



Local Flood Risk Management Strategy

Report | 2024



Kirklees Local Flood Risk Management Strategy

Report 2024

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EXECUTIVE SUMMARY

This Local Flood Risk Management Strategy (part of the Local Strategy) sets out how Kirklees Council undertakes its flood risk management responsibilities to meet the requirements of the Flood and Water Management Act 2010. Kirklees Council is a Lead Local Flood Authority (LLFA) and is required to establish a strategy to define how local flood risk will be managed locally.

In Kirklees, there are over 35,000 properties currently at risk or will be affected from surface water flooding in a 1 in 1,000-year rainfall event, and 9,000 at risk from main rivers in a 1 in 1,000-year fluvial event. These numbers will rise in the future due to climate change. Our vision is to make our communities more resilient to flooding both now and, in the future, to enhance the environment for future generations. A complex and changing climate requires a variety of risk management interventions like nature-based solutions such as Natural Flood Management (NFM). NFM includes slow the flow methods and adaptive land management techniques.

The objectives we set for the Local Strategy reflect those of the National Strategy and are based on a long-term approach to achieving our vision, which is to make our communities, businesses, and land more resilient to flooding both now and in the future. The objectives are delivered through a set of shorter term, measurable actions which formulate our Flood Risk Action Plan. Our overarching objectives for managing flood risk are:



This Local Strategy considers resilience a key aim in supporting existing and new communities in dealing with future flood risk. Resilience is defined in the National Strategy as:

“The capacity of people and places to plan for, better protect, respond to, and to recover from flooding and coastal change.

This Strategy is based around the four key themes of resilience:

1. **Place making** – to make our local places more climate resilient to flooding by considering land use in combination with flood risk
2. **Protect** – ensure our communities are better protected from flooding both now and in the future
3. **Response** – being adequately prepared to ensure we can better respond to a flood event
4. **Recovery** – recovering quickly and effectively from a flood event.

The Strategy identifies high risk catchments and localities based on flood risk from surface water, historic flood events, existing properties and infrastructure, and social deprivation. This has helped us to identify areas which may require more focused consideration.

A Flood Risk Action Plan has been developed so that we can implement the right measures in much needed areas and can track progress of these actions over time. The Flood Risk Action Plan will be undertaken in partnership and collaboratively with other Risk Management Authorities, to manage local flood risk across the district. The Strategy will be reviewed and monitored to ensure it is still current and measures remain applicable.

The disastrous impact flooding can have on communities is understood. Research carried out by the University of York and the Centre for Mental Health reported that the risk of long-term mental health problems was up to nine times more likely for flood victims compared to those who had never experienced flooding¹. Therefore, we strive to support communities to recover more quickly and effectively after major flood incidents.

This Strategy sets out to mitigate the impacts of flooding, however, the approach set out cannot remove all the flood risks that exist in our communities.

¹ [University of York | January 2021](#)

INTRODUCTION

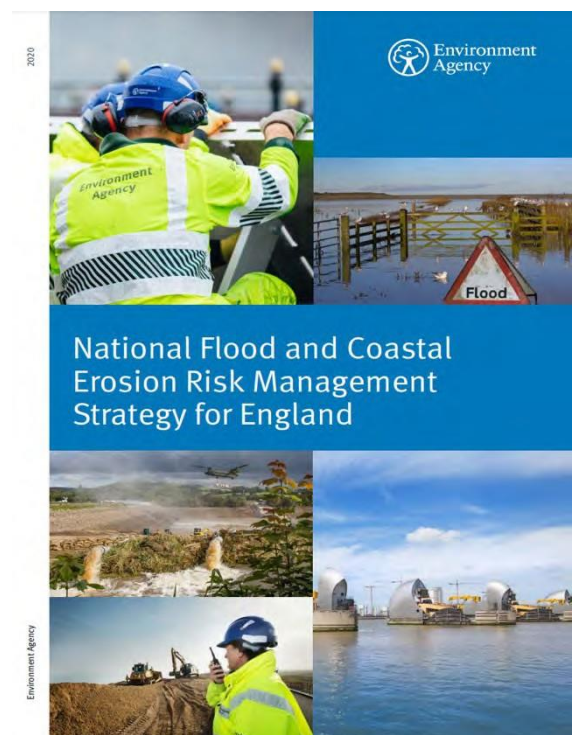
The risk of flooding in England is predicted to increase due to climate change and population growth. It is not possible to prevent all flooding but there are actions that can be taken to manage these risks, increase resilience, and reduce the impacts on communities. Climate change estimates will evolve therefore the challenge we face due to the unpredictability of climate change is unprecedented and if we are to give our communities the best chance of protection; we need to be bold, innovative and try new approaches to managing flood risk and be adaptive in our approach.

As the Lead Local Flood Authority (LLFA), we will provide strategic leadership in relation to flooding to all Risk Management Authorities (RMAs). Part of this duty is to develop, maintain, apply and monitor a strategy for local flood risk management in our area, which must be consistent with the National Flood and Coastal Erosion Management Strategy² produced by the Environment Agency for England.

The National Strategy sets out the long-term delivery objectives that we as a country should be taking over the next 10 to 30 years as well as shorter term, practical measures we should take working with partners and local communities.

Alongside traditional flood defences, there is the need for a broader range of actions for achieving climate resilient places. This includes avoiding inappropriate development in the floodplain and using nature-based solutions to slow the flow or store floodwaters. We need to better prepare for and respond to flooding incidents through more timely and effective flood forecasting, warning and evacuation. A strong theme throughout the National Strategy is concerned with helping communities and local economies recover more quickly after a flood or 'building back better' so that properties, infrastructure and key services such as hospitals and schools are more resilient to flooding in the future.

This Local Flood Risk Management Strategy (Local Strategy) for Kirklees sets out how we strategy will replace the existing 2012 Local Strategy for Kirklees.



² [National Flood and Coastal Erosion Risk Management Strategy for England. Environment Agency. 2020](#)

We will address, through the form of a targeted Flood Risk Action Plan, the management of local flood risk and how it undertakes its flood risk management responsibilities over the next five to ten years. This Local flood risk as defined by the FWMA (2010) includes risk from:

- **Surface runoff** – rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving) and has not entered a watercourse, drainage system or public sewer
- **Groundwater** – all water which is below the surface of the ground and in direct contact with the ground or subsoil
- **Ordinary watercourses** – any watercourse that does not form part of a main river. Ordinary watercourses can vary in size considerably and can include rivers, streams and all ditches, (the Water Industry Act 1991) and passages, through which water flows.



OUR VISION

OUR VISION IS TO MAKE OUR COMMUNITIES MORE RESILIENT TO FLOODING BOTH NOW AND IN THE FUTURE AND TO ENHANCE THE ENVIRONMENT FOR FUTURE GENERATIONS.

A changing climate requires a variety of risk management techniques with a focus on nature-based solutions such as Natural Flood Management (NFM). NFM includes the use of slow the flow methods and using adaptive land management techniques. It requires integrated catchment management and can be particularly effective within upper catchment areas with the aim to:

- Maximise water retention (in flood storage areas, wetlands)
- Slow water flows and/or the rate at which water enters a watercourse (through leaky dams, peatland restoration)
- Intercept rainfall to prevent it from reaching the watercourse (through tree planting).

NFM requires partnership working with those who use and influence the land including the Local Planning Authority, land managers and owners and water management bodies. While conventional flood prevention schemes may sometimes be preferred, NFM can be used as a longer-term, more cost-effective, and multi-beneficial option (including carbon sequestrations and biodiversity gain).

In our current approach, the LLFA planning function and Land Drainage Consents are critical in how we shape and ensure future development that is climate resilient. The Local Strategy considers the planning function of Kirklees Council in ensuring new development and infrastructure are appropriately planned. It also addresses the built environment and the importance of including community resilience.

Asset management function is also critical in making sure that we are confident that drainage infrastructure is being effectively managed, monitored and maintained. This Strategy encourages more effective risk management by enabling people, communities, businesses and the public sector to work together to balance the needs of the community, environment and economy.

The Strategy also aims to ensure that we look favourably towards local flood warning systems in partnership with the Environment Agency which will ensure we are better prepared in supporting community resilience. It ensures that emergency plans and responses to floods and incidents are effective and that communities can respond properly to flood warnings. Another key part of the Strategy is ensuring we target our investment in areas most at need.

LOCAL STRATEGY OBJECTIVES

The objectives we set for the Local Strategy are based on a long-term approach to achieving our vision, which is to make our communities, businesses, and land more resilient to flooding both now and in the future. The objectives will underpin our objectives through a set of shorter-term, measurable actions which formulate our Flood Risk Action Plan.

EVIDENCE

We will enhance our strategic understanding of flood risk from local sources, both in the present day and in the future considering new data, studies, research and science in climate change impacts for Kirklees.

COMMUNITIES

We will work with communities and businesses to raise greater awareness of present and future flood risk through engagement, support and education to help them to become more resilient to future flood risk.

ADAPT

We will work to implement adaptive approaches so we can continue to keep our natural and built environment resilient in response to a changing climate.

SUSTAINABLE

We will contribute positively to sustainable growth and support environmental net gain by influencing development and regeneration plans to deliver flood risk benefits, which will benefit society and the local economy whilst enhancing biodiversity in promoting measures that work with the natural processes of our catchments.

PARTNERSHIP

We will work with all Risk Management Authorities and stakeholders to achieve a consistent, coordinated and catchment-based approach to flood risk management.

INNOVATION

We will seek opportunities (including funding, technological, research) to be innovative and try new approaches in making communities resilient to flooding now and in the future.

FLOOD RESILIENCE AND ADAPTION

This Local Strategy considers resilience and adaptation to be a principal aim in supporting existing and new communities in dealing with future flood risk. Adaptation is about strengthening our approach to adapting to climate change. It will reduce the potential impact that our changing climate, through flooding, storms and higher temperatures, will have on Kirklees.

There are four key areas when managing flood resilience as shown below, based on the National Strategy³.

Plan to adapt: Local choice in local places



1. PLACE MAKING

IMPROVE PLACE MAKING: MAKING THE BEST LAND USE AND DEVELOPMENT CHOICES TO MANAGE FLOODING AND COASTAL CHANGE.

Communities, planners and land managers making the best land use and design choices for development and infrastructure to manage the damages from flooding and coastal change. This includes making space for water to manage risk and support wider environmental benefits.

2. PROTECT

BETTER PROTECT: BUILDING AND MAINTAINING DEFENCES AND MANAGING THE FLOW OF WATER

Sustained and long-term investment in building and maintaining flood and sea defences ensuring they provide an appropriate standard of protection, operate reliably and perform as expected when exceeded. Better protection includes nature-based solutions that manage the flow of water to reduce the risk of flooding and coastal change.

3. RESPOND

READY TO RESPOND: PREPARING FOR AND RESPONDING EFFECTIVELY TO INCIDENTS.

Organisation and communities working together to prepare for and respond to flood and coastal incidents through timely and effective forecasting, warning and evacuation.

³ National Flood and Coastal Erosion Risk Management Strategy for England. Environment Agency. 2020

4. RECOVER

RECOVER QUICKLY: GETTING BACK TO NORMAL AND BUILDING BACK BETTER

Helping people and local economies recover more quickly by clearing up the damages, returning water and power supplies or draining floodwaters from farmland. Recovery should also include building back better so that properties and infrastructure are more resilient to future events.

This combination of engineered flood alleviation schemes alongside wider catchment and community resilience actions is a vital response as flood risk increases with climate change. This integration to manage the risk will mean that more vulnerable communities are resilient to flooding and are able to remain sustainable and thriving places.

Resilience to flooding can be achieved through a suite of tools and services. These are aimed at homeowners and maintaining essential functions of organisations, businesses, communities, key infrastructure, services and land. Disasters are caused by extreme weather which are worsened by being vulnerable and unprepared. By reducing vulnerability and having targeted emergency flood response plans, the impacts of a flood event can be greatly reduced.

Flood resilience has several core themes, including:

- **Property Flood Resilience** – providing practical and cost-effective steps to help lower flood risk through the reduction of the impact of flooding on a building which in turn may help lower home and business insurance premiums.
- **Flood Emergency Plans** – being prepared helps to reduce, control or mitigate the impact and consequences of flooding.
- **Informing** – increasing the awareness of the risks of flooding through effective communications with communities and stakeholders.

PURPOSE OF THE LOCAL STRATEGY

Much has changed since the 2012 Local Strategy, including flood risk data and information, studies, strategies, climate change science, and the drive for natural flood management, sustainable development and resilience. The Local Strategy will take into consideration current thinking and understanding to tackling flood risk in our district. Our Local Strategy will encourage more effective risk management by enabling local communities and business owners to work together to:

- Balance the needs of the community, environment, and economy
- Enhance and extend our partnership working between us and other key stakeholders (e.g., charities, community groups, Parish Councils and health bodies)
- Improve community awareness of flood risk, respond to their expectations and their priorities
- Ensure a clear understanding of local flood risks and prioritise high-risk catchments and communities
- Encourage innovative flood risk management techniques
- Support the development of emergency plans and responses to flood incidents are effective and that communities are better prepared
- Support communities to recover more quickly and effectively after major flood incidents. Research carried out by the University of York and the Centre for Mental Health reported that the risk of long-term mental health problems was up to nine times more likely for flood victims compared to those who had never experienced flooding⁴
- Enable continued learning to ensure we remain progressive.

The Kirklees Local Strategy is a “living document” which will develop as new evidence, expertise and resources influence flood risk management in the district.

⁴ [University of York | January 2021](#)

THEMES OF OUR LOCAL STRATEGY

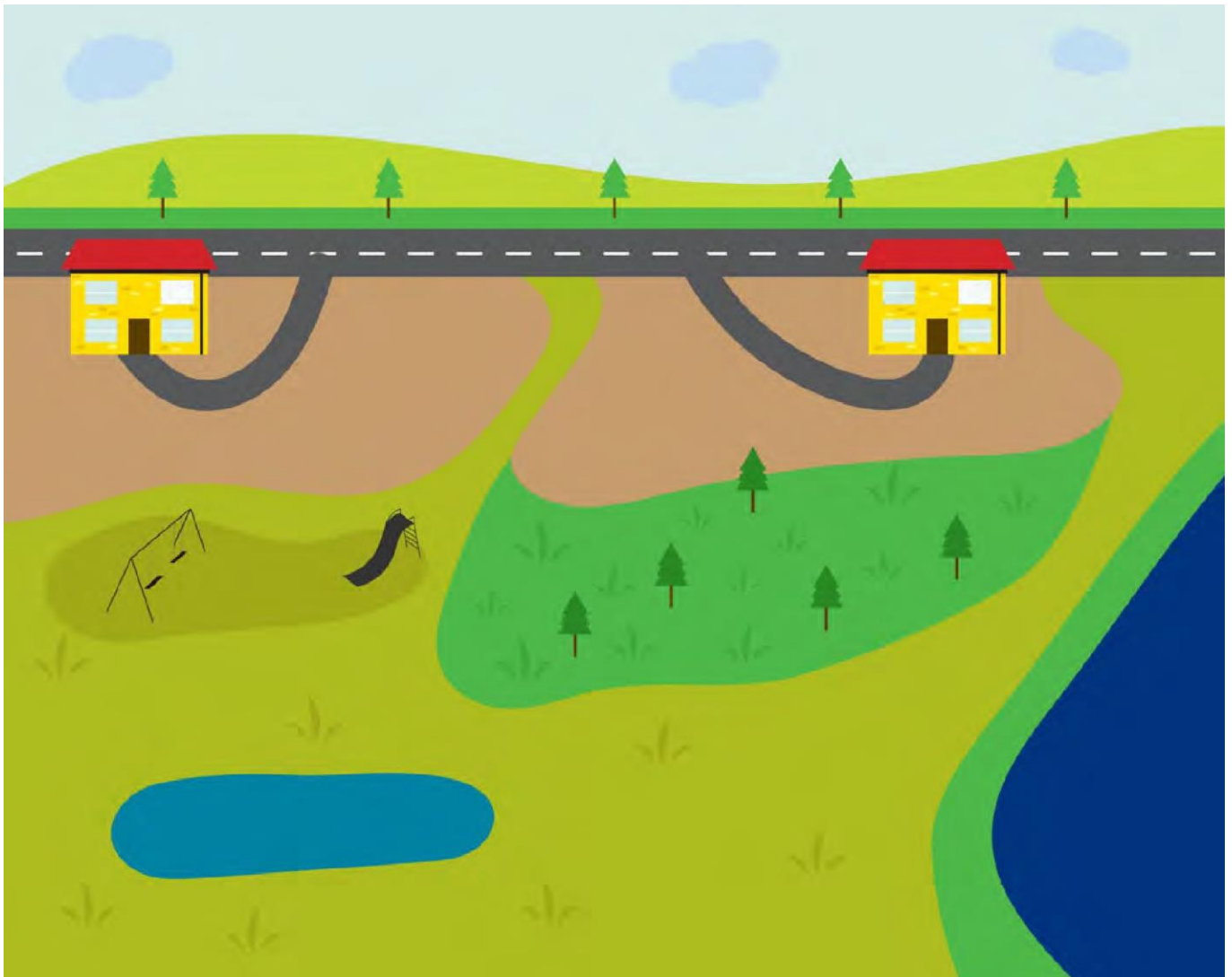
This Local Strategy establishes four key areas in which to focus our efforts in better protect and better supporting our communities against the risk of flooding.

