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Cardiff Council Strategic Flood Consequences Assessment

Version 1

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Contract

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This report describes work commissioned by Stuart Williams, by an instruction dated 23rd January 2026. The Client's representative for the contract was Stuart Williams of Cardiff Council. Hannah Booth of JBA Consulting carried out this work.

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Acknowledgements

JBA would like to acknowledge LPA and LLFA from Cardiff Council for their input into the SFCA.

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Abbreviations

Abbreviation	Definition
AEP	Annual Exceedance Probability – the chance of an event with a particular magnitude occurring in each and every year
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
DAM	Development Advice Map – shows areas at risk of flooding from rivers and the sea for the purposes of land-use planning
DCWW	Dŵr Cymru Welsh Water
FAS	Flood Alleviation Scheme
FCA	Flood Consequences Assessment
FCERM	Flood and Coastal Erosion Risk Management
FMfP	Flood Map for Planning
FRAW	Flood Risk Assessment Wales
FRMP	Flood Risk Management Plan
FWMA	Flood and Water Management Act
IDD	Internal Drainage District
JBA	Jeremy Benn Associates
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
Main River	A watercourse shown as such on the Main River Map, and for which NRW has responsibilities and powers
NFM	Natural Flood Management
Ordinary Watercourse	All watercourses that are not designated Main River. Local Authorities or, where they exist, IDDs have similar permissive powers as Natural Resources in relation to flood defence work. However, the riparian owner has the responsibility of maintenance.
PFRA	Preliminary Flood Risk Assessment
PPW	Planning Policy Wales (Edition 12)
RBMP	River Basin Management Plan
RMA	Risk Management Authorities
SAB	SuDS Approval Body
SFCA	Strategic Flood Consequences Assessment
SMP	Shoreline Management Plan
SuDS	Sustainable Drainage Systems
TAN-15	Technical Advice Note 15 – Development, Flooding and Coastal Erosion. Guidance for Local Planning Authorities to reduce flood risk and develop away from high risk areas.

Abbreviation	Definition
WFD	Water Framework Directive
WWNP	Working With Natural Processes

Executive Summary

This Strategic Flood Consequences Assessment (SFCA) has been commissioned by Cardiff Council to support the development of its Replacement Local Development Plan (LDP). The SFCA provides a robust evidence base to inform land allocation decisions and planning policies, ensuring that future development is sustainable and resilient to flood risk.

The study has identified areas at potential high risk from flooding, as well as providing details of historical flood events and details of any flood risk management structures or procedures present.

This SFCA also provides information on the opportunities to slow and store water as part of natural flood management, as well as guidance on implementing Technical Advice Note 15 (TAN-15) and managing flood risk in a development site.

Study Area

The study area is formed of the Cardiff Council LPA area. The authority area is located along the south-east coastline of Wales and is the capital and largest city in Wales. The city is predominantly urbanised, with dense inner city neighbourhoods. Cardiff serves as a political, economic and cultural centre as well as a significant residential area.

Policy and Strategy

Key legislation and policies have been reviewed as part of the SFCA. This includes national policies and strategies such as the National Flood and Coastal Erosion Risk Management (FCERM) Strategy for Wales, Future Wales: The National Plan 2040 and Planning Policy Wales (Edition 12). Regional documents such as the Flood Risk Management Plan, River Basin Management Plan and the Shoreline Management Plan have also been reviewed to understand specific flood risk and coastal erosion policies in the region.

TAN-15 and other flood risk policies have also been reviewed and outlined with respect to flood risk.

Flood Risk Review

The SFCA has identified the risk of flooding from all sources across the study area and has provided information relating to the sources of information used to understand this flood risk.

Flood risk in Cardiff arises from multiple sources. The most significant source of flooding is fluvial. Fluvial flooding affects significant extents of the urban area from the River Taff, Ely and Rhymney as well as other smaller rivers and watercourses. Some of these areas are protected by NRW flood defences.

Tidal flooding is predicted to affect large areas of Cardiff. However, the presence of flood defences at Cardiff Bay, the River Rhymney and along the Wentlooge Levels provide protection.

Surface water and small watercourse flooding poses a risk in urban areas across Cardiff.

The risk of groundwater emergence is not widespread across the county. Where groundwater emergence is predicted, areas are often low-lying areas where the water table is more likely to be at a shallow depth. Flooding can be experienced through water rising up from the underlying aquifer or from water flowing from springs.

Sewer flooding has been recorded in several electoral wards (the level to which Dŵr Cymru Welsh Water report), with the highest number of flood incidents occurring in the Splott and Penylan electoral wards.

Reservoir flooding is unlikely but could have severe consequences in the event of a breach.

Requirements for a Flood Consequences Assessment

FCAs are required for developments in Flood Map for Planning Flood Zones 2 and 3, TAN-15 Defended Zones, and areas with known flood risk. The SFCA provides guidance on when and how FCAs should be undertaken, including consideration of climate change impacts and development lifetimes.

Flood risk mitigation and flood response planning

TAN-15 outlines the complementary role that planning and building regulations have in flood management, and the requirement for the use of flood mitigation and the implementation of resistance measures to ensure the consequences of flooding are acceptable. Where development is acceptable in Zones 2 and 3 and TAN-15 Defended Zones, it must have resilience to flooding built in at the site and property level. Where possible, development should still be directed to Flood Zone 1 (where there is a lower risk of flooding) in the first instance.

Measures to reduce, control or mitigate the impact and consequences of flooding and to improve the ability of people and property to adapt, respond to, and recover from flooding are provided in the report.

Advice and guidance on working with natural processes and natural flood management have also been prepared.

1 Introduction

1.1 Project Overview

This Strategic Flood Consequences Assessment (SFCA) has been commissioned by the Cardiff Council Local Planning Authority (LPA).

This SFCA provides a robust evidence base to inform the Cardiff Council (CC) Replacement Local Development Plan (RLDP) (2021 – 2036) and will inform the development of both policies and land allocation decisions. The SFCA has been carried out in accordance with the Welsh Government's development planning guidance, Planning Policy Wales Edition 12 (PPW), Technical Advice Note 15: Development, Flooding and Coastal Erosion (TAN-15) 2025, and Welsh Government Flood Consequences Assessment (FCA) Climate Change allowances.

1.2 Stages of Strategic Flood Consequences Assessments (SFCAs)

To provide a robust assessment of the potential flood risk, SFCAs should involve the collection, analysis, and presentation of all the available information from all sources of flood risk in the study area.

Typically, SFCAs are completed in three stages, with an increasing level of detail required in the analysis at each stage. The three stages of SFCAs are summarised below in Figure 1-1:

