



Somerset
Rivers Authority

Annual Report
2018-19

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ACKNOWLEDGEMENTS: Thanks to all Somerset Rivers Authority partners and contractors who contributed to this report. All images are copyright © 2019 by Somerset Rivers Authority and its constituent members and partners (specifically, for this report, the Environment Agency, Natural England, Somerset County Council, Somerset Drainage Boards Consortium and FWAG SW), except for ones used courtesy of Dr Andrew Pledger (p.10-11), Turner Photography (p.8, bottom), National Trust (p.33, Holnicote), JBA Consulting (p.42-43, p.44 top two), Yasmin Khan of Yeovil Rivers Community Trust (p.44, artist's impression) and Misterton Resilience Team (p.51).

Front cover image: an amphibious excavator and a hopper barge head up the River Frome on works funded by Somerset Rivers Authority in Frome

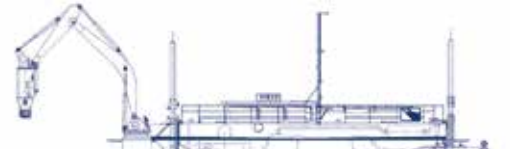
KEY POINTS FROM 2018-19

**£3.81m
EXTRA**

spent in Somerset on flood risk reduction and greater resilience



of places benefit across Somerset



**BIGGEST
EVER**

use of water injection dredging techniques to maintain the River Parrett



**AWARD
WINNING**

Hills to Levels wins UK River Prize for natural flood management

SuDS

Unique and massive review published of Somerset SuDS (Sustainable Drainage Systems)



Private Members' Bill to establish SRA as separate legal body passes Third Reading in House of Commons and begins progress through House of Lords

**around
15,207**

highways structures given extra cleaning to stop roads flooding



Major projects backed by SRA include further River Parrett dredging, River Sowey-King's Sedgemoor Drain enhancements, Bridgwater Tidal Barrier, Taunton improvements

**25th October:
First Somerset
Resilience Day**

Purpose of Somerset Rivers Authority

Flooding in Somerset goes back centuries. Over the last 100 years, places badly hit have included Athelney in 1929-30, West Somerset in 1952, Taunton and 50,000 acres of the Somerset Levels in 1960, Frome in 1968, Crewkerne in 2008... The list could go on and on.

The floods of recent years have been among the worst. In the summer of 2012, flood waters on farmland reached 9ft deep. The winter of 2013-14 was the wettest for 250 years. Around 150km² of land was submerged for weeks: 600 homes and 7,000 businesses were affected, 81 roads were closed. The cost to Somerset was estimated as being up to £147.5million.

It was during the devastating 2013-14 floods that Somerset decided to try a new, local approach to tackling flooding. Various partners drew up a 20 Year Flood Action Plan. Somerset Rivers Authority was launched in January 2015 to oversee that Plan and do the extra work that long experience has shown Somerset needs.

There is no single answer to Somerset's many flooding problems, and different parts of the county have different needs. That is why the SRA was set up as a partnership between different organisations. Those organisations are limited in what they can do individually, but as SRA partners they can get more done by acting collectively. They can take local, grassroots views about what is important for people in Somerset.

Through local taxation, the SRA funds a unique depth and breadth of actions. These are grouped into five workstreams, that reflect the local priorities of the Flood Action Plan, and the need to attack problems from different angles. The five workstreams are **Dredging & River Management (W1)**, **Land Management (W2)**, **Urban Water Management (W3)**, **Resilient Infrastructure (W4)** and **Building Community Resilience (W5)**.

In practice, SRA activities include extra maintenance, repairs and improvements; innovations; collaborations; enabling major projects to go ahead; studies, reviews, and investigations; long-term initiatives; moves that respond to Somerset's special characteristics; or combinations of the above. This report shows examples of all.



Athelney, 1929



Taunton and the Levels, 1960

MORE RAIN FORECAST

FRESH FLOODING IN THE SOUTH

Lord Waldegrave, Parliamentary Secretary, Ministry of Agriculture, yesterday visited flooded areas of central Somerset by lorry to see the damage. The lorry splashed through the flooded A.361 road, closed to traffic. By boat he visited homes evacuated in the village of Athelney, near Bridgwater, observing: "It is worse than I thought."

Mr. E. L. Kelting, chief engineer, told him that, excluding the Bath area, an estimated 50,000 acres were under water.



Frome, 1968

SRA Partners & Structure

SOMERSET RIVERS AUTHORITY BOARD was made up of the following* during 2018-19:



each represented | by **one member**



Axe-Brue Internal Drainage Board and **Parrett IDB** each represented by **two members**

The Board meets quarterly. Main functions: set strategy and priorities, approve budgets and programmes of work, ensure progress and encourage partnership working, be publicly accountable.

SRA MANAGEMENT GROUP

Senior officers from SRA partners meet every six weeks.
Main functions: support Board, develop policy, oversee SRA Technical Group.

SRA TECHNICAL GROUP

Officers from SRA partners and bodies such as Wessex Water, Somerset Catchment Partnership and FWAG SW meet every six weeks.
Main functions: identify and assess flooding problems, provide advice and guidance, prepare proposals, manage and deliver SRA initiatives.

SRA JOINT SCRUTINY PANEL

The Panel meets every six months. Each council has two representatives, the IDBs one each. Main function: scrutiny.

**Note: on 1 April 2019 Taunton Deane and West Somerset councils ceased to exist, replaced by Somerset West and Taunton Council.*

SRA Funding and Legislation

Funding from local partners

For its first full year of work in 2015-16, the SRA had Interim Funding of £2.7million from the Department for Environment, Food & Rural Affairs (Defra), Somerset's local authorities and Somerset Drainage Boards Consortium. In December 2015, the Government gave Somerset County Council and Somerset's district councils the power to raise a shadow precept of up to 1.25% of 2016-17 council tax, to fund the SRA in 2016-17. The figure of 1.25% was chosen because it came close to matching the SRA's initial budget of £2.7m.

The SRA is still reliant upon annual shadow precepting and its level is still pegged to that initial £2.7m, although the actual amount of money raised has gone up. In 2018-19, it was £2.87million. In other words: the level of the charge is frozen, but as the number of households in Somerset increases every year, more people pay, so the total amount rises. The Parrett and Axe-Brue Internal Drainage Boards also choose to contribute £10,000 a year each.

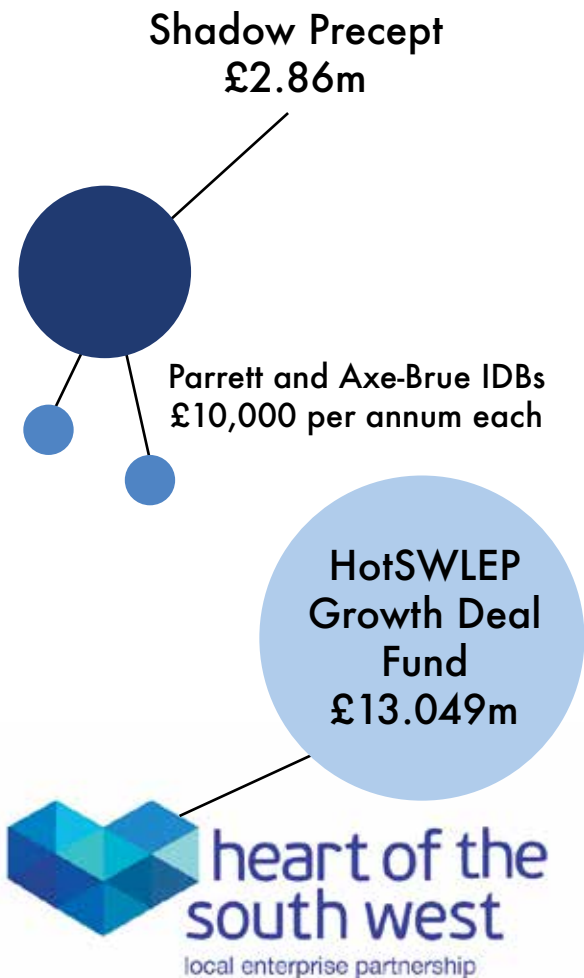
Funding from Heart of the South West Local Enterprise Partnership (HotSWLEP)

The SRA gets no central government funding from year to year. However, in 2014 Government funding of £13.049m was awarded through the HotSWLEP Growth Deal Fund for the carrying out of Somerset's 20 Year Flood Action Plan – with £3.55m for flooding alleviation works in 2015-16, and £9.5m for future years. As the body that oversees the Flood Action Plan, the SRA plans to spend its Growth Deal funding by 2021 on several major projects (*see W1; pages 7-27*).

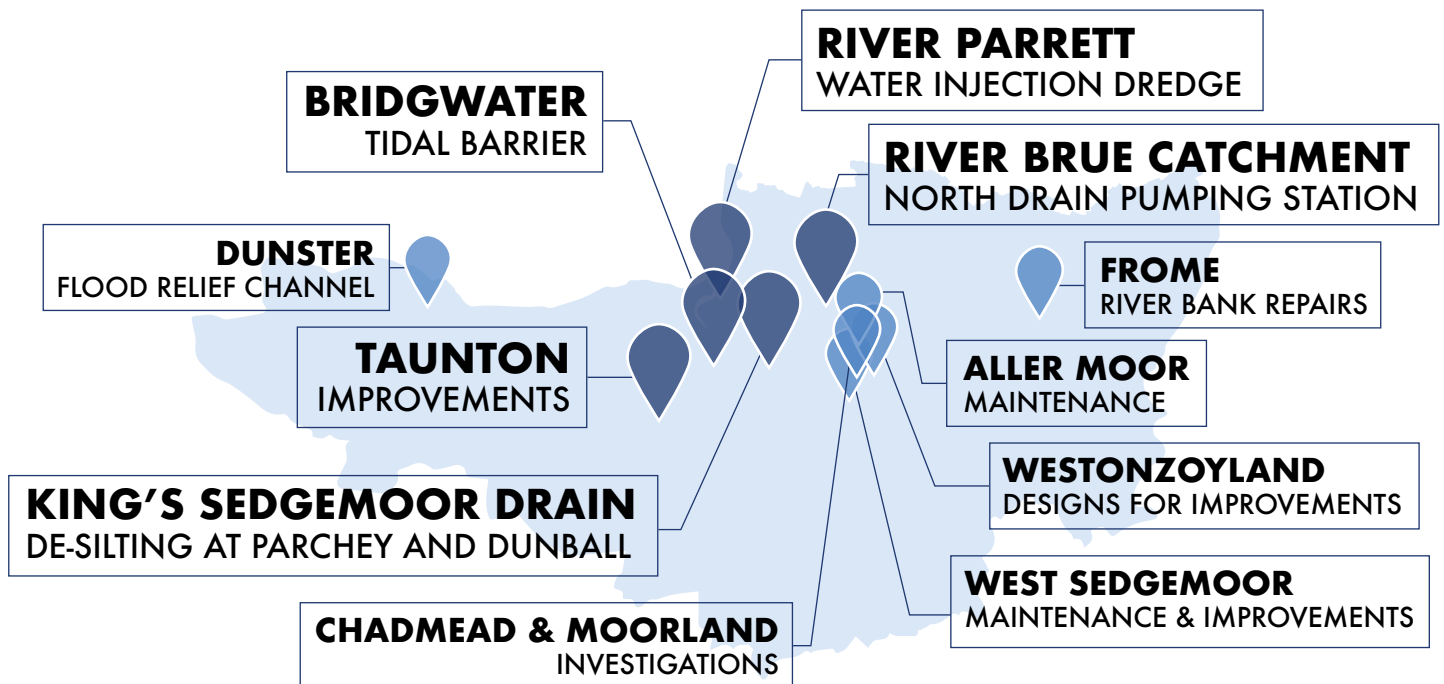
Legislation

The Government has pledged several times to put the SRA on a secure long-term footing, and give it the power to raise its own share of council tax. With Government support, Somerton and Frome MP David Warburton took up a Rivers Authorities and Land Drainage Bill drafted by Defra as a Private Members' Bill. He introduced this Bill to Parliament on 5 March 2018, then a burst of activity in February and March 2019 saw it pass through the House of Commons with cross-party support. It went up to the House of Lords and had its 2nd Reading on 16 May 2019.

Transcripts of all debates can be read on Hansard: <https://services.parliament.uk/Bills/2017-19/riversauthoritiesandlanddrainage.html> Following a critical report by the Lords' Delegated Powers and Regulatory Reform Committee, whose arguments were backed by the Lords' Constitution Committee, the Bill was withdrawn by Mr Warburton in July 2019. New ways forward are now being discussed.



2018-19 SUMMARY: Work on **major projects** has included the biggest-yet water injection dredge along the **River Parrett**, de-silting at **Parchey** and **Dunball** on **King’s Sedgemoor Drain**, repairs and improvements at **North Drain Pumping Station** in the River Brue catchment, and support for the **Bridgwater Tidal Barrier** and improvements around **Taunton**. Work on **smaller projects** has included repairs to the river banks in **Frome** town centre and along the River Avill Flood Relief Channel at **Dunster**, extra maintenance activities on **West Sedgemoor**, **Aller Moor** and around Sedgemoor, designs for improvements at **Westonzoyland** and **West Sedgemoor Pumping Stations**, and investigations at **Moorland** and **Chadmead**.



Somerset Rivers Authority spends more on dredging and river management than it does on any other workstream. Schemes are designed and delivered for the SRA by a range of partners and contractors. Money comes from either council tax or the Heart of the South West Local Enterprise Partnership’s Growth Deal Fund – or sometimes both.

There are three main strands to W1. They are:

- major SRA projects
- major projects led by other bodies and backed by the SRA
- projects in the SRA’s annual Enhanced Programmes

Water injection dredging and silt monitoring are outstanding examples of innovation in this workstream. Extra maintenance, repairs and improvements figure strongly across the county, and a revealing investigation has been carried out in the village of Moorland.

1. Maintenance dredging and silt monitoring

Towards the end of November 2018, a five-year contract for maintenance dredging along the River Parrett was let to water injection dredging specialists Van Oord. Within days, Van Oord's vessel Borr was taken to Dunball Wharf near Bridgwater in halves on the back of two lorries. The boat was bolted together and craned into the water. The crew then sailed up the Parrett to a compound near Westonzoyland Pumping Station, and worked many long and carefully-targeted hours during the first week of December.

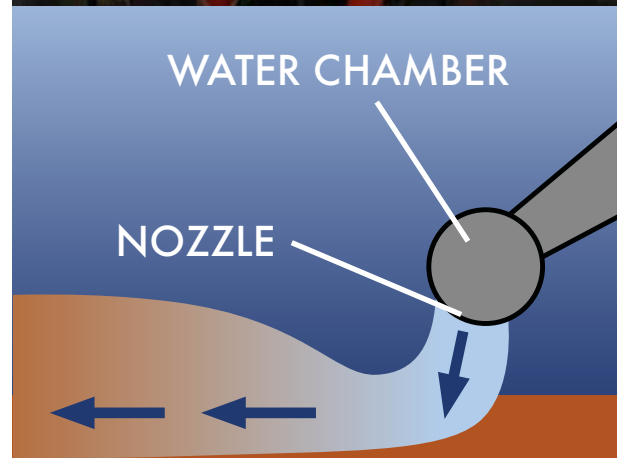
Big tides and heavy rain meant that water levels in the Parrett were high, and conditions for water injection dredging (WID) were excellent. As powerful jets of water dislodged silt from the bed of the Parrett, big tides carried it away.

There were larger amounts of silt to shift than normal, because last year's dry summer meant that flows down the Parrett were lower than usual, which in turn allowed more silt to be carried up with the tide. In total, 37,500m³ was removed in just a few days, from Burrowbridge down past Northmoor Pumping Station. That is 16,000 cubic metres more than got shifted over four months in the winter of 2015-16 using conventional methods. (In 2015-16, there were six excavators working from the banks, plus an excavator working for four weeks on a floating pontoon with a tug boat and hopper barges).

Maintenance dredging on the Parrett is delivered for Somerset Rivers Authority (SRA) by the Parrett Internal Drainage Board (IDB). The IDB acts under a Public Sector Co-operation Agreement with the Environment Agency, and works closely with the Environment Agency and Natural England on making sure that activities comply with a large number of legal requirements.

The River Parrett is the first place in the UK where water injection dredging techniques have been used on a tidal river in combination with a long-term, sophisticated silt monitoring programme.

Through partnership working and ongoing monitoring, the SRA is discovering ways of making maintenance dredging much cheaper, much quicker, and much less disruptive for local residents, farmers, nearby road users and the environment. It is a considerable success.