PLACE-MAKING



To make our local places more climate resilient to flooding by considering land use in combination with flood risk. We will make space for floodwater, ensure buildings and infrastructure consider current and future flood risks including supporting the use of climate resilient local planning policies and avoiding inappropriate development in flood risk areas through spatial planning. We will ensure early engagement with developers in the pre-planning process.

Figure 1.1 examples of place making.



PROTECT



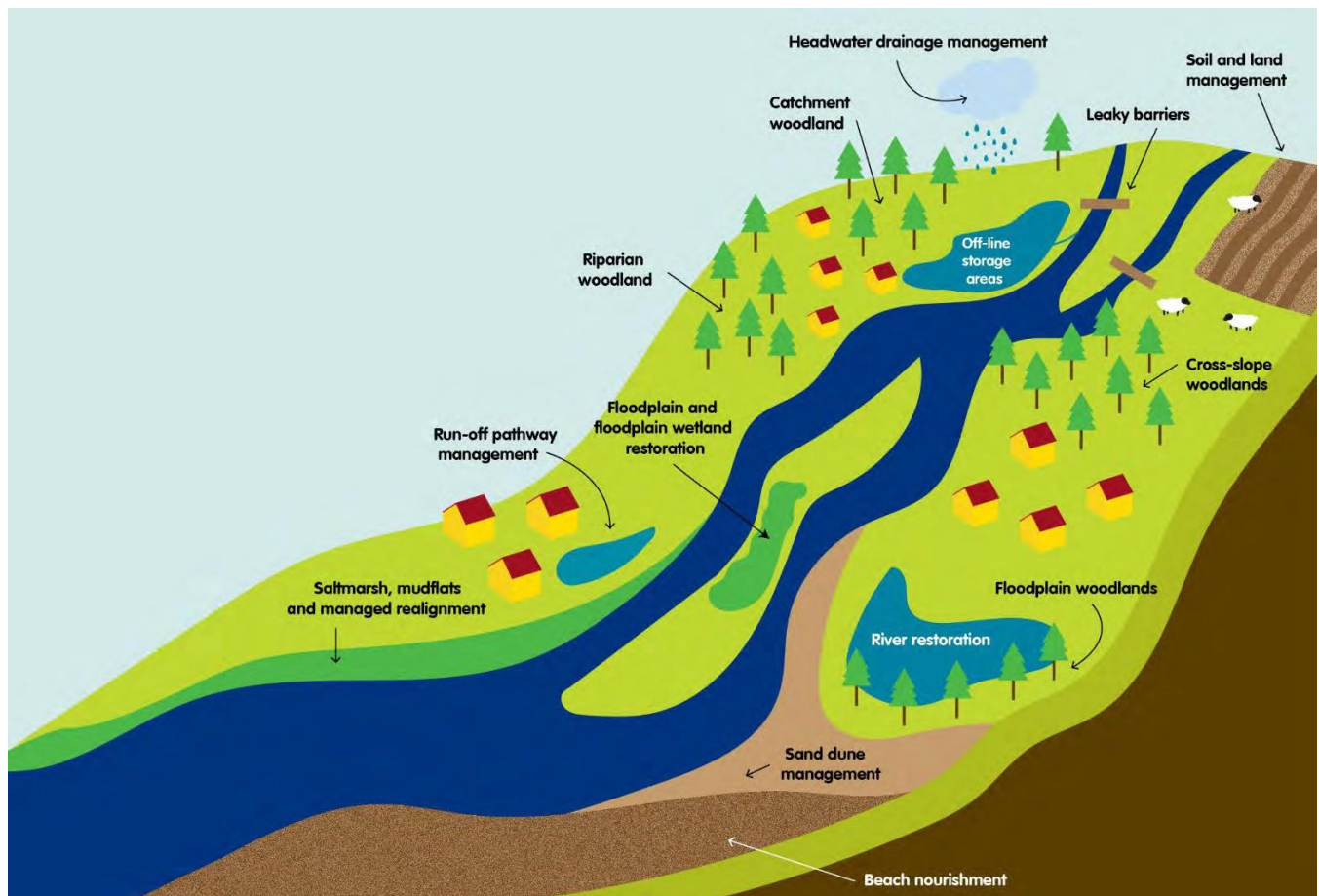
Ensure our communities are better protected from flooding both now and in the future. We will support existing communities through implementing nature-based solutions in catchments such as utilising upland water storage, better-planned land management practices, de-culverting, blockage clearance of assets, construction of new defences, retrofitting to existing homes, businesses, infrastructure and key services.

Natural Flood Management – maximising water retention, slowing the flow, slowing the rate at which water enters a watercourse, rainfall interception, floodplain restoration and gully-blocking.

Environmental Land Management – Government support schemes for landowners to alter their land management practices, to enhance the local environment and provide flood risk benefits.

Adaptive pathways – allow communities to be agile to climate change where land use can easily adapt to future changes to the local environment.

Figure 1.2 examples of natural flood management

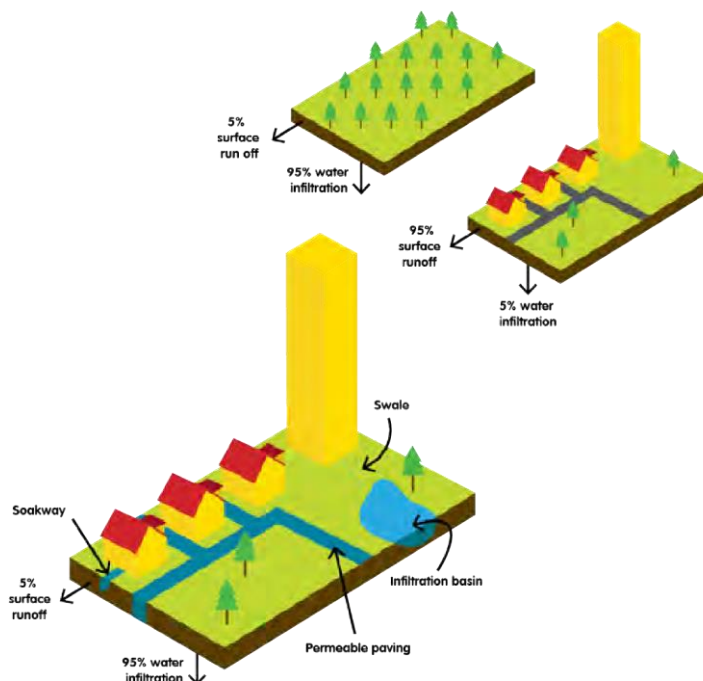


Property Flood Resilience – using various techniques to lower flood risk through the reduction of the impact of flooding on a property.



Sustainable Drainage Systems (SuDS) – used in new development or retrofitted to existing development, SuDS manage surface water and runoff as close to the source as possible and should mimic natural drainage through infiltration and attenuation following the SuDS hierarchy.

1. Rural environment where 95% of water infiltrates into the ground and 5% runs off as overland flow.
2. Urban development within the rural environment. Less infiltration and more runoff.
3. SuDS implementation including permeable paving, soakways, infiltration basins and swales.



RECOVERY



Recovering quickly and effectively from a flood event. We will aim to provide post-flood event recovery support, signpost affordable flood damage insurance, support community wellbeing and implement a build back better approach. We will also aim to review and record flood impacts to increase intelligence and review flood risk assets.

Figure 1.5 examples of responses to flooding



WHAT WE HAVE BEEN DOING

THIS SECTION BRIEFLY OUTLINES THE WORK WE HAVE BEEN DOING SINCE THE PUBLICATION OF OUR PREVIOUS STRATEGY IN 2012.

Since the publication of the previous Local Strategy for Kirklees, we have been working to satisfy the objectives of the Strategy and to implement actions from the Action Plan. A substantial amount of work has been carried out which has improved both the Council's evidence base, and to help manage local flood risk.

The main headline schemes from the previous few years include:

- £1 million DEFRA Property Flood Resilience Grant Support was put in place for flood victims in 2020 following Storm Ciara and Storm Dennis in February 2020. The scheme has helped to better protect 33 properties.
- £1.3 million Kirklees Culvert Programme completed April 2022 which has better protected 800 properties. A detailed survey of over 50 culverts were highlighted to pose a risk to residential properties. The project was delivered using in-house Council resources over a 6-year programme. Some culverts were completely replaced, and some required isolated repairs / replacements and improved access points.
- A £550k Kirklees Debris Screen Study was granted approval to review our high-risk debris screen assets from 2022-2024.
- A number of flood alleviation studies have been undertaken to improve our understanding of the sources of flood risk in our communities.
- A local flood innovation programme has been developed to scale up funding for five themes:
 1. Integrated Water Management
 2. Community Voluntary Sector
 3. Property Flood Resilience
 4. Natural Flood Management
 5. Local Flood Warning Systems.
- A community flood risk education programme has been completed reaching 1,000 properties.

Many of the measures outlined in the 2012 Strategy involved establishing new Council procedures to investigate flood events, introduce more robust data collection processes and to establish the LLFA as the main point of contact for the management of local flood risk.

Other measures in the 2012 Strategy involved improving the Council's understanding of the location and size of local flood risk and developing a programme of mitigation measures to manage the risk.

Additional studies have been completed to understand the surface water flood risk in Kirklees with outline recommendations being made. From these studies, an ongoing programme of mitigation measures is in place to address the locations at highest risk with greatest impact.

KIRKLEES FLOOD RESPONSE AND RECOVERY POLICY

This policy sets out the principles that the Council follows during flooding events which have a major disruptive impact in the area.

Arrangements are in place between the Council and the Met Office to highlight forthcoming severe rainfall events as part of the Met Office's National Severe Weather Warning System (NSWWS). Advance information on extreme rainfall events is provided by several partners and service areas within the Council. Work will continue with partners and other organisations to monitor new technology and information which may help to give more certainty to forecast information.

The Flood Response and Recovery Policy complements other Council initiatives to better protect local communities from the effects of flooding, namely:

- **Flood Risk Management programme** – identifying and delivering mitigation projects in areas that have flooded or are of higher flood risk.
- **Drainage Asset Improvement** – assessing the capacity requirements for highway drainage systems and establishing effective maintenance programmes.
- **The Severe Weather Management Plan** – forms the basis of the Council's response to severe weather in maintaining a resilient network to keep Kirklees safe and operating at times of severe weather.
- **Community wide engagement** on local flood risk to help communities and individuals to better understand the flood risk they face and to encourage a self-help approach.

Post flood recovery is concerned with getting communities back to normal as quickly as possible and building back better. The Council endeavours to help people and local economies recover by providing household skips and street cleansing operations to assist with clean-up operations. To build back better, the Council ensures appropriate flood incident data capture is undertaken by encouraging the public to report flood incidents. This helps to provide more focussed support to communities and infrastructure where it is most needed to help ensure increased resilience in the future.

The Council has committed operational resources to provide community support during flood events when resources permit. The level of service will be proportionate to the level of risk but will be assessed following significant flood events to determine whether it remains suitable.

KIRKLEES PRE FLOODING OPERATIONAL PLAN

The Pre-Flooding Operational Plan provides procedural and functional arrangements necessary to deliver the commitment within the Flood Response and Recovery Policy. The plan aims to deliver an appropriate series of actions to mitigate the risk of flooding from severe rainfall events in the district. Low-level actions in the Plan may be implemented prior to surface water flood events but it is challenging to have "spotters", who volunteer, mobilised in the right locations at the right time during such events.

OUR FUTURE LANDSCAPES AND CALDER CATCHMENT

Our partnerships involve a range of organisations collaborating and focusing on sustainable water management in the Calder, Upper Colne and Holme Catchments, West Yorkshire. The main aims of these groups are to reduce flood risk, increase the biodiversity of habitats, carbon capture and storage, green enterprise and access and recreation.

NATIONAL POLICY, GUIDANCE AND SUPPORTING DOCUMENTS

THIS SECTION LISTS NATIONAL POLICY, GUIDANCE AND RELEVANT DOCUMENT USED TO HELP SUPPORT THE FORMATION OF THE LOCAL STRATEGY. THE STRATEGY SHOULD BE CONSISTENT AND ALIGN WITH THESE POLICIES AND SUPPORTING DOCUMENTS.

NATIONAL POLICY AND GUIDANCE

THE FLOOD AND WATER MANAGEMENT ACT

The Flood and Water Management (2010) sets out how flood risk is managed in England and introduces new powers and responsibilities to Risk Management Authorities. The Act created the role of the LLFA for Unitary Authorities (such as Kirklees Council) and County Councils and set out the requirements for an LLFA to produce Local Flood Risk Management Strategies.

NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework⁵ (NPPF) received a major update in July 2021. In terms of flood risk, this included a focus on making sure local plans account for all sources of flood risk and encourage the use of green infrastructure and natural flood management. The theme of resilience was also expanded in this version, stating that development should be flood-resistant and resilient “such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment”.

FLOOD RISK AND COASTAL CHANGE PLANNING PRACTICE GUIDANCE

The Flood Risk and Coastal Change Planning Practice Guidance⁶ (FRCC-PPG) was updated in August 2022 to reflect the changes made to the NPPF in 2021. Whilst the NPPF concentrates on high level national policy, the FRCC-PPG is more detailed and advises on how planning can take account of the risks associated with flooding in plan making and the development management process.

⁵ [National Planning Policy Framework](#)

⁶ [Flood Risk and Coastal Change Planning Practice Guidance](#)

STRATEGIES, PLANS AND ASSESSMENTS

All strategies, plans and assessments listed below are available to view online.

- [River Calder Catchment Flood Management Plan](#)⁷
- [Kirklees Surface Water Management Plan](#)⁸
- [Preliminary Flood Risk Assessment](#)⁹
- [Kirklees Local Flood Risk Management Strategy](#)¹⁰
- [Humber River Basin District Flood Risk Management Plan](#)
- [Calder Catchment Level 1 Strategic Flood Risk Assessment](#)¹¹
- [Climate Change Risk and Vulnerability Assessment](#)
- [Kirklees Development Plan](#)¹²
- [National Flood and Coastal Erosion Risk Management Strategy for England](#)
- [25 Year Environment Plan](#)¹³

STRATEGIC ENVIRONMENTAL ASSESSMENT

A Strategic Environmental Assessment (SEA) is required to underpin the Local Strategy so that there is confidence that implementation of the Strategy will be sustainable and avoid adverse environmental impacts. The SEA Directive: Guidance for Planning Authorities states that the objective is “to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development”.

See Appendix A for the SEA.

HABITAT REGULATIONS ASSESSMENT

A Habitat Regulations Assessment (HRA) is a process that determines whether development plans could negatively impact local plans on a recognised site beyond reasonable scientific doubt. A HRA is required any time a development project is being carried out on a European site that is protected by Habitat Regulations.

See Appendix B for the HRA.

