

Flood Risk Management in Worcestershire

Annual Report 2022

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INTRODUCTION

This report is focussed on flood risk management activity during the 2022 calendar year. This period includes the significant flood event in February which was centred on the River Severn.



Figure 1: Flooding in Worcester in February 2022

In the week of 14th – 21st February 2022 a succession of low-pressure systems travelled across the UK (including three named storms – Dudley, Eunice and Franklin), bringing persistent frontal rain to large parts of the UK. The three storms contributed to a wetter than average February, with the UK seeing its eighth highest February rainfall total on record. Soil conditions within the upper Severn catchment were wetter than normal for the time of year.

The three named storms in rapid succession brought ‘Exceptionally High’ rainfall totals to the Welsh Mountains and Shropshire Plains catchments with above normal totals for the River Severn which impacted several communities downstream in Worcestershire. River levels along the River Severn peaked between 21st February and 25th February 2022.

35 Flood Alerts, 30 Flood Warnings, and 1 Severe Flood Warning were issued across Worcestershire in February 2022. Affected communities included Bewdley, Stourport-on-Severn, Worcester, Severn Stoke and Upton upon Severn (see Annex B), and across the county as a whole there were over 100 residential properties internally flooded, over 1000 properties evacuated and over 80 businesses affected.



Figure 2: River levels outflanked the Beales Corner temporary barriers

The repeated flood events on the River Severn reinforce why flood risk management remains a high priority for Worcestershire County Council, the other Risk Management Authorities and the Government. There were also isolated incidents of surface water flooding in various locations such as Fairway Drive in Rubery, Queen Street in Droitwich and Summerfield in Kidderminster.

Flood Risk Management Authorities continued during 2022 to work closely with other partners, landowners and impacted communities. Together they developed and delivered flooding and drainage schemes, scrutinised planning applications, managed watercourses, increased community resilience and improved drainage, sewerage and flood defence infrastructure so that more homes, businesses and pieces of important infrastructure had their risk of flooding reduced, where practicable.

1. UNDERSTANDING AND PRIORITISING FLOOD RISK

Flood risk management in Worcestershire continued to be guided by the statutory Local Flood Risk Management Strategy in 2022 which has ensured a continuing increase in the understanding of flood risk and prioritisation of resources and the management of flood issues.

Section 6 of this report gives a full list of plans and strategies that have been developed and are constantly being updated and referred to in the work of Worcestershire County Council and its partners in understanding and prioritising flood risk in the county.

The process of updating the Local Flood Risk Management Strategy continued in 2022 and engagement with partners and stakeholders will take place in due course.

Worcestershire County Council and its partners also investigated 58 cases of reported flooding in 2022.

2. REDUCING THE LIKELIHOOD AND IMPACT OF FLOODING

2.1 Flood alleviation schemes

All flood alleviation schemes can be found in Tables A1 and A2, which is given in Annex A.

Table A1 lists the Environment Agency, Worcestershire County Council, District, City and Borough Councils, Lower Severn Internal Drainage Board, and Severn Trent Water schemes completed since the last annual report.

Table A2 lists the schemes that are currently being planned. These range from those in the earliest stages of feasibility assessment to those that are in the final stages of being made ready for commencement on site.



Figure 3: Part of the proposed flood alleviation scheme at Beales Corner, Bewdley. See Annex A, Table A2, item P1 for more information on the development of the scheme.



Figure 4: Tree works were done in early 2023 to enable the scheme construction to follow on later in the year

The schemes in these two tables seek to reduce flood risk to domestic properties, businesses, key roads and other critical infrastructure.

Some of the schemes listed are 'programmes of work' and therefore appear in both the 'completed' and 'planned' tables. Property flood resilience measures, wherein works are done on individual properties to reduce the damage done by flooding / reduce the time taken to recover from flooding damage, are an example of the type of scheme that spans both tables.

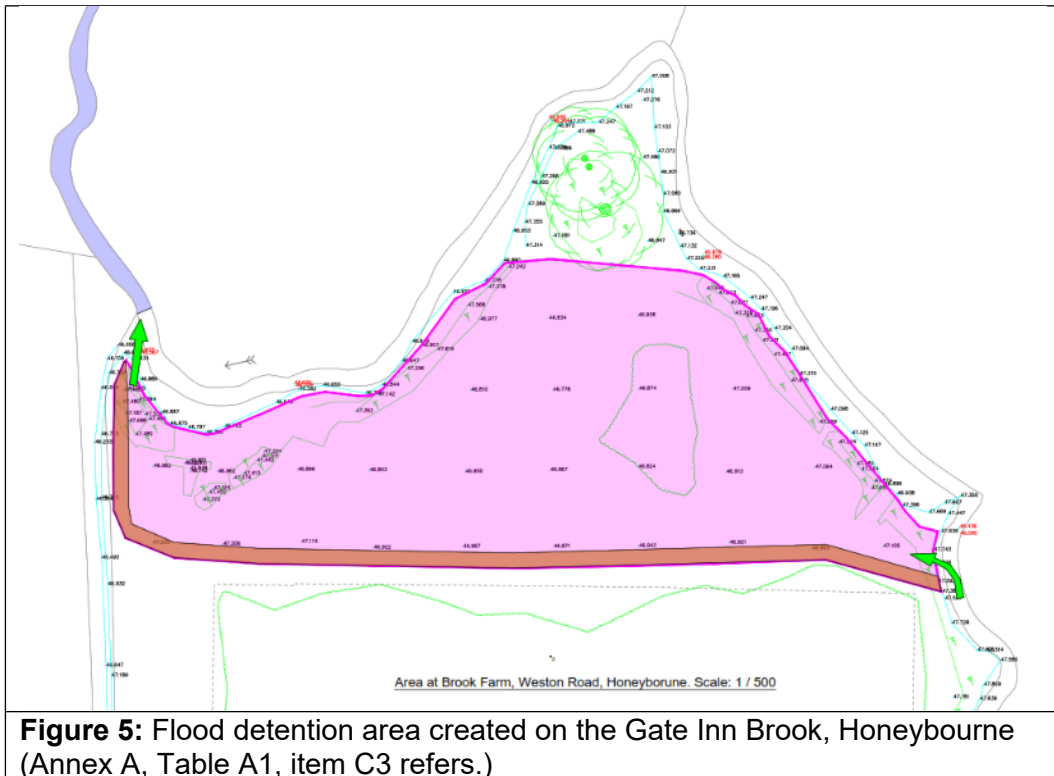


Figure 5: Flood detention area created on the Gate Inn Brook, Honeybourne (Annex A, Table A1, item C3 refers.)