WID Principle

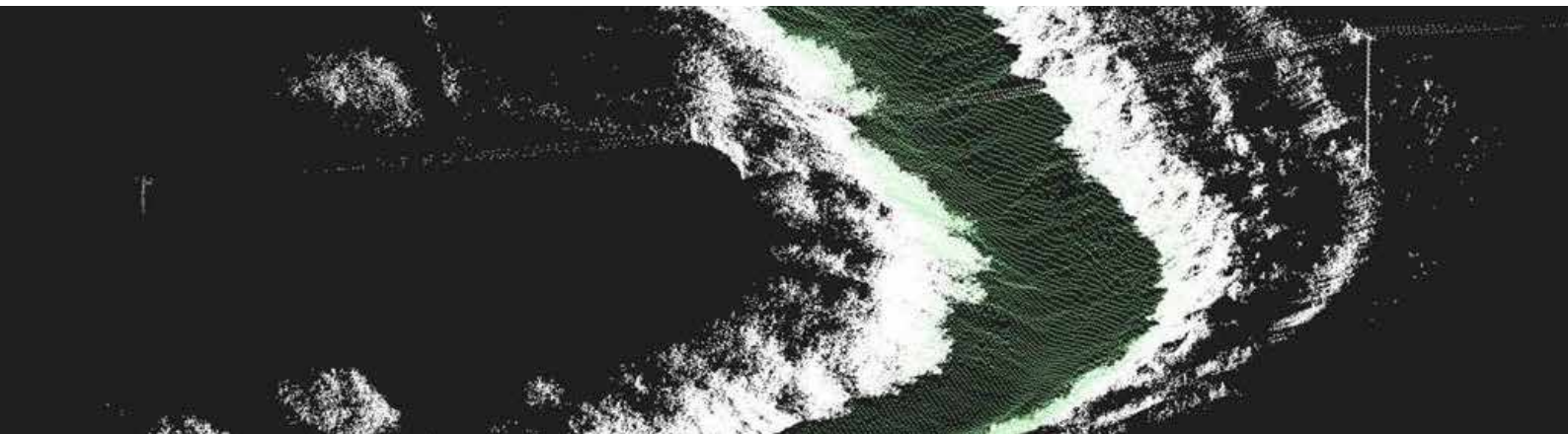


Borr on the Parrett

1. Maintenance dredging and silt monitoring

BACKGROUND: In 2014, after devastating floods, the Environment Agency spent £6million on pioneer-dredging 8km (5 miles) of the Parrett and Tone. In 2015, the SRA funded a further pioneer dredge of 750 metres of the Parrett downstream of Northmoor Pumping Station. Pioneer dredging is the name given to the dredging of areas where large amounts of silt have accumulated over several years and banks need to be re-profiled.

The pioneer dredges in 2014 and 2015 removed 248,500m³ of silt. People value this achievement and want to see it preserved. The SRA has therefore funded maintenance dredging since 2015, in places along the Parrett where it has been needed. Works in the winter of 2015-16 used conventional techniques, then 2016, 2017 and 2018 used water injection dredging. If maintenance dredging was not done, silt would re-accumulate, flood risks would increase, and expensive pioneer dredging would eventually have to be done again.



SILT MONITORING

Silt monitoring is carried out every spring and autumn along the Parrett and Tone to inform the SRA's maintenance dredging programme. Works include single beam and multi-beam 'bathymetric' (underwater) surveys of the channel bed, and laser scanning of the banks, to measure any changes.

Some very advanced technology is being developed and installed. For example, fixed location sensors have been fitted at New Bridge on the River Tone and at Oath Lock and Somerset Bridge on the River Parrett. This flux monitoring equipment can measure silt movement in rivers in near real-time.

The SRA's short-term aim is to identify places *where* silt builds up – *how* silt builds up – and *what* type of silt it is – so that maintenance work can be accurately targeted and dredging activities optimised.

The SRA's longer-term ambition is to get a better understanding than anybody has ever had before of how the tidal River Parrett-River Tone system really works. Such knowledge is extremely valuable.



Parrett silt monitoring, Bridgwater

1. Maintenance dredging and silt monitoring

SCIENTIFIC STUDIES

Because nothing quite like it has been done before in the UK, water injection dredging on the Parrett is being studied by scientists from Loughborough and Nottingham universities. Research team leader **Dr Andrew Pledger** (pictured second right) here outlines some of the fascinating work being done and gives a taster of what is being discovered.



Dredging of the River Parrett has historically been achieved by mechanical extraction of sediment from the river, using heavy construction equipment such as excavators with grabs, buckets or draglines. Whilst these extraction dredging techniques do increase channel size allowing more flood water to flow through, they also tend to be expensive and disruptive operations that risk ecological damage to river habitats. Somerset Rivers Authority and Somerset Drainage Boards Consortium (SDBC) have therefore been trialling water injection dredging (WID), in an effort to find a more cost-effective and environmentally sensitive method of sediment management in the River Parrett.



WID is very different to land-based mechanical dredging. It does not remove sediment from the river but instead uses boat-mounted pumps to inject high volumes of low-pressure water into the river bed. This mobilises fine-grained sediments (particularly sand-, silt- and clay-sized particles collectively known as “fines”) that are transported downstream by the flow, away from the areas being dredged. As sediments are not extracted and placed on land, WID is considerably cheaper than mechanical dredging. Being vessel-based, WID also has a limited impact on bankside habitats, especially as water jets are targeted at the river bed, not the banks.

Despite wide application of WID globally, mostly in marine and estuarine environments, very little is known about its effects on ecological communities and on the physical environment (e.g. channel depth, sediment condition and water chemistry where the method is applied). We also know very little about how long the effects of dredging last, especially in a fines-rich river system like the Parrett. Greater knowledge is important. It would allow us to manage rivers and estuaries more effectively, so correct methods can be applied at correct times to provide maximum benefits, with negligible impacts on wildlife.



Ecological sampling for fish (a) and diatoms (b)

1. Maintenance dredging and silt monitoring

Experiments and ecological surveys were therefore run alongside water injection dredging on the Parrett between 2016 and 2018. Scientific investigations have been led by myself in collaboration with colleagues from Loughborough and Nottingham universities, SDBC, Fishtrack Ltd and a range of other partners. Our aim was to gain a better understanding of the impacts of WID through space and time within the River Parrett. In 2017, experiments sought to quantify the effects of WID on fish, diatom (algae) and invertebrate (aquatic insects) communities, and on water chemistry, channel depth and sediment condition. In 2018, the impacts of WID on fish movements and behaviours were assessed using a range of acoustic fish survey techniques.

Final reports are being written and will be submitted for publication in peer-reviewed scientific journals (where papers are reviewed/scrutinised by academic peers prior to publication) later this year. Therefore, while we cannot share too much information just yet, we can reveal some initial findings and we will provide non-technical summaries in future SRA publications.

Initial findings suggest WID is an effective sediment removal technique for the surveyed reach of the Parrett between Burrowbridge and the M5 bridge, although its effects can be short-lived, lasting less than 10 months, meaning regular repeat dredging can be necessary to maintain channel depths.

Results indicate the method failed to influence the size of bed sediments and given the highly tidal nature and associated high levels of suspended fine sediment typical of the studied area, WID's effects on some measured water chemistry parameters were similar to the effects of the tide. For example, turbidity (a measure of the quantity of suspended fine sediment in the water) is naturally high, particularly during high spring tides (when fine sediment is washed upstream from the marine environment), and turbidity peaks during dredging were not dissimilar to those observed during high tides without dredging. This finding is of ecological importance and suggests species naturally present are likely to be resilient to rapid changes in water chemistry and to sub-optimal conditions, as observed during dredging and under high tides without dredging.

Findings have been presented at several conferences, including the American Geophysical Union General Assembly in Washington DC, and the British Hydrological Society's 13th national symposium (*Hydrology: advances in theory and practice*) in London. The research team have gratefully received financial support from a range of funders, including SDBC and the Fishmongers' Company, in the form of two MSc student scholarships. These scholarships were awarded to Ethan Sylvester and Oscar Newman (Geography and Environment, Loughborough University) who are completing projects on the effects of WID on diatom communities and fish behaviours and movements, respectively.



CONTACT DR PLEDGER BY EMAIL
IF YOU HAVE ANY QUESTIONS
ABOUT HIS TEAM'S STUDIES,
✉ GYAGP@LBORO.AC.UK

2. Pioneer dredging: Oath to Burrowbridge

IN JULY 2017 the Board of the SRA approved dredging the River Parrett between Oath and Burrowbridge, as soon as a legally compliant and affordable scheme could be found. Planning began in late 2017 and continued throughout 2018-19.

The scheme is being led for Somerset Rivers Authority (SRA) by the Parrett Internal Drainage Board (IDB), working closely with the Environment Agency and Natural England. The SRA is using Growth Deal funding from the Heart of the South West Local Enterprise Partnership.



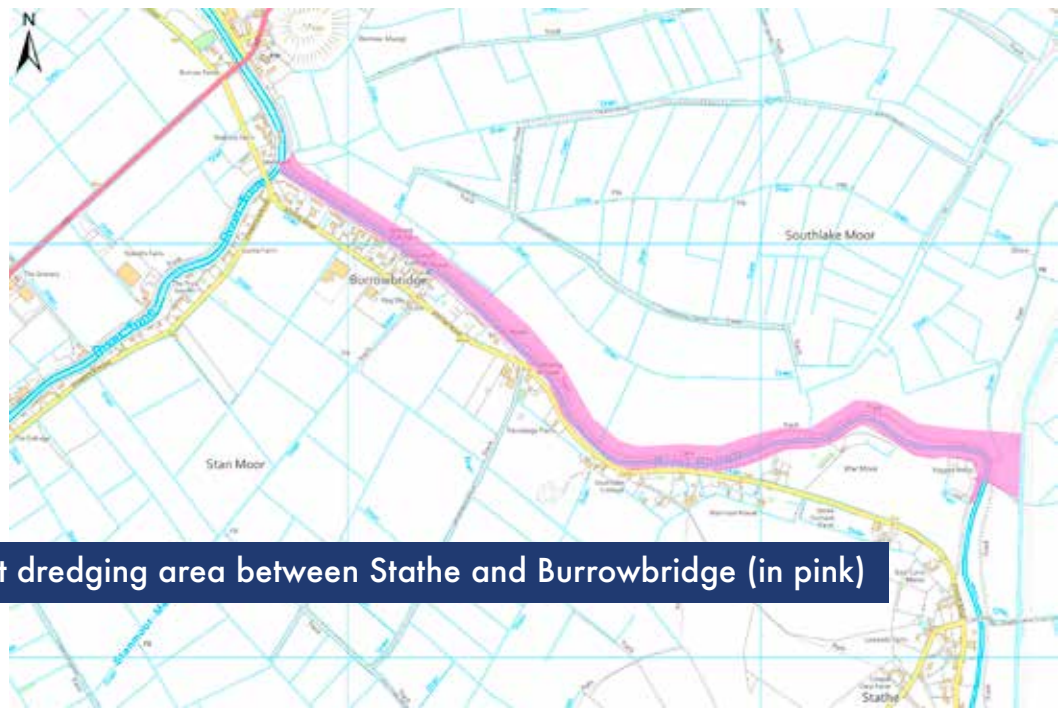
This dredge is particularly important because it would supplement other dredges of the Parrett and Tone since 2014. It would tie in with other projects, such as enhancing the River Sowey (a.k.a. the Parrett Flood Relief Channel) and King's Sedgemoor Drain. It would help the SRA to reduce flood risks across a large part of the Somerset Levels and Moors that were badly affected in winter 2013-14 and summer 2012, particularly Aller Moor, King's Sedgemoor, Moorlinch, Muchelney, Huish Level, Wet Moor, King's Moor, and Witcombe Bottom. In total, it could potentially reduce flooding to around 65km² and benefit around 200 homes.

Design, bathymetric and topographic surveys, numerical modelling and the production of environmental surveys and reports have all been undertaken. Design cross-sections have been produced to sensibly maximise the additional flow achievable in the river within physical, environmental and budgetary constraints.

Modelling has shown that works should be focused on a 2.2km (1.4mile) stretch between Beazley's Spillway at Stathe and the confluence with the River Tone at Burrowbridge where greatest hydraulic impact can be achieved. It is proposed to remove 22,000m³ of sediment using conventional methods with long-reach excavators on banks. Sediment will be used to widen banks and strengthen the Southlake reservoir dam wall.

In some areas, two-stage channels with marginal berms and areas of shallow water will be created. These improvements could benefit water voles, otters, fish, birds and invertebrates. Special attention has been paid to the need to protect hairy click beetles.

Subject to the results of statutory consultations, the SRA hopes to carry out legally-compliant works in autumn 2019.



The Parrett dredging area between Stathe and Burrowbridge (in pink)

3. River Sowy-King's Sedgemoor Drain enhancements

THE RIVER SOWY was originally known as the Parrett Flood Relief Channel. It is a man-made river conceived after floods deluged 50,000 acres of Somerset in October 1960. After long debates about cost and size, the Sowy was dug out between 1969 and 1972.

The Sowy is used by the Environment Agency to take excess water away from the River Parrett near Aller. Water flows down via Beer Wall to King's Sedgemoor Drain (KSD) near Greylake, then re-joins the Parrett at Dunball.

Providing more capacity in the Sowy-KSD system, so that it can be used more effectively, is a key aim of Somerset's 20 Year Flood Action Plan, which is overseen by Somerset Rivers Authority.

Sowy-KSD works in recent years have included the creation of new river channels under the A372 at Beer Wall, the refurbishment of a water level control structure near Chedzoy and the removal of obstructive masonry from under Dunball Old Bridge, which carries A38 traffic southbound. All these works are part of a programme to reduce flood risks across 150 square miles.



ACTIVITIES DURING 2018-19

In autumn 2018, the SRA funded the dredging of two sites along King's Sedgemoor Drain, at Parchey Bridge near Chedzoy and at Dunball railway bridge, to give these structures back the capacity to deal with flows they had nearly 50 years ago. Silt and overhanging vegetation were removed at Parchey Bridge. A floating excavator and barge were used to move silt and a digger spread it over land nearby. At Dunball more material than expected was removed, including a load of builders' rubble and assorted debris from the KSD. The work will enable more water to pass through the two bridges as quickly and smoothly as possible, and it will reduce the risk of blockages caused by flood debris clogging up their arches.

Both jobs were done for Somerset Rivers Authority by the Environment Agency, using contractors GBV (Galliford Try and Black & Veatch) and dredging specialists Land & Water. Funding came from Heart of the South West Local Enterprise Partnership (HotSWLEP) Growth Deal money.

More generally, progress has been made on further improvements planned for Dunball and on designs for increasing the capacity of key parts of the Sowy and KSD through work in these rivers' channels and on their banks. Several partners have been working together on a mitigation plan to ensure that proposed activities will be legally compliant. Options include replacing or refurbishing control structures at the Moorlinch and West Moor Raised Water Level Areas and Egypt's Clyde.

4. Strategic Approach to Mitigation

WORK on this project began in November 2017 and is continuing. Its main aims are to:

- reduce costs and risks
- enable flood risk management schemes in the county to go ahead
- secure a wide range of environmental benefits

The project is being led for the SRA by Natural England, which has successfully been involved with more than 40 other similar approaches to mitigation across the country.



Investigating mitigation at Moorlinch, left to right: Stephen Parker of Natural England, Laura Wood, Gary Cutts and Damien Nixon, Sowy Project Team

Mitigation means works that must be done – by law – to offset any unavoidably negative effects of projects. In Somerset’s case, there is an extra factor. One of the objectives of Somerset’s 20 Year Flood Action Plan is to “make the most” of the county’s special characteristics: its biodiversity, its environment, its cultural heritage. There are many features of international importance. So it is doubly vital to seek the best possible ways of reducing flood risks and protecting the environment. And it is best, wherever possible, to streamline ways of doing this.

Natural England has therefore been assessing detailed design and modelling data showing the impacts of the latest proposals for dredging and Sowy-KSD improvements. The project team is aiming to develop an approach which will provide certainty about the implementation of whatever water level management measures will be required as mitigation for flood risk reduction schemes that could harm legally-protected wetlands. Mitigation is likely to require changes to Water Level Management protocols and agreement from partners and landowners to deliver appropriate ‘shallow splash’ conditions in the winter months. (‘Shallow splash’ describes wet grassland that attracts and supports wild creatures such as waders).

Key partners and stakeholders are Natural England, the Environment Agency, Somerset County Council, Sedgemoor District Council, Somerset Drainage Boards Consortium, National Farmers Union, Country Land and Business Association (CLA), Farming & Wildlife Advisory Group SouthWest, the Royal Society for the Protection of Birds and Somerset Wildlife Trust.

A detailed report setting out mitigation options and approximate costs is being developed with partners. It will be presented at a future SRA board meeting.



Left: John Rowlands, Environment Agency





A LOT OF WATER in the catchment of the River Brue comes down to **North Drain Pumping Station (PS)**. So it is important for a wide area that the station works as effectively as possible. Pumping water from the North Drain into the Brue, as and when required, helps to avoid flooding on 9,700 acres of land.

In 2018, the Environment Agency used SRA funding and contractors AMCO to remove North Drain Pumping Station's 50-year-old leaking and collapsing concrete roof. It's been replaced with a lightweight modern roof. The walls have been re-pointed, cracks have been stitched together using steel rods and crumbling bricks have been replaced. The work took 14 weeks.



Elsewhere in the Brue catchment, Somerset Drainage Boards Consortium have been working on SRA-funded plans for bank repairs along **Decoy Rhyne**. Surveys have been done and preliminary designs drawn up, in preparation for works going out to tender.

Repairs along Decoy Rhyne are needed for two main reasons. Firstly, in times of high flow, water can overtop or percolate through the banks. This causes land to flood and then, potentially, roads and properties. Dispersing this water generally requires pumping via North Drain Pumping Station. The second reason is that banks need to be stabilised to allow future maintenance and de-silting activities to be carried out.