⁷ [River Calder Catchment Flood Management Plan 2009](#)

⁸ [Kirklees Surface Water Management Plan 2011](#)

⁹ [Preliminary Flood Risk Assessment for Kirklees. Kirklees Council. 2011](#)

¹⁰ [Kirklees Local Flood Risk Management Strategy. Kirklees. 2012](#)

¹¹ [Calder Catchment Level 1 Strategic Flood Risk Assessment 2016](#)

¹² [Kirklees Development Plan](#)

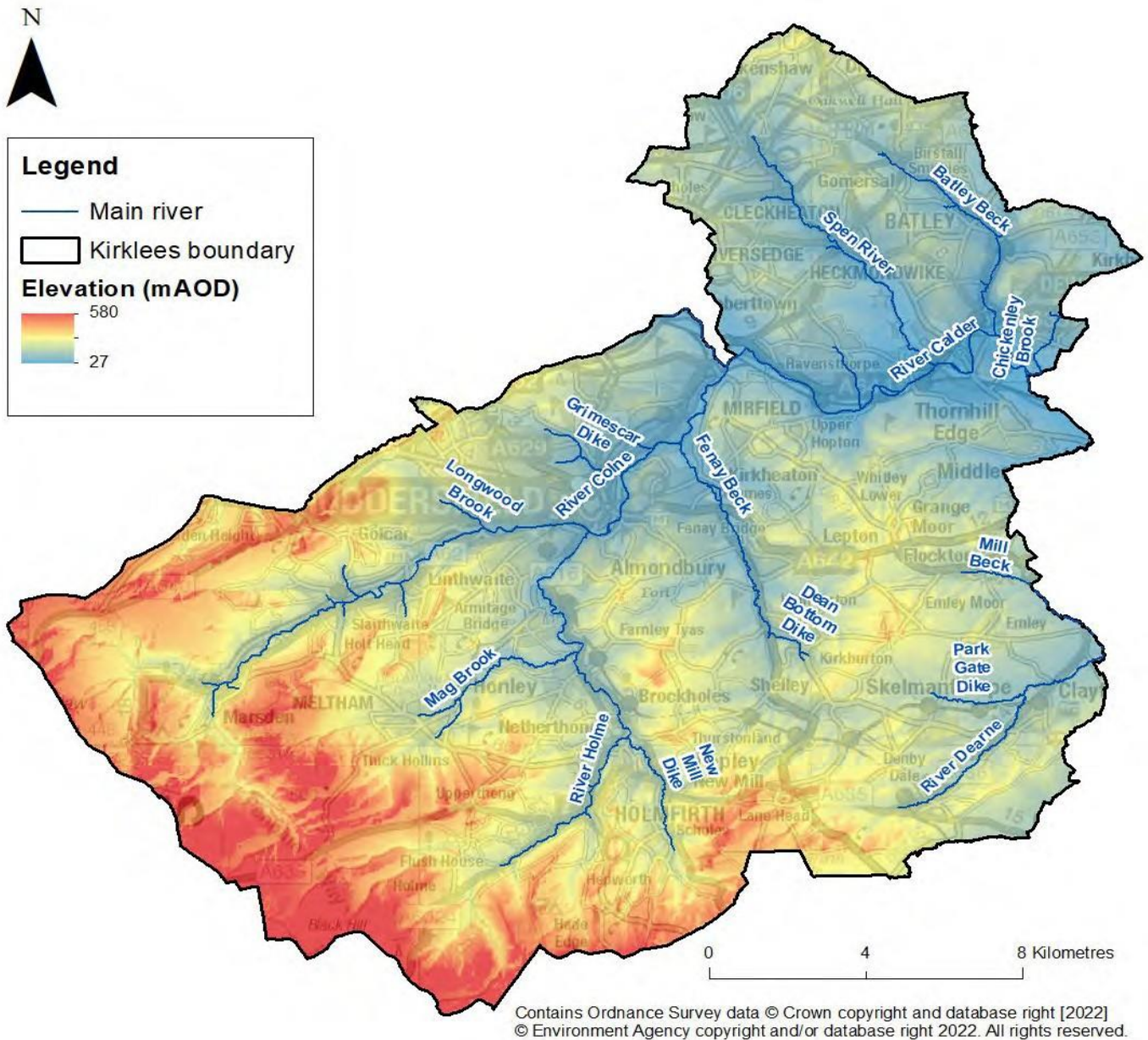
¹³ [25 Year Environment Plan](#)

FLOOD RISK IN KIRKLEES

STUDY AREA

According to the mid-2020 Office for National Statistics population estimates¹⁴, 441,290 people live in the local authority area of Kirklees. Kirklees is situated in West Yorkshire and covers an area of approximately 409 square kilometres and includes the towns of Huddersfield, Dewsbury, Batley, Heckmondwike and Cleckheaton. Kirklees is bordered by the neighbouring authorities of Bradford, Barnsley, Calderdale, High Peak District, Leeds, Oldham and Wakefield.

Figure 4.1 Topography and main rivers in Kirklees



RIVER BASIN DISTRICTS AND CATCHMENTS

Kirklees is within the Humber River Basin District (RBD). There are 18 Environment Agency (EA) management catchments within the Humber RBD, three cover parts of Kirklees, namely:

- Aire and Calder
- Don and Rother
- Upper Mersey.

As can be seen in Figure 4.2 the majority of Kirklees is within the Aire and Calder management catchment with the exception of the upper catchment of the River Dearne which is in the Don and Rother management catchment in the southeast of Kirklees. The Upper Mersey management catchment almost forms the southwestern boundary of Kirklees at the ridge of the Pennine Mountains.

There are 19 Water Framework Directive (WFD) catchments, Figure 4.3, within or partially within Kirklees that will have an influence on flood risk within the district, the majority of which flow into the Calder catchment in the north of the district. The WFD catchments loosely align with the Council's local catchments which are in place to enhance local flood warning systems by setting virtual flood alerts.

Figure 4.2 EA management catchments

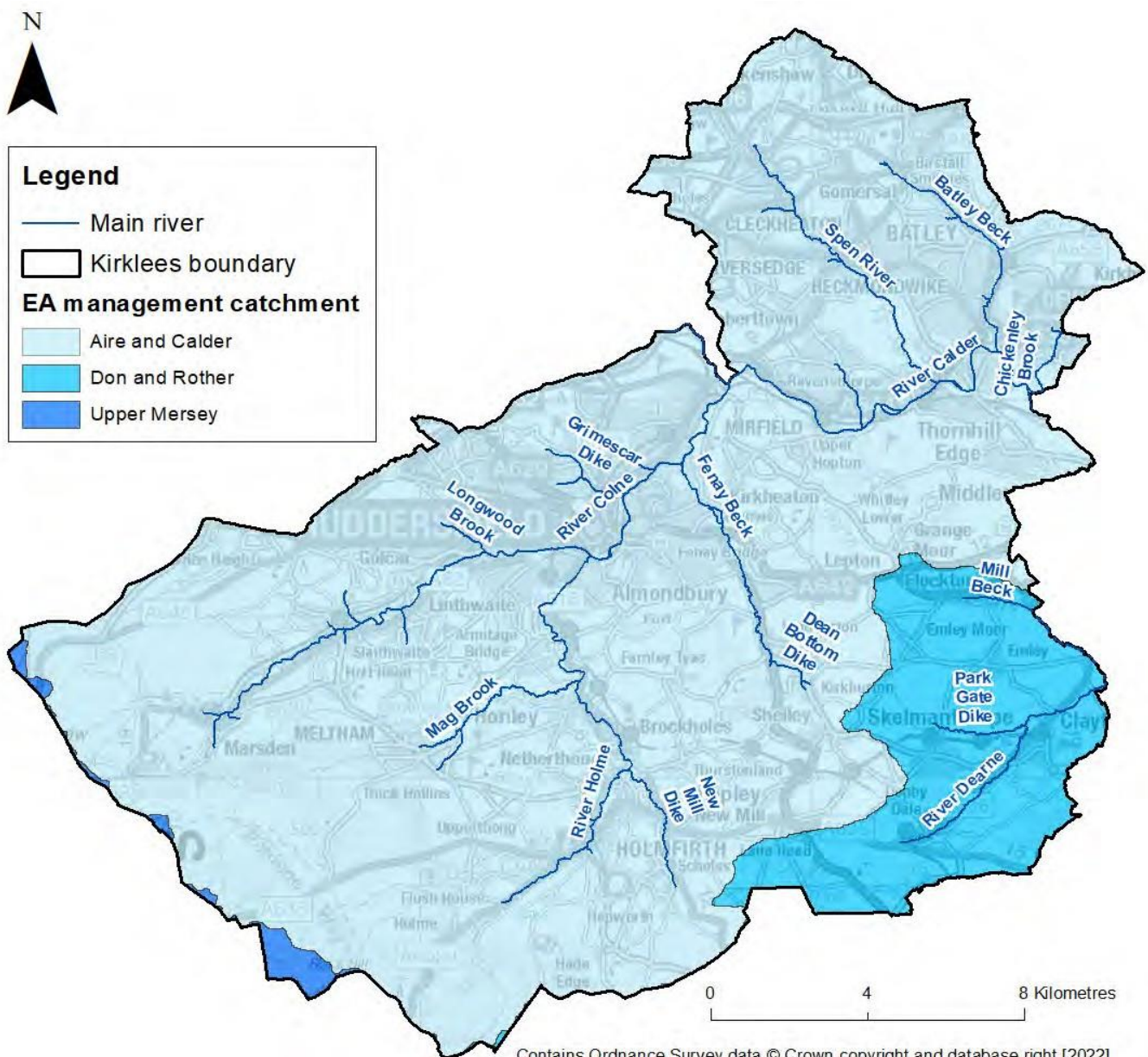
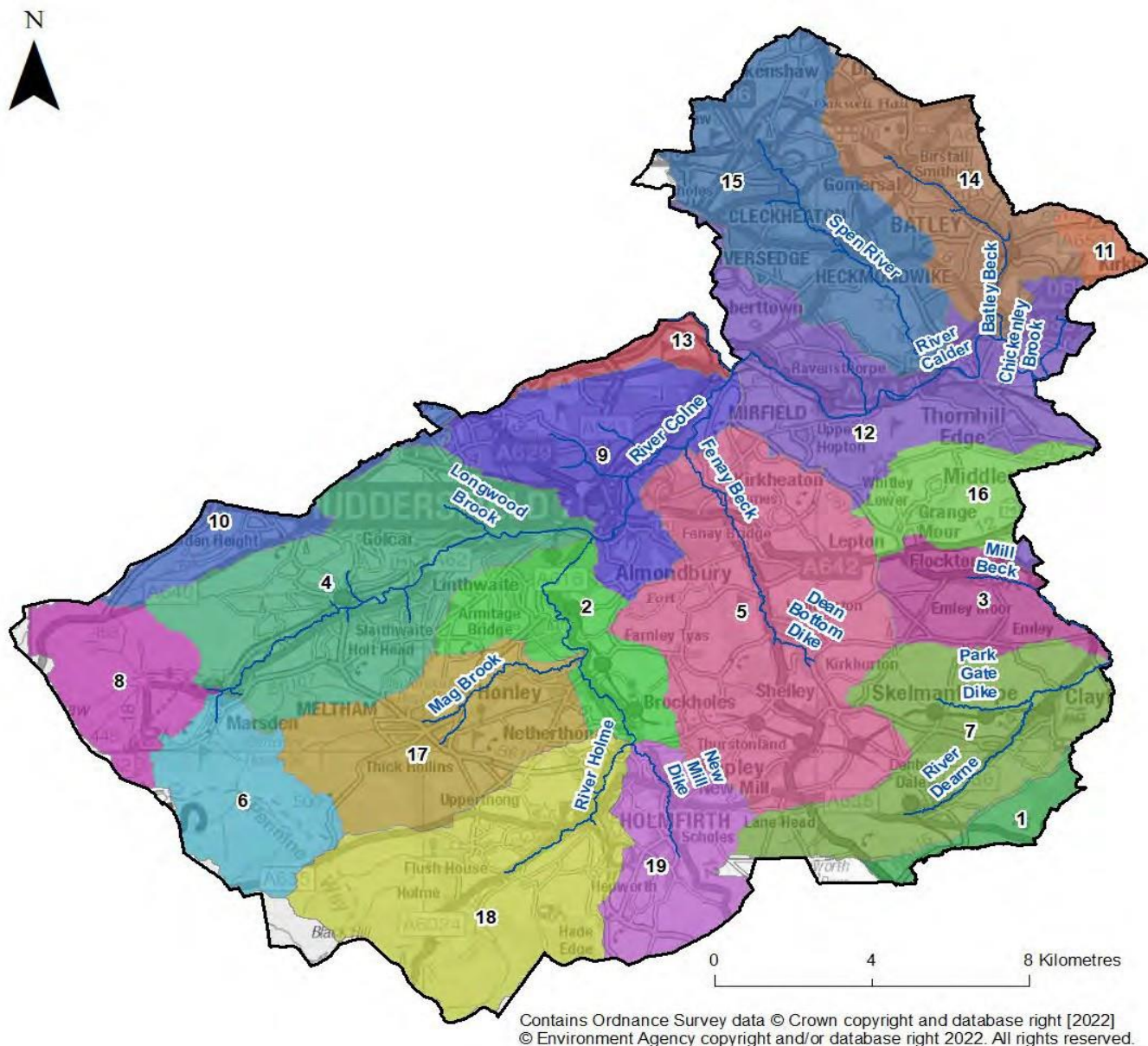


Figure 4.3 WFD catchments influencing flood risk in Kirklees



Legend

- Main river
- Kirklees boundary
- WFD river catchments**
- 1 - Cawthome Dyke from Source to River Dearne
- 2 - Holme from New Mill Dike to R Colne
- 3 - Bentley Brook from Source to River Dearne
- 4 - Colne from Wessenden Brook to R Holme
- 5 - Fenay beck from Source to River Colne
- 6 - Wessenden Bk from Butterly Resr to River Coln
- 7 - Dearne from Source to Bentley Brook
- 8 - Colne from Source to Wessenden Brook
- 9 - Colne from River Holme to River Calder
- 10 - Black Brook from Source to River Calder
- 11 - Chald from Source to River Calder
- 12 - Calder from River Colne to River Chald
- 13 - Calder from Ryburn Confluence to River Colne
- 14 - Batley Beck from Source to River Calder
- 15 - Spem Beck from Source to River Calder
- 16 - Smithy Brook from Source to River Calder
- 17 - Mag Brook from Source to River Holme
- 18 - Holme from Source to New Mill Dike
- 19 - New Mill Dike from Source to River Holme

RAPID RESPONSE CATCHMENTS

The Environment Agency has a Rapid Response Catchment (RRC) register which was prepared using a combination of flood event factors such as time to peak, flood depths and velocities and the amount of debris carried in the floodwater. Potential property numbers affected and vulnerable sites such as care homes and campsites were also considered.

The RCC register states the following for Kirklees:

- **Very High-Risk catchments** – Brockholes (River Holme), Holmfirth (River Holme), Oakenshaw (Hunsworth Beck)
- **High-Risk catchments** – Marsden (River Colne), New Mill (New Mill Dyke), Ravensthorpe (River Spen)

These Rapid Response Catchments are shown in [Appendix C](#).

Many communities in the Colne/Holme catchment, with its steep-sided valleys, and small watercourses draining off hillsides and through urban areas, could be vulnerable to flash flooding if subject to particularly intense rainfall over a sustained period.

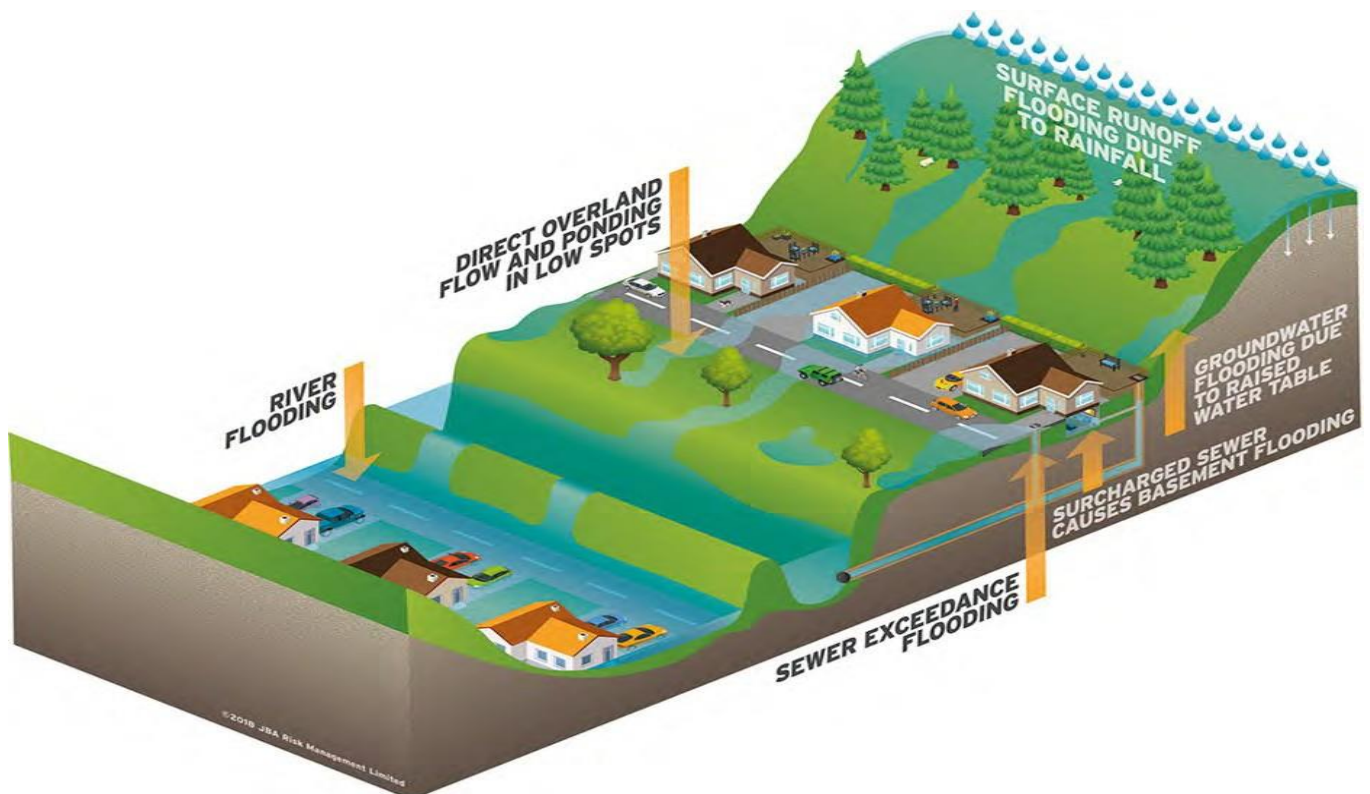
Along with other high-risk communities, we will look to provide appropriate support to the communities affected by these rapid response catchments.

FLOOD RISK

Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land not normally covered by water and presents a risk when human or environmental assets are present in the area that floods. Assets at risk from flooding can include housing, transport and public service infrastructure (including vulnerable services such as hospitals and schools), commercial and industrial enterprises, agricultural land and environmental and cultural heritage. Flooding in Kirklees can occur from many different and combined sources such as fluvial (from main rivers and ordinary watercourses), surface water, groundwater, sewers or indirectly from infrastructure failure, as illustrated in Figure 4-4 below.