Most flood risk management schemes receive funding via the Regional Flood and Coastal Committee, or RFCC, (from Government Grant in Aid and / or Local Authority-sourced Local Levy) which covers the English Severn and Wye catchment. The RFCC's previous six-year programme for schemes came to an end in March 2021. The new six-year programme, which has attracted increased government funding, was launched on 1 April 2021. Table A2 in Annex A contains schemes that are in the new six-year programme.

Both tables attribute a 'Delivery Lead' to each scheme but in many cases the schemes are underpinned by very close collaboration across the flood risk management authorities.



Figure 6: Frame for a flood barrier; part of a package of property protection works delivered at Powick Service Station. (Annex A, Table A1, item C1 refers.)

2.2 Maintenance

It would be impractical to report on all details of ongoing routine maintenance work but below is a summary of the main highlights.

2.2.1 Main Rivers

In addition to the assessment and development of flood alleviation schemes that are detailed in Table A2 in Annex A, in 2022 the Environment Agency continued to deliver its responsibility for the management of flood risk on 'Main Rivers' including:

- inspection, repair and maintenance of the Environment Agency's existing flood defences and structures following the major flood events to ensure they are fit for purpose when next called upon;
- pro-active maintenance works on more than 20 watercourses in Worcestershire including vegetation, debris and silt removal.

2.2.2 Ordinary Watercourses

In addition to the assessment, development and delivery of flood alleviation schemes that are detailed in Tables A1 and A2 in Annex A, over the report period the district council land drainage partnerships (North Worcestershire Water Management and the South Worcestershire Land Drainage Partnership) and the Lower Severn Internal Drainage Board continued to ensure that the extensive network of smaller watercourses and ditches is appropriately managed and maintained. This was achieved through the following.

- Inspection of nearly 100 km of the watercourse network.
- Liaison with riparian owners about maintenance and management of watercourses on their land.
- Implementation of land drainage consenting duties and powers including around 54 applications processed and a number addressed by pre-application discussions.
- Implementation of land drainage enforcement powers including nearly 100 successful informal enforcement actions.
- Recording and monitoring of flood risk management assets on the statutory 'Register & Record of Structures & Features'.

2.2.3 Sewerage network

Severn Trent (ST) continued to deliver its flood risk management duties through a range of activities during 2022.

- **Responding to incidents:** ST have responded to reports of operational issues on their network, including responding to internal and external sewer flooding incidents in the Worcestershire area during 2022. ST investigate the root cause of these issues (e.g. CCTV) and undertake work (e.g. clearing blockages) to ensure the sewer network is fully operational.

- **Proactive Works Programmes:** ST have increased their level of proactive investment to prevent flooding from their network (including flooding) associated with operational and structural defects on the sewer network. In 2022 and continuing into 2023 ST have a programme of work to CCTV approximately 19 km of sewers in Worcestershire.
- **Monitoring:** ST undertake regular inspections of key assets on their network, including overflows to rivers. By the end of 2022, they finished installing remote monitoring equipment in all of their storm overflows. See [Storm overflows | Looking after your sewers | Waste water | My Supply | Severn Trent Water \(stwater.co.uk\)](#) for information about storm overflows.
- **Education:** Severn Trent’s education teams visit schools across all the Severn Trent region. Some of the key topics last year were on ‘Using water, Hydration & Plastic Pollution.’ In Worcestershire in 2022 their education team visited 23 schools within the region delivering their messages to over 2000 children. For more info, please visit: [Education Zone | About Us | Severn Trent Water \(stwater.co.uk\)](#)

2.2.4 Highway drainage

Essential maintenance of highway drainage infrastructure continued over the report-period. Over 100 highway drainage schemes were delivered in 2022, including 200 new gully assets being installed to relieve drainage issues and over 2000 metres of highway drainage pipes being replaced. Over 1000 metres of ditches were dug as part of new works or maintenance.

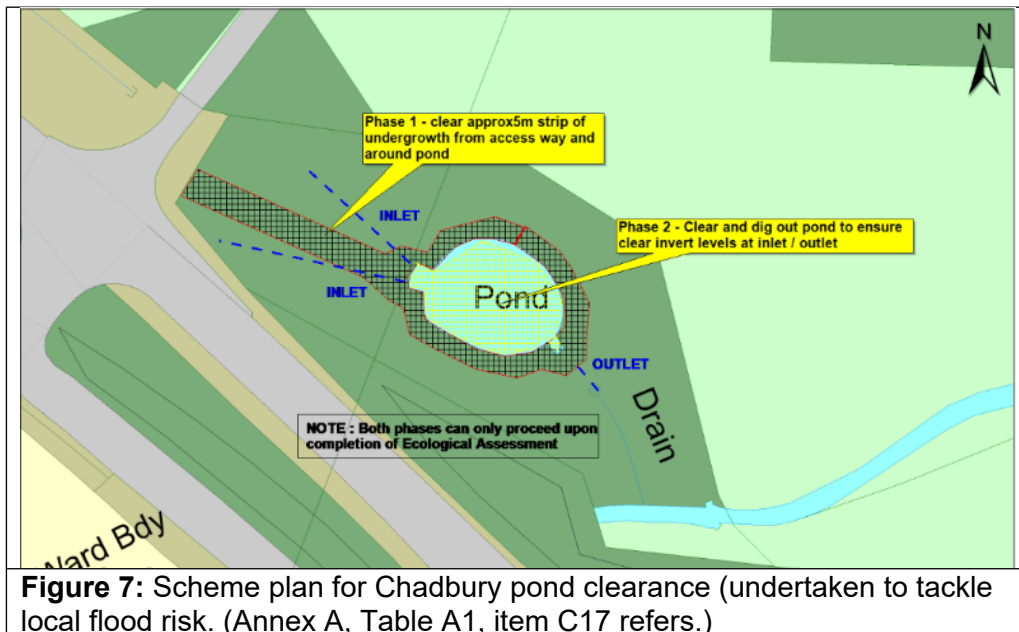


Figure 7: Scheme plan for Chadbury pond clearance (undertaken to tackle local flood risk. (Annex A, Table A1, item C17 refers.)



Figure 8: Part of the new drainage system to tackle a flood issue in chapel Lane, Bransford. (Annex A, Table A1, item C14 refers.)



Figure 9: New ditching to reduce flood risk to highway and property, Babylon Lane, Bishampton. (Annex A, Table A1, item C13 refers.)

2.3 Flood response and recovery

In addition to the day-to-day work of Worcestershire County Council and its partners to respond to and improve the response to flooding (see Annex C), the County Council, the Districts, the Environment Agency, Severn Trent and other partners maintained duty rotas and responded to flooding incidents during 2022. Of particular note is the multi-agency response to the larger flood event in February 2022 which required initiating the Tactical Co-ordinating group and Operational Cells in both north and south Worcestershire. Specific operations included the erection of demountable and temporary barriers by the Environment Agency in Bewdley and Worcester, the operation of the pumps at Kempsey, and the operation of flood gates in Upton upon Severn. Severn Trent worked alongside the Environment Agency in key locations of flood defences during the major flood events including the deployment of mobile pumps in Bewdley, Worcester and Upton upon Severn.