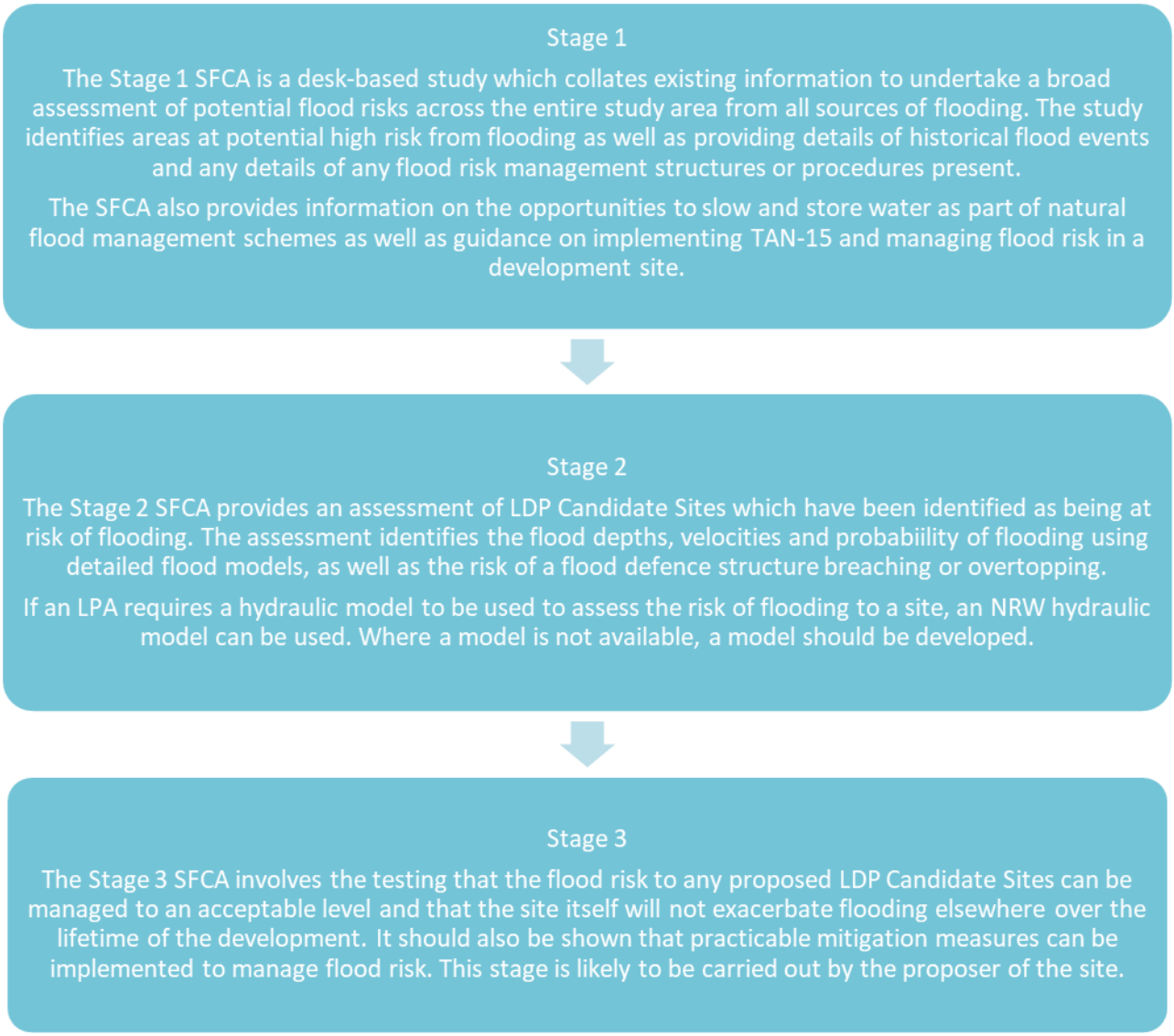

Figure 1-1 Outline of the SFCA process

1.3 Strategic Flood Consequences Assessment Objectives

This report fulfils the aims and objectives of a Stage 1 and Stage 2 SFCA as follows:

Stage 1

- To inform development regarding the management of flood risk within the Local Planning Authority Local Development Plan and, where appropriate, the Regional Strategic Development Plan.
- To understand flood risk from all sources and to investigate and identify the extent and severity of flood risk throughout the Stage 1 study area. This assessment will enable the Authority to steer development away from those areas where flood risk is considered greatest, ensuring that areas allocated for development can be developed in a safe, cost effective, and sustainable manner.
- To evaluate and consider flood risk from river, sea, and surface water sources, using Natural Resources Wales' Flood Map for Planning (FMfP). Other sources of

flooding, including groundwater and artificial sources such as reservoirs and sewers, are also considered.

- To consider the role and integrity of coastal defences and provide an understanding of the risks posed by coastal flooding and erosion, making reference to Shoreline Management Plan (SMP) policies and the Welsh National Marine Plan.
- To enable the Authorities to meet their obligations under PPW and TAN-15.
- To supplement current policy guidelines and to provide a straightforward risk-based approach to development management in the area. This is aimed at Councillors, Local Planning Authorities, the public, and developers.
- To provide a reference document to which all parties involved in development planning and flood risk can reliably turn to for initial advice and guidance.
- To provide an evidence base as part of an informed development management process that also provides guidance on the potential risk of flooding associated with future planning applications, and the basis for site specific FCAs where necessary.
- To assist the Authority in identifying specific areas where further and more detailed flood risk data and assessment work may be required.
- To provide an update to the authority's previous SFCA using new and updated flood risk information to summarise flood risks to the Authority area.
- To produce maps showing the flood risk to settlements provided by the Local Planning Authority.

Stage 2

- To identify the risk of flooding to proposed development sites which are in the process of being considered for their suitability as allocated sites within an LDP.
- To consider flood mitigation measures which could be implemented for such sites.
- To determine whether development could be made safe without increasing flood risk elsewhere

It is important to highlight that this SFCA is strategic in nature and makes use of the most current available information. This SFCA should be used as a starting point for planners, developers, and the public to initially consider development and flood risk and whether more detailed, site specific assessments of flood risk, such as an FCA, are required. Over the plan period, datasets used to inform this SFCA may be superseded, and the most up to date guidance, policy and data should be used in all site-specific detailed assessments. It is also worth noting that the presence of flood zones in an area, be it fluvial, tidal, or surface water, or the presence of groundwater flood risk does not mean that development simply cannot happen. Although, sites located within areas of lower risk should be considered in preference to areas at higher risk as part of the development planning process, and a more detailed assessment of flood risk may be required to ensure that risks can be effectively managed.

1.4 Stakeholder Engagement

The following stakeholders have been consulted during the preparation of this SFCA:

- Cardiff Council Local Planning Authority
- Lead Local Flood Authority (including SuDS Approval Body [SAB])
- Natural Resources Wales (NRW)
- Dŵr Cymru Welsh Water (DCWW)

1.5 Structure of the Strategic Flood Consequences Assessment

Section	Contents
Introduction	Provides a background to the study, defines objectives, outlines the approach adopted and the consultation performed.
Study Area	Includes an overview of the study area, including information on the topography, geological, and hydrological characteristics of the area.
Policy and Strategy	Includes information on the implications of recent changes to planning and flood risk policies and legislation, as well as documents relevant to the study.
Understanding of Flood Risk	Introduces the assessment of flood risk and provides an overview of the different types and sources of flooding in the study area.
Flood Risk Review	Provides a review of flood risk from all sources for the Cardiff Council local planning authority area.
Coastal risks- erosion and flooding	Provides a summary of the risk of coastal flooding and erosion.
Flood Risk Appraisal	Provides a summary of the candidate sites provided by Cardiff Council, which have been assessed to determine the risk of flooding.
Requirements for a Flood Consequences Assessment	Outlines what an FCA is and the requirements for an FCA.
Flood Consequences Assessment Guidance	Outlines further guidance on how guidance in TAN-15 should be applied.
Development and Resilience to Flood Risk	Outlines methods to increase the resilience of a development.
Working with Natural Processes and Natural Flood Management	Includes information on areas which could be suitable for implementing natural flood management measures.
Summary	A summary of the key report findings.
Appendices	Outline and individual flood risk maps for the

Section	Contents
	authority area.

Where local guidance or policies have been incorporated into this SFCA, they are set out within blue boxes, such as this. This aims to highlight developer parameters, requirements and exceptions of CC with respect to development and flood risk. All local policies have been reviewed and agreed by the LPA, LLFA, and SAB, with other stakeholders consulted where appropriate.

2 Study Area

2.1 Geographic Extent

The study area is formed of the Cardiff Council LPA area, as shown in Figure 2-1. The authority area is located along the south-east coastline of Wales and is the capital and largest city in Wales.

The authority area is 141km^2 with a population of approximately 362,300 (as of the 2021 census, the latest available data). The city is predominantly urbanised, with dense inner-city neighbourhoods. Rural and semi-rural areas are present around its western and northern edges and include smaller villages. Cardiff serves as a political, economic and cultural centre, as well as a significant residential area.

