

APPENDIX 1 – Local Flood Risk Management Strategy Update

1 Background

- 1.1** Following major floods during 2007, Government set up the Pitt Review to look into the way flood risk management agencies dealt with such a major event. This review came up with 93 recommendations, which Government accepted.
- 1.2** A number of these recommendations needed legislation to give local authorities and agencies the necessary powers or duties and hence the introduction of the Flood & Water Management Act 2010 (F&WMA). One of these duties was for all Lead Local Flood Authorities (Leeds City Council for this area) to prepare a Local Flood Risk Management Strategy (LFRMS).
- 1.3** The Strategy was last refreshed and reviewed by Scrutiny Board (Sustainable Economy and Culture) in December 2018 and adopted by Full Council on 27th March 2019.

1.4 Leeds Local Flood Risk Management Strategy

The Strategy outlines the approach the Council and other agencies will take regarding flood risk management. The Strategy contains:

- a. The objectives for managing flood risk.
- b. The measures proposed to achieve those objectives.
- c. Timeframe for any measures.
- d. Costs and benefits of the measures and how they are to be funded.

Specific measures are contained in Appendix C of the Strategy, which is to be updated regularly to ensure it is reactive to latest priorities.

Updated Progress against priority measures identified in Appendix C of the Strategy is included in Appendix 2.

Other actions that have been taken and continue to be taken are

- Ongoing maintenance of watercourses and flood alleviation features
- Partnership working with other key agencies, notably the Environment Agency (EA) and Yorkshire Water Services (YWS)
- Close working with community flood groups – increase awareness of flood risk
- Develop and maintain a comprehensive register of flood risk features
- Manage flood risk generally
- Investigate flooding events – where necessary producing a Section 19 Report.

Under section 19 of the Flood and Water Management Act 2010 Leeds City Council has a duty to investigate flooding when it is deemed necessary and appropriate. The report is a public statement of the circumstances of a flood event and what parties have a role in managing the risks.

- Promote sustainable development – particularly regarding Sustainable urban Drainage Systems (SuDS)
- Support planning with determining the impact of development on flood risk and securing contributions from developers to support the delivery of flood risk management measures. New developments in the city give us a great opportunity to better manage flood water and reduce the risk of flooding to the city, we will see improvements from new developments rather than pressures due to the strength of our planning legislation.

2 Major Storm Events

2.1 Storm Eva 26th December 2015

Significant infrastructure damage was sustained across Leeds as a result of Storm Eva leaving railway lines, roads and bridges closed for many days and even months in the case of Linton Bridge. Linton Bridge reopened on 2nd September 2017 after an extensive rebuilding of the main structure within the existing historic structure had been completed, costing £5.1m. The construction of Leeds Flood Alleviation Scheme Phase 1 (LFAS1) was also very badly affected and subsequently required repairs and additional works totaling £3.8m. Now completed the work on LFAS1 has greatly reduced flood risk in the City Centre.

2.2 Storm Ciara 9th February 2020

Our monitoring points recorded rainfall during the 24 hour period ranging between 37mm and 73 mm. Met Office records for West Yorkshire show this area to have been the worst hit and the rainfall in this 24 hour period exceeded the previously recorded average total monthly rainfall for February since 1981. Storm Ciara caused widespread flooding across the City. The recorded levels on the Aire and Wharfe were at their highest since Boxing Day 2015. The Leeds FAS was fully operated for the first time. Fire crews in Leeds dealt with 700 calls in a 6-hour period and attended over 100 emergencies. Bus and Train services were severely disrupted, highways were seriously affected, and police had to close several roads.

2.3 Storm Dennis 15th February 2020

Storm Dennis had a variety of impacts across the north of England. 20-30 mm of rain fell widely, with over 40 mm on some higher parts of West Yorkshire and 50-80 mm recorded widely in the west of North Yorkshire (81.2 mm at Scar House Reservoir in upper Nidderdale). Reports of flooding from the Ciara event were still coming in after Storm Dennis arrived so the statistics for both of these events have had to be combined. A total of 388 flooding related reports have been received including 24 reports of internal flooding and 157 incidents where internal flooding was imminent.