Somerset Drainage Boards Consortium have also let a contract on behalf of the SRA to consultants Edenvale Young Associates. They have begun investigating ways of reducing flood risks from the River Brue and Southwood Brook to a stretch of road between Keinton Mandeville and Baltonsborough, and properties in Tootle Bridge and Catsham.

Both of these hamlets have a history of flooding, particularly Catsham. For example, there are two homes in Catsham that face a 50% chance of flooding every year from Southwood Brook and the Brue. The most vulnerable property in Tootle Bridge has a 10% chance of flooding every year from the Brue. The Environment Agency has records of homes flooding in this area more than 10 times since 1999. A sewage pumping station is also at high risk.

A STRATEGY for the whole Brue catchment is being developed by Emilie Graille of Somerset Catchment Partnership. In March 2019, Ms Graille ran a Water Quantity and Climate Change workshop at the IDBs' offices in Highbridge with members of the SRA's Technical Group. This covered numerous topics including Water and flood risk management, Land management and sustainable agriculture, Waste water management, Ecosystems and connected habitats and Working with stakeholders.



Emilie Graille, Somerset Catchment Partnership, in Highbridge

The SRA has been re-formulating its plans for the Brue. Following a series of workshops and meetings with partners, money that was originally allocated to dredging the Brue is going to be split three ways.

1. A significant percentage is still earmarked for de-silting works on the Brue between Westhay and North Drain Pumping Station. Carefully optimising the river's capacity will help to reduce the frequency, depth and extent of flooding.

It will also help with the implementation of existing Water Level Management Plans in the Brue's catchment, and support favourable conditions for wildlife on several legally-protected sites (Sites of Special Scientific Interest, Special Protection Areas, Ramsar Wetland of International Importance).

2. An SRA contribution will enable a major £1.5 million flood alleviation scheme to go ahead in Highbridge. Led by Wessex Water, the scheme will protect 21 homes in Field Way. The SRA will use Growth Deal funding from the Heart of the South West Local Enterprise Partnership for this work.
3. Detailed plans have been drawn up for a second phase of repairs and improvements at North Drain Pumping Station. As with the first phase, this work will be led for the SRA by the Environment Agency. It will include repairing the station's gravity sluice, which has significant cracks in its wingwalls. Were the structure to fail, and control flaps become inoperable, a wide area of Tealham and Tatham Moors could be inundated. Forced reliance on pumping alone would be expensive and significantly increase the carbon footprint of the pumping station. Upstream reaches of the Brue could also potentially run dry, causing extensive environmental harm.



NOTHING like this barrier has been attempted in Somerset before: it is a big, complicated, challenging project. It will reduce tidal flood risks to 11,300 homes and 1,500 businesses. Its current estimated cost is £100 million but its benefits are valued at £1,331 million.

Work on the Bridgwater Tidal Barrier is being led by the Environment Agency and Sedgemoor District Council. Somerset Rivers Authority is helping with the funding of the early stages of this project, using Growth Deal money from

the Heart of the South West Local Enterprise Partnership. All partners have been learning as many lessons as possible from other towns with new barrier developments, like Ipswich and Boston. Forecasts of Flood Defence Grant in Aid and external funding show the scheme is affordable.

Bridgwater Tidal Barrier will be located between Express Park and Chilton Trinity village. It will have two vertical lift gates and is expected to be operational in 2024, subject to funding and statutory approvals. The scheme includes improvements to existing downstream primary flood defences along the River Parrett together with new secondary defences in the flood plain. The barrier and downstream defences are being designed to protect Bridgwater and nearby communities for the next 100 years, against tides that have a 0.5% chance of occurring in any year.

ACTIVITIES DURING 2018-19

- Sedgemoor District Council bought Heron Court at Express Park, next to the intended site of the barrier, to allow for greater flexibility in the layout of the site, and to make construction easier.
- Outline design completed for the barrier and downstream defences.
- Ground investigations completed into the suitability of nearby 'borrow pit' locations to provide material for the downstream defences.
- Key landowners consulted over principles for permanent and temporary land access and over the extraction of local 'borrow pit' material for the building of downstream defences.
- Outline design for the barrier and downstream defences presented to key stakeholders and the public in December 2018, and businesses in February 2019.
- Public drop-in held at Chilton Trinity in February 2019 to present the scheme proposals and to seek further community views and feedback.
- Somerset County Council and Sedgemoor District Council submitted a bid for funding to the Housing Infrastructure Funding in March 2019.
- Secured Technical Assurance of the Outline Business Case for the Barrier and downstream defences from the Environment Agency's Large Project Review Group. This allows for the preparation and submission of the Transport Works Act Order (TWAO) needed for the scheme to be delivered. The TWAO is being prepared for submission to the Secretary of State at Defra at the end of 2019.

7. Taunton Strategic Flood Alleviation Improvements Scheme

TAUNTON Strategic Flood Alleviation Improvements Scheme (TSFAIS) covers the Tone, its catchment and numerous tributaries. TSFAIS is led by the Environment Agency and Somerset West and Taunton Council. Somerset Rivers Authority has part-funded the scheme's development for the last four years, using Growth Deal money from the Heart of the South West Local Enterprise Partnership early on.

Phase 1 of TSFAIS studies highlighted the need for a combination of two main options. Firstly, improved flood defence walls in the town. Secondly, an area for storing up to 1.8million cubic metres of water at Bradford on Tone, to provide extra protective capacity for the next 100 years.

ACTIVITIES DURING 2018-19

In August 2018, the SRA Board was told that work completed on Phase 2 of TSFAIS had included surveys, ground investigations, initial engagement with landowners, computer modelling, initial environmental surveys and concept designs. The estimated cost of the two main options is around £50million. A new flood storage area and dam would also require an on-going commitment to maintenance. Taunton Deane Borough Council had put aside £6million of its own money for TSFAIS but all parties accepted that the total sum required was unlikely to be found soon.

A revised Project Delivery Plan has therefore been agreed. This Plan will focus on several smaller options for improvements identified during Phase 2. The aim is to give Taunton a useful increase in its capacity to manage flooding, pending the longer-term delivery of the two main TSFAIS options. The following smaller options are therefore being considered:

1. Vivary Park, Sherford Stream Improvements
2. Raising bridges on Mill Stream by Castle Street



BACKGROUND: Taunton has flooded badly before and climate change threatens worse. In 1960, more than 360 homes, shops and business premises were flooded. In response, the River Tone through the town was re-modelled and defences were reinforced in the 1980s. Taunton did not flood in 2013-14 but it came very close to flooding in 2000 and 2012. If nothing is done to improve matters, climate change is predicted to put many properties at higher risk, because increased flows of flood water will overtop the town's defences.

3. Mill Stream flow diversions by French Weir
4. Optimisation of Long Run meadow storage, upstream of French Weir
5. Conveyance improvements on Galmington Stream (particularly consideration of culverts) near Parkfield Drive
6. Bathpool options:
 - a) Closing Canal Route at Firepool
 - b) Railway Culverts between Obridge and Bathpool
 - c) Flood Relief Channel at Bathpool parallel to Hyde Lane area
 - d) Over pumping at Old River Tone Outfall by Bathpool Bridge
 - e) Old River Tone Flap Valve Bund by Bathpool Bridge

Work is also continuing on a wider Strategic Plan, to address long-term issues such as funding.

A very important part of all this work is to produce solutions for managing any impacts upon other areas, particularly places downstream of Taunton.

Extra Repairs, Improvements and Maintenance



A SCHEME to repair the river banks in **Frome** town centre, and reduce flood risks to about 300 properties, was carried out during the summer. Works focused on strengthening the River Frome's revetment: the fortified layer designed to shield river banks from erosion, especially on bends hit hardest during storms and times of high flow. Stabilised banks mean the river can now safely carry more water away and so reduce flood risks. The improvements were delivered for the SRA by the Environment Agency, using contractors Land & Water. Repairs were last done here more than 10 years ago.



A popular sight with watching spectators was a big amphibious excavator. This was used for several jobs, such as shifting broken-off chunks of concrete from the river bed and putting rocks in place to protect the river banks. A tug boat and hopper were used to carry materials along the River Frome. Frome Canoe Club, Frome Town Council, Mendip District Council, Wessex Water and Network Rail were all involved in developing this project.



Repaired River Frome revetment in Frome town centre



Just outside **Dunster**, repairs were made to the River Avill Flood Relief Channel. This runs from the edge of Dunster under the A39, and under a West Somerset Railway bridge, down to the sea. It consists of 300 eight-metre slabs of concrete. The joints between these were cleaned out and re-sealed. This strengthened the banks of the channel and so maintained its capacity to carry water away. This reduces the risk of flooding on the A39 and helps to protect local homes, businesses and land. The improvements were delivered for the SRA by the Environment Agency, using contractors Bridge Civil Engineering Ltd and specialist sub-contractors SW Concrete Repairs.

Following the works, the channel showed its worth when 127 mm of rain fell at West Dunkery from 27 November to 4 December 2018 and another 134 mm fell between 15 December and Christmas Eve.

Also near **Dunster**, works carried forward from 2017-18 were finished off near the ancient monument of Gallox Bridge. The aim here was to prevent the erosion of a 35-metre stretch of bank, by putting in a 'rock roll' system, and thereby in turn protect an access track and the main River Avill flood bank. This project was joint-funded by the SRA and the Environment Agency, and delivered by the Environment Agency using contractors Land & Water. The works were successfully tested not long after their completion when 20mm of rain fell on West Dunkery between 1.15pm and 2.15pm on 31 May 2018.

Both Dunster schemes complement earlier SRA-funded moves, such as buying equipment and a store for a new Dunster Flood Group and de-silting work at Ford Bridge upstream on the River Avill near Timberscombe.

Sedgemoor District Council used SRA funding for extra works to make local flood defence schemes and infrastructure in the **Sedgemoor** area more effective. A key aim is to deal with issues before they become problems. There were five activities:

- Clearance of an overgrown, congested ditch at Blackford near Wedmore, to help keep the local flood relief scheme working well.
- CCTV survey and inspection of surface water system in Bridgwater. The system was found to drain nowhere. Those responsible are now being pressed to complete the drainage works required.
- Structural inspection and assessment of sluice structure at Bays Pond in Cheddar. Proactive maintenance works identified and scheduled for 2019-20.
- CCTV survey and inspection of flood relief scheme in North Petherton. Culvert-checking found no preventative maintenance works required now.
- Structural inspection of damaged culvert in North Petherton. Minor repair works required because of tree growth.



ON **West Sedgemoor** and **Aller Moor**, SRA funding enabled the Parrett IDB to carry out extra maintenance of viewed rhynes. Work on West Sedgemoor covered 20.171 kilometres (12.5 miles), on Aller Moor 9.658 km (6 miles).

‘Viewed rhynes’ are a big network of the more important ditches, that the IDB keeps an eye on and usually maintains every two years. Extra SRA funding has allowed work to be done every single year. This additional work ensures that water is carried away more effectively from flooded and flood-prone areas to outfalls into main rivers such as the Parrett, and to pumping stations. This helps to protect local homes, farms and businesses, and local roads, including 650 metres of the A378 at Wrantage. It reduces the likelihood of summer flooding, which can be particularly damaging to farmers and wildlife, as it was in 2012. It also enables seasonal water level management in accordance with Water Level Management Plans. West Sedgemoor is a Site of Special Scientific Interest and a Special Protection Area and its character depends on people’s ability to manage water levels.

At permanent pumping stations, SRA funding enables extra resilience, security and efficiency. It means the Environment Agency can better protect people, homes, businesses and land. The Environment Agency’s own funding is restricted because of the limited number of properties at flood risk in the areas serviced by these pumping stations. But SRA funding reflects local priorities.

At **West Sedgemoor Pumping Station**, a plan has been drawn up to install a new trash screen that could be cleared automatically. This move would have three main benefits. First, it would protect pump equipment, by stopping material being pulled into the pumping mechanism. Second, preventing blockages would reduce local flood risks by stopping water backing up. Third, the Environment Agency would be saved the time, cost and trouble of manually removing weed and debris from the station’s existing trash screen. The SRA has paid for the costs of re-designing access arrangements to the site, and the tendering and implementation of those changes. Further stages now depend on Environment Agency funding. The project is currently expected to advance in 2020-21 or possibly beyond.

Roof repairs at **Long Load Pumping Station** have been completed, along with inlet channel works, partly using SRA funding originally allocated to roof repairs at Saltmoor Pumping Station. The move was made from Saltmoor because the Environment Agency found other funding and other means of doing what was required.

At **Westonzoyland**, it was hoped to fully electrify and automate the pumping station, and to replace its single diesel pump, which is powered by a 1990s’ lorry engine. Automation would save the Environment Agency the time, cost and trouble of sending someone out to Westonzoyland to get the pump going and then later going back to turn it off again. SRA funding paid for an options appraisal, outline design and costings to fully automate the site. Sadly, costings indicated full automation would cost over £1million. This is not considered viable.

The Environment Agency has instead decided to develop what is called an emergency ‘plug and play’ pumping option. This could enable the mobilisation of large electrical pumps – with a total pumping capacity of up to 2m³ per second – for operation under various flood scenarios. The Environment Agency intends to bid for more SRA funding so this can happen.

AREAS of land were re-instated at **Long Load**, that had been used for access and haulage on a 2017 SRA project to build up low banks along the River Yeo. Better banks will help to reduce flooding and disruption caused by road closures. Thousands of cubic metres of silt were brought on to the Long Load site after being stock-piled during SRA-funded de-silting operations at Westport Canal and Witcombe Bottom.



At **Cannington**'s major new flood defences, some landscaping work was done, which had been deferred from 2017-18 because of bad weather.



CASE STUDIES

1. Cannington Flood Alleviation Scheme

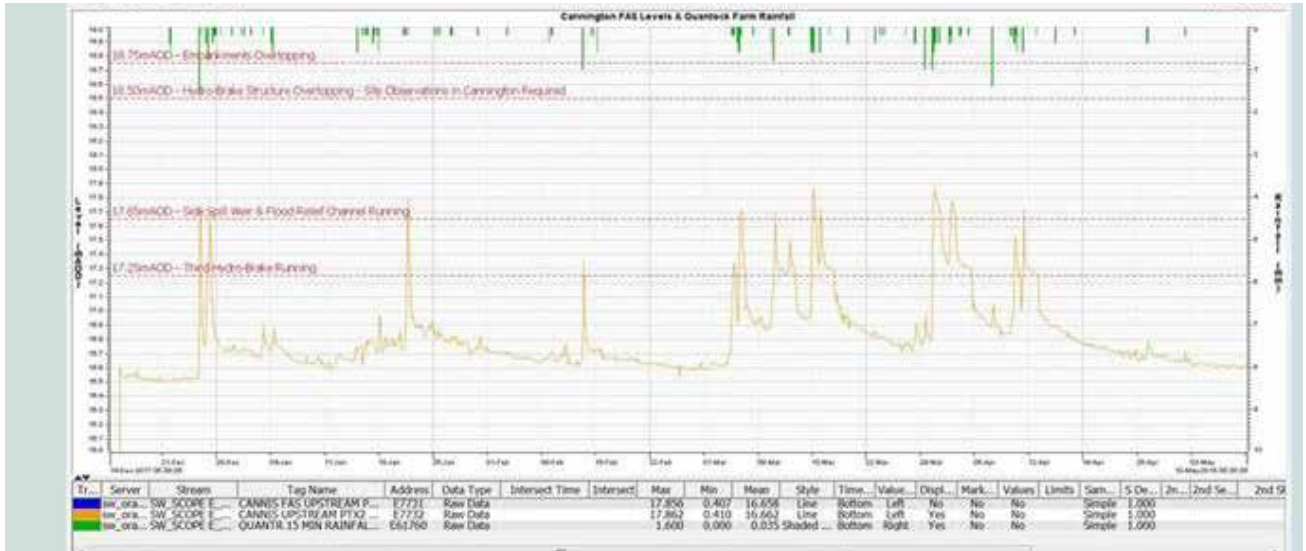
THIS SCHEME created a relief channel to divert flood water away from Cannington and better protect 200 homes and the A39. Three Hydro-Brake® flow control structures were installed along with CCTV and hydrometry / telemetry equipment.

An SRA contribution of £300,000 enabled this £4.35m scheme to go ahead, led by the Environment Agency in partnership with EDF, Cannington Parish Council, Wessex Water and Somerset County Council.



