoyland at the conclusion of the Monmouth Rebellion.

As a result of the wetland nature of the Moors and Levels, the area contains a rich biodiversity of national and international importance. It supports a vast variety of plant and bird species and is an important feeding ground for birds. The Levels and Moors include 32 Sites of Special Scientific Interest, of which 12 are also Special Protection Areas. The area has been extensively studied for its biodiversity and heritage and has a growing tourism industry.

People have been draining the area since before the Domesday Book. In the Middle Ages, the monasteries of Glastonbury, Athelney and Muchelney were responsible for much of the drainage. The artificial Huntspill River was constructed during the Second World War as a reservoir, although it also serves as a drainage channel. The Sowry River, which acts as a flood relief channel between the River Parrett and the King's Sedgemoor Drain, was completed in 1972. Water levels are managed by the Levels internal drainage boards.

[With thanks to Wikipedia]

Objectives

Government policy, as implemented by the Environment Agency, is to give priority for protection from flooding to the built environment rather than agricultural land or natural environment. Cost benefit is the main tool used in project appraisal and it is a matter for government whether they should exempt the Levels from this policy as a 'unique' environment; the only similar area being the Fens in East Anglia.

The principle objective would be to keep the levels at their optimal condition in order to meet the needs of the inhabitants, both human and otherwise. This raises three distinct needs: for residents, farmers and nature conservation. In addition there is a small amount of industry and tourism to consider.

The main object of current consideration is flooding so that must feature large in any set objectives:

1. To maintain water levels at an acceptable level in the event of a one in one hundred year event and restore them to normal within a period of one week.
2. To take into account the effects of climate change by building in sufficient resilience and/or flexibility to the plans to enable the levels to be sustained into the foreseeable future.
3. In meeting the above, allow for the differing needs of residents, agriculture, conservation and industry.

Dredging and Maintenance

During the current crisis much has been made of the need for dredging the Rivers Parrett and Tone. Obviously if there is a lack of head, enabling water to discharge, then appropriate dredging of a river bed will help but that is complicated here as the Parrett is tidal. Dredging was carried out historically but largely for navigation, enabling vessels to reach Dunball Wharf. Dredging of the tidal reach will enable water to flow out more quickly but will also enable the tide to return sooner. Dredging of the reach through Bridgwater would appear to be only beneficial, however, upstream dredging will enable flood flow to reach Bridgwater more quickly and hence make it more likely that property will flood there.

The priority is to ascertain the basis for dredging therefore an objective investigation is required. A contract for modelling of the River Parrett should be awarded as soon as possible.

Whilst the dredging debate has cornered the headlines, other aspects of maintenance have hardly been mentioned. The key carrier, other than the Parrett, is the Kings Sedgemoor Drain (KSD), which is fed from the flood overflow channel known as the River Sowey (constructed 1972). This allows water to overflow from the Parrett via a control sluice which connects into the KSD which, in turn, flows out to the tidal Parrett estuary at Dunball. A sluice controls the outflow which is entirely by gravity when tidal conditions allow. Maintenance of the KSD would appear to be based on keeping water in the catchment and conservation rather than its prime purpose as a carrier of flood water to the Bristol Channel. The KSD needs major maintenance works to restore and improve its capacity.

Pumping

Unlike most other similar areas, where the land level is below high tide, the Levels do not currently rely on pumping. A steam driven pump station was constructed in 1830 near Westonzoyland to drain the Weston Level. This was replaced by a more modern station in 1951 with a capacity of about 0.8 m³/s. If water is pumped from this station when the River Parrett is already full then it will simply increase the overflow from the upstream Parrett into the River Sowy flood channel which, in turn, connects back into this system. There is also a pump station at Henley Pump on the KSD which is designed to keep water in the upper catchment. The effectiveness of the pumping station at Athelney is not clear.

The outlet of the KSD at Dunball, despite being the critical point on the system of internal drains, currently operates solely by gravity. This is the key to the whole strategy for discharging appropriate quantities of water from the Levels. A high capacity lift station at this point, with a lowered channel to act as a sump, is central to the improvement strategy. The function of the Westonzoyland PS should be reassessed along with the suggested improved channels draining to the KSD.

Further key points need to be identified as part of the modelling exercise, and consideration given to installing pumped capacity to enable excess waters to be discharged from the North Moor and West Sedgemoor.

New Works – Lower Levels

The KSD needs to be upgraded between Dunball and its confluence with the River Sowy. The capacity of the River Sowy needs to be assessed and increased if found deficient.

Whilst the KSD is the key feature on the East bank of the Parrett, it is not possible to construct an equivalent asset on the West side due to the location of Bridgwater. It would be useful to improve the North Moor drain and construct a pumped outlet to the Parrett near Little Moor.

Westonzoyland effectively cuts off the South Moor from the KSD. A new cut along the line of the Andersea Main Rhyne joining the Chedzoy New Cut would provide an effective gravity outlet to the KSD as an alternative to the Westonzoyland PS.