3 Flood Risk Management in 2021

3.1 Incidents

2021 was a comparatively quiet year in terms of flooding incidents in the city, 595 flooding incidents were reported and investigated during 2021 which is close to the annual average across the last decade (1857 in 2015). Graphs showing incidents in 2021 and previous years are included in Appendix 3.

3.2 Maintenance

In the period from 1st April 2020 to 31st March 2021 teams carried out 2260 trash screen grid clearances at flooding “hot spots” and 151 routine beck inspections. During the period 1st April 2021 to 30th November 2021 we undertook 1619 grid clearances and 59 inspections (a reduced number due to the impact of COVID and resources).

In response to flood incident reports and defects found from inspections we carried out works to repair and clear damaged culverts and drainage assets. Reactive and planned maintenance is essential to managing flood risk and protecting residents and businesses.

Surface water flood risk remains a complicated source of flooding to residents and businesses in Leeds, with the responsibility for assets and infrastructure that affect this spread across a number of council departments and other organisations, as well as also being privately owned in many places.

The experiences of storms Ciara and Dennis have demonstrated that the city is still vulnerable to a wide range of flooding impacts. A number of properties, roads and businesses were badly affected. The council is working closely with partner organisations, in particular the EA and YWS, to deliver improvements to natural and engineered networks and to install new and improved flood alleviation measures. However more work is needed to address current and future flood risk and to mitigate the increasing impact of climate change.

3.3 Strategic Flood Risk Assessment (SFRA)

The SFRA update was completed in draft form at the end of 2021. It will need to be fully reviewed and signed off by the Environment Agency.

The primary objective of the Leeds SFRA is to inform the revision of flooding policies, including the allocation of land for future development. Furthermore, the SFRA has a broader purpose and in providing a robust depiction of flood risk across the district it can:

- Inform the development of Council policy that will underpin decision making within the District, particularly within areas that are affected by (and/or may adversely impact upon) flooding.
- Assist the development control process by providing a more informed response to development proposals affected by flooding, influencing the design of future development within the District.
- Help to identify and implement strategic solutions to flood risk, providing the basis for possible future flood attenuation works.

- Support and inform the Council's emergency planning response to flooding.

The initial results and the outputs of the current flood modelling including the impacts of climate change for all the major watercourses across the City have now been assimilated and uploaded to a GIS system.

When reviewed and finalised it will be published by Leeds CC. The SFRA provides a very important tool to both the Council and Developers as it will include the outlines and extents of the impacts of climate change, (something which is not currently available).

Work is ongoing to develop and review the current flood risk and drainage planning policies and the revisions proposed in association with the Local Plan Climate Emergency update.

The Environment Agency are being consulted and are looking for the Leeds SFRA update to be a flagship document across the Yorkshire region which reflects the recent revisions to how SFRA's are produced and fully addresses all aspects of climate change.

Some additional work is required to promote the use of blue/green corridors and the impact of climate change on the functional flood plain.

3.4 Proposed and recently completed Capital Works

Appendix C – The List of Measures in the Strategy (included as Appendix 2 in this report) has been refreshed and includes **new priorities** identified following the flooding events and investigations in 2020/21. The list also includes a brief note on individual scheme progress.

3.5 Capital Works Completed in 2020/21

In 2020/21, 2 major schemes were completed:

- Mickletown (Pit Lane) Flood Embankment £1.2m

This is a £800k project funded by a £1.1m developer contribution to reduce flood risk in Methley and Mickletown. The work commenced in August 2020 and, after some delays owing to inclement weather and associated heavy ground conditions, was completed in January 2021. The scheme created an embankment measuring 110 metres by 3.5 metres and protects properties in the Mill Lane and Pit Lane area from a 1 in 100-year (1% AEP) flood event with an allowance for future climate change.