The authority area is bordered by four other LPAs:

- Newport City Council
- Caerphilly County Borough Council
- Rhondda Cynon Taf County Borough Council
- Vale of Glamorgan Council

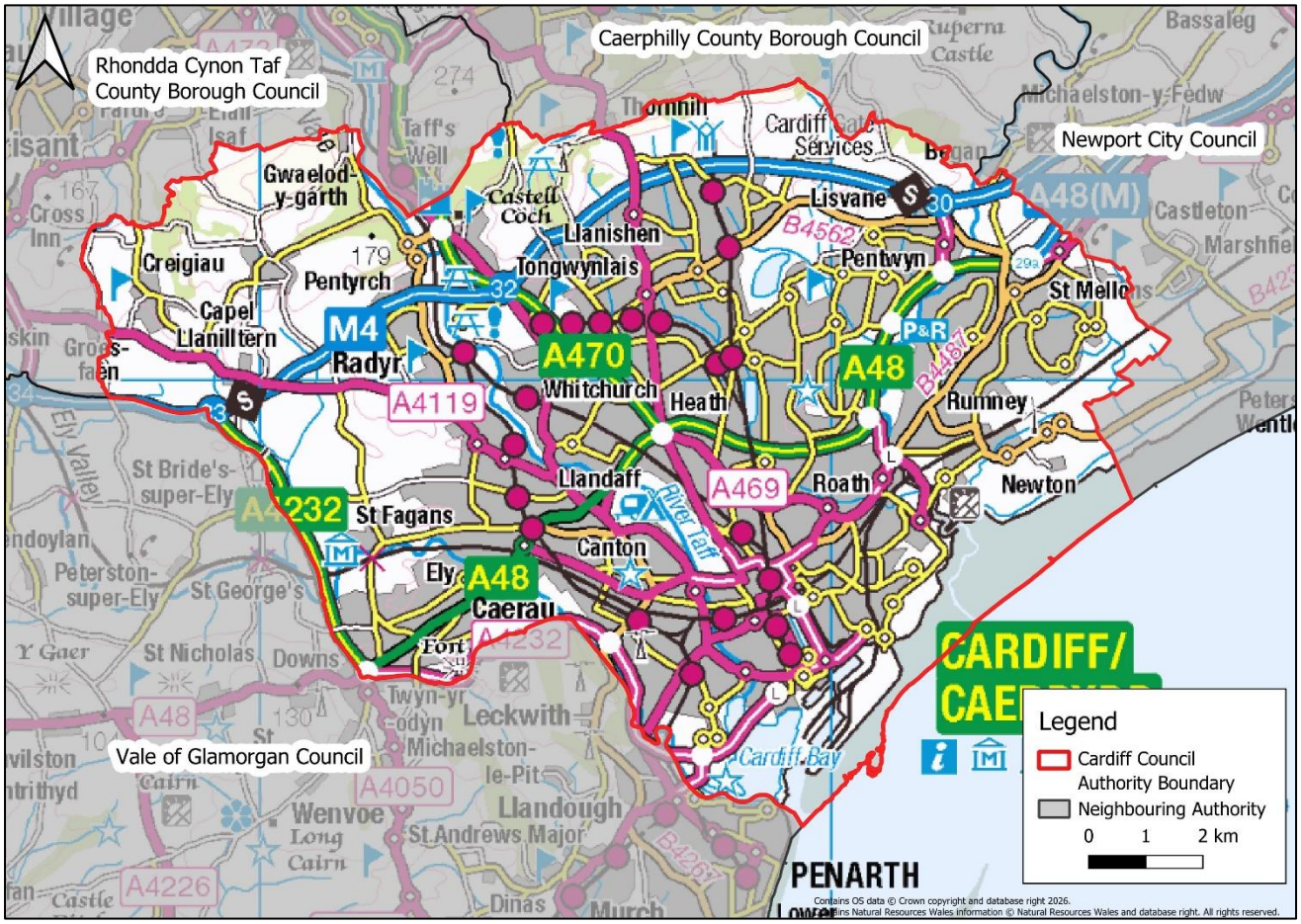

Figure 2-1 Study area

2.2 Topography

The topography of Cardiff is characterised by a flat, low-lying central area surrounded by hills to the east, north and west. Much of the city centre is relatively flat, as a result of being built on reclaimed coastal marshland.

The highest ground elevations are located to the north-west of Cardiff, at Garth Hill, and fall in a south-easterly direction. The lowest levels are located along the coastline in the southern extent of the authority area.

Topographic information, as shown in Figure 2-2, has been derived from the NRW 1m LiDAR mapping.

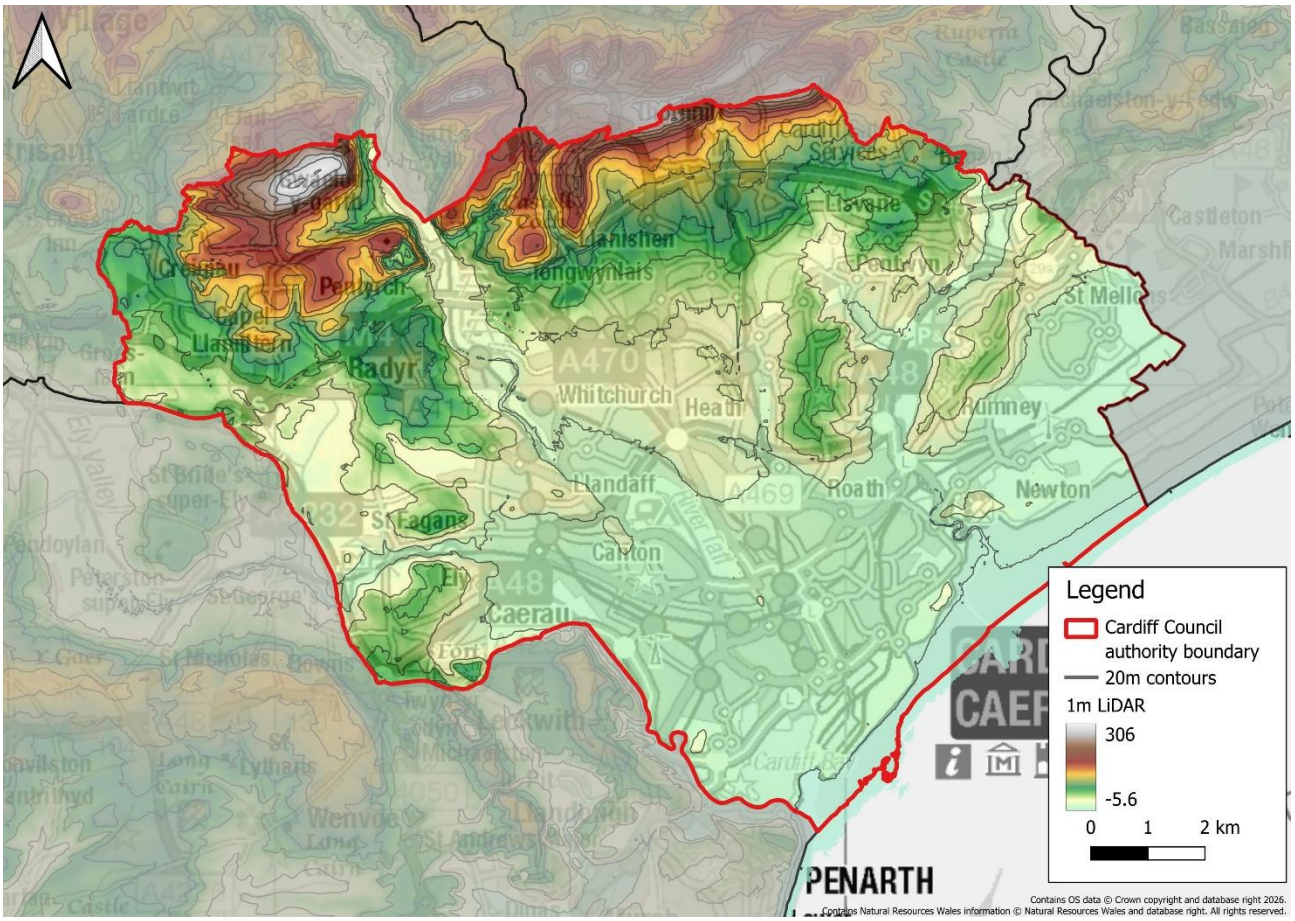

Figure 2-2 1m LiDAR data

2.3 Geology, Hydrogeology and Soils

Cardiff has a varied bedrock geology, predominantly dominated by Triassic Rocks, Lower Devonian Rocks and Pridoli Rocks formations, with smaller formations present around the rest of the authority area. The formations present in the authority area are shown in Figure 2-3.

Formations across the western and eastern extent of the study area are comprised of mudstone, siltstone and sandstone, whilst formations which are located more centrally are comprised of sandstone and conglomerate formations. Small areas of Lias Group are also

located to the western extent of the study area, comprising small areas of mudstone, siltstone, sandstone and limestone intermixed. Small areas of lower coal measures formations are also located in the north-western extent of the authority area.

