ITEM 8d

Somerset Rivers Authority

END OF YEAR REPORT 2016-17

SOMERSET RIVERS AUTHORITY END OF YEAR REPORT 2016-17: CONTENTS

INTRODUCTION

In 2016-17, Somerset Rivers Authority (SRA) spent just over £6million on actions designed to give Somerset an extra level of flood protection. This end of year report explains where the money came from and how it was spent. It also gives information about projects that have been delayed or had their funding moved to other activities. These details have been provided because the SRA wants people to know what it has achieved across the county – and it wants to be properly accountable.

The SRA raises extra money to deliver extra work. Schemes are prioritised for SRA funding on the basis of the main objectives in Somerset's 20 Year Flood Action Plan, which was developed in response to the floods of winter 2013-14. This report is divided into two sections. *Performance* covers delivery overall and by funding source, plus a table summarising 2016-17 finance; *Progress* gives more details about major projects, and smaller actions grouped according to SRA workstream – Dredging & River Management, Land Management, Urban Water Management, Resilient Infrastructure and Building Community Resilience.

Somerset's approach is uniquely joined-up. This report details just one year of the SRA's extra work. For much more information about earlier years, works in progress and works coming up, visit www.somersetriversauthority.org.uk

A note on Somerset Rivers Authority: *The SRA is a partnership between 11 of Somerset's existing flood risk management authorities: Somerset County Council, the five district councils, the Axe Brue and Parrett Internal Drainage Boards, the Environment Agency, Natural England and the Wessex Regional Flood & Coastal Committee. The SRA's purpose is to provide a higher standard of flood risk management than is affordable from the existing budgets of those flood risk management authorities.*

Photographic credits: *The front cover photograph by Charlie Granger shows works to create one of the two new river channels at Beer Wall. All photos copyright © Somerset Rivers Authority 2017, except for those used by kind permission of: p.8 (x2) Phil Brewin, Somerset Drainage Boards Consortium; p.9 Hendrik Robinson, Arcadis; p.10 Jon Woodward; p.11 Environment Agency archive; p.12 Environment Agency; p.15 (x2) Dave Coles, Sedgemoor District Council; p.17-18 all FWAG SW, except for Aisholt Common and Carhampton (SRA) and Dillington (Stephen Banks, Watershed PR); p.16 map detail, Westcountry Rivers Trust.*

PART 2: PERFORMANCE

This section provides an overview of delivery progress by funding source, together with a financial summary.

Delivery: Summary

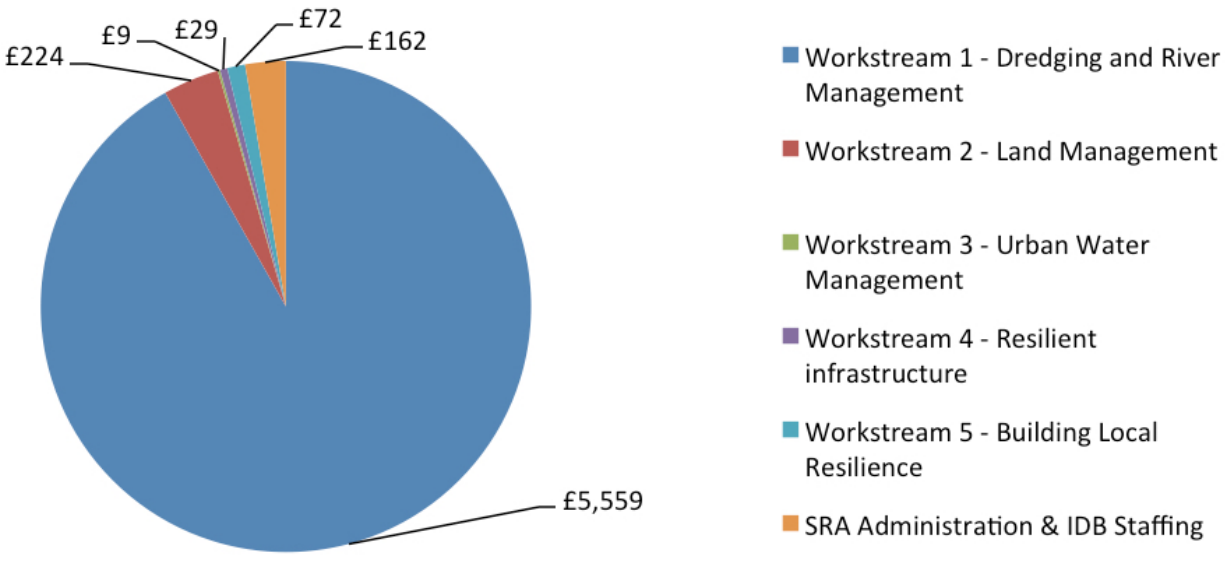
In March 2016, the SRA Board approved the Enhanced Programme of works to be delivered through the 2016-17 financial year. The Programme included 32 different actions for delivery across the whole of Somerset, covering all SRA Workstreams: W1 – Dredging & River Management, W2 – Land Management, W3 – Urban Water Management, W4 – Resilient Infrastructure, W5 – Building Local Resilience.

Table A shows the overall status of actions as at end of March 2017, by funding source and year.

The pie-chart shows the amount spent by the SRA from all of its funding sources, split by workstream.

Table A: Funding Source	No. of actions* programmed for delivery 2016-17 including those brought forward *b/f*	Actions completed during 2016-17	Actions yet to be completed	Actions closed and funds re-allocated during 2016-17
SRA Local Partners Funds 2016-17 Enhanced Programme	32	10	17	5
Interim Funds 2015-16 Enhanced Programme *b/f*	12	6	6	0
CLG Funds 2014-15 Actions *b/f*	10	4	6	0
* Excludes projects funded through the HotSWLEP Growth Deal Fund. These projects are longer-term works stretching out towards 2020-21. See Part 2a of this report: Key Projects.				

Amount spent* by the SRA during 2016/17 by Workstream (£'000)**



Total
£6,055m

*Spent: Amount claimed by delivery partners from the SRA during 2016-17 ** Includes funding from HotSWLEP

Delivery: By Funding Source

2016-17 SRA Local Partner Funds

The funding available from SRA Local Partners (council tax and contributions from Somerset's IDBs) in 2016-17 was £2,777m. Of the 32 actions approved for the SRA Enhanced Programme 2016-17, 10 were delivered, and five were closed – with their funds reallocated to a new project. A high proportion of the 17 actions still to be fully delivered are in W1- Dredging & River Management. Hold-ups have been caused by a mixture of procurement delays, environmental considerations and staff resource constraints. The SRA allocated a substantial part of its funding (£300k) towards a major Flood Alleviation Scheme at Cannington. Most of the construction work was done by December 2016, but the need for some mains service works prevented the new relief channel going 'live' before the end of March 2017. Unspent funds of £2,328m from these 17 actions have been carried forward into 2017-18. This figure includes a provision of £654k set aside for the Sowy/Kings Sedgemoor Drain (KSD) Enhancement and/or further pioneer dredging.