The new embankment has already provided benefits to local residents, as it reduced water levels close to Methley during heavy rainfall earlier in 2021. It was built with a range of environmental concerns in mind, including the creation of a new wetland area and a large amount of the existing clay and fill materials from the site were used during the build. It is estimated that the recycling of materials in this way has saved carbon emissions from 300 vehicle journeys.

The scheme planting was undertaken earlier this year and has been specifically designed to complement and enhance the surrounding area, part of which is a Site of Scientific Interest (SSSI).

FRM are currently working with the Environment Agency to identify options to deliver further flood risk resilience benefits using the remaining funding from the developer contribution.

- Otley FAS: £4.43m

Otley is at high risk of flooding. Parts of Otley flooded in December 2015 when the River Wharfe burst its banks. There have also been many times where the river has burst its banks and properties have come close to flooding. The area around Wharfe meadows Park has been the worst affected area. Over 50 houses and the road at Billams Hill were flooded in 2015. The Otley Flood Alleviation Scheme (works completed Dec 2021) reduces the risk of flooding in this area to 4 percent in any given year (from 20% prior to the scheme). The scheme comprises of a 1.5m sheet piled flood embankment, diversion of the Kell Beck watercourse, landscaping works, and vegetation management on the islands downstream of the weir which improves channel conveyance.

The Kell Beck diversion partially de-culverts (daylights) the watercourse providing improvement to habitats and biodiversity in the area. Ongoing management of vegetation on the islands will continue to maintain the standard of protection it contributes to. The web page is currently still live, and legacy information about the scheme is due to be published in Spring 2022 on a new web page.

3.6 Capital Works under Construction and Proposed

- Leeds FAS Phase 2 £112m

Phase 2 of the Leeds Flood Alleviation Scheme is a two-step scheme, reducing flood risk along the River Aire, between Leeds station and Apperley Bridge, Bradford. This involves a combination of Natural Flood Management (NFM) and traditional engineering methods, providing protection to 1048 homes and 474 businesses.

Step 1 is an 8km stretch of the River Aire, upstream of Leeds station, along the A65 Kirkstall corridor, where we are constructing raised flood walls and embankments in the area. These provisions will provide a one-in-100-year level of protection.

Step 2 comprises of a flood storage area near Calverley, and flood walls in Apperley Bridge. The flood storage area is particularly central to work on Phase 2, as the construction of a flow control structure on the existing flood plain will mean that during high river levels, this can be activated to alleviate flooding being experienced further downstream. When this is complete, it will raise the level of protection for the entire FAS2 area to a one-in-200-year level.

Once delivered in full, Phase 2 will also raise the standard of protection of Phase 1 (Leeds city centre), to a one-in-200-year level. This section was completed in October 2017.

3.7 Potential Future Schemes and Studies

- Wyke Beck Programme Phase 2

A continuation of a programme of works along the Wyke Beck Corridor which consists of two phases. Phase 1 included Arthurs Rein watercourse de culverting completed in 2018, Halton Moor environmental enhancements completed in 2019 and Killingbeck Meadows flood storage reservoir and environmental enhancement completed in 2020. Phase 2 of this project will consider options to further reduce flood risk within the catchment and seek opportunities for further ecological enhancements and natural flood management at Halton Moor.

- Potternewton Surface Water FAS

At feasibility stage, modelling is complete, and a shortlist of options produced for assessment. Work is ongoing to develop the preferred option and produce a business case for this, and discussions are ongoing with Yorkshire Water regarding sewer issues in the area and potential funding. A briefing session was held with ward members during September 2021.

- Wortley Beck FAS

The Wortley Beck Flood Alleviation Scheme is to address property flooding from Wortley Beck (also known as Farnley Wood Beck and Hol Beck). There have been frequent flooding events from this beck with over 50 properties known to have been affected by internal flooding and 200 properties within Flood Zone 3. There was also recent flooding of the outer ring road in February 2021. Funding for this feasibility work has been secured from the Environment Agency through local levy and flood defence grant in aid for the development of a flood alleviation scheme here.