Different types and forms of flooding present a range of different risks and the flood hazards of speed of inundation, depth and duration of flooding can vary greatly. With climate change, the frequency, pattern and severity of flooding are expected to change and become more damaging.

Figure 4-4 examples of flood risks in Kirklees



The different examples of flood risks in Kirklees are:

- Surface runoff flooding due to rainfall
- River flooding
- Direct overland flow and ponding in low spots
- Groundwater flooding due to raised water table
- Sewer exceedance flooding
- Surcharged sewer causes basement flooding.

FLOODING IN KIRKLEES

An important aspect of the strategy is to assess the local flood risk within the administrative area constituting risk from surface water, groundwater, and ordinary watercourses.

To assess the potential impacts of surface water flooding, property counts (both residential and non-residential) have been derived based on the Risk of Flooding from Surface Water (RoFSW) dataset. The counts revealed that Kirklees has approximately 6,600 residential properties and 3,700 non-residential properties at risk of flooding during a 1 in 100-year (1% AEP) rainfall event. This is predicted to increase to approximately 11,600 residential and 5,500 non-residential properties as a result of the impact of climate change (based on the 45% climate change uplift as advised by the EA for the Aire and Calder Management Catchment, based on UKCP18 local projections).

HISTORIC FLOOD EVENTS

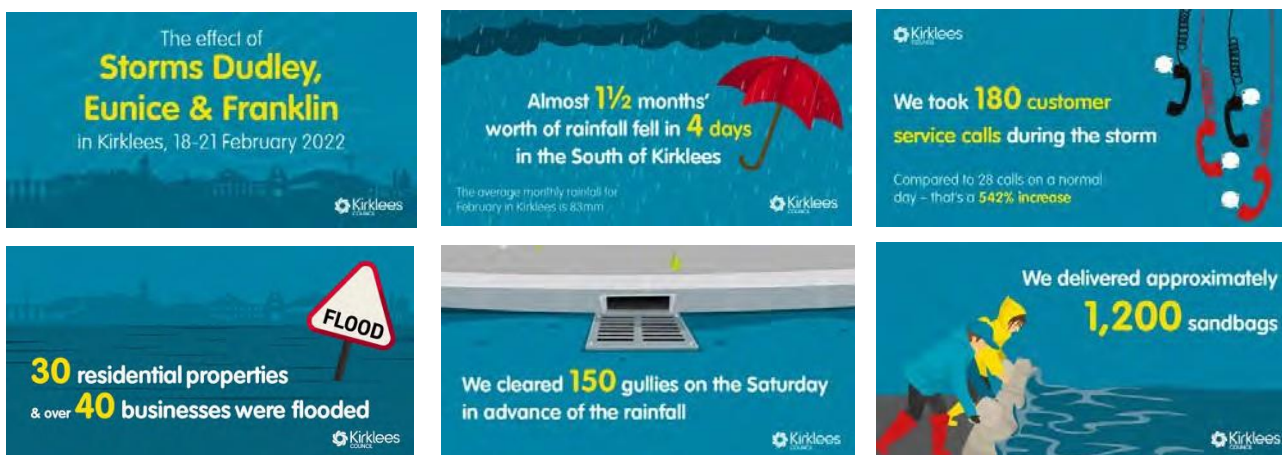
Kirklees has a history of flooding in many different locations from fluvial, surface water and sewer sources. Information on incidents of flooding is recorded by the EA and Kirklees Council. The following information sources were assessed to understand historic flooding in the district:

- EA Recorded Flood Outlines dataset
- Kirklees Council historic floods database.

Figure 4.5 below shows flood incidents, from any source, recorded as locally significant by Kirklees since 2007. These incidents include internal and external flooding of properties and businesses, and also roads, footpaths and gardens. The major flooding events within Kirklees have mainly occurred around the main rivers; the River Colne, River Calder and Spen River. Also shown is the Recorded Flood Outlines Dataset which is associated with fluvial flooding from main rivers, such as the River Calder and its tributaries.

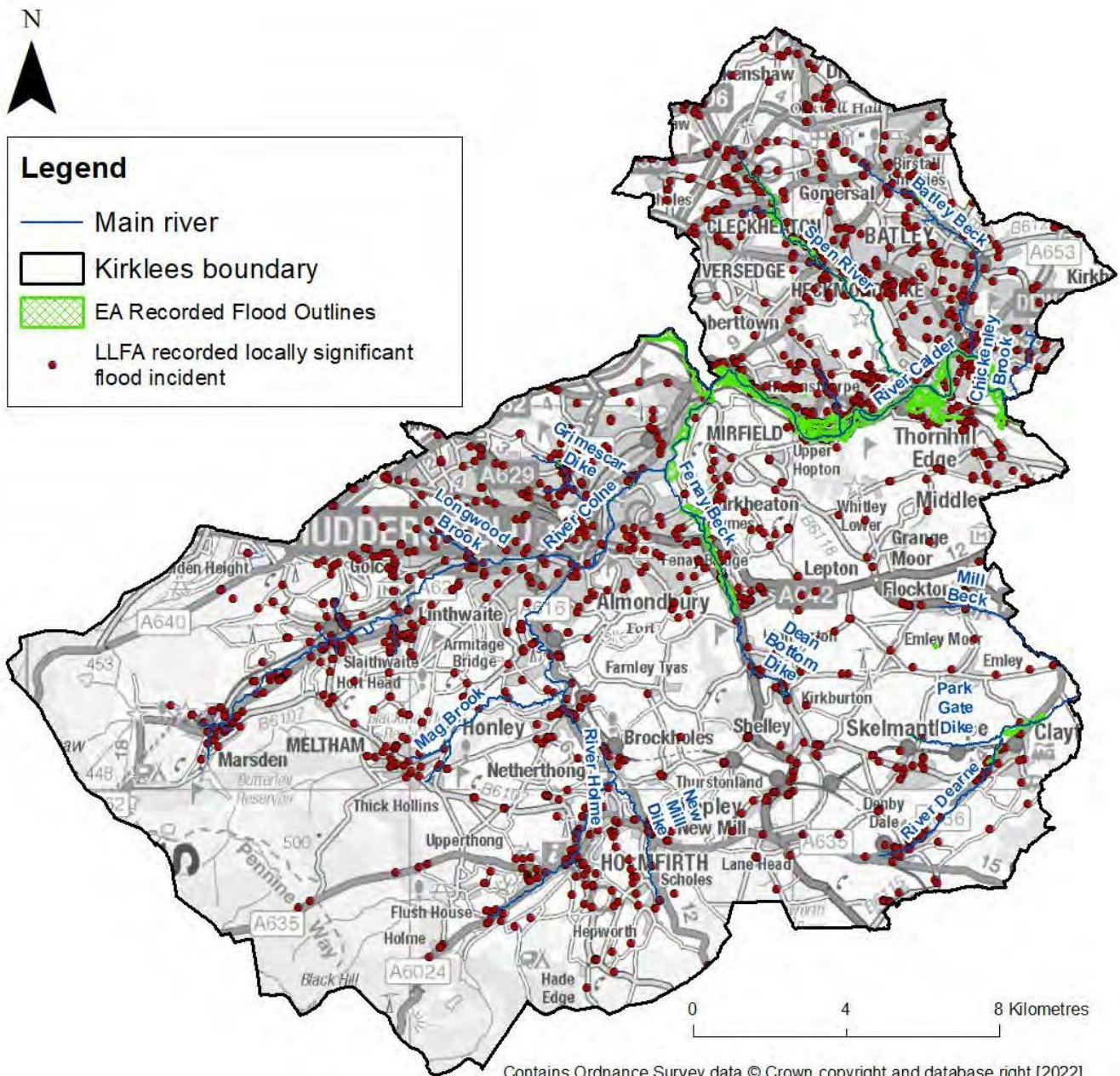
Notable recorded historic flood incidents include:

- February 2022 – Storm Dudley, Eunice and Franklin; triple storm week brought strong winds and rain to the district. A number of internal property flooding was reported to both residential properties and businesses.



- February 2020 – Storm Ciara and Storm Dennis; channel capacity exceeded on main rivers, including the River Calder, and ordinary watercourses.
- December 2015 – Channel capacity exceeded on the River Calder upstream of Sands.
- June 2007 - Estimated 500 properties flooded due primarily to surface water where rainwater was unable to enter drainage systems due to design capacity being exceeded. The flooding was widespread across the district, but hotspots occurred around Ravensthorpe, Liversedge, Cleckheaton, Chickenley, Mirfield, Milnsbridge, Brockholes, New Mill, Denby Dale, Scissett and Clayton West.

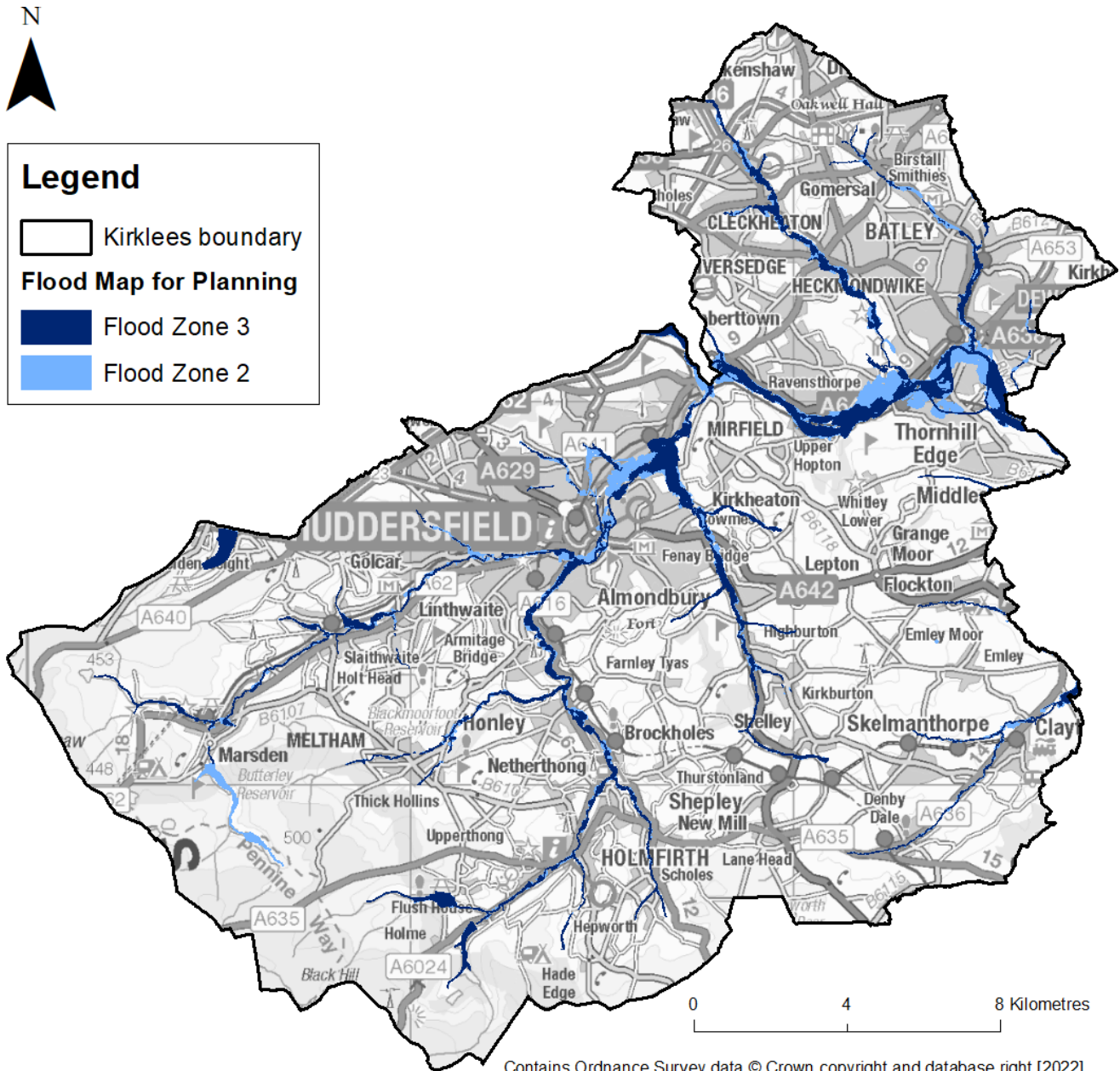
FIGURE 4.5 HISTORIC FLOODING EVENTS IN KIRKLEES



RIVER FLOODING

Figure 4.6 highlights the areas at risk of flooding from main rivers within Kirklees, as indicated by the Environment Agency's Flood Map for Planning dataset. Note that the Flood Map for Planning is based on an undefended, worst-case scenario and does not include for the effects of climate change. Flooding from main rivers is the management responsibility of the Environment Agency.

Figure 4.6 Flood risks from main rivers, Environment Agency Flood Map for Planning



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MAIN RIVER

Main rivers are generally major watercourses for which the EA have a regulatory responsibility with permissive powers to carry out maintenance, improvement or construction work to manage flood risk. The hydraulic characteristics of the main rivers in Kirklees are generally well understood with computer modelling of flood risk having been carried out over the past 15 years. The Environment Agency also regulate development or works in, on, over, under or within 8 metres of fluvial main river watercourses under the Environmental Permitting (England and Wales) Regulation 2016. This also includes within the floodplain if works do not have planning permission and require quarrying or excavation within 16 metres of any main river, flood defence or culvert.

Although flooding from main rivers falls under the remit of the Environment Agency, we will work closely in partnership with the Environment Agency to understand and help to reduce risk from main rivers to our communities.

The range of activities subject to regulation are listed online at <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits#check-if-the-activity-is-on-a-main-river>. Figure 4.7 below illustrates the main rivers within Kirklees.

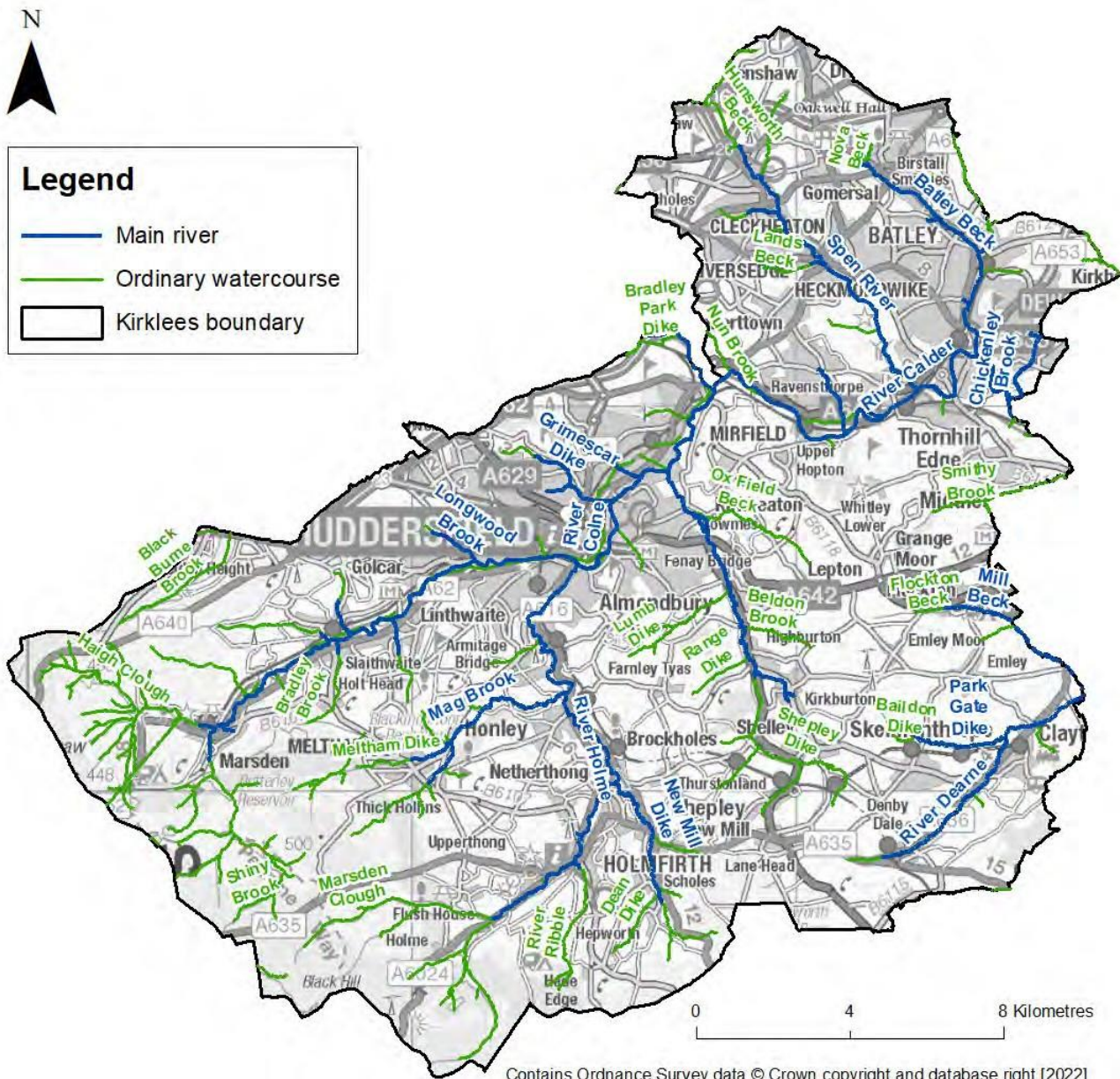
ORDINARY WATERCOURSES

Ordinary watercourses are any watercourse that is not designated main river. These watercourses can vary in size considerably and can include rivers, streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows. Ordinary watercourses do not always contain flowing water all year long; there may be times where the watercourses run dry, particularly over prolonged dry spells. Such watercourses can be described as ephemeral watercourses.