The County Council has also convened its Flood Response Group on a monthly basis with key officers from each relevant service area as part of its continuous improvement of flood response.



Figure 10: Flooding in Severn Stoke in February 2022

2.4 Natural Flood Management

The three-year initial Natural Flood Management pilot study, funded by the Department for Food and Rural Affairs (Defra), has come to an end. It was extremely successful, installing over 430 interventions to hold back water and slow the flow in the designated catchments of the River Isbourne, Merry Brook and Dowles Brook. Works were undertaken within these areas and strong relationships built with local communities, landowners, farmers, and contractors.

Funding has now been secured via the Regional Flood and Coastal Committee for a four-year project to continue this type of work in both the original catchments and others across Worcestershire including the Gallows Brook in Hagley, the Kyre Brook near Tenbury, the River Salwarpe, the River Cole, the Dick Brook near Astley.

With climate change projections for wetter winters and more intense rain events in the summer it is important that Natural Flood Management measures are identified and implemented on a catchment scale to slow, store and hold back water. This includes considering how land is used and farmed and what can be done collectively to help reduce run-off, overland flow and downstream flooding.

In March 2022 Severn Trent launched a new campaign to 'Get River Positive' which aims to improve the health of rivers and the environment. There are 5 key pledges with associated actions and timescales. Severn Trent also hosted Harriet Baldwin MP at Pershore Treatment Works to learn what Severn Trent are doing to reduce misuse of sewers, reduce flooding and the Get River Positive campaign.

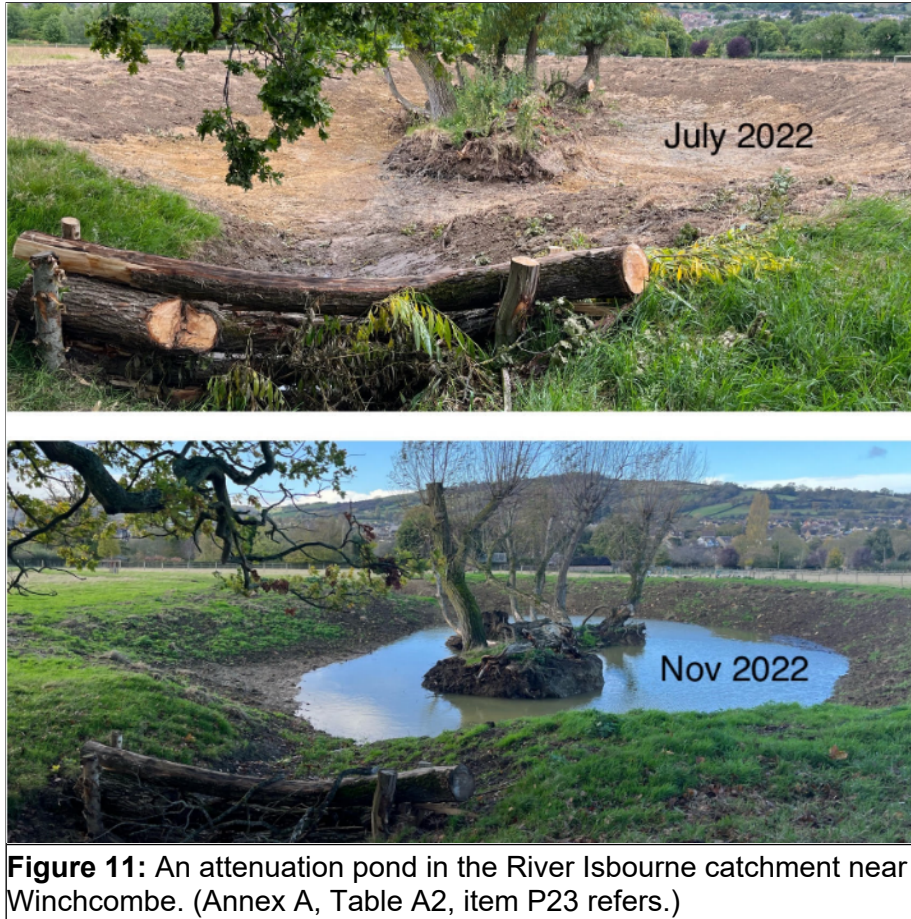


Figure 11: An attenuation pond in the River Isbourne catchment near Winchcombe. (Annex A, Table A2, item P23 refers.)

2.5 Spatial planning and development control

The South Worcestershire Land Drainage Partnership (a combined service covering Malvern Hills District, Worcester City and Wychavon District Councils), North Worcestershire Water Management (a combined service covering Bromsgrove District, Redditch Borough and Wyre Forest District Councils) and Worcestershire County Council collectively made representations on over 1500 planning applications and over 80 pre-application consultations.

In 2022 the Environment Agency made representations on 52 planning applications in Worcestershire. This work ensured that flood risk management and all matters relating to drainage were properly considered and embedded within the County's proposed developments.

Bromsgrove District Council continued to go through the process of reviewing its Local Plan which North Worcestershire Water Management commented on. They also input into the Hagley Neighbourhood Plan.

Severn Trent continued to engage with the Local Planning Authority and with developers in advance of and at planning application stage. See their website for details [Overview | Building and Developing | Severn Trent Water \(stwater.co.uk\)](#). In 2022, Severn Trent responded to over 200 pre-application and planning application consultations from the Local Planning Authorities in Worcestershire.

3. GOVERNANCE & PARTNERSHIPS

3.1 Regional Flood & Coastal Committee

The English Severn & Wye Regional Flood & Coastal Committee continues to play an important role in coordinating flood risk management including assessing proposed flood related schemes and allocating both Local Levy and Central Government Flood Defence Grant in Aid capital funding via its 6-year plan of flood alleviation schemes.

3.2 River Severn Partnership

Funding from the River Severn Partnership is helping to fund the Bewdley Beales Corner flood alleviation scheme and the potential scheme at Tenbury. A number of 'demonstrator' (pilot) projects are also in development including the following.

- *'Adaptive pathways' projects* – seeking ways to prepare for the potential impacts of climate change through interventions now which can easily be adapted and augmented in the future when the impacts of climate change become clearer and the case can be made for further funding of these adaptations.
- *Upper Severn catchment* – looking at large scale Natural Flood Management in the upper reaches of the River Severn catchment in order to reduce flood risk downstream.
- *Future options paper* – development of a future options paper which looks at the river as both an environmental and economic asset, and how the opportunities and threats can best be managed by the River Severn Partnership and the future structural opportunities for managing these.