A hydraulic modelling study is currently under review and being assessed regarding the requirement for further work. This is within the context of developing a wider catchment plan with partners, to include further environmental works, A stakeholder engagement workshop was held in December 2019 to examine the wider catchment work and a recent update to local Cllrs to inform them of the modelling difficulties.

Modelling work has recommenced, and a number of updates are underway so that Options development can start again in early 2022.

- Farnley Wood Beck FAS

A strategic option has been identified to de-culvert the watercourse between Old Road and Elland Road. This has been further developed and is now moving to outline design and implementation. The design of this scheme is underway with construction planned for Autumn 2022.

- Lyn Dyke Garforth Study

An updated integrated catchment model has been undertaken and is now completed.

Further work is required to evaluate economic benefits before progressing to the preparation and submission of an outline business case

Further consultation is being undertaken with Yorkshire Water Services to consider possible collaboration on schemes which provide mutually beneficial solutions.

Additionally, consideration is being given to property level protection and resilience schemes for some properties.

- Lyn Dyke Kippax Study

The modelling is completed, and a weighted assessment of options have been identified for three specific areas. These propose the incorporation of Property Flood resilience measures. Further work is required to refine the economic benefits before progressing to preparation and submission of an outline business case in 2022

Consultation is being undertaken with Yorkshire Water Services to consider possible collaboration in one location.

- Meanwood Beck FAS

A modelling study commenced in June 2020 investigating opportunities to reduce flood risk. A Shortlist of options has been produced identifying 5 potential sites for flood storage. These options are being further developed and public engagement was carried out throughout the summer 2021. So far it looks to have been a positive and well received engagement. Work is currently underway to develop the options further and produce a business case for this scheme. The preferred option is expected to be determined in Summer 2022 and will then proceed to the design stage following this.

- Gledhow Lake Improvements

Modelling study commenced in April 2021 to model the benefits provided by Gledhow Lake and identify improvements to assets along this beck. Survey work has also been carried out. Modelling work has now been completed. This project is now concluded. No viable capital works have been identified.

Current maintenance is considered to be suitable and the benefits of the lake have been quantified.

- Wharfedale Flooded Communities Study

A study is currently in progress to model the impact of flooding in settlements along the Wharfe including Collingham and to identify possible alleviation measures. Work continues on the Wharfedale flooded communities' study, the baseline model is complete and preliminary long list options have been put forward. Two public drop-in events have been held, one in person in Wetherby Town Hall, one online via teams. Attendance from the community was very good and supported by local ward members. A web page is now live showing

the strategic options and an online survey has recently received a very positive response.

- Property Flood Resilience (PFR) Pathfinder Survey

Property Flood Resilience (PFR), is the term used to describe measures that help to reduce flood risk to people and property. Using PFR enables households and businesses to reduce the damage and stress caused by floods, making the process of recovery and reoccupation easier.

Leeds has been selected to be part of the ongoing Yorkshire Flood Resilience project, one of three Department of Environment, Food and Rural Affairs (Defra) commissioned Property Flood Resilience Pathfinders across the country.

The project aims to increase the awareness of Property Flood Resilience (PFR) across Yorkshire and boost the uptake of PFR in the future, helping effective flood management and making **flood insurance** more available and affordable.

As many properties throughout Leeds have PFR, we are taking part in this wider Yorkshire based study to better understand the impact and effectiveness of PFR measures taken to date.

The current effectiveness of PFR that has been installed over the last 10 years was assessed. This information has been uploaded to an **online mapping system called “PFR Assured”** – which hosts data about PFR across Yorkshire.

More detailed information, data and recommendations will follow as the final evaluation process is completed.