Ordinary watercourses come under the regulation of Kirklees Council as Lead Local Flood authority, which has permissive powers to carry out works, should this be deemed necessary, and has regulatory control over certain development activities within the watercourse channel. Many ordinary watercourses exist across the district (see Figure 4.7 below), the condition and capacity of which has not historically been recorded hence limited information is available on culverted sections.

As LLFA, we aim to increase our understanding of flood risk from ordinary watercourses and the impacts such flooding is having and/or could have in the future as a result of climate change on our communities.

Figure 4.7 Main rivers and known ordinary watercourses within Kirklees

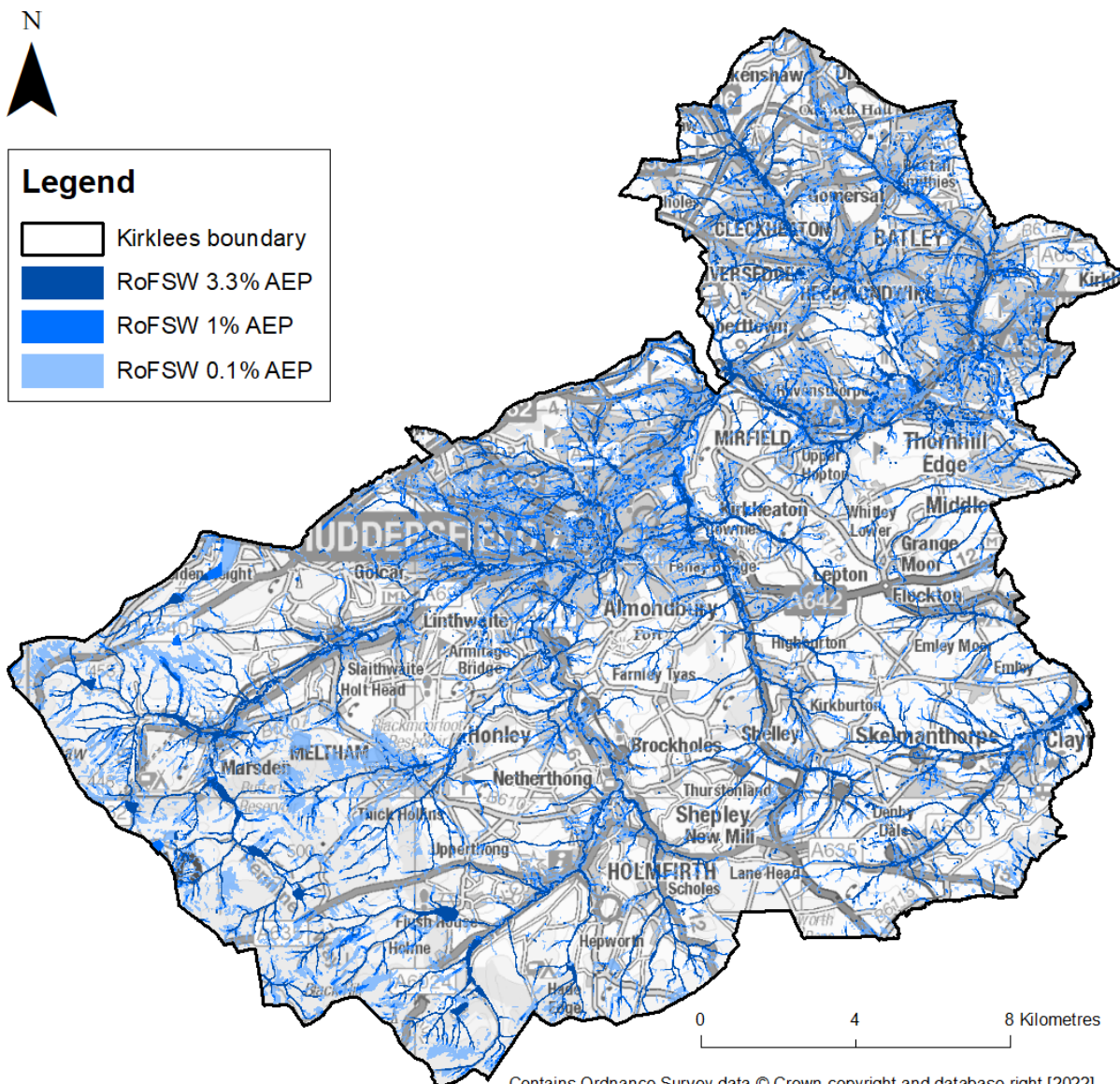


SURFACE WATER FLOODING

Surface water flooding is caused as a result of periods of high rainfall intensity or rainfall occurring when the ground is already saturated. Impermeable surfaces in urban areas are likely to heighten the risk of surface water flooding due to water not being able to infiltrate the surface. In addition, significant periods of heavy rainfall in areas with poor drainage systems may lead to blocked drains and sewer flooding. High summer temperatures can also harden the ground which can limit infiltration and cause problems during convective thunderstorms which often follow hot weather.

Figure 4.8 illustrates the Risk of Flooding from Surface Water (RoFSW) dataset which shows significant risk in the more urban areas of Huddersfield and Dewsbury and Batley in the north of the district. The more significant risk is apparent in these areas due to the greater proportion of less permeable and impermeable land surfaces. Surface water flood flows generally mimic the topography, following the watercourse channels and floodplains with areas of isolated ponding in topographic low spots.

Figure 4.8 flood risk from surface water, based on the EA Risk of Flooding from Surface Water dataset



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EA RISK OF FLOODING FROM SURFACE WATER DATASET

The national Risk of Flooding from Surface Water (RoFSW) dataset identifies areas where localised flooding can cause problems even if main rivers are not overflowing. The RoFSW presents a worst-case scenario; therefore, any location identified to be at risk from surface water flooding according to the RoFSW should be assessed in more detail, usually through an appropriate Flood Risk Assessment (FRA). The RoFSW is the primary dataset available to the LLFA for assessing surface water flood risk in the district.

The RoFSW includes surface water flood outlines, depths, velocities and hazards for the following events:

- Greater than 1 in 30 AEP event (3.3%) – high-risk
- Between 1 in 30 event and 1 in 100 AEP event (1%) – medium risk
- Between 1 in 100 event and 1 in 1,000 AEP event (0.1%) – low risk
- Less than 1 in 1,000 AEP (0.1%) – Very low risk (not shown).

At the time of writing, the EA is also carrying out a national update of the RoFSW as part of the National Flood Risk Assessment 2 (NaFRA2) project which is due for completion in 2024.

As LLFA, we will continue to manage surface water flood risk and will work in partnership with local communities to raise awareness and encourage the participation in local flood risk management. Such awareness of local flood risk and participation in flood risk management will become increasingly more important in our changing climate.

GROUNDWATER FLOODING

Groundwater flooding is caused by the emergence of water from beneath the ground, either at point or diffuse locations. The occurrence of groundwater flooding is usually local and unlike flooding from rivers, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas and can pose further risks to the environment and ground stability.

Warmer, wetter winters and hotter, drier summers due to climate change are likely to have significant impacts on groundwater levels within Kirklees. Increased periods of rainfall within the district are likely to increase the susceptibility of groundwater flooding in areas currently at risk. It is considered unusual to see groundwater breaking through the surface of the ground but the high number of basements in older properties, means that groundwater flooding to “below ground” rooms is increasingly common.

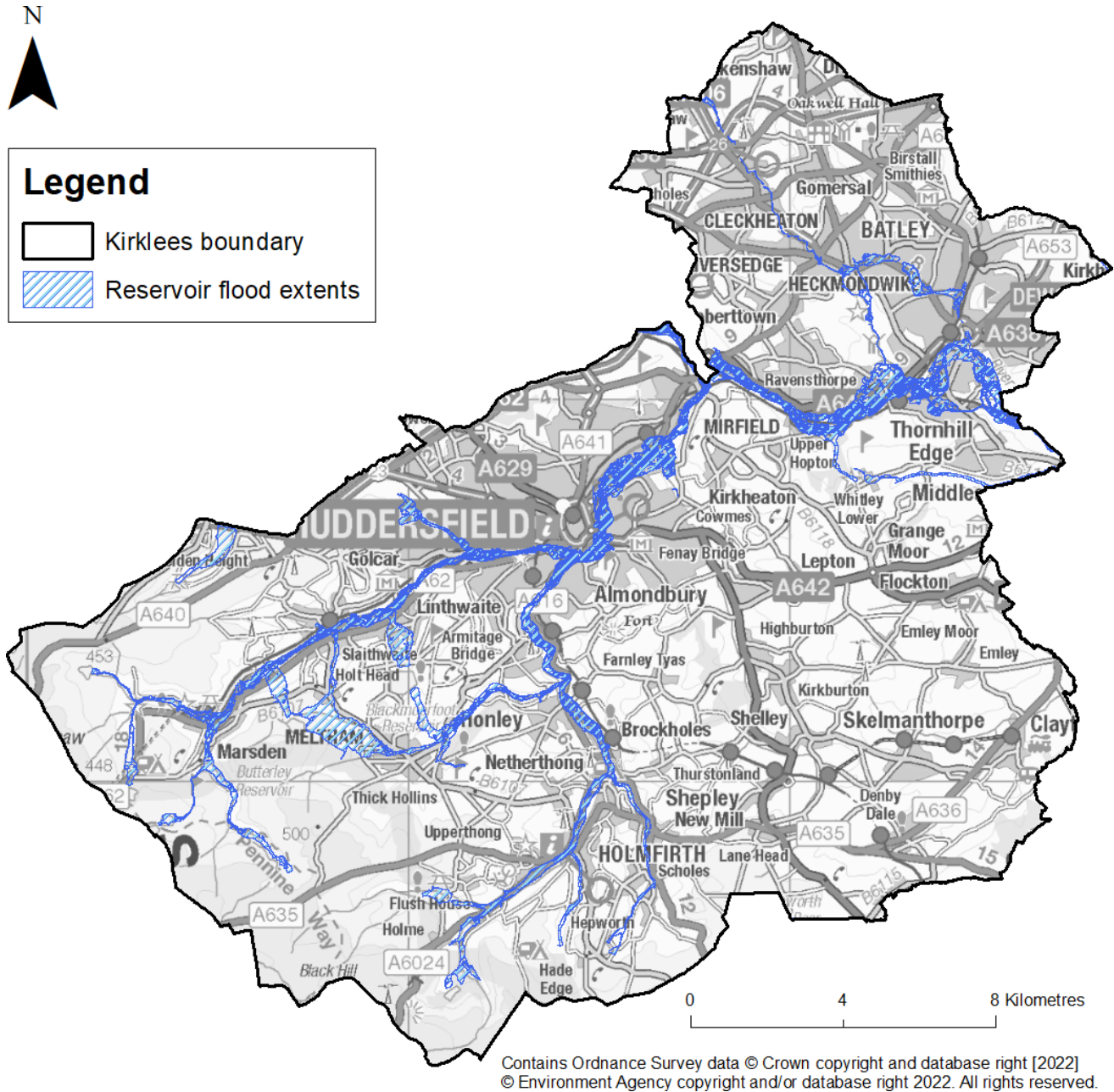
Development within areas that have a periodic high-water table will generally not be suited to infiltration SuDS. However, this is dependent on a detailed site investigation and at the Flood Risk Assessment A stage. Within Kirklees there are a high number of older properties containing cellars and basements, which can be particularly prone to rising water tables and therefore groundwater flooding. We will continue to work with homeowners concerning possible groundwater flood risk to existing properties.

Recorded incidents of groundwater flooding in Kirklees are rare. However, we will continue to raise awareness in local communities of the risks associated with groundwater flooding and how such risks can be mitigated.

RESERVOIR FLOODING

The EA has produced Reservoir Flood Maps (RFM) for all large, raised reservoirs that are regulated under the Reservoirs Act 1975 (reservoirs that hold over 25,000 cubic metres of water). Figure 4-9 highlights the risk of reservoir flooding across Kirklees in the event of a dry day i.e., when it isn't raining. The RFM extent shows the worst credible area that is susceptible to dam breach flooding. The map should be used to prioritise areas for evacuation/early warning. The RFM shows that there are 51 large-raised reservoirs which have the potential to impact Kirklees in the event of a breach. 32 of these large-raised reservoirs are located within the Kirklees boundary.

Figure 4.9 risk of flooding from reservoirs (EA Reservoir Flood Map)



We will work with and support reservoir owners to ensure the risk of flooding from reservoirs remains very low.

SEWER FLOODING

Sewer flooding has the potential to occur where significant amounts of intense rainfall overload the sewer system capacity causing water to back up through the sewers and surcharge through manholes. This has the potential to flood both road infrastructure and property. Pinch points and failures within the drainage network may also restrict flows.

Yorkshire Water owns the majority of the combined and surface water sewers within the district. Since 1980, sewer systems have been designed not to flood during a 1 in 30-year (3.3% AEP) rainfall event. However, higher magnitude events, e.g., a 1 in 100 chance of occurring in any given year (1% AEP), can still overwhelm the sewerage system through both surface water and fluvial sources. Existing sewerage systems can be placed under additional pressure where development reduces the permeable area within a catchment and through the impacts of climate change. This can lead to increased overland flows and therefore can occur in any location across Kirklees.

The Council continues to work in partnership with Yorkshire Water, the Environment Agency and other parties to better understand the interaction of the sewerage and drainage networks and provide improvements that will help further reduce the risk of flooding from sewers.

FLOOD MITIGATION

EXISTING FLOOD DEFENCES

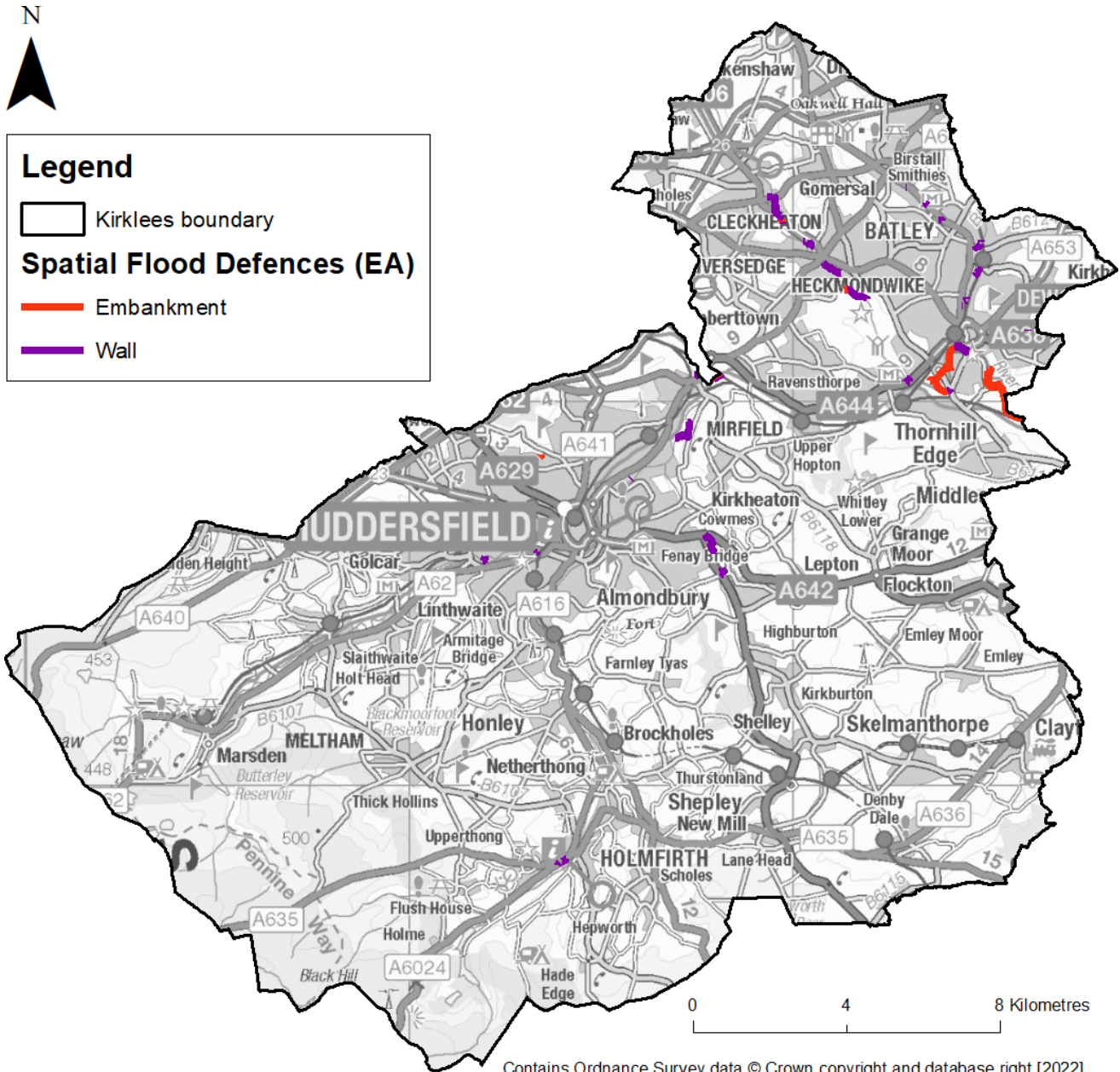
The EA's Spatial Flood defences dataset shows major flood defence walls and embankments currently owned, managed or inspected by the EA (Figure 4-10). Flood defences can be structures, buildings or parts of buildings, and can include manmade defence assets such as flood walls or embankments, or natural defences such as high ground.