Mudstone is formed from fine grains of clay and mud and Siltstone is formed from larger particles which are predominantly silt. Sandstone is formed from even larger ‘sand sized’ particles and limestone is formed from variable particle sizes.

Limestone often exhibits higher permeability than other geology, as water dissolves the calcium carbonate, enlarging joints and fractures which can store and contribute to water storage. Sandstone is usually porous enough to allow percolation and can store large volumes of water. In contrast mudstone and siltstone rock types are generally impermeable and do not accommodate the store of large volumes of water.

The superficial deposits which overlay the bedrock in the authority area are shown in Figure 2-4 and include Alluvium, Glacial Sand and Gravel, River Terrace Deposits and Till.

The majority of the authority area is classified as a Secondary B aquifer, which comprises predominantly lower permeability strata which may, in part, have the ability to store and yield limited amounts of groundwater. The northern and eastern areas of the authority area are underlain by a Secondary A aquifer. This is defined as permeable layers that can support local water supplies and may form an important source of base flow to rivers. A small area in the east and north-west of the authority area is classified as a Principal Aquifer, which are strategically important rock units that have high permeability and water storage capacity.

Across the Cardiff, soils are largely described as ‘slightly acid loamy and clayey soils with impeded drainage', 'loamy and clayey soils of coastal flats with naturally high groundwater', 'freely draining floodplain soils' and 'freely draining slightly acid loamy soils'. Small areas in the north-east of the authority area have soils described as 'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'. Such soil types result indicate higher water tables and a reduced capacity to infiltrate surface water.

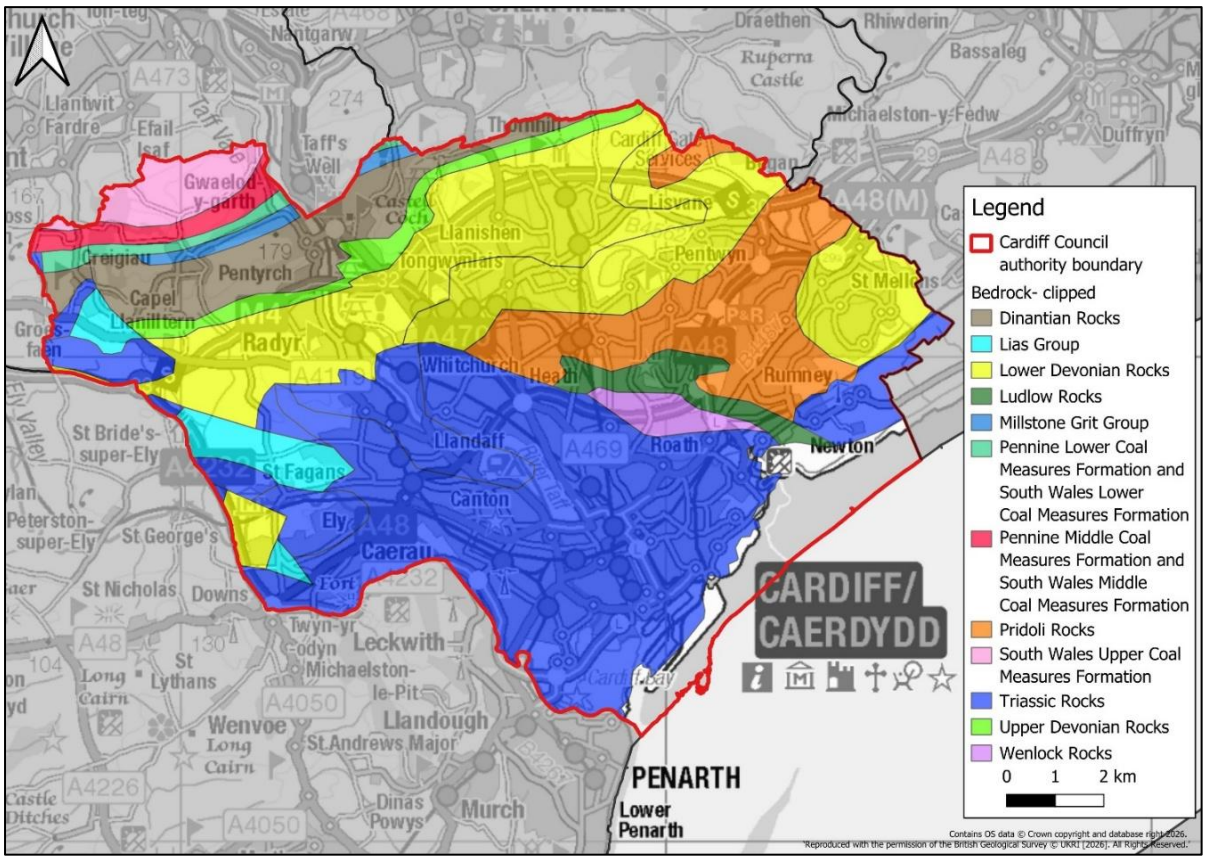

Figure 2-3 Bedrock Geology

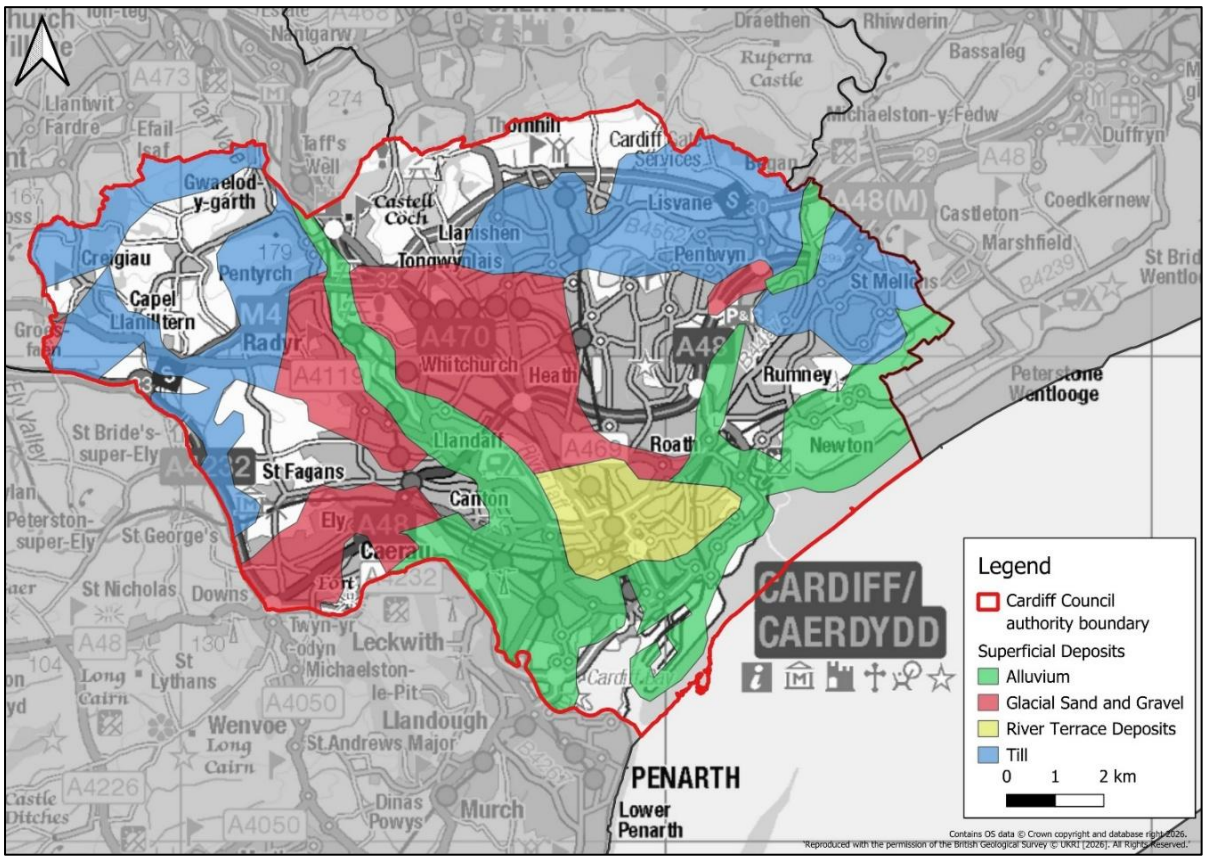

Figure 2-4 Superficial Deposits

2.4 Watercourses and Catchments

The main river catchments in Cardiff are the Ely, Taff, Rhymney and Reens West, as shown in Figure 2-5. A small area along the western boundary is within the Thaw and Cadoxton catchment. However, this catchment predominantly drains in a southerly direction within the Vale of Glamorgan authority area, and has a minor extent within the Study area, and has therefore not been discussed further.