2015-16 SRA Interim Funding and Enhanced Programme Delivery Status

Twelve actions (out of an original 23) were brought forward into 2016-17 from the SRA's Enhanced Programme for 2015-16. Six of these actions were completed during 2016-17, including: four local flood risk management measures from W4, delayed before by the need to resolve problems such as leaks from a privately-owned septic tank; more dredging of Hixham Rhyne; and re-instatement work on the banks of the Cripps. The other six remaining actions have been carried forward again, for completion in 2017-18. One of these actions is the appointment of a Riparian Enabling and Enforcement Officer, now set to happen in Summer 2017. Other actions scheduled for late 2017 include River Brue tree work, further Mark Yeo dredging, and drainage improvements from Old Cleeve to Blue Anchor Road. Reasons for delay included landowner consent and contract preparation matters. Remaining 2015-16 Interim Funding of £608k has been carried forward into 2017-18 to cover outstanding actions, with a provision of £200k set aside for the Sowy/KSD Enhancement, a key project for the SRA.

2014-15 Department of Communities & Local Government Funding (CLG)

Ten of the actions which received CLG funding in 2014 were brought forward into 2016-17; four were completed during this year. Some of the six remaining involve community working, which demands a slower pace of delivery, while completion dates were possibly over-ambitious when set in 2014. These include SRA funding to further support the Community Resilience in Somerset Partnership (CRISP) and working with communities to provide grants for equipment and training. Phase 2 of the Community Land Trust activity gained funds from the Dream Fund, so its allocated CLG funding will instead support Phase 3 during 2017-18. Unspent CLG funding of £167k has been carried forward for spending on outstanding actions in 2017-18.

HotSWLEP Growth Deal Funding and Key Projects

The SRA spent £4,044m of funding available through HotSWLEP's Growth Deal Fund during 2016-17, from a total of £13.49m awarded for longer-term project work stretching out to 2020-21. The total funding available in 2016-17 (excluding HotSWLEP Growth Deal Funding) was £5.114m. This figure includes unclaimed funds brought forward from 2015-16, both Interim Funding and remaining CLG monies. The total funding spent by the SRA in 2016-17 was £6,055m. However, this is not a true reflection of the spend by SRA delivery partners on SRA works, as there is a time lag between the delivery partners receiving their contractor invoices and subsequently raising a claim to the SRA. The total spend by all SRA partners on works in 2016-17 was therefore greater than the £2,011m stated (*see Table B - next page*).

A balance of £3,103m has been carried forward into 2017-18. Funding requirements have been reviewed and updated throughout the year by the SRA Board, and surplus funds have been re-allocated to new works which have emerged as delivering greater benefit. This is why in some cases in Table B (*below*) the amount carried forward to 2017-18 varies from the Difference that is shown between the Original Funding and the Spent figure.

Finance: Summary

Table B shows the financial summary for the year split by funding source showing the amount spent by the SRA and what is carried forward to 2017-18.

Table B: Somerset Rivers Authority 2016-17 Financial Summary				
Funding Source	**Original Funding 2016-17 £'000**	**Spent* 2016-17 £'000**	**Difference £'000**	**Carry Forward 2017-18 £'000**
SRA Local Partners Funding - Council Tax & IDB				
Capital programme	757	48	709	603
Maintenance Programme	1,674	240	1,434	1,003
Provision for Sowy/KSD	0	0	0	654
Contingency	108	0	108	26
SRA Administration & IDB Staffing	238	161	77	42
Total SRA Local Partners Funding	**2,777**	**449**	**2,328**	**2,328**
Interim Funding brought forward from 2015-16**				
Enhanced Maintenance Programme	1,488	1,416	72	72
Maintenance of Rivers & Rhynes	601	96	505	314
Provision for Sowy/KSD	0	0	0	200
Contingency	30	0	30	21
SRA Administration & IDB Staffing	2	1	1	1
Total Interim Funding	**2,121**	**1,513**	**608**	**608**
Communities & Local Government Funding (CLG)				
Outstanding Activities	199	49	150	150
Contingency	17	0	17	17
Total CLG Funding	**216**	**49**	**167**	**167**
Total Funding	**5,114**	**2,011**	**3,103**	**3,103**
HotSWLEP Growth Deal Funded Projects				
Dredging, Sowy/KSD, Bridgwater Barrier, Slow the Flow		**4,044**		
Total Spent 2016-17*		**6,055**		

* Spent: *Amount claimed by delivery partners from the SRA during 2016-17*

** Interim*: £1.9m contribution from DEFRA and £800k contribution from SRA Local Partners*

PART 3a: KEY PROJECTS – Dredging

1) 750m of Pioneer Dredging on the River Parrett

One of the earliest achievements of 2016 was the pioneer dredging of the first 750m of the Parrett downstream from Northmoor Pumping Station towards the M5 and Bridgwater. This was a complex job. Due to the width of the river, narrow banks, poor access, and the dangers of high-voltage overhead cables, most of the dredging (600m) was done using a pontoon-mounted excavator on the river.

Pioneer dredging on the River Parrett

As dredged material could not be disposed of directly on to the existing banks, it was placed in barges, transported by tug to Westonzoyland Pumping Station, unloaded into tractor and trailer, then incorporated into adjoining farmland as a soil conditioner. A shorter length (150m) of dredging was undertaken from the bank next to the road leading to Moorland.

The work was given the go-ahead by the Board of the SRA in October 2015. Money came from the SRA's funding for 2015-16, and from Heart of the SW Local Enterprise Partnership's Growth Deal fund. Following the Board's vote, the Environment Agency – on behalf of the SRA – awarded a 'design and build' contract to Galliford Try, Black & Veatch and Land & Water. These companies worked on the 8km dredge of the Parrett and Tone in 2014. The Environment Agency oversaw and managed the contract. One notably successful aspect of the 750m dredge was the way it followed on seamlessly from SRA-funded maintenance dredging of 2.2km of the Parrett, upstream of Northmoor Pumping Station, that was carried out for the SRA by the Parrett IDB with contractors WM Longreach before Easter 2016.

Generally, the 750m dredge only removed silt from one side of the river. The aim was to achieve a cross-sectional area of around 70m^2, as with the 8km pioneer dredge and the 2.2km maintenance dredge. Contractors worked around existing hard flood defences so as not to reduce their stability, and avoided environmentally sensitive areas and protected species.

