

Flood Risk Management in Worcestershire

Annual Report 2021

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1. INTRODUCTION



Figure 1: Kempsey pumps in operation in January 2021

Since the last report in September 2020 there have been three notable flood events in Worcestershire: in December 2020, January 2021 and in June 2021. December 2020 and June 2021 were relatively small, with internal flooding of between 5 and 10 properties alongside widespread flooding of highways and uninhabited land. January 2021, however, was another large event on the River Sever, similar to that of February and March 2020, with internal flooding of around 230 residential properties and 60 businesses along the Severn corridor, in particular in Bewdley, Stourport and Worcester (Diglis and the city centre), but also with impacts in Shrawley, Severn Stoke and Upton upon Severn.



Figure 2: Tweet from the EA regarding flooding in Worcester in January 2021

These flood events have reinforced why flood risk management remains a high priority for Worcestershire County Council, the other Risk Management Authorities and the Government.

Even with the commitment of resources to the major flood events and the operational restrictions created by the Covid-19 pandemic, the Risk Management Authorities have continued, over the last 12 months, to work closely with other partners,

landowners and impacted communities. Together they have 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 have had their risk of flooding reduced, where practicable.

In response to feedback received, this annual report to the Overview and Scrutiny Panel has been re-structured to be briefer than in previous years, while focussing more on progress in the last 12 months, particularly with regard to flood schemes (more details can be found in Appendix 1).

2. UNDERSTANDING AND PRIORITISING FLOOD RISK (Aim No. 1 in Strategy)

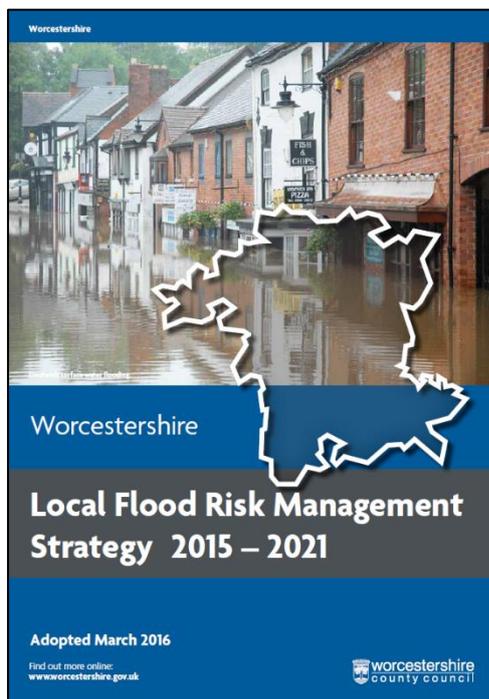


Figure 3: Worcestershire's current Local Flood Risk Management Strategy

Flood risk management in Worcestershire has continued to be guided by the statutory **Local Flood Risk Management Strategy**, a key element of which is the regularly updated action plan. This contains a number of actions which have 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 which have been developed, are constantly being updated and are referred to in the work of Worcestershire County Council and its partners in understanding and prioritising flood risk in the county.

The Flood and Water Management Act (2010) in Section 19 places a duty on the Lead Local Flood Authority to formally **investigate** flooding it deems to be significant

and publish a report of the findings. A policy defining the Lead Local Flood Authority's approach to this and criteria for what represents 'significant' is set out in the Local Flood Risk Management Strategy.

Section 19 Flood Investigation Report Report Reference:			
<small>Under Section 19 of the Flood and Water Management Act 2010 Worcestershire County Council (WCC) as the Lead Local Flood Authority, has a duty to investigate certain incidents of flooding and to establish which authorities have duties in relation to the event. We will investigate all incidents of flooding that are considered to be locally significant. The number of properties deemed to be locally significant are defined in Worcestershire's Local Flood Risk Management Strategy. We will continue to investigate as many other incidents of flooding as our resources allow. This document serves as an assessment of a flooding incident which meets the criteria listed within the Local Flood Risk Management Strategy.</small>			
Date of Incident:		Date of Investigation:	
Site Location:		Completed by:	
			
<small>Figure 1 Location plan (Hagley example)</small>			
Figure 4: The front page of the new Section 19 report template			

Despite the relatively small number of impacted properties (10 in total), the circumstances surrounding the flood events in Hagley in October and November 2019 led to a commitment to carry out a formal investigation. The investigation report has been produced in draft and the final version is due to be published on the website in the next few months, having been delayed by the subsequent county-wide significant flood events and the response to Covid 19. A mitigation action plan has been put in place alongside the investigation in response to issues highlighted as they became apparent, and there is now an active flood group in Hagley.

Work is ongoing to produce a **new Section 19 investigation report template** to be used for future flood events.

3. REDUCING THE LIKELIHOOD AND IMPACT OF FLOODING (Aim No. 2 in Strategy)

3.1 Flood alleviation schemes

As mentioned in the Introduction, this Annual Report has been reshaped - compared to previous editions - in order to be more concise. Accordingly, all flood alleviation schemes can now be found in Tables 1 and 2, which can be found in Appendix 1.



Figure 5: A recently completed pond with a leaky dam that aims to 'slow the flow' to the benefit of local drainage systems in Hollywood (this is scheme C5 in Table 1)

Table 1 lists Environment Agency, Worcestershire County Council, second tier local authority, Lower Severn Internal Drainage Board, and Severn Trent Water schemes that have all been completed since the last annual report, whilst Table 2 sets-out all of the schemes that are currently being planned. The schemes in these two tables all 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 one example of a type of scheme that spans both tables.