There was a visit from senior figures in Defra and the Treasury in October 2022 to highlight opportunities. Discussions continued regarding how the River Severn Partnership works together with the English Severn and Wye Regional Flood and Coastal Committee.

3.3 Other groups, partnerships and fora

Representatives from Worcestershire County Council, the district councils and often the other Risk Management Authorities attended meetings and fora including the following.

- Worcestershire Land Drainage Group
- District Council Land Drainage Partnership Boards
- Regional Environment Agency / Lead Local Flood Authority Networking Group
- Worcestershire Natural Flood Management Project Steering Group
- The West Mercia Local Resilience Forum (Worcestershire) Severe Weather Group
- The Local Government Flood Forum
- The Worcestershire Local Nature Partnership
- The Worcestershire Green Infrastructure Partnership
- The Worcestershire Infrastructure Steering Group
- The Worcestershire Local Transport Board

4. COMMUNITY ENGAGEMENT & RESILIENCE

4.1 Local flood groups

In 2022 WCC again worked closely with an increasing number of community Flood Action Groups in Worcestershire including Hagley, Diglis, Hollywood, Powick, Severn Stoke and Tenbury Wells.

Supporting communities at risk of flooding and increasing their resilience is a key priority within the Local Flood Risk Management Strategy. Work is under way to establish more Flood Action Groups in other at-risk communities, not least those severely impacted by the major flood events in the last 3 years.

This important work is being facilitated by partnering with the National Flood Forum, a Bewdley-based charity which specialises in empathically supporting flooded individuals and communities alongside forming partnerships with Flood Risk Management Authorities (FRMAs) to co-create a way forward to reduce the risk and increase resilience. The National Flood Forum provides emotional and practical advice, including support immediately after a flood event. In March 2022, the National Flood Forum hosted recovery sessions alongside the Risk Management Authorities in flood risk areas around Worcestershire.



Figure 12: Flood recovery in Upton upon Severn in 2022. Hosted by the National Flood Forum, WCC and RMA partners

The National Flood Forum is integral to the formation and development of community Flood Action Groups. These groups engage with their wider community, providing RMAs with their local knowledge and feedback on local issues. The National Flood Forum's extensive experience, empathy and critical independence is a vital element in its successful engagement record, and this helps to develop trust and partnership within communities. It is intended to extend this successful partnership into future years.

4.2 Other engagement

In 2022 Flood Risk Management Authorities also engaged with communities in Worcestershire outside the formation of community flood action groups. There was engagement with those at risk of flooding in a number of locations subject to

recent flooding, or at which a scheme is being developed. These include, Himbleton, Evesham, Wickhamford, Bewdley, Stourport, Droitwich, Summerfield, Upton upon Severn, and Worcester.

A number of communities benefitted from the County Council's flood grants following the flooding in February and March 2020 and February 2022. Severn Trent's community fund continued in 2022 supporting local projects across the Severn Trent region, including Worcestershire. North Worcestershire Water Management also undertook the following.

- A community planting day for residents in Lickey End and one at Shenstone Close.
- Liaison with the Wolverley Flood Group.
- Engagement with planning agents at the forum organised by Wyre Forest District Council.
- Engagement with university students by doing a presentation at Worcester University.

5. PLANS, POLICIES & STRATEGIES

5.1 Local Flood Risk Management Strategy

We have now received updated guidance on development of Local Flood Risk Management Strategies and we began the process of updating the Worcestershire Local Flood Risk Management Strategy in 2022.

5.2 Flood Risk Management Plans

There are several multi-agency Flood Risk Management Plan (FRMP) groups in Worcestershire that assess and plan mitigation measures to address flooding where there are high concentrations of past and future potential floodspots. A standard local FRMP process and reporting structure has been adopted and followed at a number of locations such as Bromsgrove, Droitwich, Hollywood, Redditch and Hagley. In 2022 these groups continued to meet to both further develop and implement the FRMPs. Also, a new FRMP group was initiated for Worcester City and this group has already met three times to discuss reducing flood risk in the city.

In addition, Worcestershire County Council, as Lead Local Flood Authority, has worked over the last two years with the Environment Agency to develop the national FRMP for the Severn and Humber River Basin Districts for the second cycle of plans to cover the period 2021-2027. Like the first cycle FRMPs covering the period 2015-2021, these were produced for each River Basin District in England and cover all sources of flooding. They can be found at [Flood risk management plans 2021 to 2027 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/collections/flood-risk-management-plans-2021-to-2027)

5.3 Other related plans, policies and strategies

A range of other related plans, policies and strategies were produced and / or contributed to by the Risk Management Authorities during 2022 including the following.

- Drainage and Wastewater Management Plan (due to be published by Severn Trent this month – March 2023)

- Preliminary Flood Risk Assessment
- Worcestershire Surface Water Management Plan
- Local Flood Risk Management Plans
- Multi-Agency Flood Plans
- Green Infrastructure Concept Plans
- Worcestershire Minerals Local Plan
- District Local Development Plans
- Neighbourhood Plans
- Catchment Flood Management Plan



Figure 13: Soil being transported to Severn Stoke for use in the flood alleviation scheme. (Annex A, Table A2, item P7 refers.)

6. PROGRESS SINCE LAST ANNUAL REPORT

Table 1 below has a description of the intended areas of progress we identified in the last annual report (“We said”), alongside a description of the progress made in these areas in 2022 (“We did”).

Table 1: Progress made in 2022 against previous future priorities in the 2021 annual report.

We said	We did
Publication and implementation of the Hagley formal investigation report.	Completed and published
Continued implementation of the Hollywood formal investigation report recommendations, including appraisal of the potential flood scheme and continuing to work with partners to build a compelling business case for a flood scheme.	Modelling now completed and business case being developed.
Further development and implementation of the local FRMP for the new Redditch 'Flood Risk Area', as identified by the review of the Preliminary Flood Risk Assessment.	Environment Agency Severn Flood Risk Management Plan completed with Worcestershire-wide and Redditch-specific measures included.
Implementation of the six-year, county-wide Natural Flood Management project.	Funding now secured and project underway.
Implementation of lessons learned from recent major flood events and further development and testing of emergency plans.	A number of recommendations now actioned, and the Worcestershire Flood Response Group continues to meet regularly for the purposes of continuous improvement.

7. FUTURE SCOPING

As previously reported, a great deal of progress was made with many aspects of flood risk management during 2022. However, considerably more work is still required. Priorities for the next 12 months include the following:

7.1 Understanding and Prioritising Flood Risk - Future actions

- Continue to increase understanding and appropriate prioritisation of flood risk through the ongoing multi-agency FRMP framework for Droitwich, Hagley, Wythall, Redditch, Worcester and Bromsgrove.
- Assess and investigate future potential surface water flood risk.