More than 13,000m^3 of silt were removed between April – August 2016. The 750m dredge was delivered on time and well within the original budget of £2.14m.

2) Dredging strategy, including trials, silt monitoring & dredging the River Brue

When the Board of the SRA approved the 750m pioneer dredge, members also agreed that more cost-effective dredging techniques and sites should be investigated. A Dredging Strategy Project Board was then set up, and consultants from HR Wallingford produced a 'Dredging Opportunities Report', which recommended:

a) Further detailed modelling of the River Parrett upstream of Burrowbridge to Oath and the River Parrett downstream of Northmoor towards the M5

b) Review of proposed dredging locations on the River Brue

c) Trials of potential agitation dredging techniques

d) Monitoring (channel shape and form)

The Dredging Strategy Project Board also asked that: *e)* Further work on environmental assessment and benefit assessment should be carried out before the strategy could be considered complete.

Achieved: *a)* Additional River Parrett modelling sensitivity tests have been undertaken.

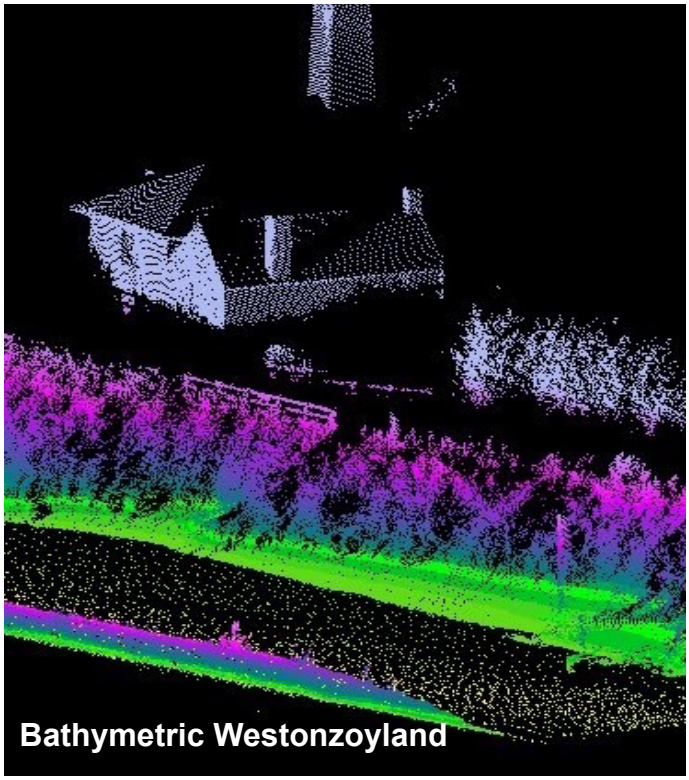
The dredging trials vessel Borr in demonstration mode

c) Initial 'Dredging trials' undertaken. Three weeks of dredging trials in November – December 2016 were carried out for the SRA by the Parrett IDB between Westonzoyland Pumping Station and Burrowbridge. The trials carried on from where 2.2km of maintenance dredging was finished in 2015-16 by the Parrett IDB for the SRA.

The techniques tested were water injection dredging and agitation dredging: both aimed to lift silt from the bed of the channel and move it away from critical locations using natural forces in the river. Timing was crucial: work had to be done when an outgoing tide could carry silt away. While contractors Van Oord have successfully used these hydrodynamic techniques in marine locations all over the world, these SRA-funded trials were the first time that these two techniques have been tried out in the UK on a tidal river in conjunction with a sophisticated and long-term monitoring programme, so as to fully understand where silt goes and how effectively it is dispersed.

The trials produced promising results. Water injection dredging is capable of moving large volumes of material from the bed of the channel very quickly indeed. Agitation dredging is slower, but may be more precise. Overall, the potential benefits of using new hydrodynamic dredging techniques are: Cheaper, more efficient, better for the environment, less trouble for residents, less impact on farmers.

d) The SRA has been working to identify places where silt builds up – how silt builds up – and what type of silt it is – so that maintenance work can be better targeted and dredging activities optimised. HR Wallingford's Dredging Opportunities Report recommended the use of contemporary survey technology. The shape and form of the dredged Parrett and Tone have been measured regularly since the 8km pioneer dredge was completed in 2014, and an excellent data set is being recorded and used to identify trends. As HR Wallingford recommended, Single Beam and Multi Beam Bathymetric Survey of the channel bed, combined with Laser Scanning of the banks, were trialled with positive results.



Bathymetric Westonzoyland

e) A full Environmental Impact Assessment (including Water Framework Directive and Habitat Regulations Assessments) was completed for the dredging trials. Water quality was continuously monitored throughout the trials and river habitats and geomorphological features surveyed and monitored before, during and after. Only transient minor environmental effects were recorded. No significant damaging impacts were observed. Work on environmental assessment and benefit assessment continues.

Not yet achieved: *b)* Brue dredging review. The SRA's original intention was to dredge a 4km stretch of the River Brue between North Drain Pumping Station and Westhay, to achieve better conveyance of water. However, HR Wallingford recommended further investigations and modelling, as their research suggested this might not be the best place to dredge. IDB engineers and their advisors reviewed the Environment Agency's River Brue Hydraulic Model to determine if it could be used for dredging investigations, to the level of accuracy required. Discussions about improving the model are yet to conclude. Brue work has also suffered from limited IDB resources and a greater initial focus on the Parrett and Tone.

3) Maintenance dredging on the River Parrett

Achieved: After the dredging trials, the Parrett IDB asked the SRA if works could go on for another two weeks, upstream to Burrowbridge itself, in a wider range of conditions, so as to maintain sections of the 8km that was pioneer-dredged in 2014. The Parrett IDB were encouraged by early analyses of data, and observations of silt movements along the river. Costs fell well within budget. In total, more than 8,000m^3 of silt was moved.

KEY PROJECTS – Sowy/King's Sedgemoor Drain (KSD) Enhancement

A key part of Somerset's 20 Year Flood Action Plan, a series of actions designed to improve the entire River Sowy/KSD system while balancing a range of interests. This key project will reduce flood risk over a wide geographical area, maintain access, increase resilience, respect the local environment, and promote business confidence.

In 2016-17, the SRA and its partners followed up on works done after the floods of 2013-14. For several weeks in early 2014, Beer Wall on the A372 near Othery was impassable because of flooding. Somerset County Council repaired the road, raised it by 60cm, then – underneath it, in 2015 – installed four massive culverts.