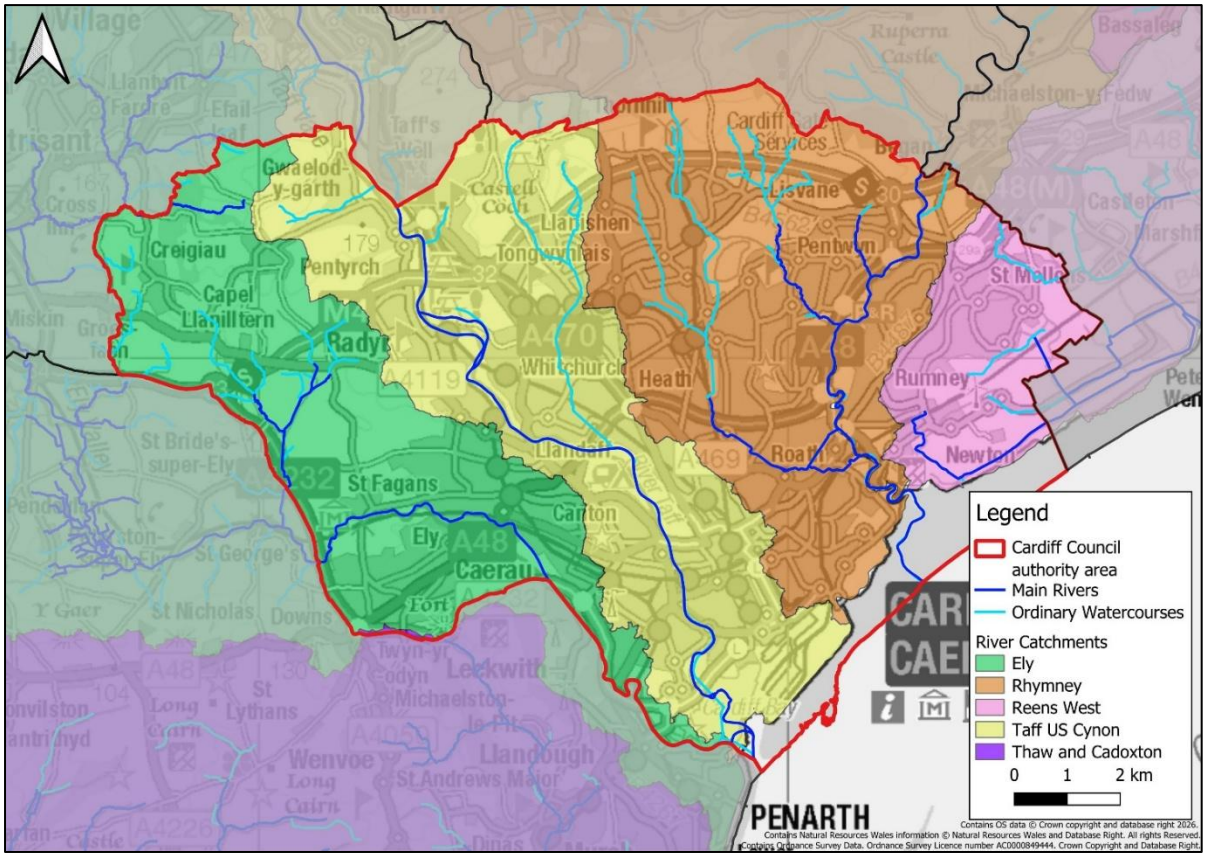

Figure 2-5 River catchments in Cardiff Council authority area

Ely

The Ely catchment covers the western extent of the authority area and predominantly covers the course of the River Ely in Cardiff.

The River Ely is an NRW designated Main River. The river rises in the neighbouring authority area of Rhondda Cynon Taf, in the hills north of Tonyrefail, and flows in a south easterly direction through the neighbouring authority area of The Vale of Glamorgan before flowing into the authority area at St Fagans. The river continues to flow in an easterly direction, then southerly, through the areas of Ely, Caerau, Leckwith and Grangetown before entering Cardiff Bay. The River Ely is tidally influenced between Cardiff Bay and western Fairwater.

Two tributaries of the River Ely are present within the Ely catchment in Cardiff. These are the Nant Dowlais (and its tributaries) and the Nant Y Cesair. The Nant Dowlais rises to the south of Rhydlafar and flows south through a predominantly rural area before leaving the

authority area and flowing towards its confluence with the River Ely. The Nant Y Cesair rises to the north of Pentyrch and flows westerly through a predominantly rural area towards its confluence with the River Clun, in Rhondda Cynon Taf. The River Clun is, itself, a tributary of the River Ely, with its' source on the western side of The Garth.

Fluvial flood defences are present on the River Ely at the International Sports Village and comprise high ground which provides a standard of protection of 0.1% AEP and form a TAN-15 Defended Zone.

Taff

The River Taff catchment is situated in the centre of the authority area and covers the course of the River Taff and its tributaries.

The River Taff, an NRW designated Main River, flows into the authority area from the neighbouring authority area of Rhondda Cynon Taf at Gwaelod-y-garth. The river flows in a southerly direction through a predominantly urbanised route including the areas of Radyr, Llandaff, Pontcanna, Riverside, and through central Cardiff towards Grangetown. The river discharges into Cardiff Bay in the south of the authority area.

The River Taff is tidally influenced up to Pontcanna fields as a result of the Severn Estuary. Flood defences are present along the banks of the River Taff in Grangetown, Butetown, Canton, Pontcanna, Gabalfa, Danescourt and Melingriffith and form TAN-15 Defended Zones.

Several ordinary watercourse tributaries of the River Taff flow into the river during its course through Cardiff. These are the Nant Cwmllwydrew, Nant y Fforest, Nant y Briwnant, Nant Cwmnofydd, Rhydwaedlyd Brook/Whitchurch Brook.

Rhymney

The River Rhymney catchment covers a large area towards the eastern extent of the authority area, including the River Rhymney and a number of other watercourses.

The River Rhymney rises in the neighbouring authority area of Caerphilly. The river flows into the authority area to the north-east of Pontprennau and flows in a south westerly direction through the areas of Llanrumney, Rumney, Pengam and Tremorfa before flowing into the Severn Estuary. The River Rhymney is tidally influenced from the west of Llanrumney to its confluence with the Severn Estuary.

Flood defences are present along the River Rhymney in three locations, to the north-east of Pontprennau, at Llanrumney, and at Pengam and Tremorfa. Flood defences at Llanrumney form a TAN-15 Defended Zone for Rivers and Sea and defences at Pengam and Tremorfa form a TAN-15 Defended Zone for the Sea.

Several NRW Main Rivers and ordinary watercourses, situated in urban areas in the city, form tributaries of the River Rhymney. These include the Nant Pontprennau, Nant Glandulais, Roath Brook, Llanishen Brook, and Nant Fawr.

Reens West

The Reens West catchment is in the east of the authority area. The catchment comprises part of the Wentlooge Levels, where the drainage network extends east towards the coastline.

The catchment includes two NRW designated Main Rivers, the Tabbs Gout and the Tarwick Reen, as well as number of reens stretching from Trowbridge, St Mellons and Pwll Mawr to the coastline.

3 Policy and Strategy

3.1 Legislation

3.1.1 European Union Floods Directive and the Flood Risk Regulations

The European Floods Directive (2007) sets out the EU's approach to managing flood risk and aims to improve the management of the risk that floods pose to human health, the environment, cultural heritage and economic activity.

The Directive was translated into Welsh law by the Flood Risk Regulations (FRR) 2009 and outlines the requirement for Natural Resources Wales (NRW) and Lead Local Flood Authorities (LLFA) to create Preliminary Flood Risk Assessments (PFRAs), with the aim of identifying significant Flood Risk Areas.