Most main rivers within Kirklees have some form of flood defence along their reaches. These consist mostly of areas of natural or engineered areas of high ground which are not shown on Figure 4-10. Manmade defences include embankments, flood walls and flood gates. Flood defences are given a standard of protection and asset condition rating. An assessment of flood defences within the district highlights the majority of assets have a standard of protection to an annual exceedance probability of between 20 and 50 years, meaning protection is provided until a flood event exceeds a 1 in 50-year (2% AEP) flood event. The condition rating of the flood defence assets is mostly either 2 or 3, rated as good or fair when they were last inspected between 2021 and 2022.

ASSET MANAGEMENT

Kirklees own and maintains assets across the district, which includes culverts, bridge structures and trash screens. We are also responsible for its highway drainage systems such as highway gullies and carrier drains which are required to drain the public highway. The Council maintains these in accordance with the Well Managed Highway Infrastructure Code of Practice.

Figure 4.10 EA Spatial Flood Defences dataset indicating major flood walls and flood embankments within Kirklees



WORKING WITH NATURAL PROCESSES

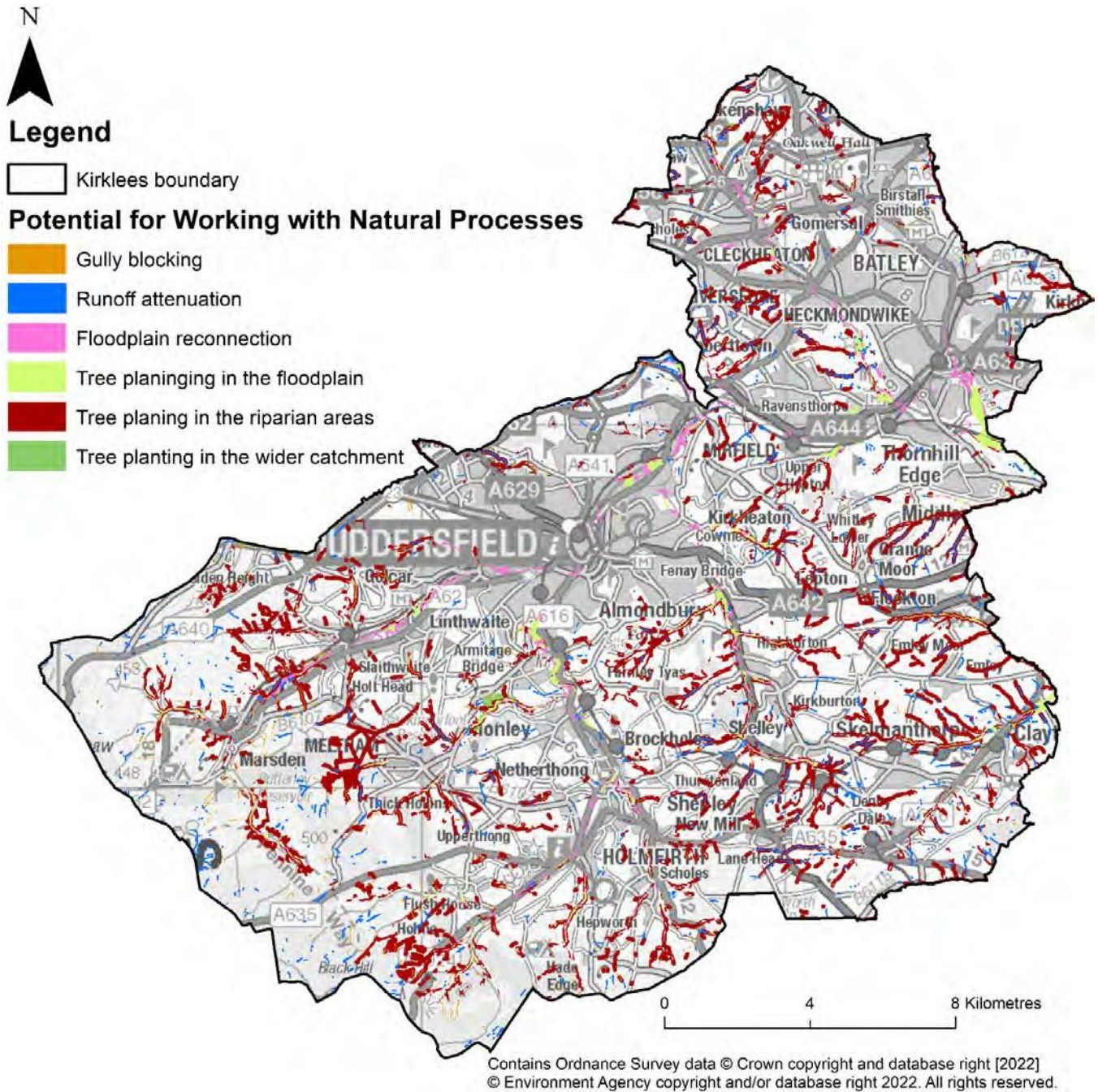
Working with Natural Processes (WwNP) or Natural flood management (NFM) is a type of flood risk management used to protect, restore and re-naturalise the function of catchments and rivers to reduce flood and coastal erosion risk. WwNP has the potential to provide environmentally sensitive approaches to minimising flood risk, to reduce flood risk in areas where hard flood defences are not feasible and to increase the lifespan of existing flood defences.

A wide range of techniques can be used that aim to reduce flooding by working with natural features and processes in order to store or slow down flood waters before they can damage flood risk receptors

(e.g. people, property, infrastructure, etc.). WwNP involves taking action to manage flood and coastal erosion risk by protecting, restoring and emulating the natural regulating functions of catchments, rivers, floodplains and coasts.

Figure 4.11 illustrates the EA's Working with Natural Processes dataset. There is considerable opportunity across Kirklees for tree planting along flow pathways within smaller floodplains to attenuate flooding. The opportunities for tree planting are mainly confined to less urban areas.

Figure 4.11 Working with Natural Processes



Within Huddersfield the only opportunity for WwNP is floodplain reconnection, which aims to reconnect a watercourse and its natural floodplain, especially during high flows, to reduce the rapid propagation of flows downstream. These opportunities have been identified in areas of low risk where there are no existing developments but where natural river features or landscape modifications, such as historic embankments, disconnect the channel from the floodplain.

CLIMATE CHANGE – UK CLIMATE PROJECTIONS

THIS SECTION OF THE REPORT HIGHLIGHTS THE POSSIBLE IMPACTS OF CLIMATE CHANGE ON SURFACE WATER IN KIRKLEES AND THEREFORE WHY BUILDING RESILIENCE INTO OUR COMMUNITIES IS SO IMPORTANT.

Following on from the UK Climate Projections 2009 (UKCP09), the UK Climate Projections 2018 (UKCP18) delivered a major upgrade to the range of UK climate projection tools designed to help decision-makers assess their risk exposure to our changing climate.

The UKCP18 project used cutting-edge climate science to provide updated observations and climate change projections up to the year 2100 across the UK. The project builds upon UKCP09 to provide the most up-to-date assessment of how the climate of the UK may change over the 21st century.

UKCP18 updates the projections over land and provides a set of detailed future climate projections for the UK at a 12km scale. Models of high impact events such as from localised heavy rainfall in summer months were created. UKCP18 enables the UK to adapt to the challenges and opportunities presented by climate change.

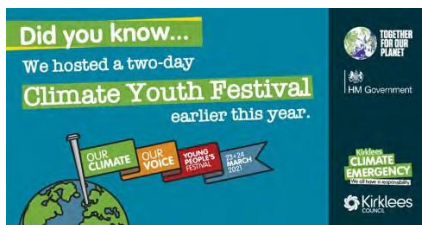
KIRKLEES CLIMATE EMERGENCY¹⁶



The Council declared a climate emergency in 2019 in the knowledge that we must all take urgent action to improve and protect our environment.

Our vision is for a Net Zero and Climate Ready Kirklees by 2038. This provides us with focus on both mitigation and adaptation to climate change.

For mitigation, carbon emissions from human activities will need to be dramatically reduced to zero, with any remaining emissions safely removed from the atmosphere.



15 Met Office UKCP18

¹⁶ [Kirklees Climate Emergency](#)

IMPACTS OF CLIMATE CHANGE ON SURFACE WATER IN KIRKLEES

As part of this Strategy, we have modelled the climate change allowances for peak rainfall to give an insight into the effects of climate change on surface water flows and the subsequent impacts on communities in Kirklees.

The likely impacts of climate change are well documented and will have a significant impact on flood risk. Increases in duration and intensity of extreme rainfall events as a result of climate change will increase flood risk from multiple sources.

Surface water flooding is caused by periods of high rainfall intensity or rainfall occurring when the ground is already wet. Climate change projections indicate wetter winters in the future, with more frequent and intense rainfall events. Therefore, instances of surface water flooding are likely to become more common, particularly during the winter months where overland flow will increase due to saturation of permeable surfaces.

To gauge the impacts of climate change on surface water and for small scale drainage design, the Environment Agency updated their allowances for peak rainfall intensities in 2021 based on management catchments, provided in Table 5-1, which should be used as a guide for small (less than 5km²) and urbanised drainage catchments when carrying out modelling as part of a Flood Risk Assessment. The allowances are based on the high emission scenario of UKCP18, with the central allowance representing a 4°C increase by 2100.

TABLE 5.1: EA PEAK RAINFALL INTENSITY ALLOWANCES FOR MANAGEMENT CATCHMENTS IN KIRKLEES

Total potential change anticipated for peak rainfall intensities (based on a 1961-1990 baseline).

Management catchment – allowance category	3.3% annual exceedance rainfall event: 2050s (up to 2060)	3.3% annual exceedance rainfall event: 2070s (2061-2125)	1% annual exceedance rainfall event: 2050s (up to 2060)	1% annual exceedance rainfall event: 2070s (2061-2125)
Aire and Calder – Upper end	35%	40%	40%	45%
Aire and Calder – Central	20%	25%	25%	30%
Don and Rother – Upper end	35%	35%	40%	40%
Don and Rother – Central	20%	25%	20%	25%
Upper Mersey – Upper end	35%	40%	40%	45%
Upper Mersey – Central	20%	30%	25%	30%

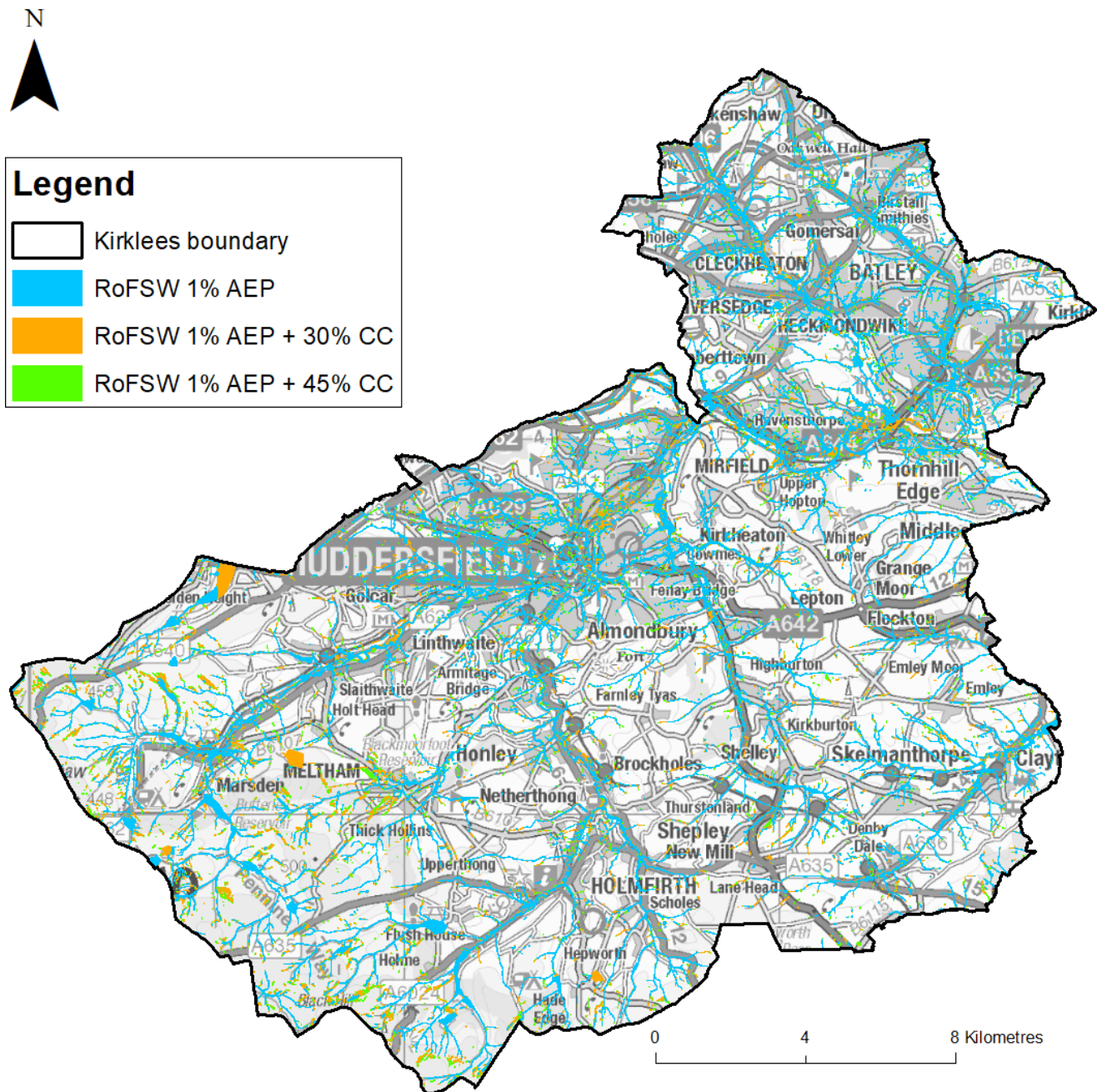
To assess the impacts of climate change on surface water flood risk, the Risk of Flooding from Surface Water (RoFSW) 1 in 100-year (1% AEP) mapping has been updated with 30% (Central) and 45% (Upper End) uplifts.

Figure 5-1 shows that the extent of surface water flooding is likely to increase with climate change across Kirklees, particularly within the low-lying floodplains of the River Colne and River Calder and along topographical flow paths of existing watercourses and their tributaries. Across the whole of the

district, it is predicted that there will be a 36% increase in the number of properties at risk of surface water flooding in a 1% AEP event as a result of a 30% increase in rainfall intensity.

This Local Flood Risk Management Strategy sets out how it plans to manage the flood impacts of Climate Change. It recognises the importance of addressing the causes of climate change by promoting nature-based solutions like tree planting and peatland restoration initiatives with our partners. In restoring and adapting our landscapes, we are mitigating the impact of Climate Change.

Figure 5.1 Flood risk from surface water with 30% and 45% climate change allowances, based on the Risk of Flooding from Surface Water dataset



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FLOOD INVESTIGATION AND ASSET RECORDING

THIS SECTION BRIEFLY OUT THE ROLES AND RESPONSIBILITIES OF THE KEY RISK MANAGEMENT AUTHORITIES IN KIRKLEES, UNDER THE PROVISIONS OF THE FLOOD AND WATER MANAGEMENT ACT 2010 (FWMA). APPENDIX D INCLUDES A MORE COMPREHENSIVE LIST.

In relation to Kirklees, the Risk Management Authorities in the district include:

- Lead Local Flood Authority – Kirklees Council
- Environment Agency
- Water and sewerage companies – Yorkshire Water
- Highways Authority – Kirklees Council and National Highways (strategic roads e.g., motorways)

Under the provisions of the Flood and Water Management Act the following duties and powers are common to all risk management authorities:

- Duty to cooperate with other risk management authorities
- Duty to act consistently with the national and local strategies
- Powers to take on flood risk functions from another Risk Management Authority
- Duty to contribute towards the achievement of sustainable development
- Duty to be subject to scrutiny from the LLFA's democratic process.

This underpins our understanding that the very same rainwater passes through our drainage assets as it continues along its water cycle journey. The LLFA will therefore ensure it continues to work collaboratively in partnership with all partners to reduce flood risk.