Achieved: **1)** Beer Wall. The Environment Agency, working with contractors Skanska for the SRA, increased the capacity of the Sowy/KSD system by creating two new river channels under the A372. These branch off from the Sowy and Langacre, pass under Beer Wall through the new culverts, then reconnect downstream. The channels and culverts more than double the amount of water that can flow underneath the road.

Work also included installing concrete piled walls, supporting piles and a base slab framework for two new tilting weirs. Dutch engineers were commissioned for the specialist job of fabricating and installing the tilting weirs in the two new channels, to get greater control of upstream water levels. The new structures can be controlled remotely by the Environment Agency. (*Below: Beer Wall, Summer 2016.*)

Beer Wall

Two new river channels at Beer Wall

Better river gauging equipment and new CCTV cameras have also been installed to improve flood and water level management, and maintain appropriate environmental conditions within an area of international importance for wildlife (chiefly, migratory birds). Other features include innovative, combined passes for eels and otters, and platforms which allow disabled people to go fishing.

The SRA used Growth Deal money from Heart of the SW Local Enterprise Partnership.

2) Chedzoy Flap. The Environment Agency, for the SRA, improved Chedzoy Flap, which controls the confluence of the Penzoy system (including Chedzoy New Cut) and the KSD. The new structure prevents water entering the Penzoy river system from the KSD during normal operation, so better protecting farmland around Chedzoy and Andersea.

3) Dunball. Somerset County Council removed obstructive masonry (popularly known as the "lump of concrete") from beneath Dunball Old Bridge to improve the capacity and flow of water through the final stretch of the KSD; the Environment Agency is considering upstream channel widening works in Autumn 2017 to help smooth flow under both Dunball A38 bridges and so maximise the benefit of removing the "lump".

4) Parchey & Dunball. Vegetation cleared around Dunball Rail Bridge and Parchey Bridge. Surveying was also done to see if de-silting work would be beneficial. It is planned to undertake de-silting at one or both of these sites in 2017-18.

5) Channel widening. A programme to increase the amount of water that can be evacuated through the Sowy/KSD system, thereby relieving pressures on the Parrett and Tone. Enabling the Sowy system to be used more flexibly also means that upstream and downstream pumping stations can be operated earlier. Increased rates of pumping from moors in a large-scale flood will benefit many places affected by the events of 2013-14 such as Langport, Muchelney, Thorney, Moorland and Fordgate.

It is challenging across 20km^2 of an already complex landscape to understand impacts on environmentally sensitive areas (which have legal protection) and on landowners, and to bring different interests together, but much progress has been made in getting a legally compliant scheme that can go out to tender.

KEY PROJECTS – Bridgwater Tidal Barrier

Several studies have identified a Bridgwater Tidal Barrier as the best long-term solution for the protection of approximately 10,000 properties and over 600 businesses for the next 100 years or more. Somerset Rivers Authority is using Growth Deal money from the Heart of the South West Local Enterprise Partnership to support the initial development stages of the Barrier project. The aim is for a Barrier to be working by 2024. It is a key element of Somerset's 20-Year Flood Action Plan, which is overseen and co-ordinated by the SRA. The Bridgwater Tidal Barrier project is being developed by the Environment Agency and Sedgemoor District Council, working with consultants from CH2M.

Being achieved: A site on the River Parrett between Express Park and Chilton Trinity village has been selected as the optimum location for a Bridgwater Tidal Barrier. The Environment Agency and Sedgemoor District Council project team also decided that the best design for the Barrier would be a structure with two vertical lift gates. Two gates give the best flexibility and reliability for operation generally and allow for continued navigation during maintenance. These choices followed two rounds of public consultation in 2016. The site selected is known as Site 5. Judged against Site 4 – which is about halfway between Express Park and Dunball Wharf – Site 5 was found to have seven factors in its favour, as a location, such as the greatest confidence of getting permission for actually building a Barrier, and lower construction and maintenance costs.

KEY PROJECTS – Taunton Strategic Flood Alleviation Improvements Scheme (TSFAIS)

Taunton urgently needs strategic flood alleviation improvements. Defences built in the late 1980s came close to being overtopped in 2000 and 2012 and forecasts for climate change suggest a return to the kind of severe flooding seen in 1960 unless action is taken. (In 1960 – *right* – more than 360 houses, shops and businesses were flooded). TSFAIS is a crucial component of the pioneering Taunton Garden Town initiative. As well as protecting existing properties, it will allow planned development – around 4,350 new homes and nearly 10,000 new jobs – to happen safely.

TSFAIS proposals include a Bradford on Tone flood detention reservoir, improvements to Taunton town centre flood defences, possible works at French and Firepool weirs, and further options for Taunton town centre and Bathpool. The detention reservoir will work by 'storing' up to 1.8 million cubic meters of water in the upper catchment of the River Tone, above Taunton, in times of flood, releasing this in a controlled and gradual fashion and reducing peak water levels downstream. The reservoir would only be used during flood events: generally, it would be dry and could be maintained for agriculture. SRA funding is helping the Environment Agency and Taunton Deane Borough Council, as partners, to develop a scheme for which major capital funding bids will continue to be submitted.

Being achieved: Consultants appointed; extensive flood modelling work carried out. A draft Single Options report has been submitted to Taunton Deane Borough Council and the Environment Agency and is being assessed. It provides information on the technical performance of different options and whole-life costs of construction for 1) flood water storage and 2) increasing the height of existing flood defence walls in Taunton town centre. Environmental, site and ground investigations have begun, although lack of access to a key area of land at Bradford on Tone is delaying the flood storage option. Legal advice is being sought about getting the necessary powers to secure access.

Taunton 1960

New channel at Rode Bridge

PART 3b: SRA ENHANCED PROGRAMME 2016-17

W1 – Dredging and River Management

Cannington Flood Alleviation Scheme: In the last decade, 40 - 50 properties in Cannington have flooded several times. The A39 has been rendered impassable, causing serious problems for emergency vehicles, Hinkley Point and local services. An SRA contribution of £300,000 enabled a £4m scheme to go ahead, led by the Environment Agency in partnership with EDF, Cannington Parish Council, Wessex Water and Somerset County Council. **Being achieved**: A relief channel was dug to divert flood water away from Cannington and better protect 200 homes. Final completion was pushed back to early summer 2017 by delays in gas main diversion.