1. Cannington Flood Alleviation Scheme

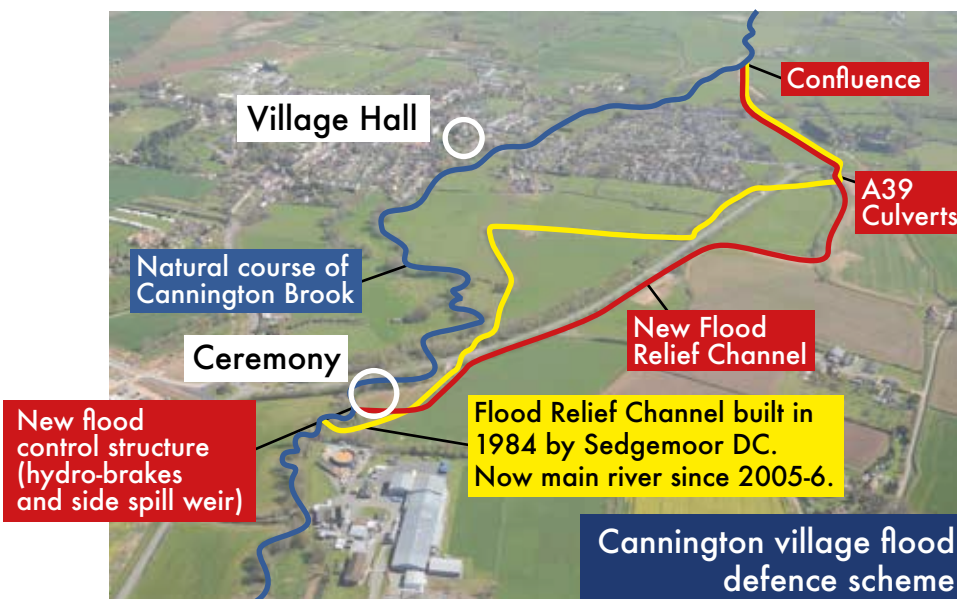
The data provided by telemetry show that the scheme is delivering benefits locally. The graphic below displays data collected at 15-minute intervals.



The line in green illustrates local rainfall. The trace shows – from the top in green – rainfall data collected locally. The scale on the left records levels in millimetres.

The results of this rainfall can be seen in the yellow line which represents upstream water levels. This vertical axis represents metres above ordnance datum (effectively ground level).

It highlights the consistent operation of the Hydro-Brakes® which restrict the volume of water passing down the main channel into the village of Cannington.



The side spill weir has also allowed water to pass into the flood relief channel on 10 occasions in the period 14 December 2017 to 10 May 2018. This is water that would otherwise have found its way into Cannington with all its restrictive culverts and channels – see the aerial view.

2. New pump at Screech Owl near Bridgwater

A NEW electric pump operates at the Screech Owl outfall into the River Parrett near Bridgwater. Triggered into action by remote sensing systems, it benefits houses close to Bridgwater & Taunton Canal and several businesses, including the Argos distribution centre, the Boat & Anchor Inn, The Canalside conference centre and JJ Motors.

Flood water can now be pumped out automatically from the Screech Owl outfall. Water could not previously pass into the Parrett when the river was experiencing high flows, for tidal and /or fluvial reasons.

The graphic below shows trends in rainfall and corresponding water levels. The peaks and troughs signal the pump operating and stopping in response to those water levels. Before the pump was installed, water levels in the Marsh Lane area of Huntworth would have steadily increased until river levels in the Parrett had dropped enough for water to be able to get out through the Screech Owl outfall. So the pump is a real benefit to the local area.

A powerful electric canister pump installed for the SRA at Huntworth is helping to reduce flood risks for homes and businesses.



BACKGROUND: The pump’s successful operation rounds off a plan drawn up when Marsh Lane was first developed. As the area was known for drainage problems, mitigating flood risk reduction measures included the creation of attenuation lagoons and channel improvements going down to the Screech Owl outfall. A concrete chamber was also built for a pump, though there was no money to buy a pump. Only because of the SRA was it possible to purchase and install a pump – a far more effective pump than was originally envisaged – and to bring electricity to the site to power it. This scheme was delivered for the SRA by the Environment Agency, using contractors Nomenca.

EVERY YEAR Somerset Rivers Authority aims to fund a small number of investigations. The SRA looks particularly for issues that lie beyond the scope of what other individual organisations can do on their own – or for issues that fall between the gaps of what other organisations are doing – or for some combination of the two. As a co-ordinating body, the SRA can get different organisations working together as partners in ways they would do not otherwise.

A good example can be found in **Moorland**. This village close to the River Parrett is best known for being at the epicentre of the massive floods of 2013-14. But in recent years, heavy downpours in Moorland have also highlighted more localised problems with surface water drainage. Intense rain – more than 50mm in 24hrs – has caused internal flooding in at least one property along Northmoor Green Lane, the flooding of a small number of gardens and driveways along Church Road and resulted in standing water on roads.

On behalf of the SRA, the Parrett IDB and Somerset County Council have been working together to identify the causes of various problems. Their investigations have turned out to be extremely interesting. They have shown how developments over the last century have affected the extensive network of inter-connected ditches that used to exist along

property boundaries and along the sides of roads and fields. Similar stories could almost certainly be told about other local villages.

Moorland's old network of ditches has been impeded in numerous ways.

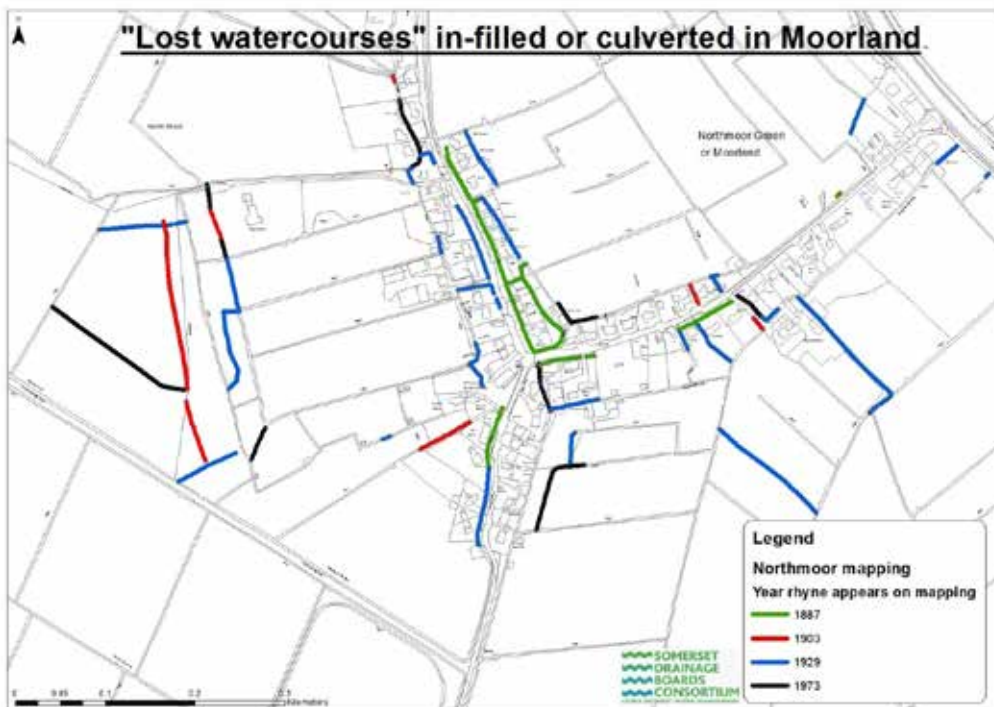
Watercourses often got culverted or filled-in when new homes and extensions were built, when parking spaces and driveways were created, and when gardens were enlarged.

Ditches that ran along both sides of roads have been extensively culverted and gully pots have been installed.

The network of small ditches that connects outfall pipes between properties to rhynes maintained by the IDB is in poor condition. Ditches are generally overgrown and clogged with silt; some have been filled-in or blocked with things like garden waste. A few ditches are difficult to access for maintenance due to the erection of sheds, garages and small agricultural buildings next to watercourses.

Very thorough analyses have been carried out for the SRA by the Parrett IDB and teams from Somerset County Council's Highways Dept and Flood Risk Management section. Their work involved CCTV surveys, ditch de-silting, drain-jetting, vegetation clearance, consultation with residents and historical research.

These investigations led to proposals being drawn up for improvements. A bid was made to the SRA for funding as part of the SRA's Enhanced Programme of works for 2019-20, and this was formally approved by the SRA Board in March 2019. A key part of the plan is to engage with local people – especially those who own ditches – about their future responsibilities for maintenance.



INVESTIGATIONS

NOT FAR from Moorland, in **Chadmead**, detailed topographic surveys have been carried out along the potential routes for a ring bank to encircle and protect properties. The background to this work is quite complicated. Summarising severely, Chadmead flooded badly in 2013-14. Water reached the highest depth ever recorded locally. Following consultations with residents about a possible ring bank, the SRA Board ordered further investigations. These have been led for the SRA by the Parrett IDB, with the SRA's Community Resilience Officer helping to liaise with residents.

Research in 2018-19 has now established that a ring bank would need to be longer and higher than first anticipated, and include a section of concrete wall. The estimated cost would be at least £900,000 (not including land acquisition or compensation). Construction is expected to be difficult because of the need to work on soft peat. If material to build the bank could not be dug out locally, 20-tonne lorries would have to make around 1,000 trips back and forth along mostly narrow lanes.

Research has also indicated that if flooding on the scale of 2013-14 were to re-occur, no homes would be flooded in the Chadmead area. This is because of the benefits of other moves taken locally, such as dredging, works at Beer Wall and the provision of additional pumping capacity.

In 2019-20, fresh discussions will be held with people around Chadmead before the matter returns to the SRA Board.

For other investigations, see the section about Tootle Bridge and Catsham in the Brue section and Beckington in W4.

WHAT ARE RIPARIAN RESPONSIBILITIES?

After the 2013-14 floods, it was widely felt in Somerset that problems were made worse because too few riparian owners knew and carried out their responsibilities, particularly for maintenance.

One difficulty is the confusing word 'riparian'. It's a Victorian coinage from the Latin *riparius*, from 'ripa' meaning river bank.

A riparian owner is somebody who has any sort of watercourse (including a main river) on or under their property, or next to any boundary of their property - unless that watercourse is known to be owned by someone else. Ownership of watercourses along boundaries extends to the centre of those watercourses.

Anyone who owns a river and a river bank has responsibilities – chiefly, for maintenance. It is a common misconception to think that a body such as the Environment Agency has a legal responsibility to carry out activities such as dredging on rivers that it does not own. *It does not.* It has the power to do works on certain rivers for the public good; it does not have a duty to do so. *Owners are responsible.*

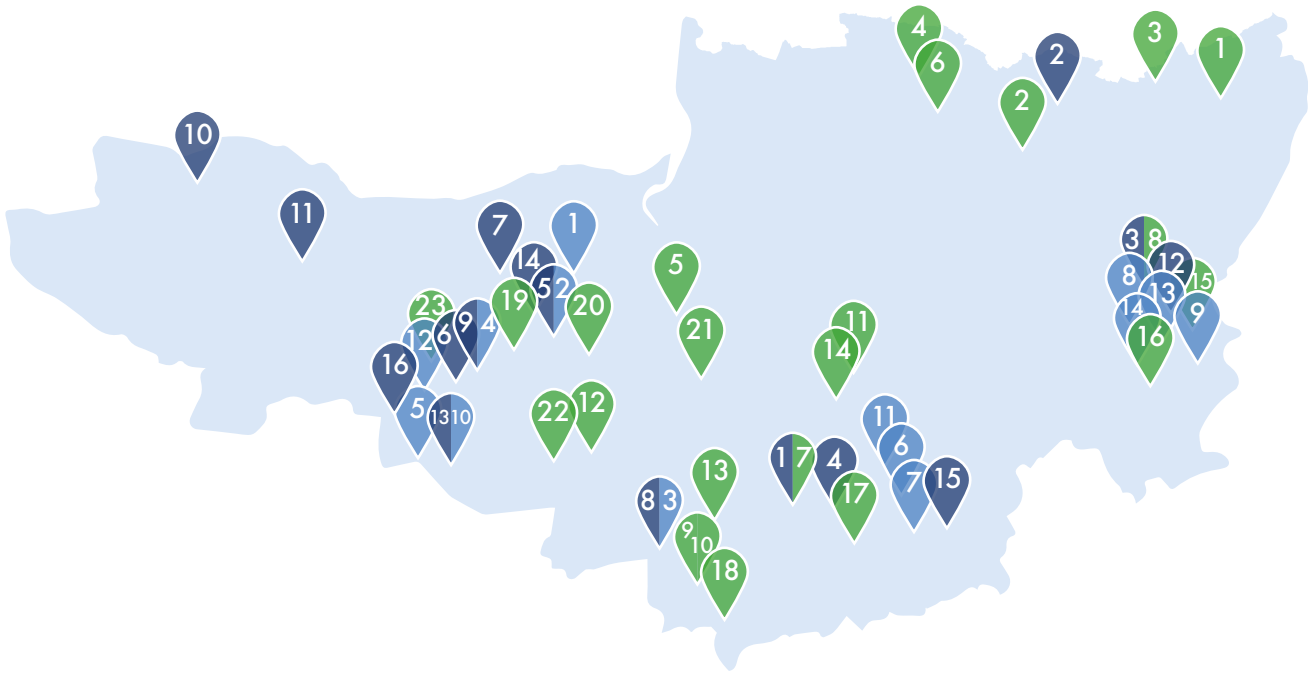
ACTIVITIES DURING 2018-19

SOMERSET Rivers Authority has been employing a part-time Riparian Responsibilities Officer (RRO) to help promote wider understanding of this situation. The RRO has met various organisations and groups, such as West Somerset Flood Board and West Somerset Flood Group. To further promote the cause, the RRO has also primed colleagues in Taunton Deane Borough Council, the Farming & Wildlife Advisory Group SW, Somerset Drainage Boards Consortium, West Somerset Council, Yeovil Rivers Community Trust and Westcountry Rivers Trust.

The RRO is an additional resource for SRA partners to call upon to help fix problems and improve projects – to make things more joined up. So, for example, the RRO worked with Somerset County Council's West Somerset Area Highways Office and a landowner in Stogursey to identify and resolve a significant highway flooding issue. The officer has also been part of the team involved in the major examination of problems in and around Beckington (see W4) and has worked with colleagues in the county council on watercourse maintenance issues.

Fly-tipping in watercourses on the Somerset Levels annoys many people. The RRO has been working with Internal Drainage Board colleagues on ways of identifying the most problematic areas and gathering evidence to help stop ugly and irresponsible dumping.

2018-19 SUMMARY: 24 capital grant schemes, 15 Triple C schemes, 23 highways referrals, 17 soil visits, UK's first online auctions for natural flood management works and 14 actions; Hills to Levels won the UK River Prize.



KEY:



CAPITAL GRANT SCHEMES



TRIPLE C MATCH-FUNDED SCHEMES



HIGHWAYS REFERRALS

Somerset Rivers Authority funds the biggest range of natural flood management activities in the UK as part of its Land Management workstream. This award-winning workstream is admired nationally for its innovation, strong partnership working and increasing sophistication. It is led for the SRA by the Farming & Wildlife Advisory Group SW (FWAG SW). Activities generally go under the popular local branding of Hills to Levels. This makes it easier for partners to get involved and to contribute match-funding so that more can be achieved. It also helps that as Somerset has some famous hills and valleys and floodplains,

the idea of trying to slow the flow of water from Hills to Levels can be simply understood.

There are three main strands to this SRA workstream. They are:

1. Capital grants offered to farmers and landowners for Natural Flood Management projects that slow the flow of water and reduce flooding risks across the county.
2. 'Highways referrals' – that is, looking for answers to highway flooding problems in better management of land nearby.
3. Soil husbandry to reduce surface run-off.



IN April 2018, Hills to Levels won the UK River Prize for 2018. The project was first selected as a finalist in the category ‘Catchment-scale project – Demonstrating a whole river approach to restoration’. The UK River Prize celebrates people and organisations that improve rivers and catchments, and seek to create a healthy natural environment.

The SRA is one of several bodies that have funded Hills to Levels over the last three years, firstly using Growth Deal money from the Heart of the South West Local Enterprise Partnership and more recently, money from council tax.

In the past year the SRA has approved 54 grant applications for natural flood management schemes across Somerset and 131 natural flood management structures and direct land management interventions in 55 different fields.

All this work aims to reduce the depth and duration of floods in Somerset; diminish local flash flooding and flood risks; and minimise sediment being washed from fields on to the banks of rivers. Benefits include less need for de-silting in lower catchments and less need for pumping to remove water on the Levels.

One trend in this workstream is the increasing density and sophistication of schemes in particular areas. This helps to make each different element more effective. For example, more natural flood management works have been completed in 2018-19 on the outskirts of Yeovil. Eight leaky woody dams have been created near Lufton College to slow the flow of water entering Wellhams Brook, and major pond improvement works have been carried out at Manor Farm, Lufton. Modelling – and anecdotal evidence from flood wardens – suggests that these works and other schemes near Yeovil are benefitting the Martock area.

Martock Parish Council’s Chair wrote to say thank you for NFM work upstream of Martock, in places such as Lufton, Montacute, Odcombe and Bower Hinton. It has provided “a degree of control over peak flows... it will minimise the number of flooding events in the village. Since the introduction of Hills to Levels work, I am pleased to inform you that no further floods associated with the water draining from the Martock catchment have occurred in the Parish.”

Another example: seven woody leaky dams were created in the Marcombe Valley, near Ashbrittle in the River Tone catchment. These dams complement a series of earlier natural flood management interventions along this tributary of the Tone, including 13 other leaky woody dams, new ponds and de-silting of lakes. Work on the lakes was done with a Ruston-Bucyrus dragline (*see back cover*), bought and specially restored for this job by the landowner (an enthusiast for vintage machinery).

FWAG SW have installed gauges to help measure changes in flows around three of the newest dams in the Marcombe Valley, and the effectiveness of all these projects in reducing flood risks is being monitored by a PhD student from Bristol. Data collected will help to create computer models that can evaluate the effects of natural flood management at catchment-scale. This is potentially a very significant piece of research, because one of the debates about the value of natural flood management in the past has been about the geographical spread of its impact.