PFRAs should cover the entire area for local flood risk (focusing on ordinary watercourses, surface water and groundwater flooding). Where significant Flood Risk Areas are identified using a national approach (and locally reviewed), the LLFA are then required to undertake flood risk hazard mapping and to produce Flood Risk Management Plans (FRMPs).

FRMPs need to consider objectives for flood risk management (reducing the likelihood and consequences of flooding) and measures to achieve those objectives.

NRW have produced National Flood Hazard Mapping which is based on generalised modelling as part of Flood Risk Assessment Wales. They have been created for three sources of flooding – rivers, the sea, and surface water and small watercourses. The maps show flood depth, velocity, hazard, and extent for high, medium, and low risk scenarios, and include an allowance for climate change.

NRW has implemented one of the exceptions for creating PFRAs, etc for Main Rivers and coastal flooding, as they already have mapping (i.e. Risk of Flooding from Rivers and Sea Map) and plans (i.e. CFMPs) in place to deal with this. NRW has therefore focused their efforts on assisting LLFAs through this process.

3.1.2 Flood and Water Management Act

The Flood and Water Management Act (FWMA) was passed into law in April 2010. It aims to improve both flood risk management and the way water resources are managed.

The FWMA created clearer roles and responsibilities and instilled a more risk-based approach. This included a lead role for Local Authorities in managing local flood risk (from surface water, groundwater and ordinary watercourses) and a strategic overview role for all flood risk for NRW. Within this study area, Cardiff Council is the Lead Local Flood Authority (LLFA).

The content and implications of the FWMA provide considerable opportunities for improved and integrated land use planning and flood risk management by Local Authorities and other key partners. The integration and synergy of strategies and plans at national, regional and

local scales, is increasingly important to protect vulnerable communities and deliver sustainable re-generation and growth. Table 3-1 provides an overview of the key LLFA responsibilities under the FWMA.

Table 3-1 Key LLFA Responsibilities

Responsibility	Description
Developing a Local Flood Risk Management Strategy	The LLFA is required to develop, maintain, apply and monitor its local strategy for flood risk management in its area. The local strategies build on information such as national risk assessments and use consistent risk-based approaches across different Authority areas and catchments. The Local Strategy is not secondary to the National Flood and Coastal Erosion Risk Management (FCERM) Strategy; rather, it has distinct objectives to manage local flood risks important to local communities.
Investigating Flood Incidents	An LLFA has a duty to investigate and record details of 'significant flooding' in its area, under Section 19 of the FWMA. The National FCERM Strategy in Wales states that the Welsh Government expects Section 19 reports to be undertaken where 20 or more homes in one area experience internal flooding. However, Local Authorities may choose a lower threshold as it is noted that smaller scale floods are still capable of causing significant damage. What constitutes significant flooding is defined by each LLFA. This duty includes identifying Risk Management Authorities (RMA) and their functions and how they intend to exercise those functions in response to a flood. The responding RMA must publish the results of its investigation and notify other relevant RMAs.
Asset Register	An LLFA has a duty to maintain a register of structures or features, which are considered to have an effect on flood risk, including details on ownership and condition as a minimum. The register must be available for inspection, and the Welsh Ministers for Wales are able to make regulations about the content of the register and records.
Works Powers	The Act provides the LLFA with powers to do works to manage flood risk from surface water runoff, groundwater and ordinary watercourses, consistent with the local Flood Risk Management Strategy for the area.
Designation Powers	Schedule 1 of the Act provides the LLFA with powers to designate structures and features that affect flooding or coastal erosion. Only those structures and features related to flood risk management in respect of ordinary watercourse, surface water and groundwater flooding can be designated by an LLFA under this Act. The powers are intended to overcome the risk of a person damaging or removing a structure or feature that is on private land, and which is relied on for flood or coastal erosion risk management. Once a

Responsibility	Description
	feature is designated, the owner must seek consent to alter, remove or replace it.
SuDS Approval Body	Schedule 3 of the Act establishes each Authority as a SuDS Approval Body (SAB). This is mostly likely to sit within the LLFA role but may be independent from this RMA. The SAB has responsibility for the approval of proposed surface water drainage systems in new developments and redevelopments, subject to exemptions and thresholds. Approval must be given before the developer commences construction. The SAB is also responsible for adopting and maintaining SuDS which serve more than one property, where they have been approved. Highways Authorities are responsible for maintaining SuDS in public roads, to national standards.

3.1.3 Sustainable Drainage Systems (SuDS)

Disposal of surface water runoff is a key consideration, whether a development site falls within a flood risk area or not. Intense development within a catchment could result in increased runoff which if not appropriately managed could result in increased flooding within and downstream of the development area. Consequently, the impact of new developments on flood risk needs to be managed to avoid any negative impacts to the development itself and to other properties and assets within the catchment.

New developments can also increase pressure on sewer systems and urban drainage. It is therefore important to manage the impact of developments in a sustainable manner.

Sustainable Drainage Systems (SuDS) aim to mimic the natural processes of Greenfield surface water drainage by allowing water to flow along natural flow routes and also aims to reduce the runoff rates and volumes during storm events. SuDS also have the advantage of providing multiple benefits such as water quality, biodiversity and amenity when designed and maintained properly.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirement for all new developments to incorporate the four pillars of SuDS design, shown in Figure 3-1. The statutory requirement for SuDS approval and the associated approval process is separate from planning permission, although there is a need for significant interactions and alignment between the two processes. Section 7.6 of TAN-15 states that, where planning permission is sought prior to SAB approval, the applicant must submit a Drainage Statement as part of the planning application. This statement should explain how SuDS will be incorporated into the development, giving the planning authority confidence that SuDS are appropriately integrated and that the scheme is likely to achieve SAB approval.

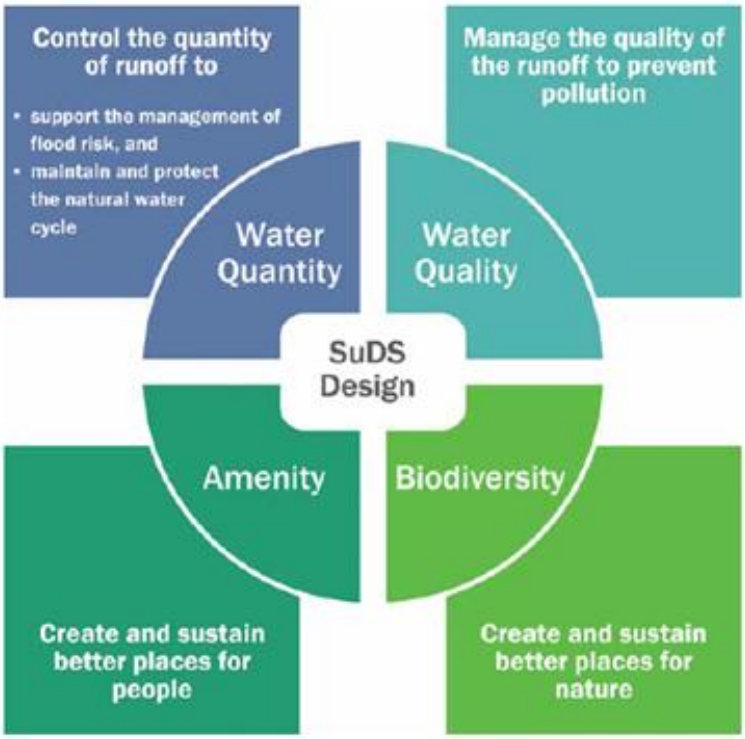

Figure 3-1 Four Pillars of SuDS (CIRIA, 2015)

There are a number of technical standards and design guidance for SuDS, which are available in the documents listed below:

- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems (Welsh Government, 2018),
- C753 The SuDS Manual (Ciria, 2015),
- Rainfall Runoff Management for Developments – SC030219 (Environment Agency, 2013),
- Planning Policy Wales (PPW) – Edition 12, July 2024,
- The Building Regulations 2010 Part H: Drainage and Waste Disposal,
- Design and Construction Guidance for foul and surface water sewers (2023).