Pumping Station Repairs and Improvements: SRA-funded works increase the resilience and security of permanent pumping stations and help temporary pumps to be accommodated and operated. Environment Agency budgets do not allow for this degree of extra maintenance and improvement. **Achieved**: West Sedgemoor PS (windows replaced), Stockmoor PS (improvements for pump deployment and monitoring), Midelney PS (roof-fixing, removing asbestos, repairing concrete slab on which building sits), Westover PS (sheet-piling to stop water leaking from the Parrett under the station to Huish Level moor, from where it requires pumping out). **Being achieved**: Roof repairs and inlet channel works due in 2017 at Long Load PS (late Spring), Saltmoor PS (early Summer, dovetailed with pump extraction and replacement), North Drain PS (Autumn).

Main River Asset Improvements: **Achieved: 1) Rode Bridge**, near Frome, is a Scheduled Ancient Monument that was vulnerable to being damaged when the River Frome rose high during times of flood and water could not smoothly pass through its two main middle arches. Side arches were partially blocked with earth, vegetation and debris. Works - *see left* - improved flows through the bridge, to a) create more flood capacity, b) prevent flood waters backing up in the Frome's flood plain, and c) benefit the adjoining inn The Mill at Rode, recently refurbished at a cost of £400,000 by owners Butcombe Brewery. They joined in as partners to this scheme, paying for further improvements. The scheme was designed and delivered for the SRA by the Environment Agency with contractors Land & Water.

Removing fallen tree, Mells River

2) Orchardleigh / Spring Gardens: An area of complex channels, with a long history of flooding problems, close to where the Mells River joins the Frome. More flood capacity created (*see above*) by removing dead and fallen trees that were obstructing the flow of the Mells River through Orchardleigh, near Brookover, and clearing the old Mill Race in Spring Gardens. The scheme was designed and delivered for the SRA by the Environment Agency, using five Somerset men from Lawton Forestry sub-contracting for Ground Control.

Main River Asset Improvements, *continued*:
3) Mis Brook, between Beer Wall and Langport: three culverts installed to improve access for Environment Agency maintenance works. **Being achieved**: **Huntworth pump** – new electric canister pump selected, and supporting hydrometry installation designed (to trigger the pump). Infrastructure agreement reached with Western Power Distribution. Pump due in place for use by November 2017. **Not yet achieved**: **Huntworth Brook** de-silting postponed for environmental reasons; work now scheduled for Autumn 2017.

Cripps River, Mark Yeo, Hixham: The Environment Agency, for the SRA, proposed to follow up on three pioneer dredges in 2015. **Achieved**: The banks of the Cripps were re-seeded and temporary fences removed. Another 1km of Hixham Rhyne was dredged, downstream of the 2.2km done previously. **Not yet achieved**: Environmental considerations meant that work on the Mark Yeo near Rooks Bridge is now scheduled for Autumn 2017.

Wessex De-silt Top Up: De-silting increases the amount of water that can be stored in-channel and improves the performance of pumping stations. It adds ecological and amenity value as it reduces the risk of de-oxygenation in channels and of fish kills in small, heavily silted channels. It can also reduce how often main rivers need to be weed-cut as part of routine Environment Agency work. SRA funding enabled extra de-silting.

Achieved: The Environment Agency, for the SRA, cleared 5000 tonnes of silt from Witcombe Bottom (*pictured bottom*), immediately upstream of Long Load Pumping Station to enable more efficient pumping. The silt has been stockpiled locally for use in building up low banks of the River Yeo. **Being achieved**: The Environment Agency, for the SRA, dredged 3.5km of the Westport Canal in Hambridge (*pictured middle*). The remaining 700m are due to be completed in the autumn. Work had to pause for fish spawning. **Not yet achieved**: Work on Hamp Brook, Isle Brewers and Stockmoor deferred for environmental reasons until Autumn 2017.


Westport Canal


Witcombe Bottom, Long Load

Wessex De-silt was added to the SRA Enhanced Programme 2016-17 during the year. Funding from the five following schemes was re-allocated to this Top Up.

1 Andersea Pump Platform: In 2013-14, some lower lying buildings around Andersea were flooded, along with a large area of land. **Withdrawn**: Proposal dropped because it turned out that it would not be economically possible to increase the capacity of a locally undersized network of ditches and culverts – and without doing this, the benefits of the pump platform would be insufficient. Instead, to better protect Andersea, the Environment Agency has re-configured a water control structure at Lakewall.

2 Brue Banks improvements: Machines working on bank tops, on activities such as weed-cutting, must now have at least two metres' clearance either side. Along parts of the Brue the banks are not wide enough. **Not achieved**: Given the low number of properties that would benefit, and because it emerged that construction would cost several million, the SRA decided this Brue Banks scheme could not be justified. The Environment Agency is investigating alternatives.

3 Tree work: Removal of trees and woody vegetation from 67km of main river channels identified at an IDB workforce workshop in 2014. **Not achieved**: Limited resources within Somerset Drainage Boards Consortium made progress difficult: scheme closed, so as to re-allocate its funding, and focus instead on Brue tree work, delayed from 2015-16.

4 IDB Computer Hydraulic modelling: Modelling of problems watercourses and locations to identify current performance and identify improvements. **Funding withdrawn**: Modelling requirements in 2016-17 related to pioneer dredging and could therefore be met instead from the HotSWLEP Growth Deal fund.

5 IDB Parrett maintenance dredge underspend: As the maintenance dredging of 2015-16 cost less than forecast, money was re-allocated to the Wessex De-Silt Top Up package as descibed on p.10.

Brue tree work: Improving flow capacity between Hackness and North Drain Pumping Station Scheme by removing fallen trees and pruning obstructive trees. **Not yet achieved**: Works being planned for September 2017, but will depend on obtaining an Environmental Permit which is likely to require reference to the Environment Agency's River Brue hydraulic model (being reviewed as part of the dredging strategy – see p.6-8).

West Sedgemoor and Aller Moor: Previous funding regimes restricted maintenance on these moors, mostly to every other year, resulting in reduced channel flow capacity and land recovering more slowly from flooding. **Achieved**: Parrett IDB weed clearance and sediment removal now yearly, with around 37,500m of additional channel maintenance.

Isle Brewers bank repairs: A bank colonised by badgers near Isle Brewers is an important part of the village's flood defences. If badgers dug right through, flood water could surge through and destroy the bank. Restoring it would cost a lot of money. The Environment Agency's existing budget allows for routine maintenance work at Isle Brewers, but not for tackling badgers. **Achieved**: The SRA funded extra work to protect local people and properties. The Environment Agency, on behalf the SRA, installed steel sheet piles (*see below*) to stop badgers digging through the bank. No badgers were moved or harmed in the work, which was carried out by a specialist contractor under licence from Natural England. Badgers are a protected species.