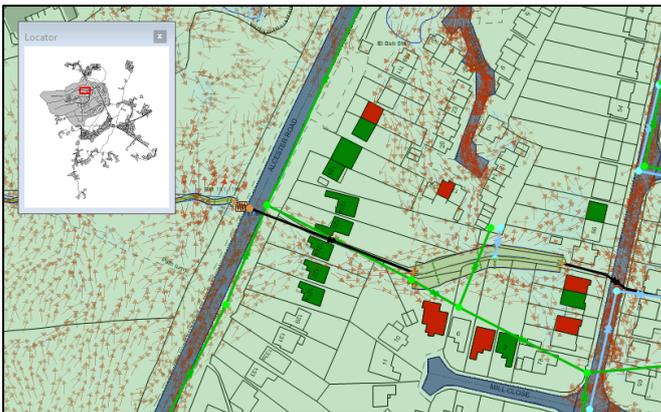


Figure 6: Modelling undertaken in Wythall

The previous edition of the six-year programme for schemes - the means by which government investment in all schemes across England is overseen, via the twelve Regional Flood and Coastal Committees - came to an end in March 2021. The new six-year programme, which has attracted increased government funding, launched on 1 April 2021: Table 2 in Appendix 1 contains schemes that are in the new six-year programme.

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

3.2 Maintenance

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



Figure 7: Tenbury Wells flooding from the River Teme

3.2.1 Main Rivers

In addition to the assessment and development of flood alleviation schemes that are detailed in Table 2 in Appendix 1, over the report period the Environment Agency has 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.

In its strategic role, the Environment Agency has, during the last 12 months undertaken the following.

- Overseen and directly implemented the final stages of the English Severn and Wye Regional Flood and Coastal Committee 6-year capital investment programme (2015 – 2021) within which over £12 million in flood defence benefits has reduced flood risk to over 500 homes.
- Led preparation for the next Regional Flood and Coastal Committee six-year programme beyond 2021.
- Continued to support the ongoing development of the River Severn Partnership.
- Provided flood risk technical support and guidance on a number of major infrastructure projects including the Southern Link Road Phases 3 and 4.
- Worked with partners to align economic growth and local development plans with flood and environmental risks.



Figure 8: The temporary barriers in Bewdley after being breached in January 2021

3.2.2 Ordinary Watercourses

In addition to the assessment, development and delivery of flood alleviation schemes that are detailed in Tables 1 and 2 in Appendix 1, 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** have continued to ensure that the extensive network of smaller watercourses and ditches is appropriately managed and maintained. This has been achieved through the following.

- Inspection of over 100km 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 68 applications processed and a number addressed by pre-application discussions.
- Implementation of land drainage enforcement powers including around 120 successful informal enforcement actions.
- Recording and monitoring of flood risk management assets on the statutory 'Register & Record of Structures & Features'.
- Direct maintenance by the Lower Severn Internal Drainage Board including vegetation management and some improvement works at Gadfield Elm to help evacuate water from the highway to alleviate the flooding to a residential property. This involved removing a stone arch and another field access culvert and replacing with a larger diameter culvert. Around 200m of channel was widened and reprofiled.

3.2.3 Sewerage network

Severn Trent Water has continued to deliver its flood risk management duties through a range of activities over the last 12 months.

- **Reactive response:** We have responded to reports of operational issues on our network, including responding to internal and external sewer flooding incidents in the Worcestershire area during 2020/2021. We investigate the root cause of these issues (e.g. by use of CCTV) and undertake work (e.g. clearing blockages) to ensure the sewer network is fully operational.

- **Proactive Works Programmes on our sewerage assets:** We have increased our level of proactive investment to prevent flooding from our network (including flooding) associated with operational and structural defects on the sewer network. This has included expanding our “Blockbuster programme”, which has helped bring down the number of operational incidents.
- **Educating customers including:**
 - visiting schools in Worcestershire and delivering key messages on saving water and sewer misuse to 2,330 children through interactive assemblies, workshops and eco talks.
 - proactively seeking new schools to visit and continue to build on partnerships with existing schools and colleges.



Figure 9: An example of typical highway and sewer flooding

3.2.4 Highway drainage

Essential maintenance of highway drainage infrastructure has continued over the report-period. 100 broken gully connections have been repaired by Ringway as part of the Highways contract, with a further 24 gullies scheduled for repair, whilst over 21,000 gullies have been jetted.

3.3 Flood response and recovery

Worcestershire County Council, the Districts, Environment Agency, Severn Trent and other partners have maintained duty rotas and responded to flooding incidents over the last 12 months. Of particular note is the response to the larger flood event in January 2021 with the operation of demountable and temporary barriers by the Environment Agency in Bewdley and Worcester, the Severn Trent’s deployment of mobile pumps at Bewdley, Worcester and Upton-on-Severn.



Figure 10: The destruction left after the Dick Brook flooding of 2007

In addition to the day-to-day work of Worcestershire County Council and its partners to respond to and improve our response to flooding (see also Appendix 2), Worcestershire County Council also led a multi-agency task and finish group to update the Worcestershire Multi-Agency flood plan, following new guidance published by Defra. The document has now been sent for peer review by Defra as required. The multi-agency group has also undertaken the following.

- A review of the **Dick Brook Rapid response catchment framework** and provided awareness training and an exercise for responders.
- **Beales Corner Plan** update following on from the failure of the temporary barrier in January 2021. Worcestershire County Council road resurfacing has been undertaken and an improved temporary scheme has been tested and is being installed. A revised plan is now in place pending works to create a permanent barrier which is expected to take place in the next few years.
- Commenced work in identifying **Camping and Caravan** sites at high risk of flooding.
- Started the process of **reviewing individual teams' flood response processes** to enable better co-ordination with partners and more joined up communications before, during and after a flood event. The County Council's Flood Risk Management team's process has been updated.