Whilst at the time of writing, Cardiff Council has not published specific local SuDS guidance, developers are strongly encouraged to engage with the SAB as early as possible at the conceptual design phase of new developments, and to engage in the SAB Pre-application process. This will allow the SAB to support developers throughout the SuDS design phase and provide guidance on acceptable technical details.

3.1.4 Water Framework Directive and Water Environment Regulations

The purpose of the Water Framework Directive (WFD) is to deliver improvements across Europe in the management of water quality and water resources. The first cycle of River Basin Management Plans (RBMP) and WFD required all inland and coastal waters to reach "good ecological status" by 2015 through a catchment-based system. Incorporating a

programme of measures to improve the status of all natural water bodies. There is an exception for “heavily modified water bodies”, that are required to achieve “good ecological potential”. The Water Environment Regulations (2003) transposed the WFD into law in England and Wales. NRW is leading on the delivery of the WFD in Wales.

The River Basin Management Plans for the Cardiff Council authority area are discussed in more detail in Section 3.4.2.

3.1.5 Wellbeing of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act 2015 places a duty on all public bodies to safeguard the well-being of future generations. The duty is based on the principle of sustainable development and requires public bodies to think about the long-term impact of their decisions, whilst collaborating with others, communities, and each other. The seven well-being goals listed within the Act aim to present Wales with an opportunity to make a long-lasting and positive change to current and future generations.

In terms of flood risk management, it is therefore important to ensure that developments do not occur in areas at risk of flooding, or where the risk of flooding cannot be managed to an acceptable level. Additionally, any flood risk management works should not result in an increase of flooding elsewhere. A precautionary approach is undertaken in this SFCA to ensure that the well-being of future generations is not compromised as a result of proposed development.

3.1.6 Coast Protection Act 1949

Under the Coast Protection Act 1949, Cardiff Council is the designated Coast Protection Authority for Cardiff.

The Act gives Coast Protection Authorities the powers to implement coastal defence works, including sea walls, groynes, and revetments, but such works are guided by the Shoreline Management Plan (see Section 3.3.9 of the SFCA report).

3.2 National Policy

3.2.1 Future Wales – The National Plan 2040

Future Wales is a national development framework which sets the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including achieving decarbonisation and climate resilience. Future Wales sets a direction for where investment should be made in infrastructure and development and makes clear the importance of planning new infrastructure and development in a way that ensures opportunities are maximised and multiple benefits are achieved.

Policy 8 of Future Wales sets out considerations for the future of Wales in terms of Flood Risk. It states that Flood Risk Management that enables and supports strategic growth and regeneration in National and Regional Growth Areas shall be supported. Additionally,

Welsh Government will work with authorities and developers to plan and invest in new and improved infrastructure, promoting nature-based solutions as a priority, where opportunities for social, economic and environmental benefits are maximised when investing in flood risk management infrastructure.

Policy 8 highlights that flood risk is a constraining factor to development, especially as a result of a large number of Wales' towns and cities being located on the coast or located alongside major rivers. It identifies that the likelihood of rising sea levels and increased rainfall caused by climate change means the risk of flooding is projected to increase over the lifetime of the development and sustainable solutions will be required. The policy identifies that a strategic approach should be taken to prioritising development in places that are not at flood risk, followed by places where flood risk can be managed in an acceptable way. Policy 8 points towards the requirements of PPW and the requirements of Technical Advice Note 15: Development, Flooding and Coastal Erosion (TAN-15) to direct development away from areas at risk of flooding.

3.2.2 Planning Policy Wales

Planning Policy Wales (PPW) Edition 12 aims to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation. It is supplemented by a series of Technical Advice Notes (TANs).

PPW addresses a wide range of issues including the placemaking of sustainable settlements, the location of new development, the commitment to the re-use of land and promoting sustainability through good design.

PPW indicates that Local Authorities should recognise in their policies the housing needs of all and must ensure that sufficient land is genuinely available, or will become available, to provide land for housing judged against the general objectives and the scale and location of development provided for in the development plan.

Paragraph 6.6.18 of PPW states that '*the provision of SuDS must be considered as an integral part of the design of the new development and considered at the earliest possible stage when formulating proposals for new development*'.

Paragraph 6.6.22 of PPW refers to 'Development and flood risk' and states that "*Planning authorities should adopt a precautionary approach of positive avoidance of development in areas of flooding from the sea or from rivers. Surface water flooding will affect choice of location and the layout and design of schemes, and these factors should be considered at an early stage in formulating development proposals*."

Paragraph 6.6.23 continues that "*Government resources for flood and coastal defences are directed at protecting existing developments and are not available to provide defences in anticipation of future development*." PPW then advises that a sustainable approach to flooding will involve avoiding development within areas at flood risk.

Paragraph 6.6.24 adds that "*planning authorities [should] take a strategic approach to flood risk and consider the catchment as a whole by providing a preliminary representation of flood risks, which inform decisions on the location of new development and the requirements necessary to support any applications which may be proposed.*"

3.2.3 National FCERM Strategy for Wales

The National Strategy for Flood and Coastal Erosion Risk Management in Wales[1] (National FCERM Strategy) was published in October 2020 and sets out how the Welsh Government intends to manage flood and coastal erosion risks in Wales over the ten year lifetime of the policy document. The Strategy has been drafted with a longer-term, strategic view, recognising the nature of flood and coastal erosion risk with respect to the challenges of climate change. It works alongside other strategic plans for shoreline management, infrastructure and development planning.

With regard to managing flood and coastal erosion risk in Wales, the strategy sets out five high level objectives:

- Improving our understanding and communication of risk;
- Preparedness and building resilience;
- Prioritising investment to the most at risk communities;
- Preventing more people becoming exposed to risk;
- Providing an effective and sustained response.

Each of these objectives are related to specific measures and actions outlined in the National FCERM Strategy. NRW report on the application of the National FCERM Strategy through a 'Section 18' report every two years. This is reviewed by the Flood and Coastal Erosion Committee.

3.2.4 National Resources Policy

The focus of the Natural Resources Policy (NRP)[2] is on improving the way Wales manages its natural resources and forms a key part of the delivery framework for the sustainable management of natural resources established by the Environment (Wales) Act. The NRP sets out the opportunities and challenges that face Wales's natural resources and how these will be monitored and addressed. In relation to flooding the NRP highlights how careful management of ecosystems can play a crucial role in building resilience to the impacts of climate change such as flooding. It also highlights that there are opportunities to manage flooding by using Natural Flood Risk Management techniques across Wales with NRW aiming to increase the role of nature-based solutions in flood and water management.

1 https://gov.wales/national-strategy-flood-and-coastal-erosion-risk-management-wales
2 https://gov.wales/sites/default/files/publications/2019-06/natural-resources-policy.pdf

3.3 Technical Advice Note 15: Development, Flooding and Coastal Erosion

Technical Advice Note 15: Development, flooding and coastal erosion (TAN-15) sets out the criteria against which the consequences of a development in an area at risk of flooding can be assessed.

TAN-15 was introduced in 2004 by the Welsh Government. It provided technical guidance related to development planning and flood risk using a sequential characterisation of risk based on the Development Advice Map (DAM). An update to TAN-15 was implemented on the 31st of March 2025, with the DAM replaced by the Flood Map for Planning (FMfP). This SFCA has been prepared in accordance with the updated TAN-15 guidance, and subsequent TAN-15 FAQs document published by Welsh Government in March 2026.

TAN-15 (2025) reflects the core principles of the National FCERM Strategy to adopt a risk-based approach in respect of new development in areas at risk of flooding and coastal erosion. TAN-15 comprises technical guidance related to development planning and flood risk and provides a framework within which the flood risks arising from rivers, the sea and surface water, and the risk of coastal erosion can be assessed.

Its initial requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions. An indicative sequence to negotiating the various elements of TAN-15 is provided below in Figure 3-2.