Isle Brewers


Carhampton

West Somerset Streams: **1) Carhampton** - Few places in Somerset are being targeted with such a range and number of small-scale improvements as Carhampton. **Achieved**: The SRA funded the clearance of a heavily-overgrown channel (*see above*), on Crown Estate land, from the junk shop down towards the village recreation field. This improved the channel's capacity for conveying water, cutting flood risk in the village and along the A39, benefitting local people, businesses, and visitors going to and from Dunster, Minehead and Exmoor. The Environment Agency delivered the work, supported by Somerset County Council, with - *as also at Minehead* - Quantock & Exmoor Tree Care sub-contracting for Ground Control.

2) Minehead - About a third of the properties in Minehead and nearly all of the town's businesses are at high risk of surface water flooding and, in the past, problems have occurred because of under-capacity in channels and structures being blocked. Most of Minehead lies within the floodplain of the Bratton Stream and its tributaries. **Being achieved**: Improvements along the Bratton Stream in Parks Walk (*see below*). Invasive species were removed, and trees and bushes trimmed by hand, to enhance the stream's capacity to carry water, while maintaining its appeal as a popular feature of Minehead's second-biggest park. The Environment Agency delivered the work for the SRA. It was paused in early Spring 2017 to allow for fish migrating.


Minehead

Maintaining Resilience of Wet Grassland: A plan to improve, replace or remove almost 240 water-level control structures and bring extra benefits to farming and wildlife for the next 20-30 years in key parts of the floodplains upstream of Langport. **Not yet achieved**: Identifying a lead body with sufficient resource to scope and agree the project initially hampered progress. Five landowner consultations complete. IDB/ Natural England site inspection complete (with regard to water levels). Natural England 'bird use' survey undertaken.

Step change in encouraging and enforcing riparian work: In the wake of the floods of 2013-14, it was widely felt in Somerset that problems were exacerbated because too few riparian owners knew and carried out their responsibilities, particularly for maintenance. There was a need to be more pro-active. **Not yet achieved**: The job of Riparian Enabling and Enforcement Officer has been offered as a secondment to a Somerset County Council applicant, and the role is due to be taken up in Summer 2017. The Officer will work with all SRA partners, backed up by communications activity that will seek to raise awareness of riparian owners' responsibilities.

South Somerset Enhanced Maintenance: SRA funding enables smaller schemes that deal with local issues in a pro-active way that makes flood alleviation schemes work with extra effectiveness. **Achieved**: Enhanced maintenance and safety improvements completed at North Perrott by South Somerset District Council's Streetscene team: repair works to improve flows at Portfield Lane, Langport (in Curry Rivel parish).

Sedgemoor District Council flood relief and drainage assets: Additional SRA funding gives Sedgemoor DC greater capacity to undertake works that deal with issues before they become problems and to put in enhancements, such as telemetry, that make flood defence schemes and infrastructure more efficient. **Achieved**: Extra maintenance in the stream next to North Petherton Primary School (repairing the weir structure, replacing head and retaining walls, improving access - *see below*) and near Greinton (culvert repairs to prevent more costly and disruptive works later). **Being achieved**: Telemetry equipment due to be installed by June 2017 at Blake Gardens, Bridgwater and Bays Pond, Cheddar. Real-time data will help flow regulation and barrier deployment.

North Petherton, looking upstream...

...and downstream

W2 – Land Management

Somerset Rivers Authority funds natural flood management activities that benefit roads, villages and towns - and improve the environment for people and wildlife. Every field, every farm, every stream has a part to play in holding water for as long as possible in upper and middle catchments to protect communities and businesses lower down.

There were three main strands to this workstream in 2016-17: capital grants offered to farmers and landowners for projects that 'Slow the Flow' of water and reduce flooding risks across the county; 'highways referrals' in areas that feed into the Levels and Moors – that is, looking for answers to highway flooding problems in better management of land nearby; and highways referrals in West Somerset.

Natural flood management capital grants: **Achieved** - In 2016-17, the SRA drew on £550,000 of Growth Deal money from the Heart of the SW Local Enterprise Partnership to fund nearly 50 schemes across Somerset. Locations included: *West Somerset* – Brompton Ralph, Combe Sydenham; *Taunton Deane* – Bishop's Lydeard, Croford, Fitzhead, Halse, Milverton, Oake, Pitminster, Poundisford, Staple Fitzpaine, Staplegrove, West Buckland; *South Somerset* – Ilminster, South Petherton, Donyatt, Martock, Crewkerne, Curry Mallet, Norton sub Hamdon, Hamhill Country Park, Stoney Stoke, Tintinhull; *Sedgemoor* – Goathurst, Aisholt Common; *Mendip* – Launcherley.


Tinker's Bubble: leaky log dam, mini-waterfall


Poundisford: de-silted pond


Curry Mallet: new pond


Brompton Ralph: pre-planted coir pallets


Dillington: 6,000 trees planted


Staple Fitzpaine: bund


Combe Sydenham: gabions

By the A39, near Carhampton: soil investigation

Highways referrals in catchments of Levels & Moors: A working arrangement to deal with flooding hotspots was agreed between Somerset County Council's Highways department and Lead Local Flood Authority team, West Somerset Flood Group, the Farming and Wildlife Advisory Group South West (FWAG SW) and the SRA.

Visits and follow-ups by a FWAG SW land management expert, often in association with a highways officer, involved examining problems and their causes, talking to landowners and coming up with solutions (such as improved soil management). In 2016-17, this work had two sources of funding. Hills to Levels (partially funded through the People's Postcode Lottery) paid for investigations in areas with catchments that feed into the Somerset Levels and Moors. The SRA also contributed to this work, and after Hills to Levels funding expired in January 2017, the SRA Board agreed in February to give extra funding. **Achieved**: More than 100 local flooding hotspots investigated, in parts of West Somerset and Mendip, and across Taunton Deane, South Somerset and Sedgemoor, with dozens of actions resulting.

Highways referrals in West Somerset: The SRA funded 57 extra investigations in West Somerset. There was great demand for this service and in February 2017 the Board agreed more funding, to enable work to continue and be completed. **Achieved**: Locations included Bilbrook, Brushford, Carhampton (*above*), Dulverton, Horner, Luxborough, Minehead , Monksilver, Nettlecombe, Porlock, Roadwater, Selworthy, Stogumber, Stogursey, Washford, West Luccombe and Williton.

Wetland Biomass: The SRA gave the RSPB a grant to explore the possibility of setting up a Payments for Ecosystem Services Biomass to Bioenergy scheme within the Avalon Marshes. **Achieved**: The bulk of this work was done in 2015-16, and was completed in 2016 with the production of items such as a 'Draft Code of Practice for the Land Manager Model to supply large-scale anaerobic digestion plants' and the assessment of a new case study in the southern Levels & Moors where biomass to bioenergy could be trialled.