SCHEDULE 3 SUSTAINABLE DRAINAGE (FWMA)

The possible future enactment of Schedule 3¹⁷ of the FWMA means there is a requirement for the inclusion of SuDS in all new development which must be approved by the Council as the 'approving body'. The Council may be required to adopt and maintain SuDS for new developments once the development is complete. It is expected that legal, statutory guidance will be produced which will provide a more consistent approach to SuDS design and approval. The Council will engage with Government and its partners to ensure it will offer an effective approach to managing flood risk for our communities.

KIRKLEES FLOODING RESPONSIBILITIES



- Kirklees Council Lead Local Flood Authority (LLFA) – manage flood risk from ordinary watercourses, surface water and groundwater.
- Environment Agency – responsible for main rivers and regulate operation of large raised reservoirs.
- Highways Authority (Kirklees Council and National Highways) – responsible for providing and managing highway drainage and some roadside ditches/gullies.
- Yorkshire Water – responsible for public water supply and sewerage systems.

¹⁷ [Schedule 3 Flood and Water Management Act 2010](#)

FLOOD INVESTIGATIONS

We have a duty to investigate and publish reports on significant flood incidents (where appropriate and necessary) to identify which authorities have relevant flood risk management functions, and what they have done or intend to do (FWMA 2010).

We will endeavour to investigate flood incidents which meet the following criteria:

- where one or more residential or business property suffers internal flooding
- where there is a risk to life as a result of the depth and / or velocity of floodwater
- where critical infrastructure (e.g. emergency services buildings, utility company infrastructure, schools, day centres, hospitals and main transport routes) suffer flooding or obstruction, or were in imminent danger of flooding
- where five or more properties were in imminent danger of flooding, or
- where local democratic pressures from elected members, committees, or other elected bodies, might be considered as a factor in determining whether a formal investigation should be carried out.

Note: we will only formally publish details if considered appropriate.

ASSET RECORDING

The LLFA has a duty to maintain a register of structures or assets that have a significant effect on flood risk (FWMA 2010). The LLFA has discretion to set a local indication of “significance” to determine which assets it records on the register, which is available for inspection.

The Council’s register of drainage assets aims to include the following structures or features:

- Pipes and culverts:
 - Where the diameter is greater than 600mm or cross-sectional area is greater than 0.3m², or
 - Where the pipe/culvert has a recorded history of flooding, or
 - Where the pipe/culvert is within 20m of a cluster of 5 or more recorded flood incidents (non-cellar) – excluding pipes of 225mm diameter or less.
- Debris screen:
 - where a debris screen is blocked.
- Others:
 - reservoirs
 - mill ponds
 - environment Agency assets.
- SuDS:
 - all new SuDS adopted by Kirklees.

HIGH RISK CATCHMENTS

Kirklees Council has carried out a high level strategic study into which are the highest risk hydrological catchments in the district based on surface water flood risk and flood risk from main rivers to existing properties and infrastructure.

At a strategic level, this will help us to identify the communities within these high risk catchments that may be in greatest need of action on flood risk management.

STRATEGIC APPROACH

To identify areas that may be at the highest risk of flooding from surface water and main rivers, an assessment of surface water and fluvial flood risk has been undertaken for Kirklees. We have identified the top ten catchments where risk to existing properties and critical and vulnerable infrastructure is highest from both surface water and main rivers. We have also considered recorded historic flood events and levels of social deprivation to help to help us to prioritise our flood risk management actions to less well-off communities to ensure they receive the same consideration as more affluent areas where damages as a result of flooding may be higher in monetary terms.

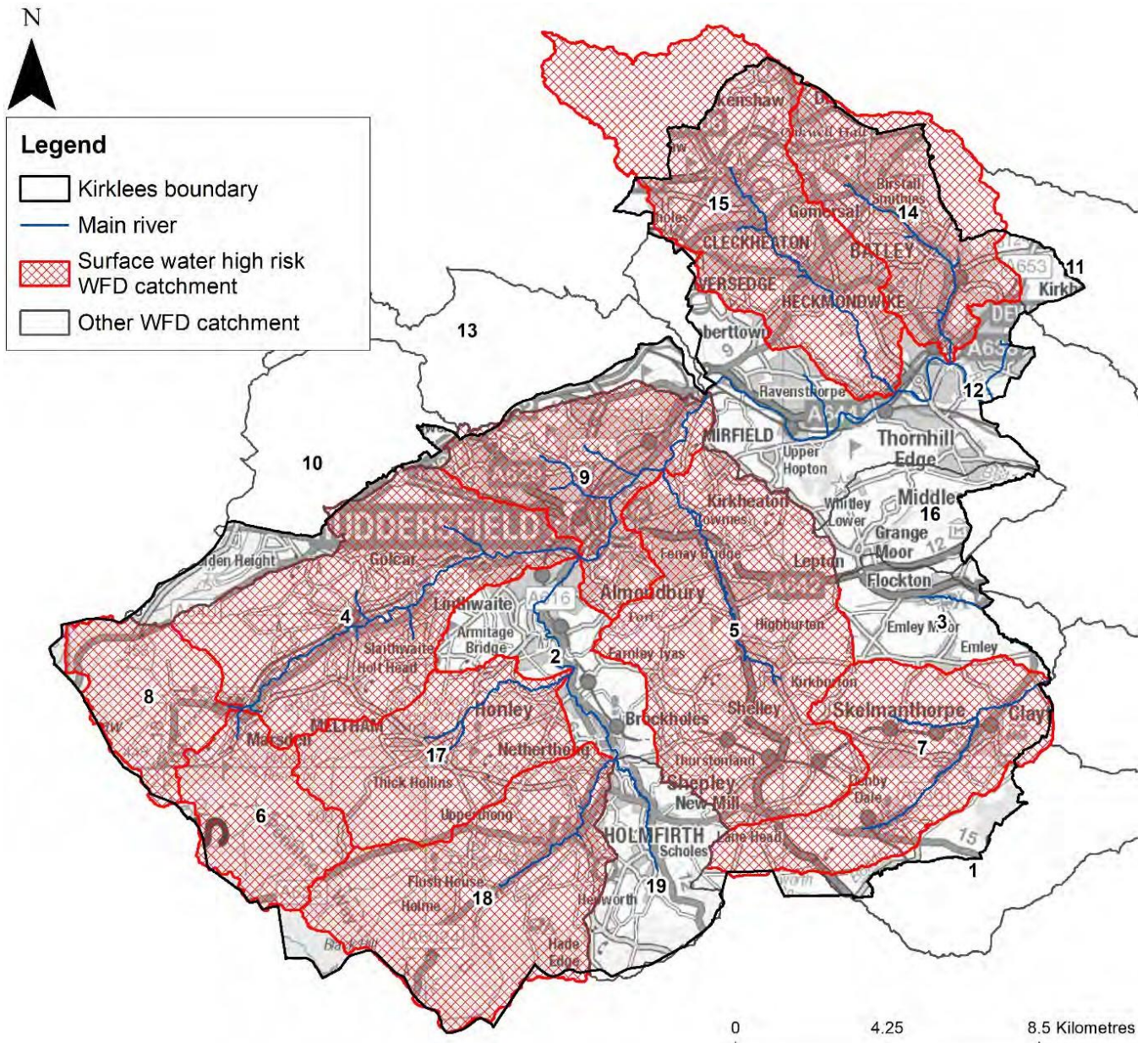
Note this is a strategic approach to identifying those areas most at risk. It is not a detailed investigation designed to target locations where specific flood risk management schemes are required.

For the purposes of this assessment, the district has been split into 19 areas based on the Water Framework Directive (WFD) watercourse catchments to allow a catchment-based approach to be taken. To identify the high-risk surface water catchments the RoFSW dataset and modelled surface water climate change data have been used. The Flood Map for Planning has been used to identify the high-risk fluvial catchments. We have also used property and critical infrastructure data, historic flood event information recorded by Kirklees and social deprivation data. The methodology process is detailed in Appendix E.

Figures 7.1 and 7.2 show the top ten WFD catchments with the largest number of receptors (residential properties, non-residential and infrastructure) at risk from surface water and main river flooding respectively, within Kirklees. The historic flood event data has been used to help corroborate the catchments shown to be at highest risk. Figures 7-3 and 7-4 show a comparison of the high-risk catchments with the social deprivation data.

We will ensure all communities are afforded the required support that is proportionate to risk and consequence.

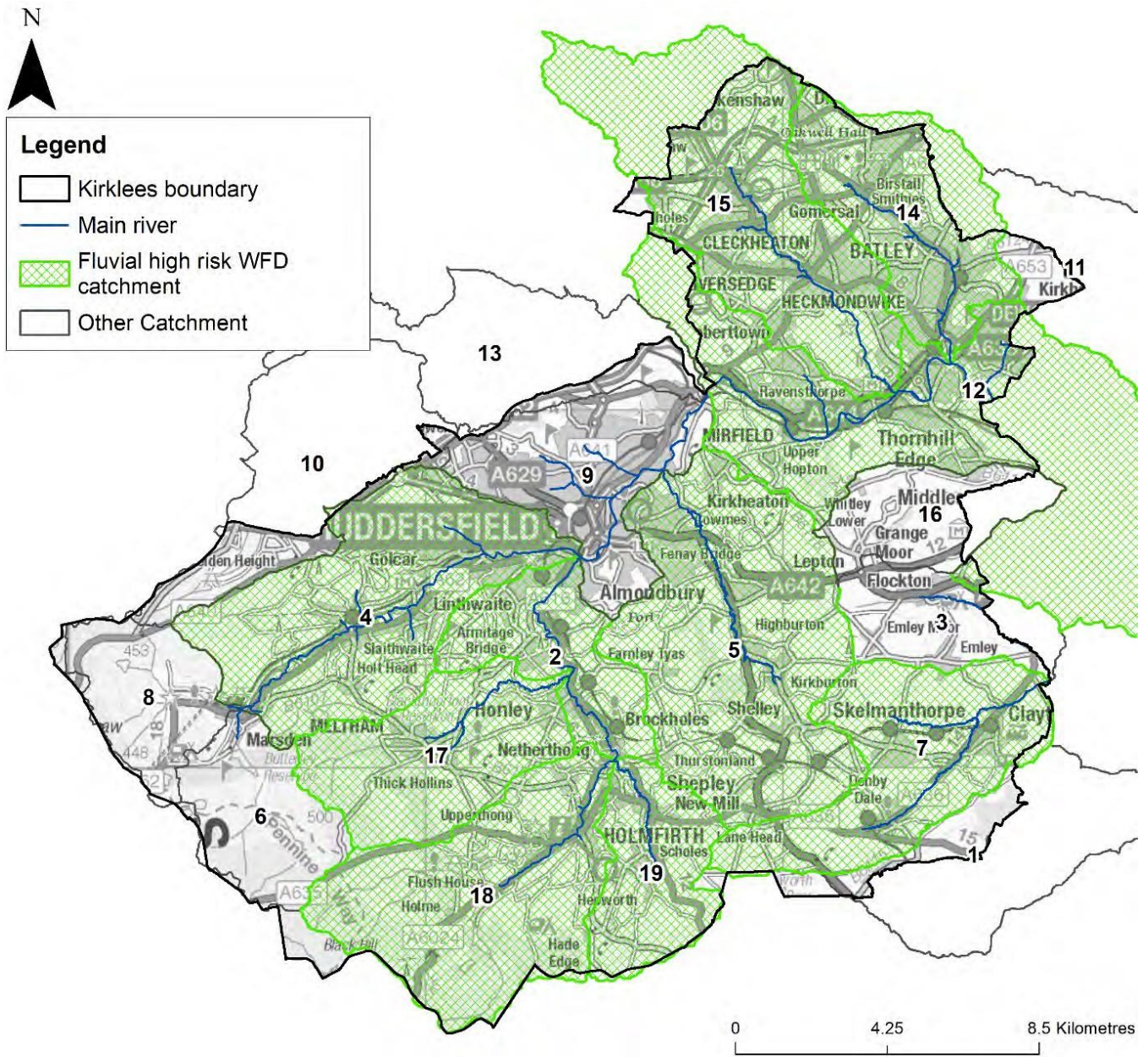
Figure 7.1 Top ten WFD catchments with the largest number of receptors at risk from surface water



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- | | | |
|---|---|---|
| 1 - Cawthorne Dyke from Source to River Dearne | 8 - Colne from Source to Wessenden Brook | 15 - Spen Beck from Source to River Calder |
| 2 - Holme from New Mill Dike to R Colne | 9 - Colne from River Holme to River Calder | 16 - Smithy Brook from Source to River Calder |
| 3 - Bentley Brook from Source to River Dearne | 10 - Black Brook from Source to River Calder | 17 - Mag Brook from Source to River Holme |
| 4 - Colne from Wessenden Brook to R Holme | 11 - Chald from Source to River Calder | 18 - Holme from Source to New Mill Dike |
| 5 - Fenay beck from Source to River Colne | 12 - Calder from River Colne to River Chald | 19 - New Mill Dike from Source to River Holme |
| 6 - Wessenden Bk from Butterly Resr to River Coln | 13 - Calder from Ryburn Confluence to River Colne | |
| 7 - Dearne from Source to Bentley Brook | 14 - Batley Beck from Source to River Calder | |

Figure 7.2 Top ten WFD catchments with the largest number of receptors at risk from main rivers



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- | | | |
|---|---|---|
| 1 - Cawthorne Dyke from Source to River Dearne | 8 - Colne from Source to Wessenden Brook | 15 - Spen Beck from Source to River Calder |
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| 4 - Colne from Wessenden Brook to R Holme | 11 - Chald from Source to River Calder | 18 - Holme from Source to New Mill Dike |
| 5 - Fenay beck from Source to River Colne | 12 - Calder from River Colne to River Chald | 19 - New Mill Dike from Source to River Holme |
| 6 - Wessenden Bk from Butterly Resr to River Coln | 13 - Calder from Ryburn Confluence to River Colne | |
| 7 - Dearne from Source to Bentley Brook | 14 - Batley Beck from Source to River Calder | |

Figure 7.3 Top ten WFD catchments with the largest number of receptors at risk from surface water compared to social deprivation