3.4 Natural Flood Management

The three-year DEFRA (Government Department for Food and Rural Affairs) funded pilot study is now coming to an end. It has been a hugely successful project, installing over 300 interventions in the designated catchments of the River Isbourne, Merry Brook and Dowles Brook. Works have been undertaken within these areas and relationships built with local communities, landowners, farmers and contractors.



Figure 11: One of the many small storage areas installed as part of the Worcestershire Natural Flood Management pilot project, which was funded by Defra over the last 3 years

Funding has now been allocated via the Regional Flood and Coastal Committee to allow the project to be extended for a further six years, continuing works in the current catchments, but also looking to extend to other areas of the Worcestershire county.

With climate change at the forefront of people's minds and the likelihood of intense rainfall events becoming more common, it is imperative that Natural Flood Management measures are identified and implemented on a catchment scale, looking at ways to slow, store and hold back water, but also considering the bigger picture of how land is used and farmed and what can be done collectively to help reduce run-off, overland flow and downstream flooding.

3.5 Spatial planning and development control

Wyre Forest District Council has been going through the process of drafting its new Local Plan, whilst Malvern Hills District, Wychavon District and Worcester City Councils have been continuing to work on the collective South Worcestershire Development Plan Review. Flood risk management has been woven into the drafting of both plans.



Figure 12: Surface water modelling undertaken in support of the planning process for Hoo Brook Roundabout in Kidderminster

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 have collectively made representations on 2040 planning applications and 123 pre-application consultations. This work has ensured that flood risk management and all matters relating to drainage have been properly considered and embedded within the County’s proposed developments.

4. GOVERNANCE & PARTNERSHIPS (Aim No. 3 in Strategy)

4.1 Regional Flood & Coastal Committee

The English Severn & Wye Regional Flood & Coastal Committee plays 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.



Figure 13: The English Severn & Wye Regional Flood & Coastal Committee logo

The main focus for the Regional Flood & Coastal Committee over the last 12 months has been the successful delivery of schemes and achievement of targets within the final year of the six-year programme which finished in March 2021, alongside the priority to prepare for and set in motion the current six-year programme, including a number of schemes in Worcestershire.

4.2 River Severn Partnership

The River Severn Partnership, formed in September 2019, brings together the Environment Agency, Local Authorities, Local Enterprise Partnerships, Severn Trent Water, Water Resources West, Natural Resources Wales, Wildlife Trusts and others to establish a strategy for adapting to climate change and to improve resilience across an area which covers the Rivers Severn, Teme, the Warwickshire Avon and the Wye.

£1.5 million was secured by the Partnership in recognition of the innovative action it is seeking to take to build resilience. The Partnership has been chosen as one of four nationally to trial and develop new ways of planning ahead and making wise investment choices based on the long-term uncertainties brought by climate change.

Over the last 12 months there have been discussions regarding how the River Severn Partnership works together with the Regional Flood and Coastal Committee.

4.3 Other groups, partnerships and fora

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

- 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

5. COMMUNITY ENGAGEMENT & RESILIENCE (Aim No. 3 in Strategy)

5.1 Local flood groups

The Risk Management Authorities have worked closely with an increasing number of community flood groups over the last 12 months at locations including Hagley, Hollywood (Wythall) and Tenbury.



Figure 14: A local community working together to remove flood water from a home

Community resilience is a major priority within the new National Flood Risk Management Strategy, and it is key that support for and engagement with these groups is continued and that more groups are encouraged to take shape in other at-risk communities, not least those severely impacted in the major 2019-21 flood events.

These groups are generally very active within the community and they provide a key link by establishing partnerships with the Risk Management Authorities.



Figure 15: The National Flood Forum's post-flood Recovery Trailer

This important work is made possible and most effective by the embedded partnership with the National Flood Forum, a Bewdley-based charity with considerable experience and expertise in working with flooded individuals and communities. This includes support immediately after a flood event for flooded people and Risk Management Authorities, and in the long-term through the

formation of community flood action groups. We are looking to extend this partnership into future years.

The National Flood Forum's experience, empathy and critical independence is a key component in the successful engagement record we have and helps augment the development of trust.

6. PLANS, POLICIES & STRATEGIES (Aim No. 4 in Strategy)

6.1 Local Flood Risk Management Strategy

The Strategy Action Plan articulates a number of targets for the Risk Management Authorities. The Strategy was due to be reviewed and updated during 2021, although we are awaiting the updated guidance on development of Local Flood Risk Management Strategies which is due out from the Environment Agency prior to doing this work. Progress with implementation is being monitored by the Worcestershire Flood Risk Management Strategic Co-ordinating Group.

6.2 Flood Risk Management Plans

There are currently local multi-agency Flood Risk Management Plan groups in Worcestershire which assess and plan mitigation measures to address flooding where there are high concentrations of past and future potential floodspots. A standard local 'Flood Risk Management Plan' process and reporting structure has been adopted and followed at a number of locations such as Bromsgrove, Droitwich, Hollywood, Redditch and, during the last 20 months, Hagley.