CASE STUDY: INNOVATION - NFM ONLINE AUCTIONS

THE UK's first online auction for natural flood management works was held in summer 2018, in the Somerset catchments of the River Parrett and River Tone.

This went so well that in early 2019 a second online auction for natural flood management works was run across the whole of Somerset, excepting only the lowest-lying areas where such works would have less point.

The software used was developed by the Environment Agency with FWAG SW, Natural England's Catchment Sensitive Farming initiative and the Sylva Foundation at Oxford University.

Somerset Rivers Authority provided the money for the grants that farmers and landowners bid for. In total, over the two auctions, this was more than £65,000.

Both auctions were reverse auctions. In conventional auctions, bids go up until the highest one wins. In reverse auctions, the victors are those who submit lower bids.

In Somerset's online NFM auctions, farmers were given a choice of natural flood management measures to bid for. These included planting crops that stop soil being washed off fields during the winter, after maize has been harvested; planting hedges to slow the flow of water; and aerating soil to increase the amount of rain that can filter into the ground.

In the first auction, 63 bids were successful across 14 different farm holdings. Better maize management and hedge-planting were most popular, followed by grassland sub-soiling, soil bunds and leaky ponds, and leaky woody dams. All bids were assessed by FWAG SW to make sure they were feasible and cost-effective. FWAG SW advisers later inspected all works to make sure they were carried out to a good standard.

In the second auction, which was widened to include the catchments of the River Axe and River Brue, 147 bids were successful across 26 different farm holdings.

The system is still new, but the signs are that it has several strengths. It cuts out paperwork. It saves time and money. It draws on farmers' and landowners' unrivalled knowledge of their own land. Using maps inside the online auction system, participants can pick out bits of their land where they believe that NFM activities will produce the best flood prevention results for them and for local communities.

Farmers agreed that the system was easy to use – and got results.



Anthony Gothard, a Stoke St Gregory farmer who won grants in both auctions, said: "It only took me a few minutes to place my bid online and there wasn't any paperwork. I'm really pleased with what I've been able to achieve with the grant money."

Sam Passmore of Manor Farm, Otterhampton near Bridgwater, who successfully bid for a better maize management initiative in summer 2018, said: "Being encouraged to implement measures which will improve our soil health as well as limit the risk of environmental damage, when combined with a financial incentive, should be seen as a win-win situation for us."

SUCCESSFUL AUCTION BIDS FROM FIRST AUCTION

BETTER MAIZE management includes techniques such as drilling and cultivating fields with a winter cereal or ryegrass, after maize has been harvested. Water running off from compacted maize ground can contribute to localised flooding. Encouraging the infiltration of water through soil can minimise runoff problems. Establishing green cover also helps to intercept rainfall and protect the soil surface.



PARRETT CATCHMENT

In the River Parrett catchment, grants were given for maize management on a total of 159.3 hectares. Places were: **Bower Hinton Farm, near Martock**, Wellhams Brook; near **Walford**, seven fields between the A38 and the M5, Parrett catchment; **North Petherton, Haddon Farm**, Petherton Stream; **Cannington College, Rodway Farm**, River Parrett; **Fiddington, Peadon Farm**, Stogursey Brook and Fiddington Brook; **Otterhampton, Manor Farm**, Fiddington Brook. There were also successful bids from **Bower Hinton Farm** for two leaky woody dams and a 24-metre soil bund, from **Barrington, Hill Farm**, Westmoor Main Drain for 215 metres of hedge planting and 50.5 metres of hedge planting on bund, and **Rodway Farm at Cannington** for 21.9 hectares of grassland subsoiling.



TONE CATCHMENT

In the River Tone catchment, grants were given for maize management on a total of 51.1 hectares. Places were: **Wellington, Bryants Farm**, Westford Stream (fields just south of Wellington and Chelston); **Trull, Canonsgrove Farm**, Sherford Stream; **Meare Green Farm, near Stoke St Gregory**, River Tone; **North Curry** (including fields at **Huntham** and **Knapp**), River Tone catchment.



There were also successful bids from **Greenham, Lower Cothay Farm**, Upper Tone for 46.9 hectares of grassland subsoiling between Cothay Manor, Kittisford and Wellisford, and from **Wellington, Bryants Farm**, Westford Stream for 18.6 hectares of grassland subsoiling.



Also near Wellington, in the catchment of the Upper Tone, **Pinksmoor Farm** bid for 40 metres of hedge planting on a new bund on the outskirts of Holywell Lake. This planting – featured on BBC Points West – has filled a gap in the lower corner of a field. It will help to stop localised flooding. FWAG SW say this is a great example of hedge planting on a bund; they are “very pleased” with it.



THERE IS usually a time-lag between grants for schemes being approved by the SRA and work being done at sites by contractors. So although the SRA approved 54 grant applications in 2018-19, this does not mean that people always sprang into action immediately afterwards. All sorts of factors can affect timings, such as contractors' availability and the seasons. It would be daft to plant trees in July, for example.

CAPITAL GRANT SCHEMES

17 **Barrington**, Hill Farm, Westmoor Main Drain, Parrett catchment. Two hundred trees have been planted on sloping land above Barrington as part of a multi-pronged SRA attack on flooding problems resulting from run-off down Bonning's Lane. The trees will help to stabilise soil, reduce run-off and slow the flow of water. See also the entry on the previous page for Barrington under 'Parrett Catchment'. These schemes stem from – and are supported by – Barrington Parish Council.

2 **Binegar Bottom**, Mells River source catchment. A leaky pond, scrape and bund have been created on the south side of Binegar Bottom, to store rapid run-off and reduce peak flood flows. Lower Binegar and Gurney Slade are in a high flood risk zone 3. The last floods were in 2013 following heavy rain on a saturated catchment. This scheme was led by Binegar Parish Council, following advice from FWAG SW.



38 **Bruton**, River Brue. Brue Crew volunteers have been improving the Brue near Church Bridge in Bruton town centre, following detailed discussions with Somerset Wildlife Trust, The Wild Trout Trust and the Environment Agency. The weir has been v-notched to help draw flow, particularly during the summer. Other moves are planned in 2019-20.

4 **Compton Durville**, Lambrook Brook, Parrett catchment – (x2). Two grants were given for a package of works including a bund with a leaky outlet, inlet and outlet swales, de-silting of ditches, an upgraded trash screen plus de-silting, and culvert-jetting. Adaptations were also made to a large new pond to enable 2,300m³ of floodwater storage, with a leaky outlet to control the water level. These works have reduced flood risks at Picken Bridge, Shapway and downstream in Mid Lambrook, East Lambrook and beyond.

52 **Cothelstone**, tributary of Back Stream, River Tone catchment. Around 4,950m² of a very large pond upstream of Bishop's Lydeard has been de-silted to allow for the storage of an additional 3700m³ of water. In some areas, the silt was two metres deep. Phase 1 of a bigger scheme; Phase 2 involved SRA and Triple C funding. See Triple C section (page 35).



6 **Croford**, tributary of Hillfarance Brook, Tone catchment – (x2). A leaky pond has been created on Knights Farm land near Cotcombe Wood to divert peak flows from the Hillfarance Brook tributary and then slowly release stored water back into it. The pond was also fenced to avoid its banks being churned up by livestock.



- 7 Crowcombe**, Leigh Mill Bridge, Lee Lane, Doniford Stream – (x2). A second phase of works following a 2017-18 scheme. The new works included fine-tuning dams, creating an additional brash dam, installing a flow spreader and planting 350 trees to help 1) increase the surface roughness of the floodplain and slow the flow, 2) take up water to reduce peak flow, and 3) stabilise the soil to reduce erosion which would otherwise cause sedimentation downstream.



- 83 Dommett - Folly Farmyard (Buckland St Mary)**, River Ding, Parrett catchment. A new technique of hingeing living trees into a watercourse is being trialled here as part of a series of NFM works designed with an enthusiastic farmer. Hingeing involves adapting hedge-laying techniques to create living, green wood dams with saplings of willow and hazel. Other works included improving an existing leaky pond outlet, adding another leaky pond to make a cascade and increase storage capacity, and excavating around an old lime kiln to fine-tune flow paths.

- 94 Fitzhead parish - Goulds Farm between Ford and Hoccombe**, Tributary of Halse Water, Tone catchment. A drainage pipe and leaky dam have been installed to improve the connectivity between roadside and boundary ditches and a pond previously created with SRA funding. The pond had not been filling up as often as desired – but it is now. It takes excess water from the road and reduces overtopping of ditches and overland run-off.

- 10 Holnicote Estate**, Horner Water catchment and River Aller catchment – (x2). Natural flood management works were completed at Hurdledown, between Exford and Porlock, and at Lower Selworthy Farm. Both schemes were part of the National Trust's major Riverlands initiative on its 12,000-acre Holnicote estate.

At Hurdledown, 280 metres of hedgerow were planted with 1000 young beech trees to help slow the flow of rainfall down the Horner valley.

At Lower Selworthy, works focused on a main location for River Aller catchment run-off, namely slopes running down towards the A39. Improvements included the creation of riparian corridor and habitat through the fencing-off of key areas and the creation of swales and scrapes.

Both initiatives were funded by the SRA and the EU's Interreg 2 Seas programme as part of Somerset's new Co-Adapt programme. Co-Adapt is aiming to increase local resilience to the water-related effects of climate change: flooding and droughts. More Holnicote works are planned for 2019-20.



- 11 Luxborough**, Monkham Farm, Upper Washford River. Three cross drains and two silt traps have been installed at Monkham Farm to catch and divert run-off water away from the road and village.

12 Stoney Stoke, Stoke Farm, tributary of River Pitt and Upper Brue – (x2). Two thousand trees have been planted to create 1.25 hectares of new woodland strip either side of a watercourse, with 1100 metres of fence re-positioned to allow for this. The aim is to absorb run-off from adjacent slopes and to slow down the movement of water. There are also plans to install six woody dams.

1310 Thorne St Margaret, Rewe Farm, Upper Tone, Tone catchment. The SRA contributed 40% towards the cost of trees planted in a field above a steep bank that had previously collapsed onto the road. The trees will help to prevent future landslides by binding soil with their roots and drawing up water. The Woodland Trust gave the other 60%. See the Triple C section for more about Rewe Farm (page 37).



14 West Bagborough, Stout Lane, Back Stream, Tone catchment. A scheme to re-direct heavy flows of water from Stout Lane into Fuzzy Down field by digging out a grip and ditch and building a bund. This scheme will help to reduce the amount of water reaching West Bagborough. It was delivered for the SRA by Somerset County Council's Rights of Way section as part of a series of SRA-funded works in this part of the Quantocks.

15 Yeovil (Brympton parish), Lufton, Wellhams Brook, Parrett catchment – (x3). More natural flood management works have been completed on the outskirts of Yeovil. Eight leaky woody dams have been created near Lufton College to slow the flow of water entering Wellhams Brook, and major pond improvement works have been carried out at Manor Farm, Lufton. Hydraulic modelling has been done for the Wellhams Brook catchment to investigate the effects that natural flood structures may have. The study suggests that with all the structures proposed and installed, including flood water storage ponds and leaky dams, flood peaks may be reduced by just over a quarter (25.6%) during floods that have a 20% chance of happening every year.



16 Waterrow, Hurstone Farm, Upper Tone – (x2). Two grants were given for de-silting an existing pond and adapting its outlet to divert overflow into a new leaky pond, constructing four brash dams, de-silting a historic mill leat, filling floodplain gullies and installing coir matting to prevent loss of soil into the river, and taking excess spoil off the floodplain. Further works are planned.



TRIPLE C MATCH-FUNDED SCHEMES

The EU's Interreg 2 Seas part-funds Hills to Levels through the Triple C initiative. The three Cs stand for Climate resilient, Community-based, and Catchment planning and management. The SRA match-funds Triple C schemes in Somerset. A short film showcasing Hills to Levels was entered for the Interreg 2 Seas Video Awards in March 2019. (It won in April 2019).



1 Aisholt Common: The Quantock Hills AONB Service led work at three sites to slow the flow of run-off, reduce soil erosion, and trap sediment. Features included two cascades of woody dams, which used timber and brush from locally pruned-out silver birch and beech trees, and the installation of coir matting. The scheme complements earlier SRA-funded activities on the Quantocks, and will help to reduce flood risks lower down at West Bagborough. See also the entry for West Bagborough in the main section on 2018-19 NFM schemes (*page 34*).



52 Cothelstone: A sluice structure has been installed to enable a large freshly-desilted pond to operate as a leaky pond that can store more water and then release it slowly. The new structure consists of weir boards, a pipe with a sluice gate, stone blockwork to protect the outlet banks and stone downstream to prevent scouring. It replaced a broken penstock. This is Phase 2 of a bigger scheme. Phase 1 was described in the main section on 2018-19 NFM schemes (*page 32*). Phase 3 will involve restoring historic silt traps upstream.



83 Dommett - Folly Farmyard: A clay-lined pond has been created in the corner of a boggy field, to fill during periods of high flows from an adjacent ditch, with a pipe outlet to the ditch. Spoil was used to raise the level of a wet gateway and the feeder ditch to the pond was cleaned out.

94 Fitzhead - Knights Farm: A scheme was designed for an infiltration ditch, extended hedgebank and hedge-planting to help control run-off. Works are due to be carried in 2019.



5 Marcombe Valley: Seven leaky woody dams have been created and monitoring equipment installed in the Marcombe Valley, near Ashbrittle in the River Tone catchment. (More information is given on p. 28 in the introduction to this W2 section).

6 Montacute: A leaky woody dam cascade has been created in a small stream running through Mill Copse in the grounds of the National Trust's Montacute House near Yeovil. This will help to slow the flow at the top of the Wellhams Brook catchment, which feeds down past Martock into the River Parrett, and improve water quality by filtering out sediments.

7 Odcombe - (x2): A pond was enlarged and a penstock installed to create more storage for flood water and provide more control over water levels. Martock's flood wardens have been enthusiastic supporters of this scheme.



8 Shepton Montague, Higher Farm: Eight woody dams have been created to help slow the flow down to Pitcombe.



9 Stoke Trister, near Wincanton: Four leaky woody dams have been built in a small channel at Culverwell, which is known for being quite flash-floody in winter and has caused localised road flooding downstream.



10 Thorne St Margaret - Rewe Farm: 0.4 hectares of trees were planted in a field above a steep bank that had previously collapsed onto the road. The trees will help to prevent future landslides by binding soil with their roots and drawing up water. Triple C contributed 60% towards the labour costs of planting the trees and erecting fencing, plus the fencing materials. The SRA match-funded 40%. See also the entry for Thorne St Margaret in the main section on 2018-19 schemes (*page 34*).



11 Tintinhull, Perrins Hill Farm: Four leaky woody dams have been created along a tributary of Wellhams Brook, to slow down and store winter rainfall upstream of Martock in the River Parrett catchment.



12 Wiveliscombe: Fencing has been re-positioned along the top of part of Pyncombe Lane where a steep bank has previously collapsed and blocked the road. The SRA previously funded bank stabilisation. This extra work will help to further reduce the risk of landslides in wet weather.



13 Wincanton, Moorhayes Farm: Ten leaky dams have been created at two sites to trap woody debris and slow the flow of water.

14 Wincanton, Suddon Grange Farm: Six leaky dams (four woody, two brushwood) have been installed along a small brook to help slow the flow of water.

HIGHWAYS REFERRALS IN 2018-19

Roads range from the M5 down to rural single-track lanes. Investigations look at where water comes from, where it goes, and how land management initiatives could make a difference.

MENDIP

- 1 Critchill, Frome:** Reports of field run-off from maize stubble on to the highway prompted a soil inspection visit in November 2018. Quotes for a sediment pond to prevent water reaching the road are awaited.
- 2 Dinder and Masbury, A371:** Reports of surface water on private land discharging on to the highway. FWAG SW, the estate landlord and tenants met in February 2019 to discuss natural flood management and maize management. The farmer at Masbury has created a leaky pond; talks at Dinder are ongoing.
- 3 Vobster Cross to Hatchett Hill:** Reports of surface water from private land discharging on to the highway. Discussions have been held with the farmer and the Mendip division of Somerset County Council's Highways Department about possible solutions, including enhanced flood water storage in the field and clearing the culvert beneath the road, but no definitive answers have yet been found.

SEDGEMOOR

- 4 Ashton Windmill, Chapel Allerton:** Reports of run-off from adjacent field causing highway flooding, sometimes for long periods during wet weather. Landowners to be contacted to discuss possible hedge-laying and compacted grass ley solutions.
- 5 North Petherton:** Landowner advised about run-off from field adjoining Dancing Hill and the High Street in North Petherton. Action recommended: cultivating strips across the field to help to slow the flow during heavy downpours.
- 6 Wedmore, Plud Street:** The farmer is to re-establish a hedge bank and hedge to solve the problem of run-off from a maize field. Chisel ploughing has also been done.

SOUTH SOMERSET

- 17 Barrington, Bonning's Lane:** Following reports of run-off from fields accumulating in Bonnings Lane, FWAG SW provided advice to the landowner on soil management, hedgerow and woodland planting, and installing a grass buffer strip. Hedge planting was successfully bid for in the first SRA natural flood management auction, and planted in winter 2018 (*pictured right*). Coir rolls have also been provided to the landowner to install before each winter, in association with the parish-funded flood warden.