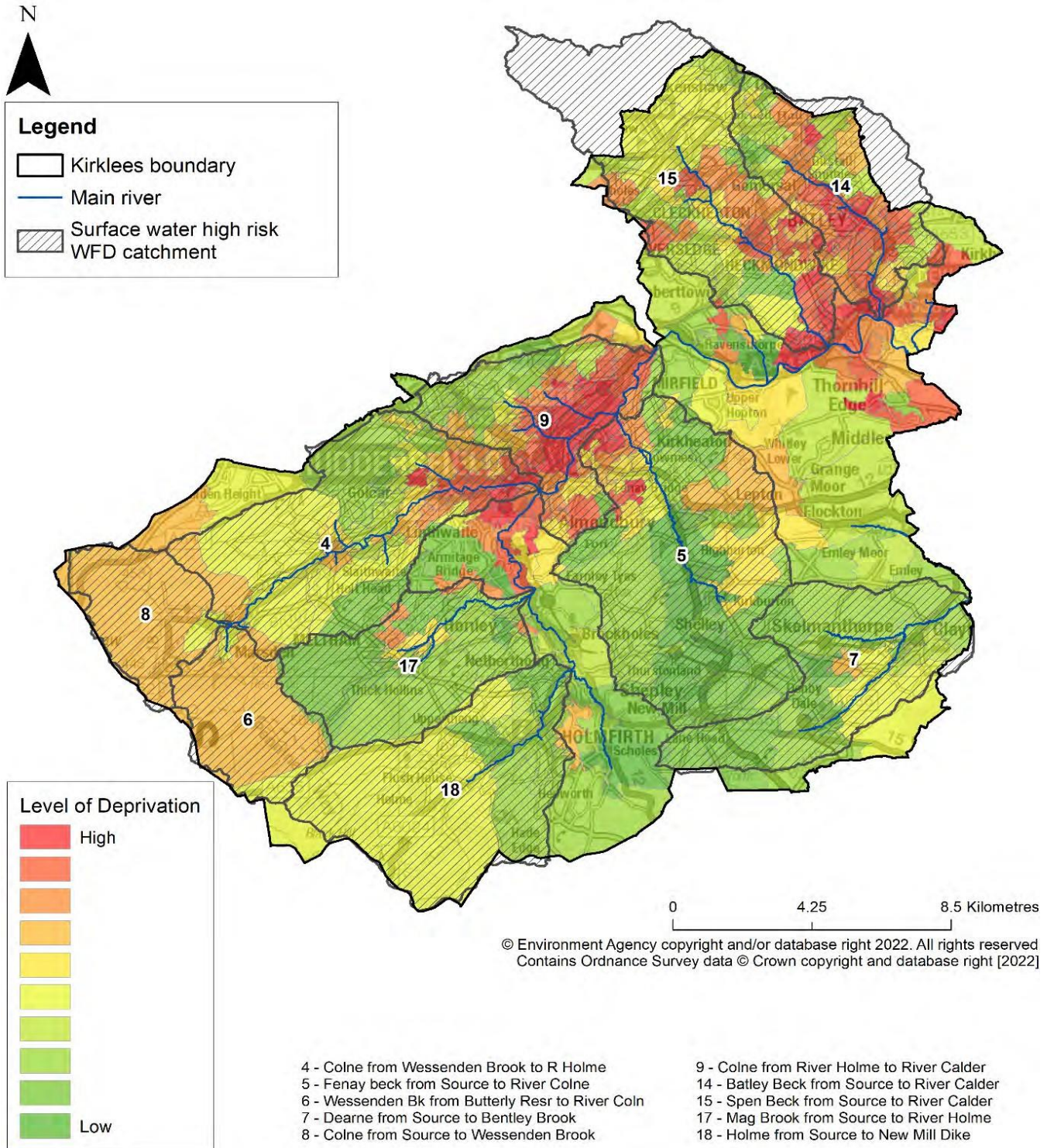
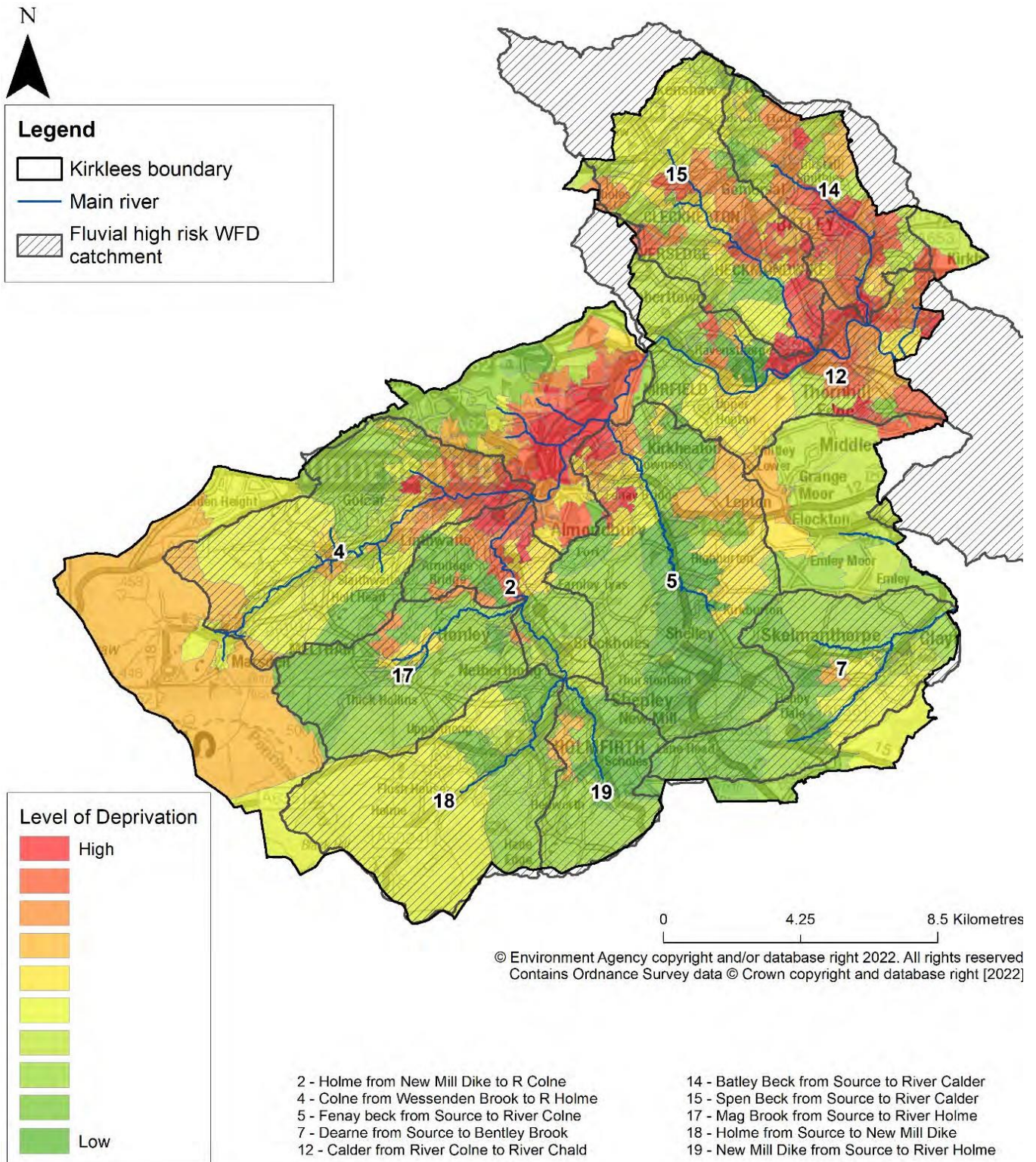


Figure 7.4 Top ten WFD catchments with the largest number of receptors at risk from main rivers compared to social deprivation



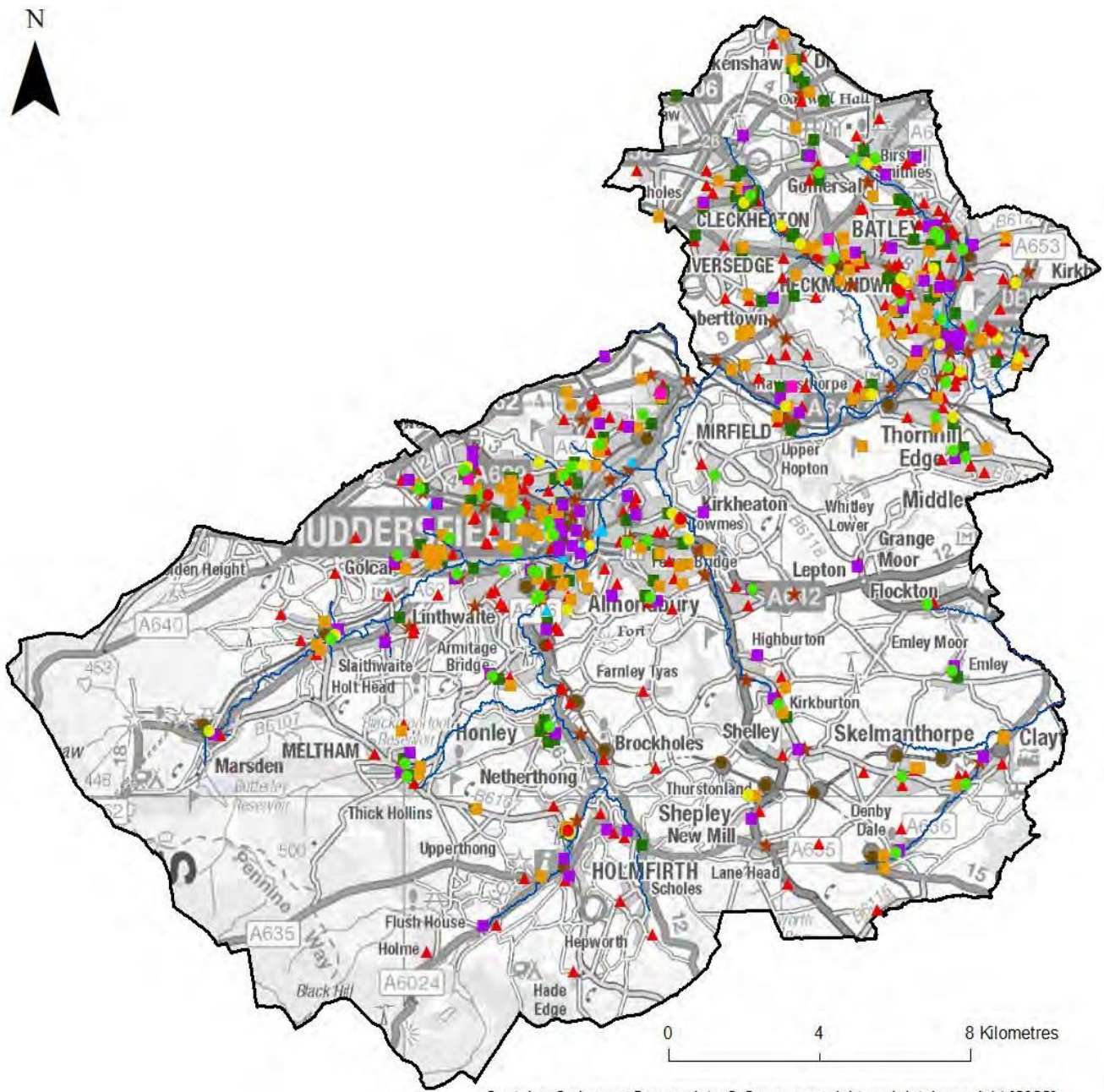
There are a number of critical and vulnerable infrastructure sites in Kirklees where the consequences of being flooded would impact on a large number of people and also the vulnerable people in society. It is therefore important that such infrastructure is protected and resilient to the impacts of climate change on flooding. Such critical and vulnerable infrastructure includes the following:

- hospitals, clinics and GP surgeries
- care homes and rest centres
- sheltered housing centres
- schools, colleges and universities

- children’s homes
- bus and train stations
- petrol stations.

Figure 7.5 shows the locations of the critical and vulnerable infrastructure which are mainly centred around Huddersfield, Dewsbury and Batley. These communities are located in the high-risk surface water catchments and areas of high social deprivation based on the above figures. Tables 7.1 and 7.2 list the number of ground floor residential properties, ground flood non-residential properties, and critical services at risk within each high-risk surface water and high-risk fluvial catchment respectively.

Figure 7.5 Critical and vulnerable infrastructure in Kirklees



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Legend

- | | | | | |
|-------------------|--------------------|-----------------|----------------------|---------------------|
| Kirklees boundary | Hospital / hospice | Children's home | Sheltered housing | Bus / rail stations |
| Main river | GP surgery | Rest centre | School | Petrol station |
| | Clinic | Care home | College / university | |

TABLE 7-1 RESIDENTIAL AND NON-RESIDENTIAL PROPERTIES, AND CRITICAL SERVICES AT RISK FROM SURFACE WATER IN THE 1 IN 1,000-YEAR EVENT IN HIGH-RISK SURFACE WATER CATCHMENTS

WFD high risk catchment ID	WFD high risk catchment name	Main communities at risk	Number of residential properties at risk	Number of non-residential properties at risk	Number of critical/vulnerable infrastructure at risk
8	Colne from Source to Wessenden Brook	Rural, Marsden	114	30	1
6	Wessenden Bk from Butterly Resr to River Coln	Rural, Marsden	225	68	0
4	Colne from Wessenden Brook to R Holme	Marsden, Slaithwaite, Huddersfield, rural	3749	1085	41
17	Mag Brook from Source to River Holme	Meltham, Honley, rural	1376	293	9
7	Dearne from Source to Bentley Brook	Marsden, rural	948	357	8
9	Colne from River Holme to River Calder	Huddersfield	3343	1295	50
18	Holme from Source to New Mill Dike	Holmfirth	830	354	11
15	Spenn Beck from Source to River Calder	Heckmondwike, Liversedge, Cleckheaton	4554	1193	39
14	Batley Beck from Source to River Calder	Dewsbury, Batley, Gomersal, Birstall Smithies	2966	1435	53
5	Fenay beck from Source to River Colne	Dalton, Fenay Bridge	3309	601	25

Total at risk:

- Residential properties = 21,414
- Non-residential properties = 6,711
- Critical/vulnerable infrastructure = 237

Note: Some properties straddle two or more catchment boundaries.

TABLE 7-2 RESIDENTIAL AND NON-RESIDENTIAL PROPERTIES, AND CRITICAL SERVICES AT RISK FROM RIVERS IN THE 1 IN 1,000-YEAR EVENT IN HIGH-RISK FLUVIAL CATCHMENTS

WFD high risk catchment ID	WFD high risk catchment name	Main communities at risk	Number of residential properties at risk	Number of non-residential properties at risk	Number of critical/vulnerable infrastructure at risk
12	Calder from River Colne to River Chald	Dewsbury, Mirfield	1446	1024	14
15	Spenn Beck from Source to River Calder	Dewsbury, Cleckheaton, Heckmondwike	1401	504	11
7	Dearne from Source to Bentley Brook	Denby Dale, Skelmansthorpe, rural	50	80	1
5	Fenay beck from Source to River Colne	Dalton, Fenay Bridge	461	174	2
2	Holme from New Mill Dike to R Colne	Brockholes, Newtown, Honley, Lockwood	238	282	4
14	Batley Beck from Source to River Calder	Dewsbury, Batley	115	556	6
4	Colne from Wessenden Brook to R Holme	Huddersfield, Marsden	276	279	4
18	Holme from Source to New Mill Dike	Holmfirth	128	148	2
19	New Mill Dike from Source to River Holme	Hepworth, New Mill, rural	61	33	0
17	Mag Brook from Source to River Holme	Meltham	36	45	0

Total at risk:

- Residential properties = 4,212
- Non-residential properties = 3,125
- Critical/vulnerable infrastructure = 44

Note: Some properties straddle two or more catchment boundaries.

FLOOD RISK ACTION PLAN

Together with the longer-term Local Strategic themes, we have also formulated a set of shorter term, measurable actions which formulate our Flood Risk Action Plan (Appendix F)

The Action Plan is to remain a live document and be continually updated as and when new measures and actions are defined, when new funding sources or delivery partners are found, and when the action has been delivered or a programme for delivery has been formulated. The Strategy is to be in place for the next five to ten years, during which the measures in the Action Plan will be delivered.

The measures making up the Flood Risk Action Plan have been developed from the following sources:

- Rollover actions from the current Implementation Plan where still appropriate
- Feedback and suggestions from stakeholders following the stakeholder engagement workshops carried out as part of this Local Strategy
- The Humber Flood Risk Management Plan 2 (2021 – 2027) consultation responses on measures included in the latest FRMP update
- Identified high flood risk catchments and communities.

The measures listed within the Flood Risk Action Plan shows how it aligns with the following:

- Resilience themes:
 - Place making
 - Protect
 - Respond
 - Recover
- Geographical areas where actions are required
- Key delivery partners for delivering the action.

FUNDING FOR IMPLEMENTING THE FLOOD RISK ACTION PLAN

In the flood industry there are number of funding streams that are available to support the development and delivery of capital flood measures. These include:

- Flood and Coastal Erosion Risk Management Grant in Aid (FCERM GiA)
- Local Levy
- Council's Flood Management Capital Programme
- Central government grants
- Private / local funding.

The Council will remain abreast with alternative funding sources and work with its partners to support bids to increase investment within the district.

IMPLEMENTATION, MONITORING AND REVIEW

THIS SECTION SETS OUT THE PROCESS BY WHICH THE COUNCIL WILL IMPLEMENT, MONITOR AND REVIEW THIS STRATEGY. OUR LOCAL STRATEGY HAS BEEN DEVELOPED TO SUPPORT OUR UNDERSTANDING AND MANAGEMENT OF LOCAL FLOOD RISK OVER THE NEXT TEN YEARS AND THEREFORE WILL REQUIRE PERIODIC REVIEW TO ENSURE IT REMAINS CURRENT AND IN LINE WITH LOCAL AND NATIONAL POLICY, CHANGES IN CLIMATE CHANGE SCIENCE AND LOCAL FLOOD RISK

IMPLEMENTATION AND MONITORING

Our Local Strategy sets out the roles, responsibilities, objectives, and the priorities of all the organisations that have a statutory role in managing flood risk. In partnership with these organisations and key stakeholders, we will use this Strategy to guide our approach to local flooding issues across Kirklees.

The overarching objective of the Strategy is to reduce local flood risk to residents, businesses, key infrastructure, and communities by increasing resilience in our communities. This will be achieved through the implementation of our Flood Risk Action Plan with a focus on nature-based solutions and helping communities to be more resilient. The measures and actions will be delivered over the next five to ten years. The successful implementation of the Strategy will be influenced by external factors such as funding and resource availability. Funding of capital works may prove to be a challenge in Kirklees, particularly where schemes must receive partnership contributions. Where appropriate, we will seek to fund schemes through multiple routes.

Additionally, the Council will continually seek new sources of funding to support our flood risk management objectives. Where required, we will still look to carry out improvements to flood defence infrastructure to address known local flooding problems from surface water, ordinary watercourses and groundwater. However, it may be that in many areas the risk of flooding is managed through early flood warnings and local resilience measures. The Council will act as enablers to help communities take action to help themselves and carry out their own riparian responsibilities.

We will also seek to reduce flood risk through other actions such as planning and development control, working with landowners and land managers, progressing investment and increasing resilience. We will seek to retain and develop the expertise already present in the Council as well as increasing capacity where required. Through collaborative working and addressing issues at the appropriate authority level, we will make the best use of the resources and funding available.

Our partners are committed to delivering the objectives of the Flood Risk Action Plan to reduce flood risk to the communities of Kirklees over the next five to ten years. We will continue to take responsibility for implementing the Strategy and will lead on developing and continuing existing relationships with partners and stakeholders.

REVIEW

The Local Strategy will be reviewed and updated as and when required, specifically when there is a material change to legislation, the National Strategy, or the approach to flood risk in the district which may not be compatible to the Local Strategy. The Flood Risk Action Plan will be reviewed annually to check that the measures and actions taken undertaken continue to be appropriate and achievable. It should be noted that this Strategy represents the current situation (at the time of publishing) based on the current evidence base.

APPENDIX

A – Strategic Environmental Assessment

B – Habitat Regulation Assessment

C – Rapid Response Catchments

D – FWMA Roles and Responsibilities

E – High Risk Catchments

F – Flood Risk Action Plan



Local Flood Risk Management Strategy

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