Sowy/KSD - mapping scenarios & engagement: In April 2015, in partnership with Hills to Levels, the SRA used CLG money to commission the RSPB to engage one-to-one with farmers and landowners who could be affected by proposed improvements to the Sowy/King'ssxczvv Sedgemoor Drain system. **Achieved**: A report produced in 2016 detailed meetings with 27 farmers. Findings covered the Sowy/KSD, the resilient nature of grasslands, payment systems and the use of floodplains. Many farmers volunteered their belief that it was better for flood waters to cover their land on floodplains than enter people's houses.

Aisholt Common: contour weaving

W3 – Urban Water Management

Sponge EU: A project to raise awareness of what the owners of large impermeable areas can do to reduce run-off and hence flooding. **Being Achieved**: Somerset County Council and Westcountry Rivers Trust (WRT) successfully bid to the EU's Interreg 2 Seas programme for a 4-year project to 2020 (unaffected by Brexit). The SRA is contributing funding, to help WRT retrofit residential SuDS (Sustainable Urban Drainage Systems) and the county council retrofit community areas and retail parking space. Sophisticated Ecosystems Services Mapping is being done (initially in Taunton) to identify suitable sites. *Below: WRT map detail.*

Rain garden project: A small demonstration project (half-funded by Wessex Water, and being delivered for the SRA by Somerset County Council) to show the environmental and run-off reduction benefits of 'rain garden' techniques. **Being achieved**: Contract tendered to create small-scale examples, working with residents and social housing providers.

SuDS Review: A study to establish whether selected Somerset SuDS schemes were adequately designed, were constructed as designed, have any deficiencies, and are being adequately maintained. **Being achieved**: Project tendered and awarded by Somerset County Council to consultants JBA; pilot review of two sites undertaken. Proposal submitted to SRA to update and expand project to give fuller picture of SuDS performance in Somerset.

SuDS Inspection: A large proportion of developer-constructed SuDS remain in private ownership for future maintenance. No authority is funded or resourced to inspect these assets during construction. **Being achieved**: SRA funding is enabling Somerset County Council to offer a SuDS Inspection service to Local Planning Authorities, initially for major developments, to help ensure that drainage schemes are being built as specified.

Planning requirements: A study to establish how planning requirements to reduce run-off can be determined and the extent to which they can be created, for eg, by requiring rainwater harvesting on new development. **Being achieved**: Review carried out within Somerset County Council of national and local planning policy; interviews done with Local Planning Authority officers and stakeholders. Interim findings report circulated.

Encouraging urban and village run-off reduction: A Somerset-wide campaign – involving all SRA partners and drawing on all of the above strands in Workstream 3 – to raise awareness of urban water management issues, in particular to communicate the realities of the impact of run-off, and of the limited powers which Local Planning Authorities have to address matters concerning new and existing developments. Better explanation, better understanding and better evidence with which to lobby central Government for changes are among the key aims of W3. **Being achieved**: Research being done, strategy being prepared.

Wirral Park: Wirral Park balance pond and pumping station was built in 1989 to help protect Glastonbury against flooding. In 2015-16, the SRA funded the replacement of life-expired one-way flap valves and gate valves, and the removal of two skips full of silt and debris from the inlet channel. This was Phase 1 of a scheme designed and delivered by Mendip District Council to ensure that Wirral Park would continue to protect more than 200 homes and four hectares of industrial estate. **Not yet achieved**: Phase 2 will upgrade Wirral Park's dated electrical control system to meet current regulations and allow remote monitoring should the need arise. This SRA-funded Mendip DC scheme was delayed in 2016 because of a staff vacancy, however, a consultant engineer was appointed in February 2017 and work is now set to be delivered in 2017-18.

W4 – Resilient Infrastructure

Inspections and remedial works to culverts under roads in IDB areas: A programme that prioritises around 700 of the most vulnerable and strategically important culverts within Somerset Internal Drainage Board areas. Responsibilities are sometimes unclear, so SRA funding is being used to gain a better understanding of structures, and to make necessary improvements, irrespective of ownership. Through activities such as repairing, removing blockages, and replacing life-expired structures, this enhanced flood risk management will improve the conveyance of water and help to prevent disruption to residents and travellers. **Being achieved**: Preliminary inspections have been carried out of more than 500 culverts. Work continues in 2017-18.

De-silting structures: Somerset County Council's existing budgets only allow for the de-silting of structures such as bridges when there is a threat to the structure itself. But extra SRA funding enables de-silting where there is also a benefit to the watercourse and, therefore, a reduced risk of flooding to roads and nearby properties. Co-ordination with other de-silting activities increases the benefit to whole catchments. **Achieved**: Structures de-silted in: *West Somerset* – Holnicote, Horner (*see right*); *Taunton Deane* - near Creech St Michael; *Sedgemoor* – Edithmead; *Mendip* – Huxham (A37), Leigh upon Mendip. **Not yet achieved**: *West Somerset* – Monksilver, awaiting Environment Agency consents.

Gully emptying: Somerset has 152,000 gullies. They are emptied by Somerset County Council's Highways Department on three types of rounds: annual rounds (in flood-susceptible areas), 2-year rounds (non flood-susceptible rural areas) and 4-year rounds (non flood-susceptible urban areas). The SRA funds an additional six-month round for the highest-risk gullies in flood-susceptible areas on SCC's annual round. This work keeps roads open, makes them safer, preserves access for communities, and safeguards properties from flooding. **Achieved**: Various Somerset locations benefited from this extra work. *West Somerset* - Bridgetown, Carhampton, Dulverton, East Quantoxhead, Exford, Minehead, Monksilver,


Silted-up bridge near Horner Green


Before...


... After

Porlock, Treborough, Wheddon Cross, Withycombe: *South Somerset* - Bruton, Cudworth, East Stoke/Stoke Sub Hamdon, Forton, Montacute, Mudford, Pitcombe, Somerton/Compton Dundon, Winsham, Yeovilton: *Sedgemoor* - Cannington, Compton Bishop, Greinton, Nether Stowey, Wedmore: *Mendip* - Ashwick, Croscombe, Holcombe, North Wootton, Nunney, Wanstrow.