- 38 Bruton:** Reports of surface water run-off on to Dropping Farm Lane creating a hazard, particularly during the winter. However, the farm manager was not aware of any issue and as the field is very flat it was difficult to see how any problem might arise.
- 9 Chard, Brutton Way:** Reports of accelerated run-off from field access trackway contributing to localised flooding issues on amenity land managed by South Somerset District Council and properties adjoining Brutton Way. FWAG SW visited to see if cross-drains on the track would help but this idea was shelved as there was no sensible place to send water.
- 10 Chard, Laurel Gardens / Crimchard area:** Investigations were carried out into complicated problems with surface water run-off and highway drainage. Talks involved FWAG SW advisers, Somerset County Council's Highways Department, landowners and residents. It was concluded that there were very limited opportunities for natural flood management works. Instead, Somerset Council has decided to move 47 gullies from its 4-year cleansing cycle to its annual programme. On this annual programme, the gullies will also qualify for an extra SRA-funded cycle, so in 2019-20 they will be emptied twice. The county council has also made a successful bid to the SRA for three new silt-traps in the Crimchard area. These will help to protect around 60 properties.
- 11 Somerton, Wasps Nest Farm Lane:** Reports of run-off surging onto the highway from above fields and collecting on Wasps Nest Farm Lane. Somerset County Council's Highways Department wrote to landowners to urge them to maintain their ditches, but run-off still needed to be contained in fields or captured and dispersed in a controlled way. The SRA agreed to fund a culvert that will enable the water to flow within a ditch, as opposed to overtopping and travelling down the road where it floods the lane. The landowner has agreed to carry out ditch work, including digging grips to allow water to drain from the lane. An application for funding was submitted and approved in July 2018; construction is pending.
- 12 M5 southbound near Shoreditch:** Frequent flooding on the M5 southbound carriageway near Shoreditch has caused several accidents. FWAG SW and Highways England visited the site with the landowner. Soil was inspected and areas were identified for natural flood management. It was agreed that FWAG SW should apply to the SRA for a grant to carry out ditch and field works on flow pathways, and contact landowners upstream. A programme of drainage maintenance was also agreed with Highways England.
- 13 Peasmarsh, near Ilminster:** Reports of run-off from a field next to the A358 causing flooding to properties. The farmer agreed to install a cross drain in the gateway to divert run-off to an adjoining ditch.
- 14 Long Sutton, Langport:** A member of the public told Somerset County Council Highways that run-off from fields adjoining Burnt House Lane and Langport Road was leaving soil and large stones on the road. The complainant feared that the state of the ditches could also lead to highway and property flooding. A visit found no signs of debris; a further inspection is planned to be sure.
- 15 Wincanton, Riding Gate:** Reports of mud and silt running off land used for maize growing, blocking the drains and causing a potential skid risk. The farmer broke off from his pre-Christmas preparation of turkeys to put straw bales in the gateway to block silt. Unfortunately, the problem persisted. FWAG SW revisited, and the farmer is now planning to create a grassy field corner, change the field's management and put in a silt trap.

16 Wincanton, West Hill: Reports of run-off from maize fields contributing to localised highway flooding at West Hill. A FWAG SW visit found the fields' soil structure was in good condition. FWAG's recommendation was to make an application for Countryside Stewardship to install a 6m grass buffer strip to help slow the flow of field run-off and reduce the amount reaching the highway. This was successful.

17 Lopen, Lopen Lane: Reports of run-off from a field causing soil on this narrow road to block drains. Part of the problem is that the lane is marked as an access route to Over Stratton on sat nav and this increases the volume of traffic, which is undercutting roadside banks, causing destabilisation and adding to the volume of sediment deposited. Visits made in summer 2018. Traffic management solutions mooted, to reduce pressure and bank side erosion.

18 Tatworth, A358: FWAG SW and Somerset County Council (SCC) investigated a complicated situation involving highways run-off flowing across a field because of a damaged gateway drainage system and property flooding problems not helped by liquid digestate spreading. As the site was due to be developed by a major housing company, SCC agreed to check on flood control measures included in the planning application for the site.

TAUNTON DEANE

19 Combe Florey - (x2): Advice given about land use and soil structure at two sites presenting flood risks to the A358.

20 Kingston St Mary: Discussions held with landowners about diverting water across fields to reduce problems of road flooding and deteriorating, causing dangers for cyclists.

21 North Curry: Reports of water running down a track onto Helland Hill, carrying mud, silt and stones into the highway drainage system. Landowner visited, and agreed to install some rolls of coir matting in a gateway to help fix the problem.

22 Trull: Discussions begun with farmer about water flowing onto road from farm fields and track.

23 Wiveliscombe, Pyncombe Lane: Landowners visited to discuss soil husbandry, grazing and farm traffic as part of a co-ordinated follow-up to SRA and Triple C funded schemes to reduce the risks of landslides and run-off.



SOIL VISITS

INVESTIGATING and encouraging better soil husbandry to reduce the run-off of surface water can sometimes lead on to the development of bigger natural flood management projects. For example, a visit to the Exmoor village of Winsford in late 2018 prompted the development of plans for works in summer 2019, including brush dams and woody dams in Winn Brook, watercourse fencing, gateway works and a soakaway ditch. Keeping soil in good health also brings obvious benefits to farmers. Note: to avoid double-counting, the list below does not include visits already covered in the sections about ‘Successful auction bids...’ and ‘Highways referrals’.

Mendip: Nunney (Sharpshaw Farm - *pictured above*);

Sedgemoor: Fiddington (Peadon Farm), **Fordgate** (Fordgate Farm), **North Newton** (Newcotts Farm), **Otterhampton** (Manor Farm), **Spaxton** (Gothelney Farm), **Thurloxton** (Keirles Farm), **West Newton** (West Newton Farm);

South Somerset: Ashill (Southtown Farm), **Curry Mallet** (Stud Farm), **South Petherton** (Frogmary Green Farm);

Taunton Deane: Bishops Lydeard (Portman Farm), **Pinksmoor** (Pinksmoor Farm), **Wellington** (Miscanthus Nurseries) - Subsoiling miscanthus trial, just north of A38 Wellington bypass;

West Somerset: Brompton Regis (Lyncombe Farm), **Winsford** (Little Ash Farm), **Wootton Courtenay** (Brockwell Farm).

2018-19 SUMMARY: A unique 747-page review of **Somerset's Sustainable Drainage Systems (SuDS)** has been published, and a contract let for the production of **Somerset-specific guidance for property developers** to help them create high quality SuDS at new sites across the county. A **SuDS inspections service** has been funded; responsibility for rain garden facilities in **Taunton** handed over; progress made on plans for a storage pond in **Yeovil**; and a second phase of works completed at Wirral Park balance pond and pumping station in **Glastonbury**.

In built-up areas, rain often falls on hard impervious surfaces such as roads, roofs and pavements so it runs off fast and cannot infiltrate into the ground. This can increase local flood risks. The SRA's Urban Water Management workstream lets partners focus on thorough, joined-up and distinctively local approaches to tackling flooding problems.

In 2018-19, this workstream's outstanding achievement was the publication of a massive review of Sustainable Drainage Systems (SuDS) across Somerset. The scope of this SuDS Review is unmatched anywhere else in the UK. Locally, its findings are now being used to inform the production of Somerset-specific SuDS guidance for developers, funded by the SRA. Nationally, the review is providing an unprecedented level of hard evidence for ongoing debates about SuDs and stimulating widespread interest: see, for example, this blog by W3 leader Dan Martin on the industry-leading Susdrain website: <https://www.susdrain.org/community/blog/somerset-suds-review/>

As part of the review, 20 recently-built sites were inspected for Somerset Rivers Authority by Somerset County Council, working closely with Wessex Water, local planning authorities, district council drainage engineers, the Environment Agency, Somerset Drainage Boards Consortium and contractors JBA. Sites were assessed to ascertain whether they were adequately designed, constructed as designed, have any deficiencies, and are being adequately maintained. They included big housing estates, retirement apartments, industrial units and offices, an arts centre, and a hotel and pub. Run-off was considered in detail.

Generally, in terms of being able to cope with basic flows of water, and allowing for climate change, over three-quarters of the sites surveyed were satisfactory or better.





However, 6% were rated poor or very poor. In these cases, little was known about who was responsible for maintenance or what the maintenance regime should be. Inspections at some developments still being built showed inadequate site management practices, allowing sediment and pollution to enter surface waters. Individual defects were also identified, such as poorly-constructed permeable paving, non-native vegetation, and road and car park levels being higher than the entrances to properties, thereby raising the risk of water flowing into them.

Overall, the review showed that not enough is being done across Somerset to use SuDS to their full potential. SuDS are not just about managing the quantity of water, they offer wider benefits that enhance communities as a whole. They can play a key role in reducing pollution and improving water quality, make places much more attractive for people to live as well as creating habitats for wildlife.

The review found little evidence of consideration of water quality treatment in designs, although several sites did include features that would improve water quality. It also found little evidence of the deliberate provision of biodiversity and amenity benefits in drainage designs, and some sites had missed potential opportunities.



One example of good practice was Clarks' Houndwood development in Street (*pictured left*). This considered SuDS at an early stage, and incorporated SuDS into the design brief and through the master planning stage. It used surface SuDS features to provide amenity and biodiversity benefits, including reed bed channels, tree pits and bio-retention planters in public and semi-public amenity areas.

The SRA and its partners want to encourage more high-quality design and better place-making across Somerset.

URBAN WATER MANAGEMENT

ACTIVITIES IN 2018-19

An SRA-funded **SuDS Inspections** service has allowed local councils to check sites while they are being built. Learning lessons from the SuDS Review, team members have been fine-tuning checklists and reporting mechanisms.

Somerset County Council has let an SRA-funded contract for the production of **Somerset-specific guidance for property developers**, to help them create high quality, multi-benefit, integrated SuDS at new sites across the county. The guidance will incorporate specific requirements from all partners involved in the planning process and draw upon some of the challenges identified through the SuDS Review. The aim is to have detailed guidance completed by spring 2020 for adoption by Somerset's Local Planning Authorities.

Responsibility for the maintenance of new **rain garden** facilities at Middleway and Kilkenny Court in Taunton was formally handed over to Taunton Deane Borough Council (as was; now Somerset West and Taunton Council). The SRA and Wessex Water funded the creation of several planters in 2017-18, to serve as small demonstrations of what could be achieved. Somerset County Council worked with Westcountry Rivers Trust on the planters, as part of the EU-backed **Somerset Sponge 2020** project. The aim of Sponge 2020 is to encourage 'innovative participatory adaptation solutions to reduce the risks of and damage from urban flooding... at considerably lower costs'. The SRA has been part-funding the development of Somerset County Council's Sponge 2020 plans for car park retrofits in Taunton.

A second phase of SRA-funded improvement work has been completed by Mendip District Council at **Wirral Park balance pond and pumping station in Glastonbury**. This was built in 1989 to help to protect more than 200 homes and four hectares of industrial estate from flooding. The SRA previously 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. Now Wirral Park's dated electrical control system has been updated to meet current regulations and to allow remote monitoring should the need arise.

In a **Yeovil** scheme supervised by FWAG SW for the SRA, Yeovil Rivers Community Trust (YRCT) has designed a pond in the grounds of Preston Academy, along the Preston Brook. This will help to reduce flooding downstream. It will also benefit pupils' education and improve the area for wildlife. The school's governors have approved the pond, subject to various conditions. It will need, for example, to be constructed over school holidays.



Interreg 
 2 Seas Mers Zeeën
SPONGE 2020
 European Regional Development Fund



Artist's impression of proposed Preston Academy pond by Yasmin Khan, YRCT

2018-19 SUMMARY: Somerset Rivers Authority carried out an extensive programme of extra maintenance works to reduce flood risks to roads and nearby properties, including gully-emptying, drain jetting, edge of road clearing, de-silting of structures and culvert improvements. Drainage works have been carried out near **Chelston** and **Stoke sub Hamdon**; schemes designed for **Monksilver**, and **Stogursey** and **Shurton**; studies advanced at **Beckington** and **Bradford on Tone**.



De-silting operations at Blake Bridge in Bridgwater



Although its name emphasises rivers, Somerset Rivers Authority deals with highways as well as waterways. This is because the SRA oversees Somerset's 20 Year Flood Action Plan, which was drawn up during the floods of 2013-14. Those floods closed 81 roads, often for long periods. Countless people suffered difficulties. Businesses lost time and money: 86% of Somerset businesses were badly hit – the estimated cost to the local economy of highway and travel problems was up to £15 million. (The total estimated cost of the floods was up to £147.5m).

So two of the Flood Action Plan's six main objectives relate directly to making Somerset's infrastructure more resilient: they are to 'Maintain access for communities and business' and to 'Ensure strategic road and rail connectivity, both within Somerset and through the county to the South West peninsula'.

A programme of additional maintenance therefore got the largest share of spending in this workstream in 2018-19. Hundreds of places susceptible to very local flooding benefitted. De-silting of structures, gully-emptying, drain jetting and targeted edge of road clearing were all delivered countywide for the SRA by Somerset County Council. In areas covered by Internal Drainage Boards, an ongoing programme of remedial works to culverts is being led for the SRA by Somerset Drainage Boards Consortium.

Gully emptying: Somerset County Council's Highways Department empties gullies in areas most susceptible to flooding once a year. The SRA funded an additional six-month round for 15,043 of the highest-risk gullies countywide; far too many to list individually! The aim is to keep roads open, make them safer, preserve access for communities, and safeguard properties from flooding.

15,043
gullies
emptied

Drain jetting: 134 places benefitted in 2018-19; in Mendip 25, Sedgemoor 23, South Somerset 33, Taunton Deane 25, West Somerset 28. 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, because they feature on annual gully-emptying rounds. Final selections are made using local knowledge and professional judgement.

134 places
benefitting from
drain jetting

Countywide targeted edge of road clearing: 906 extra tonnes of debris were cleared from 32.44 miles of road edgeways at 22 places, to stop structures such as drains and gullies getting clogged. Roadsides in rural areas highly susceptible to flooding were swept after trees began to shed their leaves. This work is delivered for the SRA by Somerset County Council's Highways Dept; it is an extra activity for Somerset because the county council does no other sweeping. The aim of this SRA-funded action is to reduce flood risks by stopping detritus entering and blocking drainage systems. Local knowledge and professional judgement are used in choosing sites and (where possible) road-edge clearing is integrated with other preventative maintenance activities such as extra gully-emptying.

906
tonnes
of debris
cleared from
32.44 miles
of road edgeways

Places were: **Mendip:** Ashwick, A37 Old Frome Rd – Underhill; Binegar, A37 Underhill – Marchants Hill; Cranmore (x2), A361 East Cranmore A361 and A361 Slait Hill - Haygrove; Kilmersdon, B3139 Kilmersdon Hill; **Sedgemoor:** Spaxton, Merridge Hill; **South Somerset:** Bruton, B3081 Dropping Lane; Cudworth, Cudworth Hill; Lopen, Lopen Lane; Montacute, Hollow Lane & Townsend; Tatworth & Forton, B3162 Forton Road & Horn Moor Road; Winsham, Whatley Lane; **Taunton Deane:** North Curry/Fivehead, Langport Rd; Wiveliscombe (x2), Hartswell, Langford Budville Road, Pyncombe Lane, South Street; **West Somerset:** Nettlecombe (x2), Clitsome Lane, Slade Lane; Old Cleeve (x2), Battallers Lane – Roadwater, Lodge Rocks.

De-silting of structures: Works were completed at seven locations. The biggest scheme was around Blake Bridge in Bridgwater town centre. This job was delivered for the SRA by Somerset County Council's Highways Dept using contractors Crestmoor Construction and several sub-contractors. The two main aims were to increase the River Parrett's ability to flow under the bridge, and to safeguard the bridge itself, as serious pressures were being exerted on its arches by very large build-ups of thick, heavy silt. Methods used included high-pressure jetting of silt on the banks and some water injection dredging from a vessel on the river. **Other locations** where structures were de-silted were: **Mendip:** Doultling Hill culvert, A361, between the Charlton House Hotel and Doultling Hill, tributary of River Sheppey; Fosse Combe Culvert, between Spargrove and Albion's Vale, River Alham; **South Somerset:** Jordan's South, bridge north of Horton Cross near Ilminster, tributary of River Isle; **Taunton Deane:** Harpford Bridge, between Holywell Lake and Langford Budville, Tone catchment; West Hatch Culvert, near Griffin Lane-West Hatch Lane junction, Parrett catchment; **West Somerset:** Ford Bridge, A398 west of Timberscombe, River Avill.

7 structures
de-silted



Culvert inspections and remedial works in IDB areas: Works have included de-silting, vegetation clearance, high-pressure water jetting and structural repairs. The main aims have been to improve the conveyance of water and to help prevent disruption to residents and road users.

One high-priority site was at Nythe (*pictured below*), where a culvert was in a very bad state, with short sections of pipe disconnected and wonky. This increased the danger of water backing up and flooding the road. Also, a hole had appeared in the edge of the road and the ground was collapsing. This dangerously crumbling culvert was repaired at the end of March 2019, so that water could drain through under Nythe Road and traffic could keep flowing north of Langport between High Ham and Pedwell. Somerset Drainage Boards Consortium delivered the scheme for the SRA, using local contractors Bernard Perry. The job was completed ahead of schedule.