7.2 Reducing the Likelihood and Impact of flooding - Future actions

- Continue to develop and deliver major flood alleviation schemes at Severn Stoke, Toronto Close (Worcester), Bewdley and Tenbury.
- Continue delivery of other smaller flood alleviation schemes in locations such as Summerfield, near Kidderminster.
- Continue to develop and deliver Property Flood Resilience schemes in Evesham, Wickhamford, Droitwich, Worcester and Hibleton.
- Continue to develop and implement the county-wide Natural Flood Management programme.
- Implement lessons learned from recent major flood events and further develop testing of emergency plans.
- Introduce and implement new schemes onto the Regional Flood & Coastal Committee 6-year Medium Term Plan and complete schemes already on it.
- Continue to deliver the programme of the highway surface water drainage schemes.
- Continue the maintenance of flood risk management infrastructure including highway drainage and flood defences.

- Continue to discharge Land Drainage Act responsibilities including consent application processing and enforcement where required to ensure ongoing maintenance of the ordinary watercourse network.
- Continue to discharge statutory consultee duties and scrutinise planning application drainage plans.
- Prepare for the likely forthcoming statutory SuDS Approval Body (SAB) role.
- Explore options for the future maintenance of Sustainable Drainage Systems (SuDS).

7.3 Governance and Partnerships - Future actions

- Continue management and implementation of the Local Flood Risk Management Strategy.
- Review and refresh of the Local Flood Risk Management Strategy.
- Renew the Worcestershire flood risk management partnership and governance framework.

7.4 Community Engagement and Resilience - Future actions

- Continue to support existing community flood action groups and support the establishment and development of new ones in areas at risk of flooding.
- Further engage with communities and landowners to increase their resilience.

7.5 Plans, Policies and Strategies - Future actions

- Further develop and maintain the Register & Record of Structures and Features.
- Further develop and maintain the Register of Flood Risk Management Schemes.
- Review and update the Preliminary Flood Risk Assessment.
- Continue to engage with and support the development of the River Severn Partnership
- Review the Water Infrastructure for a Sustainable Economy (WISE) project and further integration between economic growth, infrastructure development and flood risk management.



Figure 14: A newly constructed storage pond at Padgets Lane, Redditch. To add ecological value it was designed to permanently hold water at low levels. (Annex A, Table A1, item C7 refers.)

ANNEX A. FLOOD ALLEVIATION SCHEMES – COMPLETED AND PLANNED

Table A1: Completed flood alleviation schemes

No.	Location	Delivery lead	Completed scheme details	Cost (£k)
C1	Malvern Hills District	MHDC	Property flood resilience measures were installed on 54 residential properties and 29 business properties within the Malvern Hills District.	375
C2	Broad Marston Manor, Broad Marston	WDC	Creation of swales and channels to help protect the manor, with the arisings used to form a bund that protects the village from fluvial flooding (from Noleham Brook). WDC provided survey and design advice, whilst the landowner funded the works.	No public-purse cost (see left)
C3	Honeybourne	WDC	As above, a range of measures to reduce flood risk locally (to the farmer's benefit, but also to the village's benefit), WDC provided survey and design advice, whilst the farmer funded and undertook the works.	No public-purse cost (see left)
C4	Bewdley and Stourport	NWWM	Administering of Defra's Property Flood Grant Scheme 2020 to fund up to £5,000 towards flood resistance and/or recoverability for 45 dwellings and 20 businesses internally flooded in February 2020.	286
C5	Blake Brook at White Wickets, Kidderminster	NWWM	Reinstatement of a headwall and installation of a trash screen at the inlet of a culverted watercourse on council owned land which will facilitate monitoring and maintenance visits and reduce the flood risk for the adjacent dwelling.	2
C6	Holly Lane, Portway	NWWM	Reinstatement of ditch to reduce flooding to nearby properties	1

No.	Location	Delivery lead	Completed scheme details	Cost (£k)
C7	Battens Drive, Redditch	NWWM	Construction of a storage pond at Padgets Lane, Redditch to reduce risk of flooding to Battens Drive. To add ecological value, it was designed to permanently hold water at low levels.	3
C8	Harport Road, Redditch	NWWM	Substantial ditch clearance work at Harport Road, Redditch, to reduce flood risk to nearby property and highway.	2
C9	Beacon Hill, Rubery	NWWM	Reinstatement of ditch on Beacon Hill, Rubery, reducing risk to highway and five garages after floods of 2021 and 2022.	3
C10	Cheviot Close, Stourport-on-Severn	NWWM	Scheme to install property level protection measures after Property Flood Grant application [2020] had to be cancelled (contractor pulled out at the last moment) and there was insufficient time to arrange another one within the grant deadline	7
C11	Kinsham	ST	Sewer improvements were completed in the village of Kinsham near Tewkesbury involving sewer lining, sewer replacement, new sewers and sealing manholes to reduce infiltration into the sewers. This has significantly improved the condition of the sewer network and reduces the risk of flooding and pollution in the village. The schemes alleviates flooding to 6 properties.	550
C12	Worcestershire	ST	Property Flood Resilience (PFR) - ST have a programme of PFR installations across the Severn Trent region, including Worcestershire. In 2022, ST fitted PFR to 6 properties in Worcestershire to reduce the impacts of flooding to properties.	To be determined
C13	Babylon Lane, Bishampton	WCC	New ditching to reduce flood risk to highway and property.	21

No.	Location	Delivery lead	Completed scheme details	Cost (£k)
C14	Chapel Lane, Bransford	WCC	New drainage system to tackle flood issue / wet spot outside properties.	25
C15	Eckington Road, Bredon	WCC	Clearance work, rebuilding of collapsed large culvert, rebuilding of headwall and installation of new gabion baskets.	40
C16	Manor Lane, Bredons Norton	WCC	Major scheme to reduce flooding to village; construction of new drainage outfall.	80
C17	A44 Worcester Road, Chadbury	WCC	Flooding to A44 / winter hazard offset by vegetation clearance and digging out of pond.	15
C18	Brickyard Lane, Drakes Broughton	WCC	Drainage works (including new pipe, headwall, manhole rebuild and ditch clearance) to tackle property flooding.	23
C19	Hanbury Road, Droitwich	WCC	Highway and property flooding reduced through spillway and drainage repair work (phase 1 completed; phase 2, which will see the scheme completed, about to start.)	15
C20	Briar Close, Evesham	WCC	New gulleys and connections to tackle highway flooding.	14
C21	Finstall Road, Finstall	WCC	Drainage improvements to offset property and highway flooding.	32
C22	Chapel Street, Hagley	WCC	Rectifying defective drainage	15
C23	Moat House Lane, Hindlip	WCC	New gulleys and two new soakaways to address property flooding.	15
C24	Stratford Road, Honeybourne	WCC	New gulleys, manholes and headwalls.	23