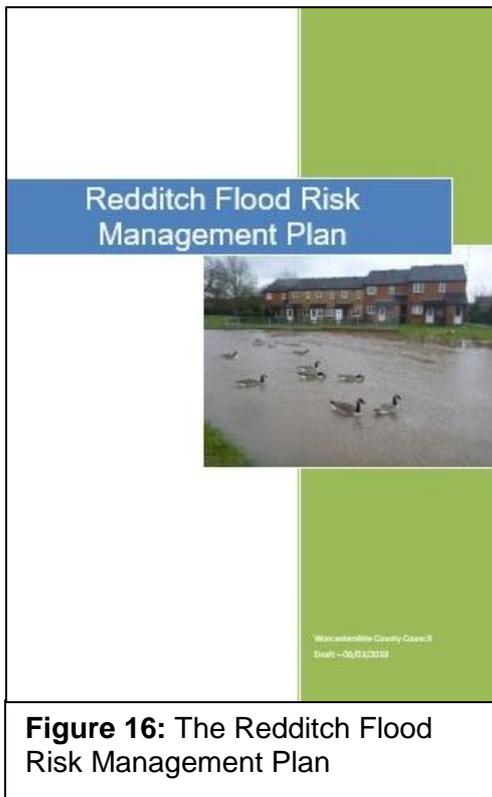
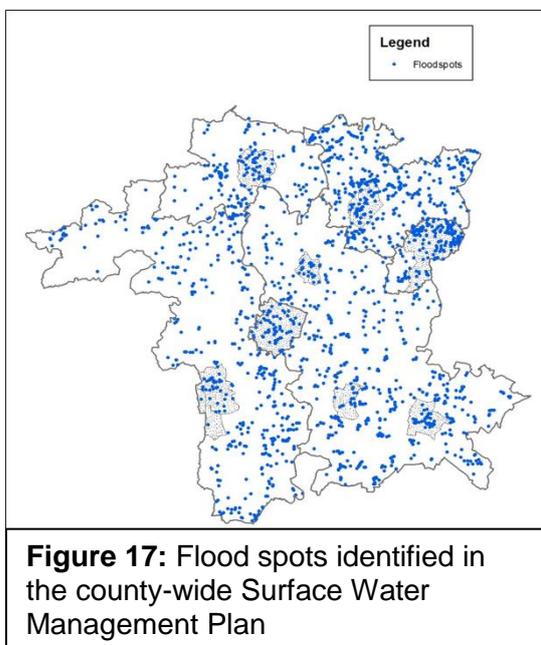


Figure 16: The Redditch Flood Risk Management Plan

In addition, Worcestershire County Council as Lead Local Flood Authority have been working with the Environment Agency to develop the national Flood Risk Management Plan for the Severn and Humber River Basin Districts over the last

two years for the second cycle of Flood Risk Management Plans to cover the period 2021-2027. Similar to the first cycle Flood Risk Management Plans covering the period 2015-2021, these are being produced for each River Basin District in England and cover all sources of flooding. These Flood Risk Management Plans set out proposed objectives and our measures to manage flood risk focussing primarily on nationally identified Flood Risk Areas where the likelihood and impact of flooding is likely to be significant for people, the economy, or the environment including cultural heritage. Recognising that there are areas at risk of flooding outside of Flood Risk Areas, the Flood Risk Management Plans have been expanded to also show what is happening in other areas. The Environment Agency is consulting on the draft second cycle Flood Risk Management Plans for three months starting this autumn 2021 via their online consultation hub, and this will be linked from GOV.UK. The draft measures will be displayed on a new online mapping tool, the Flood Plan Explorer.

6.3 Other related plans, policies and strategies



A range of other related plans, policies and strategies has been produced and / or contributed to by the Risk Management Authorities over the last 12 months including:

- 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

7. FUTURE SCOPING

7.1 Future actions

Even with the resources which we had to apply in response to, recovery from and investigation of the major flood events over the last autumn & winter, a great deal of progress has been made with many aspects of flood risk management over the last 12 months. However, more work is required, not least that which has emerged from or been confirmed by the recent major flood events. Priorities for the next 12 months include the following.

Further progress in the following areas

- Publication and implementation of the Hagley formal investigation report.
- 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.
- Further development and implementation of the local flood risk management plan for the new Redditch 'Flood Risk Area', as identified by the review of the Preliminary Flood Risk Assessment.
- Implementation of the six-year, county-wide Natural Flood Management project.
- Implementation of lessons learned from recent major flood events and further development and testing of emergency plans.

Ongoing actions



Figure 18: Aerial view of a few of the many Natural Flood Management features installed as part of the 3-year Defra pilot project. We have submitted a business case for this to continue for the next six years

- Continued implementation of the Local Flood Risk Management Strategy Action Plan.
- Review and refresh of the Local Flood Risk Management Strategy and accompanying action plan.
- Assessment and investigation of future potential surface water flood risk.

- Introduction and implementation of new schemes onto the Regional Flood & Coastal Committee 6-year Medium Term Plan, and completion of schemes already on it.
- Ongoing delivery of the highway surface water drainage scheme programme.
- Continued maintenance of Flood Risk Management infrastructure including highway drainage and flood defences.
- Further development and monitoring of the Register & Record of flood risk structures and features.
- Further development and updating of the Register of Flood Risk Management Schemes.
- Further engagement with communities and landowners focusing on the development of local engagement and resilience.
- Ongoing scrutiny of planning application drainage plans.
- Exploration of options for the future maintenance of Sustainable Drainage Systems (SuDS).
- Further integration between economic growth, infrastructure development and flood risk management.
- Continued liaison with communities to support existing flood action groups and establish new ones in areas at risk of flooding.



Figure 19: An aerial view of Powick in flood. Worcestershire County Council have been working with the Environment Agency to look at any opportunities to mitigate the flood risk in the village.