DESIGNING SCHEMES

A38 drainage improvements: Work done for the SRA by Somerset County Council will reduce the duration of flooding on the A38 near Chelston, between Wellington and Taunton. The drainage system here is over 90 years old and cannot cope with a lot of heavy rain. A 300mm pipe was therefore fitted under the road close to Blackdown Garden Centre and the River Tone tributary Haywards Water, to take more water away. This improvement followed on from an SRA-funded scheme along the A38 at Rumwell the year before. In March 2019, the SRA Board approved funding for a major study into further upgrades near Chelston.

East Stoke, Stoke sub Hamdon: Two new manholes allowed for a full CCTV survey and very useful culvert-jetting. This year, detritus, roots and bits of broken pipe have all been cleared by Somerset County Council, using contractors Skanska. This SRA-funded work complements earlier highway drainage improvements carried out by Somerset County Council; 10 properties, and the road to Montacute, should now benefit from reduced flood risks. A report has also been prepared on the capacity of the system and potential further improvements. Findings are being discussed with the local county councillor with a view to engaging with residents.

Monksilver: The SRA Board agreed in September 2018 to put £170,000 from underspends on projects in 2017-18 into flood protection works in Monksilver. Somerset County Council's Highways Dept then designed a scheme for the SRA, focusing on problems at the northern and southern ends of the village. A contract was let to Skanska for the carrying out and completion of works in three phases between April and June 2019. The scheme complements earlier projects by Somerset County Council, and more minor SRA-funded activities such as underground CCTV surveying, drain jetting, de-silting near The Notley Arms and natural flood management works upstream at Combe Sydenham. The latter were delivered for the SRA by the Farming & Wildlife Advisory Group SouthWest, as part of the Hills to Levels initiative.



Shurton and Burton Highway Flood Relief: Somerset County Council's Highways Department has been designing a scheme for the SRA at two sites. The main aims are to reduce the risk of the hamlets of Shurton and Burton, in the parish of Stogursey, from being cut off by flooding, to improve the emergency evacuation route from Hinkley Point and to help protect some nearby properties. Site 1 is between Water Farm and Little Water Farm on Water Lane. Site 2 is Newnham Bridge on Shurton Road. Both places flood because of their low level and also, at Stogursey, because of an obstructed water channel. The parish council has agreed to work with landowners so as to get them to fulfil their riparian responsibilities in clearing water courses to reduce the level of flooding.

Water Lane design works progressed well during the year. At Newnham Bridge, matters have proved more complex, because variations in carriageway levels of more than half a metre make raising the road to a single uniform height more difficult. Works are expected to start in autumn 2019.



CCTV surveys: SRA-funded CCTV surveys have been done to address local flooding problems and local concerns about the condition of culverted watercourses, to inform investigations, and support proposed schemes. Accurate information enables Somerset County Council's flood risk team to pinpoint issues and to encourage the owners of watercourses and structures to take on their riparian responsibilities for them. If need be, CCTV survey results also help the team to carry out enforcement.

Aside from supporting an investigation into surface water flooding problems in Moorland (*see the W1 section of this report*), success stories have included works in Curry Rivel and Baltonsborough.

In **Curry Rivel**, a CCTV survey gave vital information about a culverted watercourse linked particularly with bad flooding at the village school. Information gathered has enabled Somerset County Council, and its contractor Skanska, to identify improvements that will help to reduce the risk of flooding. These

will be complemented by SRA-funded natural flood management measures, delivered by FWAG SW, to slow the flow of water in the upper catchment of the watercourse.

In **Baltonsborough**, a CCTV survey was done because various riparian owners had concerns about a culverted watercourse that was flooding property and the highway. Information gathered has enabled Somerset County Council to identify several collapsed sections of culvert and obstructions that could not be flushed away by pressure-jetting. The county council's project team have been using the survey's findings to engage people in conversations about their responsibilities. The aim is to co-ordinate necessary works until owners have resolved all major issues.

Beckington surface and foul water investigation: A review has been carried out for the SRA of all relevant information about Beckington, especially its underground drainage network. Work has also begun on various surveys and assessments. Beckington has a long history of flooding. People's homes have been affected and there have been many problems along Warminster Road and Bath Road, particularly in the centre of the village. Various partners have therefore been working together for the SRA on the first phase of a project to lessen the risks of flooding in the future. Mendip District Council is the lead partner. It has been collaborating with Wessex Water, Somerset County Council's Highways Department and the Farming and Wildlife Advisory Group SouthWest. An Options Appraisal Report is planned for 2019-20, and a bid for further SRA funding is expected, so that action can be taken.

Flood alert systems: On behalf of the SRA, Somerset County Council's Highways Dept has been liaising with equipment suppliers about the practicalities of setting up a sophisticated flood detection and warning system at Oake Road, **Bradford on Tone**. This would 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.

2018-19 SUMMARY: The SRA part-funded Somerset's first Resilience Day, a flood insurance survey on the Somerset Levels & Moors and a pilot household resilience survey in **Misterton** near Crewkerne. It helped to set up the **West Moor** Futures Group and began work on **Wet Moor, Tealham** and **Tadhham Moor**, gave communities grants for equipment and backed Somerset's new Co-Adapt project tackling the water-related effects of climate change (flooding and drought).

One of the six main objectives of Somerset's 20 Year Flood Action Plan is to "Increase resilience to flooding for families, agriculture, business, communities and wildlife". Hence this workstream. It aims to make people better informed and equipped, so they can better protect themselves against flooding and recover more quickly afterwards. It also aims to encourage discussions about flooding and water management issues across Somerset, and particularly matters concerning adaptation and sustainability.



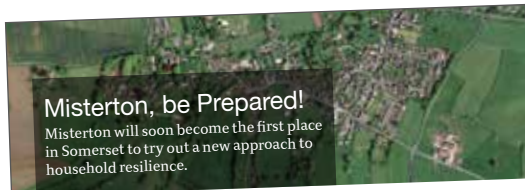
Dr Rachel Burden, Environment Agency



Dr Teresa Bridgeman, West Somerset Flood Group

This is why the SRA part-funded the first **Somerset Resilience Day** in October. More than 80 volunteers, wardens, councillors and community leaders travelled to North Petherton for a day of talks, workshops and displays. Subjects included riparian responsibilities (what people who own watercourses are supposed to do) and the art of setting up a flood group – and keeping it going. A key feature was giving people chance to learn from each other's experiences. BBC Radio Somerset broadcast interviews with participants. Feedback from attendees included: "Excellent – well worthwhile. Good calibre presenters, articulate and authoritative" ... "Thanks for the massive amount of work in organising the event and for all the staff of the numerous agencies that attended. Makes us feel there is real help available." The event was organised by the Environment Agency and Somerset Prepared and 10 other agencies and organisations were also involved with different elements of the day.

Somerset Prepared is a partnership devoted to helping Somerset communities be better prepared for emergencies. Members: Environment Agency, Somerset Civil Contingencies Unit (CCU), Devon & Somerset Fire & Rescue Service, Avon & Somerset Police, Somerset County Council, Safe South West, Rotary International, Somerset Rivers Authority, Community Council for Somerset, South West Ambulance Service, British Red Cross.



Would you know how to protect your family and home in an emergency?

Household resilience planning: what is it? Basically, it's about common sense and thinking ahead. It's about making a few simple, practical arrangements to keep your family and your home safe in the event of possible emergencies.

What sort of emergencies? The events most likely to cause disruption in Somerset are severe weather and flooding, but even a simple fire can cause disruption. Take time to consider the risks in your area - what would cause disruption to your daily routine? If one of the emergency services advised you to leave your property or stay safe indoors, would you have all you need to look after yourself and your family?

What is going to happen in Misterton?

Misterton Resilience Team are hoping to gather information from Misterton villagers to assess local knowledge and interest in resilience, if an incident were to occur. Local Rotary group members are helping by calling on all households to offer advice and get people's views, which will then be analysed by local authorities.



What will Rotary members be doing?

Rotary members will be out and about in Misterton, talking to residents and sharing ideas and information and top tips to help local people be prepared.

When will this take place?

During the two weeks starting Monday 19 November.

In November, villagers in **Misterton** near Crewkerne took part in a **household resilience survey**. This was organised and funded by the SRA in partnership with Somerset Prepared, Misterton's lively parish resilience team, and a willing bunch of local Rotary volunteers. The centre of Misterton was flooded in February 2016 (*pictured left*), and there have been various other emergencies in the past. It was therefore judged to be a good place to start exploring ways of getting people more interested in household resilience planning. That is, in thinking ahead and making a few simple, practical arrangements to help people keep themselves and their homes safe in the event of possible emergencies. After a four-page leaflet went to all households in the village in early November, Rotary members called at every property to offer further advice and gather information. Following on from this pilot project, other communities across Somerset are to be visited.

Also in November-December 2018, a **flood insurance survey** was carried out for the SRA by the Community Council for Somerset. Lack of affordable flood insurance was one of many worries faced by households in Somerset after the floods of 2013-14, and one of the survey's aims was to find out if this was still a problem in some of the worst-hit communities. A particular focus was on what difference the setting-up of Flood Re in 2016 had made. Questionnaires were sent to properties in Athelney, Burrowbridge, East Lyng, Fordgate, Moorland, Muchelney, Oath, Thorney, West Yeo and Westonzoyland, and county councillors engaged with residents in Chadmead and North Curry. People elsewhere in Somerset were able to get involved with the survey if they wanted to. Results will be used to help the SRA decide what further courses of action, if any, should be pursued.

The SRA funds grants for equipment and training given to Somerset communities by Somerset Prepared. Five places benefitted in 2018-19: **Curry Mallet** and **High Ham** in South Somerset, **Hatch Beauchamp**, **Milverton** and **Sampford Brett** (near Williton) in what is now the Somerset West and Taunton Council area.

The two biggest grants went to Milverton and High Ham. Milverton Parish Council was given a contribution towards a diesel generator, torches, foil blankets, first aid kits and training, snow shovels, rechargeable floodlights, hi viz jackets and walkie talkies. The equipment will be used by the 40 or so volunteers registered to help with Milverton's Emergency Plan. It will also improve the resilience of the village's Designated Place of Safety.

High Ham's flood defence committee was given a contribution towards the costs of hydro sacks, hydro snakes, rechargeable LED floodlights, hi viz jackets and Personal Protective Equipment. The lower areas of High Ham parish are at serious risk of flooding. A recent flood defence report identified the need for more equipment to enable the community to be more resilient.

BUILDING LOCAL RESILIENCE

LOOKING INTO THE FUTURE

As part as Building Local Resilience, Somerset Rivers Authority has been encouraging local people and organisations to co-operate and adapt to the water-related effects of climate change – flooding and drought. The Somerset Levels, particularly, are at the forefront of concerns about the effects of climate change and sea level rises. Several partners in the SRA – Somerset County Council, Mendip District Council, Sedgemoor District Council, South Somerset District Council, and the new Somerset West and Taunton Council – have all declared climate emergencies and pledged to take action. Members of the SRA Joint Scrutiny Panel, largely drawn from local councils, have raised climate change issues and the subject regularly featured in debates in Parliament about the Rivers Authorities and Land Drainage Bill. The Environment Agency’s new Draft National Flood and Coastal Risk Management Strategy also stresses that “climate change is the biggest challenge we face. It poses the greatest threat to our economy, environment, health, and way of life. The increased risk of flooding and coastal change that it brings is significant.”

Notable SRA moves in 2018-19 have included funding for a new project called Co-Adapt, support for a new Environmental Land Management scheme on the Somerset Levels, and nurturing the formation of the West Moor Futures Group. A similar association of landowners is being encouraged on Wet Moor, and there are ongoing discussions about an SRA project devoted to Maintaining the Resilience of Wet Grassland. Also, as covered in the Workstream 2 section of this report, the SRA has match-funded Triple C schemes: the three Cs stand for Climate resilient, Community-based, and Catchment planning and management.

Co-Adapt: Support from Somerset Rivers Authority has helped Somerset to take part in a new project called Co-Adapt. The aim of Co-Adapt is to get local people and organisations co-operating and adapting to the water-related effects of climate change. Work began early in 2019.

The SRA’s main interest is in flood protection and alleviation, but Co-Adapt will also help to encourage greater resilience to drought on nearly 10 square miles of the Somerset Levels. Recent Environment Agency predictions suggest that England could run short of water within 25 years. One of the aims of the Environment Agency’s new draft national Flood and Coastal Risk Management Strategy is to “help communities better understand their risk and give them more control about how to adapt and respond”.

In Somerset, Co-Adapt is part of the EU’s Interreg 2 programme. Its main partners locally are FWAG SW, Somerset Wildlife Trust, Somerset County Council, the National Trust and Devon County Council (as the accountable body for the Blackdown Hills AONB Partnership). Great emphasis is placed on what the EU calls co-creation, which means people and organisations working together.



Local and European partners in Co-Adapt at Dillington House



Moor Associations, Farm Liaison and Maintaining the Resilience of Wet Grassland: One of the aims of Somerset's 20 Year Flood Action Plan is to facilitate "better management of the most vulnerable and challenging parts of the Somerset Levels, with the consent of owners and occupiers, with the intent of helping them to remain profitable and build greater resilience to climate and economic change." A first phase of SRA-funded exploratory works focused on the need for greater collaboration between farming, conservation and water management sectors, using a positive common goal as a tool for change. A second, more practical phase then helped to establish, in summer 2018, the new West Moor Futures Group. The Group has met twice, designed a logo and put signs out on the moor to discourage dog walkers from disturbing nesting birds.

Similar approaches have begun on Wet Moor and Tealham and Tadham Moor. One important topic is how engineering works could bring benefits to both farmers and wildlife. Such works could include better maintenance of existing water level management control features or the design and installation of new equipment.

Early in 2019, FWAG SW advertised for a Moor Associations Co-ordinator to continue with this work as part of Co-Adapt. FWAG SW also advertised for a Farm Liaison Officer. The SRA agreed to fund both posts for two years.

Discussions have also begun about linking Co-Adapt with the SRA's existing project on Maintaining the Resilience of Wet Grassland. The Wet Grassland project has been led for the SRA by the Parrett IDB, working closely with Natural England. It has been investigating how water levels and land can be managed to enable flood-resilient farming and good environmental outcomes in flood-prone areas for the next 20 to 30 years. As one of the main aims of Co-Adapt is to make 2500 hectares of the Levels better adapted for flooding and drought, there is an obvious and promising overlap.

BUILDING LOCAL RESILIENCE

ENVIRONMENTAL LAND MANAGEMENT INNOVATION

In addition to the initiatives outlined above, in June 2018 the SRA Board agreed to be part of developing a new Environmental Land Management scheme in the Somerset Levels. The Board also agreed to be involved in trialling how payments for land management on the Levels could be combined with flood risk management, agricultural production and the delivery of improvements for nature. Background:

1. **Brexit.** Payments to farmers and landowners have been under review as part of the Government's preparations for Brexit. Through EU-based subsidies, the floodplains of the Somerset Levels and Moors (7,531 hectares) currently get over £3.7m of public funding every year. A further £2.5m is paid out every year to the hillier land in between the various moors. Some wetter floodplain areas can receive up to £650 per hectare annually. The farmed wetland of the Levels is very dependent on public payments. They underpin the Levels' special character and rural economy. There are currently 296 agri-environment farm agreements, of which 250 stop in 2022.

The Levels are very vulnerable to reductions. The Government has been stressing that future Environmental Land Management payments should be linked to the delivery of "public goods" that result in a cleaner, greener and healthier countryside. In the Levels, there is likely to be particular emphasis on flood risk management and wildlife.

2. **A Vision for the Somerset Levels and Moors Vision in 2030.** This Vision was agreed by the Somerset Levels and Moors Task Force during the floods of 2014. It helped to shape Somerset's 20 Year Flood Action Plan, which is now overseen by Somerset Rivers Authority. The Vision's headline statement was: "We see the Somerset Levels and Moors in 2030 as a thriving, nature-rich wetland landscape, with grassland farming taking place on the majority of the land. The impact of extreme weather events is being reduced by land and water management in both the upper catchments and the flood plain and by greater community resilience."

The SRA Board agreed it made sense for the Somerset Levels to seek to become a pilot area, so it could try to shape its own distinctive future, in much the same way as Somerset Rivers Authority has allowed the whole of Somerset to create its own unique and local ways of tackling flooding.