No.	Location	Delivery lead	Completed scheme details	Cost (£k)
C25	Stourport Road, Kidderminster	WCC	Tackling flooding of pedestrian crossing.	16
C26	B4424, Little Clevelode	WCC	Upsizing of system to alleviate flooding of gardens.	23
C27	Church Lane, Little Witley	WCC	Replacement of defective pipe.	15
C28	A38, Severn Stoke	WCC	Highway and property flooding reduced through various drainage works.	14
C29	Penn Hall Lane, Stockton	WCC	New pipe and spillways installed to reduce highway flooding.	15
C30	The Grove, Stourport	WCC	Two phases of work to reduce highway flooding.	23
C31	Worcester Road, Summerfield	WCC	Improvements of existing drainage and digging of new ditch to reduce flood risk to properties and highway.	27
C32	Malvern Road, Worcester	WCC	New drainage connection to tackle highway flooding.	20
C33	Hallow Road, Worcester	WCC	Drainage scheme to tackle highway flooding.	18
C34	County-wide	WCC	81 other highways drainage schemes of sub-£10K value delivered across the county.	353

No.	Location	Delivery lead	Completed scheme details	Cost (£k)
C35	County-wide	WCC	Programme of drainage and flooding problem investigation works (including jetting, trial holes and CCTV surveys).	269

Table A2: Planned flood alleviation schemes

No.	Location	Delivery lead	Planned Start	Planned finish	Planned scheme details	Est. Cost (£k)
P1	Beales Corner, Bewdley	EA	Summer 2023	To be determined	Permanent flood risk management scheme (which is likely to include some demountable sections) that will replace existing temporary barrier system. Designed with minimal operational and maintenance requirements in mind. Outline Business case signed off Sept 22. Planning Permission granted Feb 23.	7500
P2	Bromsgrove	EA	2022-23	2022-23	A strategic outline business case, which looks at a range of options, has been completed. The leading option to increase storage upstream (in a National Highways-controlled area) is being investigated. Outline business case is being developed, to include review of current modelling and further surveying along Spadesbourne Brook.	1107

No.	Location	Delivery lead	Planned Start	Planned finish	Planned scheme details	Est. Cost (£k)
P3	Diglis	EA	To be determined	To be determined	An initial feasibility study, carried out in July 2021, is being re-visited to identify viable options for reducing the flood risk at Diglis Avenue.	To be determined
P4	Evesham, Droitwich, Himbleton and Wickhamford	EA	2023 - 24	2026-27	Property flood resilience schemes in Evesham, Droitwich, Himbleton and Wickhamford. Droitwich property surveys to be completed late January 2023. Himbleton – engagement with property owners to start summer 2023. Wickhamford – Approx 13 properties to take up PFR offer. Evesham – working with Town Council to provide engagement support. 40 properties surveyed to date.	1806
P5	Hagley	EA	To be determined	To be determined	Feasibility study is under way to get a more complete understanding and identify potential flood risk management options, including Natural Flood Management (NFM), that will mitigate flood risk.	To be determined
P6	Himbleton	EA	Summer 2023	To be determined	Proposed PFR measures have received full business case sign off. Engagement with property owners to start summer 2023. A feasibility study is also underway to get a more complete understanding and identify further potential flood risk management options, including NFM, that will reduce flood risk.	To be determined

No.	Location	Delivery lead	Planned Start	Planned finish	Planned scheme details	Est. Cost (£k)
P7	Severn Stoke	EA	Spring 2023	Late 2023	Planning permission and full business case approval are both in place for this scheme. Pre-construction activities are taking place - including stockpiling of material in advance of construction, archaeological investigations and discharge of planning conditions.	1800
P8	Tenbury Wells	EA	Late 2023	To be determined	Design work continues on this complex scheme. There have been increased costs due to increased complexities of scheme. Further funding requested. Outline business case approved on 02/12/2022. Planning permission submission spring 2023. Possible planning determination Summer 2023. Full business case submission Summer 2023. Construction possibly late 2023 (18-24 month construction period).	9800
P9	Barbourne Brook, Worcester	EA	01/07/22	01/03/24	Work on a business case to reduce flood risk on the Barbourne Brook in Worcester is underway. This has included a number of culvert surveys and model updates	To be determined
P10	Toronto Close, Worcester	EA	To be determined	To be determined	This scheme consists of a flood wall and flood embankment. It is hoped the funding gap, due to increased construction costs, can be filled with the announcement of the frequently flooded communities allowance. Sufficient funding is in place to allow completion of pre-construction activities, however. As at February 2023: detailed design to be finalised and planning application to be submitted, with full business case approval anticipated mid-2023.	2100

No.	Location	Delivery lead	Planned Start	Planned finish	Planned scheme details	Est. Cost (£k)
P11	Peopleton	WDC	2023-24	2023-24	Clearance of 520m of drainage channel.	5
P12	Dunley Brook, Aerley Kings	NWWM	ongoing	2025	Installation of SuDS to reduce the risk of flooding for properties, if modelling (currently ongoing) demonstrates that approved development does not already fully mitigate the risk.	To be determined (FDGiA bid to be submitted)
P13	Stourport Road, Bewdley	NWWM	Ongoing	Feb-23	Installation of a communal barrier in a courtyard to create a dry evacuation route for multiple flats when the Severn is in flood.	10 (WCC Cllr funding)
P14	Millennium Way, Catshill	NWWM	Feb-23	Feb-23	Natural Networks & Worcestershire Working with Water (WWwW) project in partnership with WCC & Catshill and North Marlbrook Parish Council; reinstating a section of dilapidated watercourse, improving flow of the Battlefield Brook & improving habitat potential.	10
P15	Plack Brook, Feckenham	NWWM	To be determined	2026-27	Diversion of existing flows to create an additional watercourse and reduce flood risk to properties and roads that are important for school access.	To be determined
P16	Pearl Lane, Stourport	NWWM	Ongoing	Summer 2023	Working with landowner to de-culvert a section of the watercourse south of Malvern Edge Court which is in Malvern Hills but would reduce flood risk for Wyre Forest residents upstream	To be determined (Natural Networks bid submitted)