A tidal barrier on the River Parrett estuary below Dunball is likely to be too expensive to warrant further consideration.

New Works – Upper Levels

Langport is a major obstacle between the upper levels around Muchelney and the lower levels. The route of the abandoned railway could be used to extend the Sowy River flood relief channel back up to Muchelney.

The Middle Drain on West Sedgemoor could be upgraded and a pumped discharge to the Parrett or Sowy considered.

Taunton and the Bridgwater and Taunton Canal

Whilst the purpose of the canal is navigation, all waterways can also serve drainage purposes. As the canal originates in Taunton and falls to Bridgwater, it could be used to divert a proportion (1-2 m³/s) of the water which falls on the developed area of the town to reduce peak flows in the River Tone. This would require alteration to the four locks along the route.

Catchment Management and Modelling

Current thinking on flood alleviation includes amelioration of peak flows from upstream areas of the catchment. Central to this is the runoff from the town of Taunton and any measures to reduce peak flow from the town will be beneficial. Diversion of some water to the canal is mentioned above; however, there will be opportunities to store water in the localised catchment which need to be identified. Better implementation of SUDS is essential for new development.

Agricultural and wooded areas can help mitigate flood peaks by holding water back locally. Small check dams are common features abroad and contour ploughing can reduce runoff from arable land.

Catchment modelling has already been mentioned in respect of dredging the tidal Parrett however, it could be extended to optimise the management of the water levels using the sluices and pumps in concert. If cost-effective, a real time model could be developed with actual rainfall as an input thus enabling managers to predict the result of their actions. Some aspects of this could be automated.

Emergency Planning

Response to the on-going emergency in the Levels has been mixed. Whilst the Environment Agency have extensive experience and standard response plans, it would appear that more could be done to customise procedures to this unique area. Published reports of the IDB pay lip service to emergency planning as their main agenda would appear to be to keep water in the catchment rather than remove it. An updated and more appropriate plan is required.

Management

The levels are a complex system; however, this is matched by the complexity of their management systems. Many parties have an interest in the levels which are listed in APPENDIX A1. Their roles and responsibilities need to be clarified.

APPENDICES

A1 Organisation and Responsibilities

A2 Timelines and Costs

A3 Maps and Diagrams

APPENDIX 1 – Organisation of the Levels

	Responsibilities
National Government, Secretary of State for the Environment and the Treasury	Overview of local government and funding.
Environment Agency	Flood control; main rivers and the KSD. Emergency planning.
Parrett Internal Drainage Board	Control and maintenance of non-main river watercourses.
Wessex Water	Water supply and sewerage.
Somerset County Council	Highways, including highway drainage. Tourism and County planning. Emergency planning. Management of the B&T Canal.
District Councils: Sedgemoor, South Somerset, Taunton Deane and Mendip	Local planning and some watercourse maintenance.
British Waterways	Canals and navigable rivers but not the B&T.
Natural England	Development and protection of reserves and SSIs.
Parish Councils	Local intervention and volunteers.
Somerset Wildlife Trust	Management and maintenance of wildlife areas.
RSPB	Bird sanctuaries.
NFU	Farmers' interests.
County Police, Fire and Rescue	Emergency planning and response.
Chambers of Commerce	Business interests.

A2 Investment programme

The following projects are proposed:

Project	Timing	Client	Cost* £ ,000
Kings Sedgemoor Drain pumped outfall and sump at Dunball [Point D]	Phase 1a	EA	5,000
River Parrett dredging through Bridgwater	Phase 1a	EA	1,000
Modelling River Parrett (for dredging purposes)	Phase 1a	EA	250
KSD improvement from Dunball to R Sowy river confluence [C to D]	Phase 1b	EA	500
Catchment modelling stage 1	Phase 1b	EA	250
Revised emergency management plan	Phase 1b	SCC/EA/IDB	100
Catchment modelling stage 2	Phase 2	EA	250
River Sowy upgrading	Phase 2	EA	500
Adaptation of the Bridgwater and Taunton Canal	Phase 2	BW	200
Westonzoyland pumping station renewal** [W]	Phase 2	EA	2,000
New flood channel, Sowy River to Muchelney	Phase 3	EA	2,000
West Sedgemoor Middle Drain Improvement (and pumping station)	Phase 3	IDB	1,500
Taunton flow alleviation	Phase 3	T&D DC	2,000
North Moor Drain improvement (and pumping station)	Phase 4	IDB	1,500
River Tone flood abatement	Phase 4	EA	2,000
Andersea Chedzoy improved drain	Phase 4	IDB	500
Total investment			£19,550

* preliminary guestimates only

** this may not be necessary if the new link to the KSD is made

A more detailed Excel based program can be provided if required.

A2 Maps and Diagrams

An Ordnance Survey Explorer map (1/25000) of the Levels and drains is available illustrating the 5 and 10 meter contours.