APPENDIX 1. FLOOD ALLEVIATION SCHEMES – COMPLETED AND PLANNED

Table 1: Completed flood alleviation schemes

No.	Location	Delivery lead	Scheme details	Cost (£k)
C1	Bewdley and Stourport	North Worcestershire Water Management	Property flood resilience measures installed at 18 residential and 4 business properties affected by 2020 River Severn flooding in Bewdley and Stourport.	110
C2	Heart of England Forest land, Broad Marston	Wychavon District Council	Creation of 60m bund that prevents surface water runoff from flooding a road and seven properties.	5
C3	Broad Street, Bromsgrove	Severn Trent Water	A scheme consisting of flood gates and a retaining wall, designed to reduce sewer flooding to properties that results from hydraulic capacity issues in the sewer network	tbc
C4	Gadfield Elm	Lower Severn Internal Drainage Board	Replacement of culvert (with a larger size culvert) and widening and reprofiling of 200m of watercourse.	8
C5	Beaudesert Park, Hollywood	North Worcestershire Water Management	A pond with a leaky dam that aims to 'slow the flow' to the benefit of drainage in May Lane. Part of an overall strategy to reduce flood risk in the Hollywood/ Wythall area, for which funding is being sought.	3
C6	Malvern Hills district: properties across the district affected by February 2020 flooding from the Rivers Severn and Teme	Malvern Hills District Council	Property flood resilience measures. A grant scheme for property-owners. 177 residential properties and 131 business properties are eligible. The scheme is ongoing (see also Planned Schemes table).	282
C7	Wychavon district: properties across the district affected, primarily, by surface water flooding in November 2019	Wychavon District Council	Property flood resilience measures. A grant scheme for property-owners. 32 residential properties and 4 business properties are eligible. The scheme is ongoing (see also Planned Schemes table).	55

Table 1: completed flood alleviation schemes, continued/

No.	Location	Delivery lead	Scheme details	Cost (£k)
C8	Bridges Stone, Alfrick	Worcestershire County Council	New gullies and connections.	11
C9	Grafton(Beckford: Grafton, U46012), Ashton Under Hill	Worcestershire County Council	New gullies and repairs to existing system, plus new manhole south of the Old Cider Mill.	11
C10	Beales Corner, Bewdley	Worcestershire County Council	Carriageway resurfaced in order to improve the resilience of the EA's temporary barrier system.	146
C11	Berwick Lane, Birlingham	Worcestershire County Council	New system down lane - old system badly rooted (replacement of 40m of pipe)	15
C12	Vicarage Lane, Childswickham	Worcestershire County Council	Pipe repairs.	11
C13	Doverdale Lane, Droitwich	Worcestershire County Council	New highway drainage infrastructure installed.	10
C14	A443 Worcester Road, Great Witley	Worcestershire County Council	240m of new road drainage installed.	70
C15	Chapel Street, Hagley	Worcestershire County Council	Replace defective ACO drain with gullies.	13
C16	Haybridge Avenue, Hagley	Worcestershire County Council	Renewal of existing soakaway, together with creation of new soakaway.	12
C17	Sweetpool Lane, Hagley	Worcestershire County Council	Gulley works.	10
C18	Worcester Road, Hagley	Worcestershire County Council	Replacement of highway culvert.	55
C19	Unnamed road (C2097), near to Parsons Hall Farm, Kyre	Worcestershire County Council	Replacement of ditch with pipe (pipe will prevent subsidence).	30

Table 1: Completed flood alleviation schemes, continued/

No.	Location	Delivery lead	Scheme details	Cost (£k)
C20	Holywell Road, Malvern	Worcestershire County Council	New culvert across carriageway, plus new gullies	14
C21	Lower Wilton Road, Malvern	Worcestershire County Council	ACO drainage channel and new outfall system installed.	15
C22	Pickersleigh Rd / Meadow Road, Malvern	Worcestershire County Council	Investigation and new soakaway manhole	13
C23	Stockton Road, Malvern	Worcestershire County Council	New drainage and inlet and outlet work on existing drainage-run prevents flooding of A road.	70
C24	Lickey Rock, Marlbrook	Worcestershire County Council	New underground drainage infrastructure added.	10
C25	Bridgnorth Road, Shatterford	Worcestershire County Council	Phase 1 complete: storage area created, and new gullies installed. (Phase 2 will repair collapsed culvert and add further drainage infrastructure.)	30
C26	Shaw Lane, Stoke Prior	Worcestershire County Council	Phase 1 complete: utilities work (by others) destroyed drainage infrastructure. Drainage now re-routed and new access created. Phase 2 will need to be done by others, led by North Worcestershire Water Management and Wychavon DC.	18
C27	Dunley Road, Stourport on Severn	Worcestershire County Council	Headwall discharged onto road: new swale now collects surface water.	15
C28	Bungay Lake Road, Timberhonger	Worcestershire County Council	New drainage infrastructure and repairs to existing: owners of neighbouring properties cleared their ditches under the scheme's road closure.	20
C29	County-wide	Worcestershire County Council	Thirty other highways drainage schemes of sub-£10K value delivered across the county.	144
C30	County-wide	Worcestershire County Council	Programme of drainage and flooding problem investigation works (including jetting, trial holes and CCTV surveys).	170

Table 2: Planned schemes

Planned Environment Agency flood alleviation schemes

No.	Location	Delivery lead	Planned Start	Planned finish	Scheme details	Est. Cost (£k)
P1	Beales Corner, Bewdley	Environment Agency	2022-23	2023-24	Permanent flood alleviation scheme (which is likely to include some demountable sections) that will replace existing temporary barrier system.	6300
P2	Bromsgrove	Environment Agency	2022-23	2022-23	An outline business case, which looks at a range of options, is currently being developed.	1107
P3	Evesham, Droitwich, Himbleton, Wickhamford and Worcester	Environment Agency	2021-22	2026-27	Property flood resilience schemes in Evesham, Droitwich, Himbleton, Wickhamford and Worcester	1806
P4	Hagley	Environment Agency	To be determined	To be determined	Further scheme proposals are currently being prepared for submission to the Regional Flood & Coastal Committee's six-year programme, which received increased Government funding. This includes a scheme for Hagley that will look at reducing flood risk on a catchment-wide basis.	To be determined
P5	Severn Stoke	Environment Agency	01/05/2022	01/03/2023	Planning permission and outline business case approval are both in place for this scheme.	1796
P6	Tenbury Wells	Environment Agency	2022-23	2024-25	Detailed design work continues on this large-scale flood risk management scheme, with the target of construction starting in the Spring of 2022.	6465