No.	Location	Delivery lead	Planned Start	Planned finish	Planned scheme details	Est. Cost (£k)
P17	Sycamore Drive, Wythall (phase 1)	NWWM	Summer 2023	Summer 2023	Offline balancing area and earth bund to reduce risk to around 20 properties downstream, using RFCC funding in partnership with BDC, WCC & ST.	To be determined
P18	Childswickham Road, Broadway	ST	2023/24	To be determined	Detailed design is in progress on a scheme to reduce flooding along Childswickham Road in Broadway. The proposed scheme includes new larger sewers and specialist manhole covers to reduce flood risk properties and reduce flooding of the highway	To be determined
P19	Sugarbrook, A38, Bromsgrove	ST	To be determined	To be determined	Feasibility work is underway to consider options to reduce flood risk from the sewer network in Bromsgrove.	To be determined
P20	Upton Upon Severn	ST	Underway	Spring 2023	Construction is underway of a new pumping station, together with significant other works all designed to reduce infiltration into the network. The scheme reduces the risk of flooding and pollution and addresses known issues in Upton.	To be determined
P21	Albany Terrace, Worcester	ST	Underway	To be determined	The replacement and upgrading of sewers to improve their condition and meet the demands of a growing population and climate change.	750
P22	North and Middle Littleton	WCC	2023/24	2023/24	Surface water drainage scheme. With a place secured in the 6-year programme, a business case and scheme development work will be the next steps.	75

No.	Location	Delivery lead	Planned Start	Planned finish	Planned scheme details	Est. Cost (£k)
P23	County-wide	WCC	01/12/21	01/03/27	Continuation and expansion of WCC's successful NFM pilot project into the new six-year programme.	1350
P24	Kidderminster road, Bewdley	WCC	23/01/23	03/02/23	Repairs to drainage pipes.	15
P25	Birmingham Road, Bromsgrove	WCC	06/02/23	17/02/23	Ditching and outlet clearance.	15
P26	Hanbury Road, Droitwich	WCC	06/02/23	24/02/23	Spillway and drainage repairs (this is the second and final phase of this scheme).	23
P27	Tewkesbury Road, Eckington	WCC	27/02/23	17/03/23	New drainage system to tackle highway flooding.	23
P28	Stratford Road, Honeybourne	WCC	20/03/23	31/03/23	Further drainage works on Stratford Road.	15
P29	Spring Lane, Malvern	WCC	23/01/23	03/02/23	New drainage connection to offset highway flooding.	15
P30	A441 Birmingham Road, Redditch	WCC	09/01/23	03/02/23	New drainage pipe to tackle highway flooding.	30
P31	A38, Severn Stoke	WCC	06/02/23	17/02/23	Second phase of drainage improvements, tackling property and highway flooding.	15
P32	County-wide	WCC	22/23	22/23	39 other highways drainage schemes of sub-£10K value planned across the county.	185

No.	Location	Delivery lead	Planned Start	Planned finish	Planned scheme details	Est. Cost (£k)
P33	County-wide	WCC	21/22	21/22	Programme of drainage and flooding problem investigation works, including jetting, trial holes and CCTV surveys. N.B. £269K worth of this work has been delivered so far.	369

ANNEX B. FEBRUARY 2022 FLOOD EVENT - IMPACTED COMMUNITIES

Details of the impacts in some of the worst-affected communities from the flood event in February 2022 are given below.

Bewdley

- Flood warnings and a Severe Flood warning issued.
- Severnside demountable barriers and Beales Corner temporary barriers deployed – river levels exceeded height of temporary barriers.
- Bewdley gauge levels peaked at 5.34m (5th highest on record).
- Flooding to properties behind barriers at Beales Corner.
- Up to 80 properties impacted in Bewdley and surrounding area.
- River levels exceed height of Beales Corner temp barriers.

Stourport on Severn

- Up to 50 properties including businesses in Stourport are known to have been impacted in the February 2022 Flood.

Worcester

- Worcester river level gauge recorded 5.62m on 23/02/2022 (highest level since July 2007). Diglis river level gauge recorded 5.05m on 23/02/2022 (highest since Jan 2021)
- Flood alerts and warnings issued.
- Up to 30 properties impacted, including: community at Waterworks Road, and community at Diglis Avenue.

Severn Stoke

- Kempsey Yacht club gauge recorded 7.09m (highest since Feb 2014).
- Flood alerts and warnings issued.
- Properties in the community were impacted.

Upton upon Severn

- Saxons Lode river level gauge recorded 5.33m (highest since Feb 1990)
- Flood alerts and warnings issued.
- Approx 10 properties impacted.
- Waterside and New Street flood gates were operational during the February 2022 flood.

ANNEX C. EMERGENCY PLANNING & RESPONSE

Worcestershire County Council and district council emergency planning, drainage & highways officers work with other Risk Management Authority (RMA) partners, responders and the overarching West Mercia Local Resilience Forum in order to undertake the following.

- Help co-ordinate response to and recovery from the major flood events including:
 - provision of 24/7 Emergency Planning single point of contact for the Worcestershire Local Authorities to link with Local Resilience Forum partners through Command & Control arrangements
 - contribution to the West Mercia Local Resilience Forum Command & Control structure:
 - Bewdley Operational Co-ordination Group (Bronze Cell),
 - Tactical Co-ordination Group,
 - Strategic Co-ordination Group,
 - Communications Cell
 - operation of internal Gold, Silver and Bronze co-ordination structures.
 - co-ordination of support to the community and professional partners from the County Volunteers Emergency Committee (CVEC) including 4 x 4 support / Search and Rescue.
 - co-ordination, chairing and contribution to the Recovery Co-ordination Group.
 - contribution to and helping co-ordinate the flood event response debrief process.
- Contribute to the flood event formal investigation and production of an investigation report.
- Continue to support resilience within the identified Rapid Response Catchments.
- Continue development of a network of local rain gauges to assist in future investigations and flood warning.
- Attend parish council emergency planning fora and work with local communities to develop local resilience plans.
- Further develop individual organisation response plans.
- Install more remote watercourse monitoring equipment.
- Monitor and respond to watercourse gauge triggers.
- Further review sandbag policies.
- Produce generic resident update sheets for use during and after a flood event.

The Environment Agency continues to provide a 24/7 incident response capability. Rostered duty teams are available to respond to both flooding and environmental incidents.

ANNEX D. RISK MANAGEMENT AUTHORITY ROLES

Table 3: Risk management roles

Risk Management Authority	Core flood risk management role
Environment Agency	Main rivers, the sea and reservoirs
Water Authority (Severn Trent Water)	Sewerage system
Lead Local Flood Authority (Worcestershire County Council)	Surface water, groundwater, ordinary watercourses, Local Flood Risk Management Strategy, local leadership
Highway Authority (Worcestershire County Council)	Flooding caused by rain falling on the highway, highway drainage
District Councils (BDC, MHDC, RBC, WCityC, WDC, WFDC)	Ordinary watercourses
Internal Drainage Board (LSIDB)	Ordinary watercourses

ANNEX E. ROLE OF THE LEAD LOCAL FLOOD AUTHORITY

The Flood and Water Management Act 2010 (the Act) designated upper tier / unitary local authorities as Lead Local Flood Authorities (LLFA) and gave them a number of duties and powers including those listed below.