Initial findings from the in-depth survey of Property Flood Resilience (PFR) installations at 43 properties in Leeds during the summer of 2021 are tabulated below:

Property assurance rating				
Area	Property count			
	Red	Amber	Green	Not assigned
Leeds (43 properties)	8 (18.6%)	25 (58.1%)	2 (4.7%)	8 (18.6%)
Potternewton (8 properties)	3 (37.5%)	5 (62.5%)	0 (0%)	0 (0%)
Thorner/Garforth (14 properties)	0 (0%)	12 (85.8%)	1 (7.1%)	1 (7.1%)
Wortley (14 properties)	5 (35.7%)	8 (57.2%)	1 (7.1%)	0 (0%)
Leeds centre (7 properties)	N/A	N/A	N/A	0 (100%)

- Red** – sub-standard or defective PFR installation and/or measures / or serious maintenance requirements
- Amber** – some components of PFR package missing or maintenance required/ or not signed up to EA flood warning service/ or no emergency plan in place

- **Green** – Full suite of correctly used, maintained & stored products/ signed up to EA flood warning service / emergency plan in place.

- West Yorkshire Flood Innovation Programme

Flood Risk Managers in West Yorkshire have agreed to continue working collectively on a programme of work that closely aligns with the Resilience Innovation Programme (RIF) bid that was submitted. This group also includes the Environment Agency, Yorkshire Water, West Yorkshire Combined Authority and Leeds University through their Integrated Catchment Solutions Programme (ICASP). The programme called West Yorkshire Flood Innovation Programme (WY FLIP) held a workshop, facilitated by ICASP, in July 2021 to further develop the work started for the Resilience Innovation Programme bid. All partners across the region agreed that it would be beneficial to work together to continue to build on the aspirations outlined in the Expression of Interest (EOI) submitted.

Leeds CC FRM successfully gained £160k Local Levy to fund a Programme Manager for 2 years, the role is being undertaken by the councils Flood Risk Manager with programme support from a team at ICASP. This has recently started, and a new governance structure is being put in place with the development of funding bids and a more detailed plan in the form of a 'Roadmap' for the programme has started

4 Sources of Funding

4.1 Flood Risk Management Minor Works Capital Budget

In 2015 Leeds City Council Strategic Investment Board awarded £1m to deliver flood mitigation works that would not be eligible for other funding and to provide partnership funding as leverage to attract external contributions. In 2019/20 a further £1m was awarded.

In 2021 a further application has been approved as part of the recent capital funding review and this will provide a further £2.5 million over the next 5 years (£500,000 p.a.).

So far £1.3m has been used in the Council's Capital Programme for Flood Risk projects, with the remaining £3.2m profiled for use in future financial years.

This continues to prove an extremely beneficial way to maximise the council's ability to deliver schemes and has helped to attract substantial external funding that would not otherwise have been available.

4.2 Flood Defence Grant in Aid and Local Levy

Flood Defence Grant in Aid (FDGiA) is provided by DEFRA and allocated locally by the Environment Agency and is subject to submission of an acceptable business case. Local Levy (LL) is raised from annual contributions from councils within the region and allocated through the Regional Flood and Coastal Committee (RFCC).

During 2020/21 an additional £87,000 FDGiA was granted (in principle) to the Otley Scheme to cover additional costs due to the impact of the COVID pandemic. In addition, a further £100,000 was granted by the Department for Education for retrofitting Sustainable Urban Drainage Systems at two schools affected by the scheme.

For 2021/22 LCC have been awarded £8.9m FDGiA. Significant amounts are: £7.8m for the Leeds Flood Alleviation Scheme Stage 2 (FAS2), £842,000 for Otley Flood Alleviation Scheme and £180,000 for the Wortley Beck Scheme.

Over the past 12 months LCC have been successful in a number of LL bids that support regional schemes that LCC are taking a leading role on. Most notably - £83k to lead the Yorkshire Natural Flood Management Community of Practice, £160k to manage the WY FLIP programme for 2 years and a £175k LL bid (in addition to £95k from Grant in Aid (GiA) already secured) to develop a Legal Entity to attract green finance and secure the future of NFM work in the catchment (supporting Leeds FAS2), which is in its final stages of approval.