Table 2: Planned Environment Agency flood alleviation schemes, continued/

No.	Location	Delivery lead	Planned Start	Planned finish	Scheme details	Est. Cost (£k)
P7	Barbourne Brook, Worcester	Environment Agency	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	2375
P8	Toronto Close, Worcester	Environment Agency	tbc	tbc	The outline business case has been approved and construction is programmed to commence in early 2022. The scheme consists of a flood wall, a flood bank and property resilience measures. Construction anticipated to take 5 months.	490

Table 2: Other planned flood alleviation schemes

No.	Location	Delivery lead	Planned Start	Planned finish	Scheme details	Est. Cost (£k)
P9	County-wide	Worcestershire County Council	01/12/21	01/03/27	Worcestershire Working with Water: Natural Flood Management (NFM) Project. The continuation and expansion of WCC's successful NFM pilot project into the new six-year programme. The business case for this work has been submitted for final approval.	1350

Table 2: Other planned flood alleviation schemes, continued/

No.	Location	Delivery lead	Planned Start	Planned finish	Scheme details	Est. Cost (£k)
P10	Areley Kings	North Worcestershire Water Management	2022-23	2022-23	Further modelling of the Severn Trent Water system is underway following initial modelling work. Works are likely to centre-around making space for excess surface water, achieved by opening-up some stretches of buried watercourse and by creating some storage areas.	80
P11	Bewdley and Stourport	North Worcestershire Water Management	2021-22	2021-22	Property flood resilience measures to be installed on 20 residential and 15 business properties affected by 2020 River Severn flooding in Bewdley and Stourport.	175
P12	Childswickham Road, Broadway; A38, Bromsgrove; Buckland Road, Childswickham; Windrush Crescent, Malvern; Upton upon Severn	Severn Trent Water	tbc	tbc	Schemes for the listed locations, which would aim to reduce flooding that results from, or is contributed to by the sewer network are in the feasibility stage of assessment.	To be determined
P13	Plack Brook, Feckenham	North Worcestershire Water Management	2022-23	2022-23	Diversion of existing flows to create an additional watercourse and reduce flood risk to properties and roads that are important for school access.	65
P14	Hollywood and Wythall	North Worcestershire Water Management	01/04/2027	01/03/2028	Flooding in this area has come from fluvial and surface water sources. Survey work has been done and modelling work is underway: initial options include increasing capacity of the watercourses, improving trash screens, and providing flood storage areas.	1015

Table 2: Other planned flood alleviation schemes, continued/

No.	Location	Delivery lead	Planned Start	Planned finish	Scheme details	Est. Cost (£k)
P15	Lower Lane, Kinsham	Severn Trent Water	2021-22	2021-22	Pipe lining and pipe repair scheme to reduce infiltration into the sewer network and thus reduce flooding.	To be determined
P16	North and Middle Littleton	Worcestershire County Council	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
P17	Malvern Hills district: properties across the district affected by February 2020 flooding from the Rivers Severn and Teme	Malvern Hills District Council	01/02/2020	01/07/2022	Property flood resilience measures. A grant scheme for property-owners. 177 residential properties and 131 business properties are eligible. The scheme is ongoing (see also Completed Schemes table). The final total cost will depend upon the number of valid applications received.	To be determined
P18	North Worcestershire	North Worcestershire Water Management	01/03/2022	01/03/2025	A property flood resilience scheme, to cover North Worcestershire, is being developed for properties outside the scope of potential group or large-scale schemes.	2160
P19	Severn Stoke	Worcestershire County Council	2022-23	2022-23	Surface water drainage scheme. Initial investigation work has been undertaken, but this has revealed that further investigation is needed: this will be done early next year.	15
P20	Wychavon district: properties across the district affected, primarily, by surface water flooding in November 2019	Wychavon District Council	01/11/2019	01/02/2022	Property flood resilience measures. A grant scheme for property-owners. 32 residential properties and 4 business properties are eligible. The scheme is ongoing (see also Completed Schemes table). The final total cost will depend upon the number of valid applications received.	To be determined

Table 2: Planned drainage schemes

No.	Location	Delivery lead	Planned Start	Planned finish	Scheme details	Est. Cost (£k)
P21	A443 Worcester Road, Abberley	Worcestershire County Council	21/11/2021	03/12/2021	New gully, ACO drain and kerbing	15
P22	Grafton (Beckford: Grafton U46012), Ashton Under Hill	Worcestershire County Council	21/03/2022	31/03/2022	New drainage system diversion	20
P23	A4103, Bransford	Worcestershire County Council	18/10/2021	02/11/2021	Improvements to highway drainage.	65
P24	Swan Lane, Bromsgrove	Worcestershire County Council	25/10/2021	05/11/2021	Ditching siding out pipe repairs	13
P25	Eckington Road, Bredon	Worcestershire County Council	29/11/2021	17/12/2021	Repair and make safe washout void next to carriageway	30
P26	Broadway Bypass, Broadway	Worcestershire County Council	31/01/2022	18/02/2022	Ditching	30
P27	Egg Lane, Claines	Worcestershire County Council	04/10/2021	15/10/2021	New 50m of pipe and existing gully improvements	15
P28	Back Lane to Pershore Road, Great Comberton	Worcestershire County Council	07/12/2021	17/12/2021	replacement of 40m of pipe	10
P29	Station Road, Hagley	Worcestershire County Council	18/10/2021	29/10/2021	Pipe repair and replacement	12
P30	Stourbridge Road, Hagley	Worcestershire County Council	2021-22	2021-22	Pipe repair and replacement, plus further new infrastructure	15
P31	Harrow Lane, Himbleton	Worcestershire County Council	2021-22	2021-22	New system to outfall	30