Table 4: Lead Local Flood Authority roles

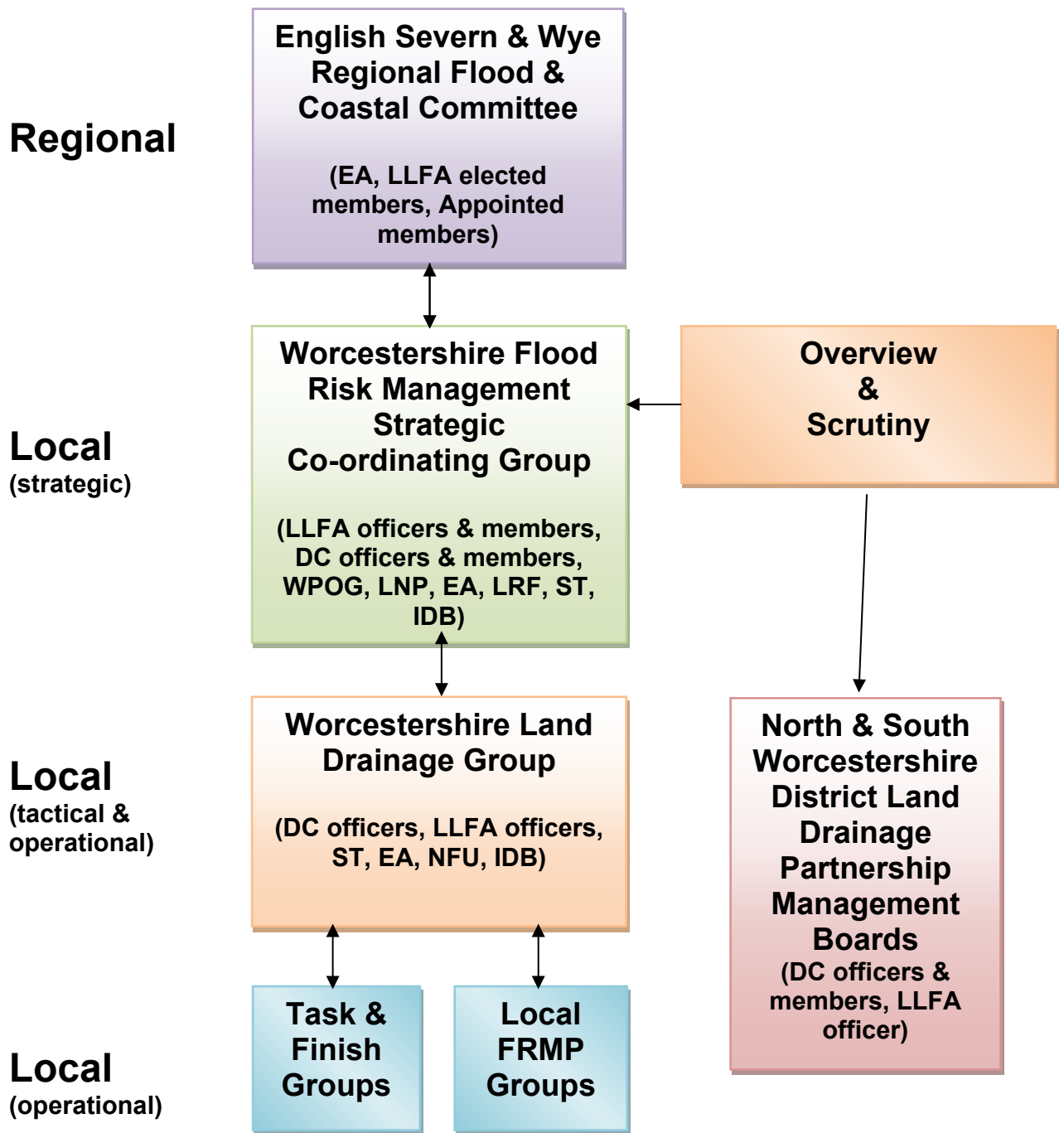
Lead Local Flood Authority Role	Summary of requirements
Duty to publish a Local Flood Risk Management Strategy	Develop, maintain, apply and monitor a strategy for local flood risk management of the area.
Duty to investigate flooding	Co-ordinate the investigation of significant flood events.
Duty to produce a record and register of structures and features	Maintain a register and record of structures and features which have a significant impact on flood risk.
Power to designate flood risk structures and features	Designate structures and features that affect flooding in order to safeguard them.
Power to carry out works	Undertake works to manage flood risk from surface runoff and groundwater.
Duty & power to administer and enforce the Land Drainage Act with regard to Ordinary Watercourses	Discharge consent applications for significant changes to ordinary watercourses and take enforcement action under the provisions of the act as required.
Duty to respond to requests for scrutiny of planning application surface water issues	Respond to requests from LPAs to scrutinise and report on surface water issues within planning applications

Under the Flood Risk Regulations (2009) Lead Local Flood Authorities have some additional duties listed below.

Table F: Further Lead Local Flood Authority roles

Lead Local Flood Authority Role	Summary of requirements
Duty to produce a PFRA	Produce a Preliminary Flood Risk Assessment by 2011 in partnership with the EA
Duty to review the PFRA every six years	Carry out a review in partnership with the EA
Duty to produce a map and Flood Risk Management Plan for 'Flood Risk Areas'	Production of Maps and Flood Risk Management Plans led by the EA supported by Lead Local Flood Authorities

ANNEX F. MAIN FLOOD RISK MANAGEMENT GOVERNANCE GROUPS



ANNEX G. FLOOD RISK MANAGEMENT ABBREVIATIONS

Table 6: Abbreviations

Abbreviation	Definition
CCTV	Closed Circuit Television
CIL	Community Infrastructure Levy
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EU	European Union
FDGiA	Flood Defence Grant in Aid
FMfSW	Flood Map for Surface Water
FRM	Flood Risk Management
FRMP	Flood Risk Management Plan
FRMA	Flood Risk Management Authority
FRMSCG	Flood Risk Management Strategic Co-ordinating Group
FRR	Flood Risk Regulations
FWMA	Flood & Water Management Act
GIS	Geographical Information System
HRA	Habitats Regulation Assessment
IDB	Internal Drainage Board
LEP	Local Economic Partnership
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LRF	Local Resilience Forum
LSIDB	Lower Severn Internal Drainage Board
MAFP	Multi-agency Flood Plan
NFF	National Flood Forum
NFM	Natural Flood Management
NFU	National Farmers Union
OWC	Ordinary Watercourse
PFR	Property Flood Resilience
PFRA	Preliminary Flood Risk Assessment
RFCC	Regional Flood & Coastal Committee
RMA	Risk Management Authority
SAB	SUDS Approving Body
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SLA	Service Level Agreement
ST	Severn Trent Water Limited
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
SWDP	South Worcestershire Development Plan
WCC	Worcestershire County Council
WISE	Water Infrastructure for a Sustainable Economy
WLDG	Worcestershire Land Drainage Group