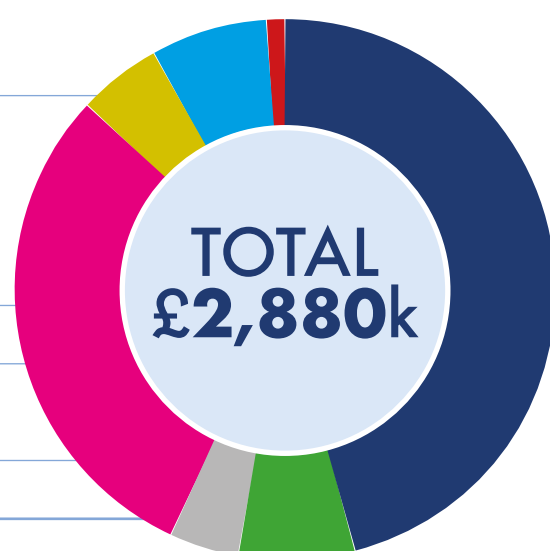
A view of the Somerset Levels from Burrow Mump

Financial Summary

2018-19 LOCAL PARTNER FUNDING

The SRA currently receives annual funding raised by Somerset's local authorities through a shadow precept* and the Parrett Internal and Axe-Brue Drainage Boards. We call these funds Local Partner Funds. In 2018-19 the SRA received funds totalling £2.88m. The SRA launched its fourth year with allocating 92% of this funding to a further 22 schemes continuing its Enhanced Programme of Works that delivers the 20 Year Flood Action Plan. The remaining 8% went towards staffing and administration and to boost a small contingency budget. The 20 Year Flood Action Plan is separated into five workstreams and the table below shows a summary of how the 2018-19 Local Partner Funds were allocated:

BY WORKSTREAM	TOTAL £k	%
Dredging and River Management	1,326	46
Land Management	202	7
Urban Water Management	107	4
Resilient Infrastructure	866	30
Building Local Resilience	133	5
SUB TOTAL	2,634	
Staff costs & Administration overheads	200	7
Contingency	46	1
TOTAL	2,880	



FINANCIAL STATEMENT

The SRA has funded over 130 schemes, actions and initiatives having raised over £11.5m since its inception in January 2015. A large proportion of these schemes can be delivered within the same financial year however some schemes and initiatives, whether they be small, large or complex by design require more long-term planning and take longer to complete.

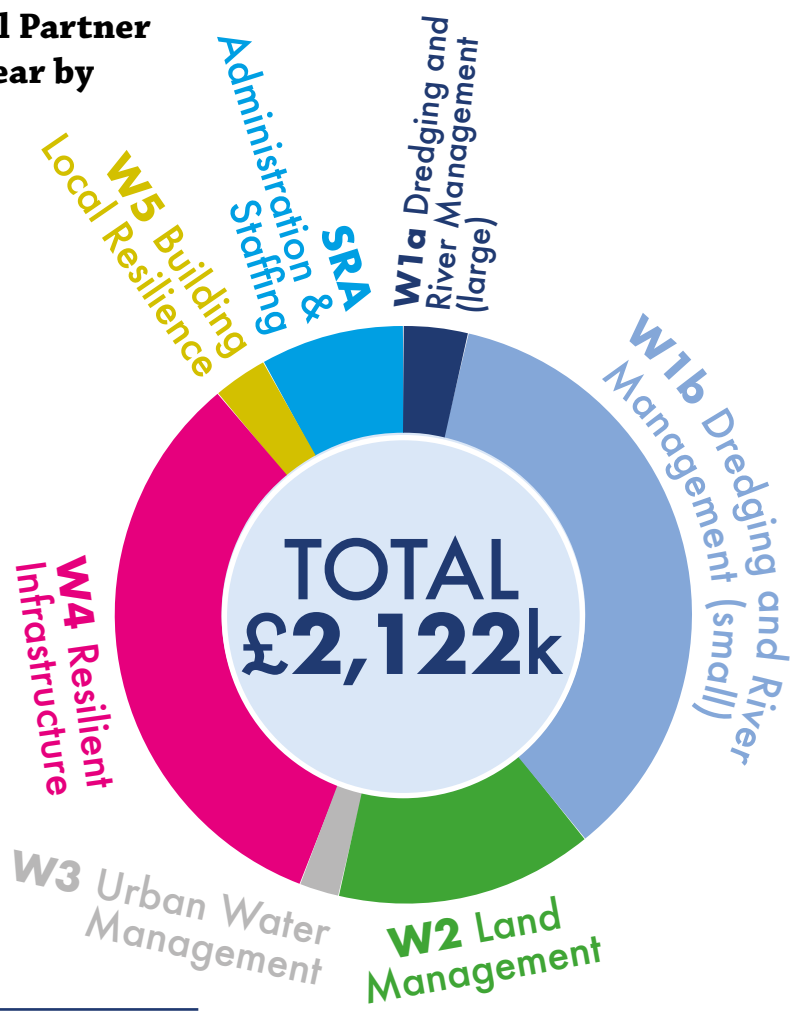
LOCAL PARTNER FUNDING 2018-19 FINANCIAL SUMMARY	LOCAL PARTNER FUNDS CARRIED FORWARD FROM PREVIOUS YEARS £k	SPEND IN 2018-19 £k	FORECAST SPEND IN 2019-20 ONWARDS £k
Enhanced Programme of Works allocation	5,865	1,951	3,914
Contingency	220	0	220
Staffing & Administration overheads	203	171	32
TOTAL	6,288	2,122	4,166

*A 1.25% 'alternative notional amount' (ANA) added to individual council tax bills; permission to raise this ANA is given by central government and can be used only to fund the Somerset Rivers Authority.

Financial Summary

The **Pie Chart** to the right shows **SRA Local Partner Funding spend during 18-19 financial year by Workstream (£k)**.

The SRA does not commission works directly, instead SRA partners deliver works on behalf of the SRA. Once works are complete, funds are claimed back from the SRA. Funds claimed back equate to the actual spend by the SRA. During 2018-19 the SRA processed delivery partner claims for Local Partner Funds totalling £2,122k:



92% (£1,952k) delivering the Enhanced Programme of works

8% (£170k) relates to staff costs and administration overheads

HotSWLEP Somerset Flooding

Following the 2012 and 2013-14 floods, the Heart of the South West Local Enterprise Partnership (HotSWLEP) awarded £13.049m of Growth Deal funding up to March 2021 to enable key capital schemes delivered. The table below provides the current balance of Growth Deal funding including what was spent during 2018-19.

HotSWLEP FUNDING 2018-19 SUMMARY	FUNDING ALLOCATION £k	FUNDING SPENT TO 31 MARCH 2019 £k	FUNDING SPENT DURING 2018-19 £k	FUNDING BALANCE £k
Pioneer Dredging River Parrett	2,438	858	165	1,415
River Sowey/KSD Enhancement Scheme	7,996	4,346	192	3,458
Bridgwater Tidal Barrier (contribution)	2,000	751	1,249	0
Land Management Capital Grants	550	459	82	9
Taunton Strategic Flood Alleviation Improvements Scheme (contribution)	65	65	0	0
TOTAL	13,049	6,479	1,688	4,882

Progress on key elements of Somerset's 20 Year Flood Action Plan

The Somerset Levels & Moors Flood Action Plan was published in March 2014, following that winter's devastating floods. When Somerset Rivers Authority was launched on 31 January 2015 the Flood Action Plan was widened to include the whole of Somerset.

The SRA oversees the 20 Year Flood Action Plan. It has six key objectives:

1. Reduce the frequency, depth and duration of flooding.
2. Maintain access for communities and business.
3. Increase resilience to flooding for families, agriculture, businesses, communities, and wildlife.
4. Make the most of the special characteristics of the Somerset Levels and Moors (with internationally important biodiversity, environment and cultural heritage).
5. Ensure strategic road and rail connectivity, both within Somerset and through the county to the South West peninsula.
6. Promote business confidence and growth.

All actions in the SRA's annual Enhanced Programmes are scored and ranked against these objectives.

TARGETS

This section describes progress against key targets in the Flood Action Plan, as set out in the Plan's Executive Summary.

Dredging

We must: Dredge the first 8km of the Rivers Tone and Parrett.

What we have achieved: 4km of the River Tone upstream of Burrowbridge, and 4km of the River Parrett downstream of Burrowbridge, were dredged back to their 1960s' river profiles in 2014 by the Environment Agency. The SRA has funded maintenance dredging every year since, and the pioneer dredging of a further 750m of the Parrett downstream of Northmoor Pumping Station in 2016. Plans have been made to dredge 2.2km of the Parrett between Stathe and Burrowbridge in autumn 2019. For more on this subject, including the SRA's use of water injection dredging techniques in combination with silt monitoring, see the W1: Major Projects section of this report.

River Sowy/King's Sedgemoor drain enhancements

We must: Increase the capacity of the Sowy/King's Sedgemoor Drain (KSD) recognising that this solution will reduce the cost of pumping during future flooding events.

What we have achieved: In 2013-14 the A372 at Beer Wall near Othery was flooded for weeks and then closed for expensive emergency pumping. Subsequently, Somerset County Council raised and repaired the road, and installed four massive culverts to allow more water to go underneath it. The Environment Agency, acting for the SRA, then created two new offshoot channels for the Sowy and Langacre to flow through the new culverts. Two tilting weirs were also installed, to enable more flexible use of the Sowy, and allow pumping stations to be operated earlier.

Other works have included the removal of obstructive masonry from beneath Dunball Old Bridge as part of measures to improve the capacity and flow of water through the final stretch of the KSD,

Progress on key elements of Somerset's 20 Year Flood Action Plan

improvements to Chedzoy Flap (to better protect farmland around Chedzoy and Andersea), and desilting to increase channel capacity at Parchey and Dunball. Further works are planned. For more Sowby/KSD details, see the W1: Major Projects section of this report.

Flood management and infrastructure solutions

We must: Invest in flood management and infrastructure solutions having developed a better understanding of their effectiveness.

What we have achieved: The SRA has so far approved 126 actions across Somerset, involving – in total – many hundreds more different elements countywide. In a summary such as this, one course of action may serve to indicate the SRA's approach to this FAP target. The combined development of water injection dredging and sophisticated silt-monitoring as a means of maintaining the capacity of crucial sections of the Parrett and Tone stems from the work of an SRA Dredging Strategy Board. This was set up early in 2016 to investigate cost-effective dredging techniques and locations. Consultants from HR Wallingford collaborated with the Strategy Board on a long report called *Opportunities for further dredging in Somerset*. This report analysed a huge range of recent and historic materials and practices, and drew on local knowledge. It recommended trials of water injection dredging techniques and modern means of silt-monitoring, and these were duly carried out and then assessed. Experiments were done with agitation dredging, which involves a vessel using a front-mounted articulated arm with a rotating cutting device and suction hose, so that a boat becomes a sort of floating vacuum cleaner with teeth. It was found that this method could be precise, but it was also much slower than the other method of water injection dredging that is described in the W1: Major Projects section of this report (*page 8*). In combination with silt monitoring, it is this other method of water injection dredging that is now widely accepted as a good way of maintaining the Parrett and Tone. It is much cheaper, much quicker and much less disruptive. However, this success was not a foregone conclusion. It has been achieved only through the SRA and its partners, particularly the Parrett Internal Drainage Board, actively seeking out a better understanding of effective solutions.

Bridgwater Tidal Barrier

We must: Accelerate the construction of a Barrier or Sluice at Bridgwater, with the objective of achieving delivery by 2024.

What we have achieved: The SRA has used Growth Deal money from the Heart of the South West Local Enterprise Partnership to accelerate the initial stages of the Bridgwater Tidal Barrier project, which is led by the Environment Agency and Sedgemoor District Council (DC).

A design and location have been chosen for the Barrier: two 'vertical lift' gates between Express Park and Chilton Trinity. Improvements are also being planned to existing downstream primary flood defences along the River Parrett, together with new secondary defences in the flood plain.

SRA funding has contributed to this project's development and design. It is also enabling the Environment Agency and Sedgemoor DC to complete the detailed business case that is essential for securing future funding, and to prepare to submit the Transport Works Act Order that is essential for getting permission to construct the Barrier. The project team intend to apply in late 2019 for the consents needed to start building in 2022, so that a Barrier can be ready for use in 2024. It will protect 11,300 homes and 1,500 businesses.

Progress on key elements of Somerset's 20 Year Flood Action Plan

Somerset Rivers Authority

We must: Establish a Somerset Rivers Board that has greater control and responsibility for work to maintain and improve water management on the Levels.

What we have achieved: Somerset Rivers Authority was launched on 31 January 2015 as a partnership of Somerset's existing Flood Risk Management Authorities (FRMAs). The SRA covers the whole of Somerset, not just the Levels. Partners take on responsibilities for extra works, above and beyond their usual activities. Through the SRA, partners collaborate to maintain and improve water management across the county.

The Local Government Finance Settlement 2016-17 included the provision of alternative notional amounts for council tax levels so that pending the establishment through legislation of the SRA as a precepting body, Somerset County Council and all Somerset district councils could set a shadow precept of up to the equivalent of a 1.25% increase in council tax for the purpose of funding the SRA. While legislation is pending, the SRA is hosted by Somerset County Council, and has no independent legal status.

After a long series of exploratory discussions with the SRA, and other interventions such as the Future Flood Prevention Report by the Environment, Food & Rural Affairs Committee, the Government drafted a Rivers Authorities and Land Drainage Bill. This Bill was designed – subject to a secondary phase of consultation across Somerset – to establish the SRA as an independent legal entity that could raise funds for itself from council tax and make the longer-term plans for the delivery of extra flood risk management works that Somerset needs. With Government support, the Rivers Authorities and Land Drainage Bill was taken forward in 2018 as a Private Member's Bill by the Somerton and Frome MP David Warburton. The Bill passed through the House of Commons in early 2019 and moved on to the House of Lords, where it passed its 2nd Reading stage but was then withdrawn. See SRA Funding and Legislation on page 6 for more details.

Catchment-sensitive farming / Natural Flood Management

We must: Support farmers to maximise the benefits from catchment sensitive farming, especially regarding run-off in the upper catchment.

What we have achieved: The first line of the Land Management section of the complete Flood Action Plan states: "Every farm and every stream has a part to play in water and flood management in Somerset." Accordingly, more than 500 farms have been visited as part of the Hills to Levels initiative, in which the SRA is a partner and major funder. Overall, more than 260 schemes have been delivered and more than 600 natural flood management structures created using funding from a range of sources. Somerset Rivers Authority itself has approved grants for 190 of those 260-plus natural flood management schemes. The SRA has also funded numerous investigations of flooding problems on roads and backed dozens of soil management initiatives. Benefits include reduced flood risks, reduced erosion, improved water quality, wider environmental enhancements and increased resilience on floodplains. For more details of this work, which has won two national awards, see the W2 section of this report.

Progress on key elements of Somerset's 20 Year Flood Action Plan

Urban water management

We must: Manage urban run-off by ensuring best practice in planning and Sustainable Drainage Systems (SuDs) implementation.

What we have achieved: A recent SRA achievement was the production of a major review of SuDS at 20 recently-developed sites across Somerset. This unique initiative looked in detail at planning and implementation issues. The SRA is now funding the production of a Somerset-specific planning guidance document to supplement the West of England Sustainable Drainage Developer Guide that was published in 2015, supported by Somerset County Council and the Environment Agency, both SRA partners. The Somerset-specific guidance will draw upon the wealth of evidence collected in the 747-page SuDS review and it will encourage best practice in planning and SuDS implementation.

Progress is also being made on a range of other initiatives: see the W3 section of this report.

Increasing business and community resilience

We must: Sustain and enhance business and community resilience capacity.

What we have achieved: Following the floods of 2013-14, an SRA-funded Community Resilience Officer worked with local communities, parish councils, the Environment Agency, district councils, emergency services and other interested parties. Detailed community flood resilience plans – to help people prepare for, or respond to, any future flooding – were distributed door-to-door in Burrowbridge, Moorland, Fordgate, West Yeo, Chadmead and Aller.

A Somerset community resilience website has been created to provide a comprehensive and easy-access information source for resilience, linked to flood risk information: www.somersetprepared.org.uk

Numerous SRA-funded grants have been given to communities by Somerset Prepared. In 2018-19, the SRA part-funded the first Somerset Resilience Day, a survey into affordable flood insurance, and a household resilience initiative in Misterton near Crewkerne. As part of Co-Adapt, the SRA has also begun match-funding a Moors Association Officer and a Farm Liaison Officer, to help make businesses and communities on the Somerset Levels more resilient to flooding. For more information, see the W5 section of this report.

Strong local leadership, engaging partners and communities

We must: Ensure strong local leadership with full engagement of local partners and communities.

What we have achieved: Until the end of March 2019, Somerset Rivers Authority was run by a Board of partners from West Somerset Council, Taunton Deane Borough Council, Sedgemoor District Council, South Somerset District Council, Mendip District Council, Somerset County Council, the Parrett and Axe Brue Internal Drainage Boards, the Environment Agency, Wessex Regional Flood & Coastal Committee and Natural England. Note: on 1 April 2019 West Somerset Council and Taunton Deane Borough Council were replaced by a new West Somerset and Taunton Council.

Progress on key elements of Somerset's 20 Year Flood Action Plan

The SRA's Management Group and Technical Group engage with SRA partners and many other organisations and individuals as required, such as FLAG (the Flooding on the Levels Action group), West Somerset Flood Group, Yeovil Rivers Community Trust, Brue Crew, The Mead residents' group near Ilchester, NFU, CLA, Somerset Catchment Partnership, Somerset Wildlife Trust, RSPB, Highways England, Somerset Water Management Partnership, etc.

Together, SRA partners are leading the delivery of Somerset's 20 Year Flood Action Plan.

The SRA's distinctive role is to identify extra work that needs to be done and to fund and commission its delivery across Somerset.

A Joint SRA Scrutiny Panel has been established, with members drawn from the county council, district councils and IDBs, to help ensure that the SRA is fulfilling its purpose.

Back cover image: a restored Ruston-Bucyrus dragline de-silting a lake in Marcombe Valley, near Ashbrittle, in the catchment of the River Tone



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