4.3 West Yorkshire Combined Authority

The Environment Agency and other Government agencies will continue to support the West Yorkshire Combined Authority (WYCA) in investigating and attracting future funding for the delivery of the flood risk programme. Although funding specifically for flood risk is not included in the devolved powers, the additional powers and financial flexibility allow for more investment decisions to be taken locally in line with local needs and opportunities. Mayoral Combined Authority (MCA) status allows for deeper engagement with government. The Mayor can also act as figurehead to unlock other local contributions and private funding.

The Combined Authority and partners have outlined a programme of flood schemes with a significant impact that require additional funding to unlock their delivery. The programme requires £120m of additional investment and is being used as the basis of engagement with Government. If the additional funding is achieved, it can accelerate delivery of Flood Risk Management schemes including a dedicated Natural Flood Management Programme. It also includes funding for schemes within Leeds and will support delivery of the flood alleviation capital programme including phase 2 of the Leeds FAS. These schemes will protect properties and businesses within Leeds and safeguard existing jobs.

This programme will strengthen the region's response to the Climate Emergency by reducing carbon emissions and improve resilience to the effects of climate change. The work in the programme is being undertaken in a way that is minimising carbon emissions through changing construction practice, incorporating low carbon materials and using Natural Flood Management (NFM) alongside hard engineering. It will support delivery of our City Region strategies relating to energy and green and blue infrastructure. Delivery of this programme will allow the City Region to make further progress toward our objective of becoming a net contributor to the UK economy and achieving our ambition of becoming a net zero carbon economy by 2030.

4.4 Section 106 agreements

Section 106 of the Town and Country Planning Act includes enabling powers for legal agreements between the Local Planning Authority and developers to provide

improvements to local services and infrastructure. In 2016 a Section 106 agreement was put in place with the developers of a new housing estate in Methley, including a sum of £1.1m for a Flood Alleviation Scheme. This scheme (Mickletown Flood Embankment – Section 3.5 above) was completed in 2021. Further S106 deposits are available, e.g. £300k is available for the Farnley Wood Beck Scheme.

5 Corporate Considerations

5.5 Equality and Diversity / Cohesion and Integration

It should be noted that by carrying out flood alleviation works the Council will be ensuring the safety of the local community and particularly those residents that have children and members of the families that have a disability, where these benefits will be greater – as currently these individuals may struggle to get to safety if flooding occurred. Included as Appendix 4

5.6 Climate Emergency

The Council declared a Climate Emergency in March 2019, with the stated ambition of working towards a net zero carbon city by 2030. The Council has accepted that very urgent action is required to make our contribution to containing global temperature rises within 1.5C. Beyond this limit, there is a strong scientific consensus that there will be catastrophic consequences for both humanity and the natural world. Since the declaration the Council has adopted a new way of working, changing its own structures and governance processes to incorporate the new climate emergency priority. Delivery of the LFRMS will help to reduce the impacts of flooding and therefore deliver managed adaptation to the future impacts of climate change. In delivering the capital programme for flood alleviation the carbon impact of these schemes will be considered to promote lower carbon solutions.

In the annual update to Executive Board in February 2022 there will be much greater emphasis on climate resilience and adaptation, LCC now not only forms a key part of the Leeds Climate Commission but also to the more recently formed Yorkshire & Humber Climate Commission including being members of the Climate Resilience Working Group with a view to planning a response to the Y&HCC Climate Action Plan launched in late 2021 around COP26.

6 Conclusions

6.1 Flood Risk is a key threat to the wellbeing of the residents across Leeds and in order to ensure action is taken it is important that Council continues a proactive approach to mitigating the impact of flooding. Moreover, throughout 2022 and looking to the future the broader focus of climate resilience and adaptation must align very closely with flood risk.

6.2 There has been good progress in the delivery of projects identified in the Strategy in 2020/21.

6.3 The current 6-year programme 2021-27 will deliver 22 schemes to reduce the risk of flooding by investing £24m in the City's flood and Climate resilience infrastructure.