Table 2: Planned drainage schemes, continued/

No.	Location	Delivery lead	Planned Start	Planned finish	Scheme details	Est. Cost (£k)
P32	Stourbridge Road, Kidderminster	Worcestershire County Council	2021-22	2021-22	Surface 'reshaping' to improve drainage	25
P33	Stourport Road, Kidderminster	Worcestershire County Council	10/01/2022	21/10/2022	New drainage infrastructure needed	30
P34	Howsell Road, Malvern	Worcestershire County Council	15/11/2021	26/11/2021	Replace 35m defective 150mm diameter pipe	15
P35	Crossways, Mable	Worcestershire County Council	29/11/2021	10/12/2021	Investigation and then new drainage needed	10
P36	Bridgnorth Road, Shatterford	Worcestershire County Council	25/10/2021	05/11/2021	Phase 2: repair of collapsed culvert plus further drainage infrastructure works	20
P37	U47209, Upper Moor	Worcestershire County Council	08/11/2021	19/11/2021	New gullies and ditching	20
P38	Bury End Lane, Upton upon Severn	Worcestershire County Council	27/09/2021	08/10/2021	New gullies and ditch.	20
P39	Manor Road, Wickhamford	Worcestershire County Council	02/02/2022	18/02/2022	Replacement defective pipework	18
P40	Kingsford Lane, Wolverley	Worcestershire County Council	2021-22	2021-22	Gulley and ditch work	10
P41	Broadwas, Callow End, Castlemorton, Cotheridge, Cradley, Malvern, Worcester	Worcestershire County Council	2021-22	2021-22	New trash screens, and in some cases other associated works such as headwall repairs and ditching, at the named locations.	38
P42	County-wide	Worcestershire County Council	2021-22	2021-22	46 other highways drainage schemes of sub-£10K value planned across the county.	290
P43	County-wide	Worcestershire County Council	2021-22	2021-22	Programme of drainage and flooding problem investigation works (including jetting, trial holes and CCTV surveys). £170K-worth of work delivered so far.	353

APPENDIX 2. 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.

APPENDIX 3. 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

APPENDIX 4. 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

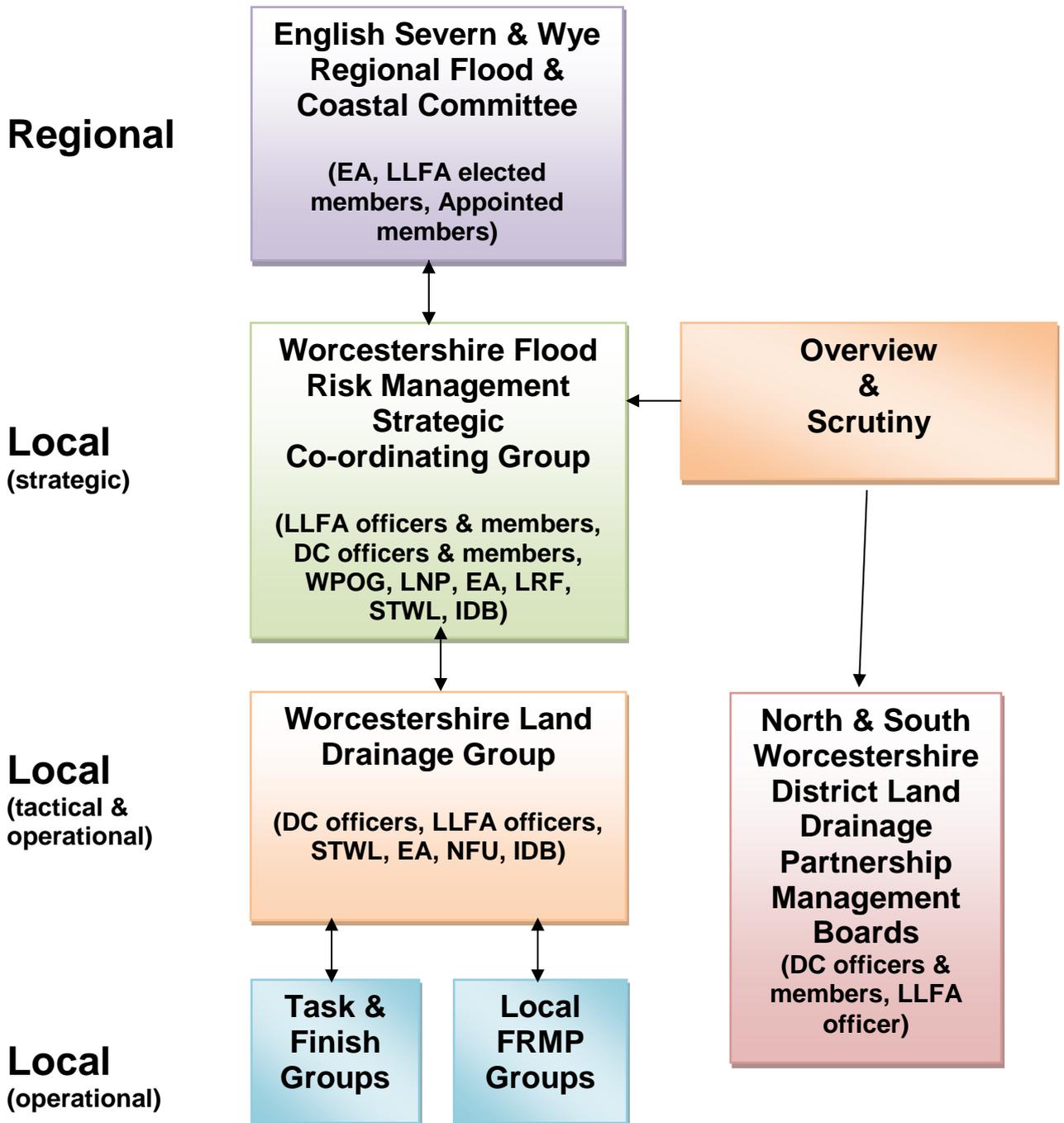
Lead Local Flood Authority Role	Summary of requirements
Duty to publish a Local Flood Risk Management Strategy	Develop, maintain, apply and monitor a strategy for local flood risk management of the area.
Duty to investigate flooding	Co-ordinate the investigation of significant flood events.
Duty to produce 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.