Drain Jetting: Under existing budgets, Somerset County Council's Highways Dept can only afford to jet drains when a bad blockage has occurred. SRA funding allows for earlier preventative maintenance at locations known to suffer problems with flooding. The programme is carefully integrated with other SRA-funded activities. So drain jetting sites also feature on annual gully rounds; but final selections are made using local knowledge and professional judgement. **Achieved**: Various Somerset locations benefited from this extra work. *West Somerset* - Clatworthy, Crowcombe: *Taunton Deane* - Kingston St Mary, Wiveliscombe: *South Somerset* - Ilchester, Martock: *Sedgemoor* - Axbridge, Catcott, Compton Bishop, Highbridge, Wedmore, Westonzoyland: *Mendip* - Ashwick, Croscombe, Holcombe, Wanstrow.

Road sweeping: SRA-funded road sweeping is delivered by Somerset County Council's Highways Dept and targeted primarily at flood-susceptible rural areas. SCC does no other sweeping, while district council provision varies (for example, West Somerset does none, while Sedgemoor tends to focus on towns). The aim of this extra SRA-funded work is to stop detritus entering and blocking drainage systems, thus reducing flood risks. Sweeping is done after trees have shed their leaves and is integrated with other preventative maintenance activities. Local knowledge and professional judgement are also used in choosing sites. **Achieved**: Just over 500 hours of sweeping removed 636 tonnes of detritus from just over 50km of roads, at places including: *West Somerset* - Nettlecombe, Old Cleeve: *Taunton Deane* - Kingston St Mary, North Curry/Fivehead, Wiveliscombe: *South Somerset* – Bruton, Cudworth, Montacute, Tatworth & Forton, Winsham, Yeovilton: *Sedgemoor* - Compton Bishop: *Mendip* - Ashwick, Binegar, Cranmore, Evercreech, Kilmersdon, Upton Noble.

CCTV surveys: Accurate information enables Somerset County Council's flood risk team to ask riparian owners to remedy problems or to carry out enforcement. **Achieved**: As a result of extra SRA funding, blockages have been cleared, trash screens funded, flood alleviation schemes advanced, riparian owners made aware of problems they need to address and previously unknown issues revealed. It is expected that several neighbourhood disputes will also be resolved. Locations included: *West Somerset* - Brushford, Doverhay (Porlock), Dulverton, East Quantoxhead, Monksilver, Williton (x2); *Taunton Deane* - North Curry (x2); *South Somerset* - Barrington, Chard, Combe St Nicholas, Galhampton, Knowle St Giles, Martock (x2), Misterton, Somerton, Sparkford, Stoke sub Hamdon (x2); *Sedgemoor* - North Newton; *Mendip* - Frome, Wraxall.

Flood Alert Systems: Proposed trial of sophisticated new flood detection and warning systems that provide real-time information, to help generate and broadcast warnings and reduce the risk of people getting injured and vehicles damaged, particularly when it is dark. **Not yet achieved**: Three sites selected by Somerset County Council's Highways Dept for the SRA – A38 Wellington Road, West Buckland; A378 Langport Road, Wrantage; Oake Road, Bradford-on-Tone – but there are concerns about initial costs and yearly maintenance costs.

Local flood risk management measures: For the SRA, Somerset County Council tackled extra cases of property and/or highway flooding from surface water and ordinary watercourses. **Achieved**: Four schemes that were unavoidably delayed in 2015-16: Combe Florey (culvert upgrade / new trash screen), Phase 1 of Enmore (Frog Lane interception of surface water), Exton (Week Lane drainage improvements), Ilminster (Cad Rd; feasibility study). **Being achieved**: Old Cleeve to Blue Anchor Road (drainage improvements). CCTV survey done; unavoidably delayed from 2015-16, now due 2017-18. Phase 2 of Enmore now due 2017-18.

Outside Northmoor Pumping Station: (from left) Stewart Granger (SRA Community Resilience Officer), Vanessa Leavy (Environment Agency), Richard Large & Ed Florey (local flood wardens), Cllr John Osman (SRA Board), Rhona Light (flood warden).

W5 – Building Local Resilience

A programme to provide inspiration, support, advice, information and practical help to communities, households, businesses, and landowners across Somerset to encourage and enable them to become more resilient.

Achieved: **1)** The SRA's Community Resilience Officer, and an Environment Agency colleague, worked very closely with communities in West Yeo, Fordgate, Moorland, Burrowbridge, North Curry and Huntham.

They provided information, advice and support to help people develop their own community flood plans, for local areas and for individual households. The plans help people prepare for and respond to any future flooding.

More widely, a report has been produced on lessons learned from two years of engagement with communities and agencies.

2) In other villages across Somerset where problems with flooding have spurred residents to take responsibility for themselves and others, by developing plans for action in emergencies, the SRA has supported people in making their communities more resilient. SRA money from the Dept. for Communities & Local Government (CLG) helped CRiSP (Community Resilience in Somerset Partnership) award grants to seven villages. These grants helped to buy equipment and stores, useful for implementing plans.

a) Supported by the SRA's Community Resilience Officer and an Environment Agency colleague, villagers in **Aller** have produced a plan which includes arrangements for the local publican and a local farmer to store emergency equipment ready for use during floods. A CRiSP grant of £2,000 of SRA money was used to buy kit including sand, tools and protective clothing.

b) After **Misterton** was flooded by an extraordinary downpour in early 2016, a working party of five parishioner was set up and a community emergency plan drafted. A CRiSP grant of £3,696 of SRA money enabled villagers to buy an equipment store and kit including safety helmets, hi-viz jackets and boots, safety signage, and a supply of sandless sandbags.

c) After **Williton** flooded badly in late 2013, residents formed a resilience group. In 2016, CRiSP gave £300 of SRA money towards a better store for the group's resilience kit.

Dunster Flood Group

d) CRiSP gave **Dunster**'s new Flood Group (*pictured above, with SRA W5 leader Nicola Dawson*) a grant of just over £3,000 of SRA money for equipment including portable sandbag fillers, sandbags, hi-viz jackets and shovels, and for a new community equipment store situated in the middle of the village.

e) **Exebridge** residents are at risk of flooding from the River Exe. Brushford and Morebath Parish Councils identified measures that would help to protect local people. CRiSP gave £2,600 of SRA money towards a community resilience store and equipment, sited by permission of South West Water near the local pumping station.

f) Other places to get grants for equipment in support of community plans were **Bicknoller** – where the SRA also funded local flood risk management measures in 2015-16 – and **Croscombe**, which has suffered flooding from surface water and the River Sheppey.

3) CRiSP website: To enhance CRiSP's online presence, the SRA's Community Resilience Officer (*pictured below right in Fordgate*) filmed a series of informative videos about flooding and community resilience in places such as Queen Camel and Aller. **Being achieved**: The SRA contributed to professional editing costs. Videos will appear on www.somersetprepared.org.uk and be shared elsewhere.

Video grab: Malcolm Shovel with Stewart Granger (*right*)