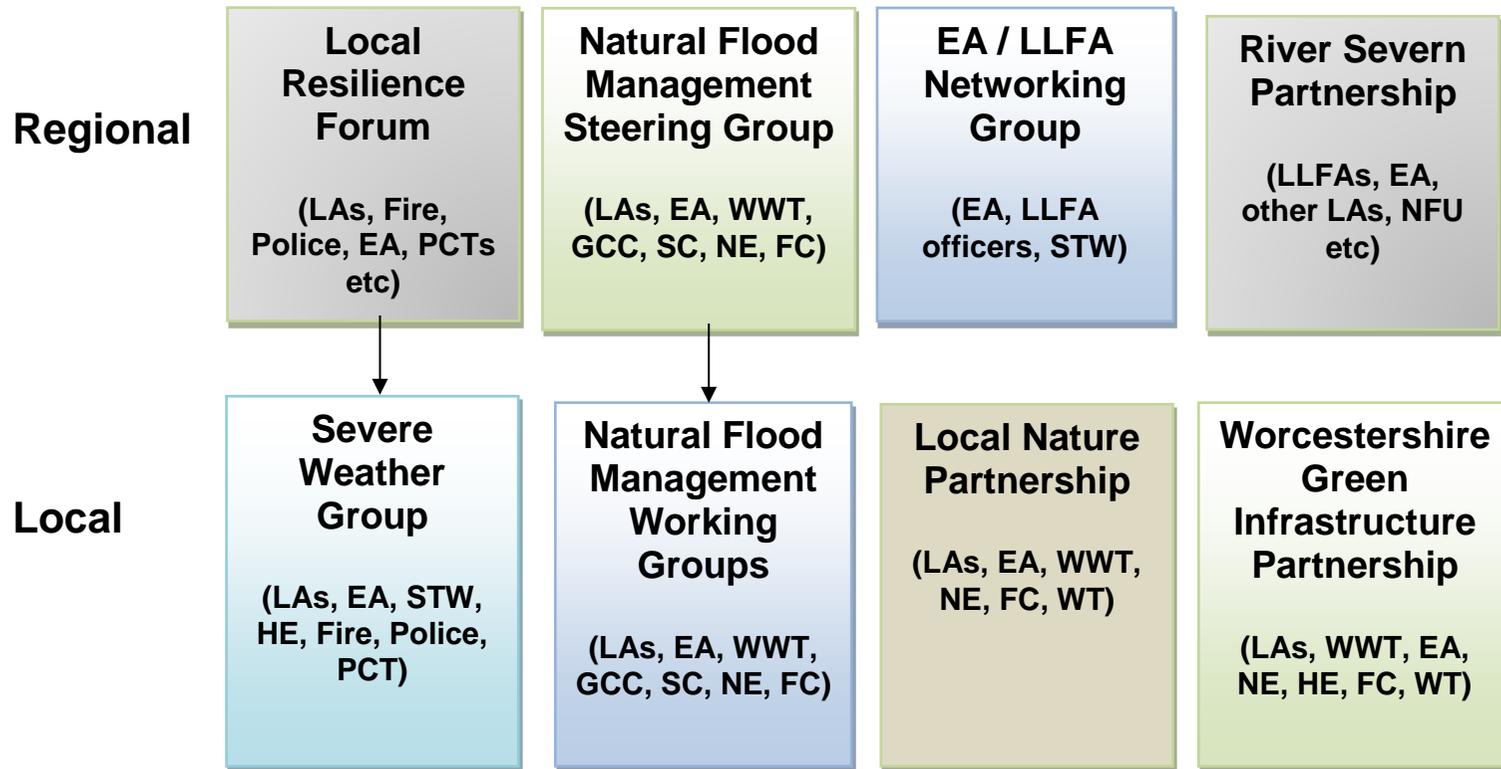
Table 5: Further Lead Local Flood Authority roles

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

APPENDIX 5. MAIN FLOOD RISK MANAGEMENT GOVERNANCE GROUPS



APPENDIX 6. OTHER FLOOD RISK MANAGEMENT RELATED GROUPS



APPENDIX 7. FLOOD RISK MANAGEMENT ABBREVIATIONS

Table 6: Abbreviations

Abbreviation	Definition
CFMP	Catchment Flood Management Plan
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
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
SEP	Strategic Economic Plan
SFRA	Strategic Flood Risk Assessment
SLA	Service Level Agreement
STWL	Severn Trent Water Limited
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
SWDP	South Worcestershire Development Plan
WCC	Worcestershire County Council
WLDG	Worcestershire Land Drainage Group