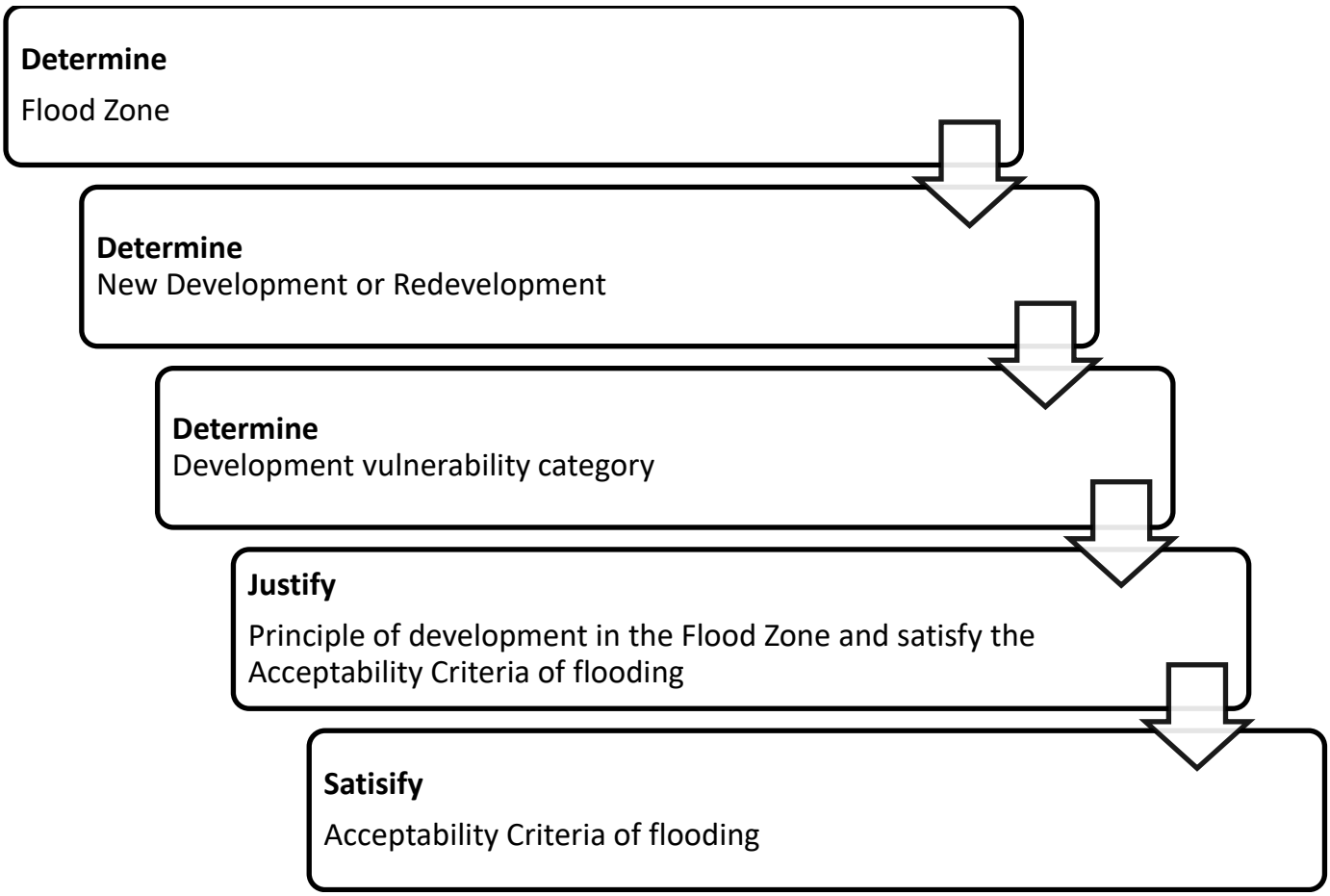

Figure 3-2 Navigating TAN-15 requirements

3.3.1 Flood Map for Planning

TAN-15 defines a number of flood zones based on the likelihood of flooding. Table 3-2 summarises the definition of the flood zones in the Flood Map for Planning (FMfP)[3], which was introduced by the Welsh Government in March 2025 as part of the updated TAN-15 guidance. The FMfP serves as the primary tool for assessing flood risk in land use planning. The FMfP provides more detailed and climate-responsive mapping, incorporating central climate change estimates over a 100-year development lifetime. The FMfP flood extents are based on these central estimates and include flood risk from rivers, the sea, surface water, and small watercourses. The November 2025 release of the FMfP has been used to inform this SFCA.

Table 3-2 TAN-15 definition of FMfP flood zones[4]

Zone	Flooding from rivers	Flooding from the sea	Flooding from surface water and small watercourses
1	Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year		
2	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change	Less than 1 in 200 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change
3	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change	A greater than 1 in 200 (0.5%) chance of flooding in a given year, including climate change	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change
TAN-15 Defended zone	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus climate change and freeboard*)	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from the sea of 1:200 (plus climate change and freeboard)	Not applicable

**Climate change and freeboard allowances are required on any flood defence scheme planned and constructed since 2016. Freeboard refers to the uncertainty allowance applied*

3 https://flood-map-for-planning.naturalresources.wales

4 Source: Figure 2, TAN-15

within the design and implementation of flood risk management schemes, such as flood walls and earth embankments.

Additionally, NRW has published a 'Recorded Flood Extents' layer, which identifies areas that have been recorded as having flooded in the past. These records are from a number of evidence sources including NRW, its predecessors or other Risk Management Authorities. The datasets include flooding records from rivers, the sea, surface water and small watercourses.

Flood Map Challenge

The FMfP is routinely updated by NRW with best available information on flood risks from the sea and rivers. These updates are published every six months. While many updates are undertaken by NRW's modelling and mapping teams, there is an established process for other parties to submit their own flood risk modelling data where it provides a more accurate assessment of flood risk. This is referred to as the Flood Map Challenge (FMC) process.

NRW publish through their website comprehensive guidance on the FMC process[5]. This guidance includes detailed specifications for the FMfP Zones, hydraulic modelling standards and supporting documentation requirements. Nevertheless, it is advised that NRW are consulted before embarking on an FMC and it is likely that expert technical advice will be required to undertake most FMCs.

Currently, there is no guidance on the process for challenging the flood map for small watercourses and surface water.

Where an FMC has been accepted by NRW, but not yet published online, NRW will respond to statutory planning consultations advising the LPA on the risks and consequences of flooding based on the best available information which would be the modelling from the FMC. This would include confirming what flood zone the site will be shown in from the next update. In line with Section 4.10 of TAN-15, once an FMC is accepted by NRW this will become a material consideration for decision makers, effective from when NRW accept it. As such the LPA will give material weight to accepted FMCs when applying the requirements of TAN-15.

3.3.2 Climate Change

Welsh Government publishes climate change guidance[6] for Flood Consequences Assessments. The latest guidance was last published in March 2026 to provide updated peak river flow allowances and peak rainfall allowances. Assessing the future effects of climate change is a key aspect of TAN-15 and any FCA required to support a planning application.

5 https://naturalresources.wales/flooding/challenging-our-flood-maps/?lang=en

6 Flood Consequences Assessments: Climate change allowances. Welsh Government (March 2026) https://gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments_0.pdf

There are three sources of flooding that utilise different climate change allowances; these are:

River flooding – Wales is divided into three river basin districts and peak river flow allowances are provided for each area. Recommendations are to use the central estimate (50th percentile) for the relevant river basin district. However, it is also advised that an assessment of risk should be undertaken using the upper estimate (90th percentile). For the central estimate peak river flows in the Severn River Basin district which covers the Study Area, are predicted to increase by 35% over the next 100 years.

Flooding from the sea – Estimated sea level rise is provided for the Authority area or can be calculated for specific sites through the UKCP18 User Interface. As a minimum, development proposals should be assessed against the upper central allowance (70th percentile) estimates to inform design levels. An assessment should also be made against the upper allowance (95th percentile) to inform mitigation measures, access and egress routes and emergency evacuation plans. For the upper central estimate, sea levels in Cardiff are predicted to increase by 0.87-1.25m over the next 100 years.

Surface water and small watercourses flooding – Peak rainfall intensity allowances are provided for catchments less than 5km^2. Recommendations are to use the central estimate as a minimum, and where there is significant flood risk, the upper end estimate should also be used. The central estimate for increasing peak rainfall intensity is 30% over the next 100 years, and 40% for the upper estimate. For drainage assessments, the upper estimate should be used. The LLFA should be consulted where surface water and small watercourse flood risks are considered significant.

At the time of writing, the latest Welsh Government climate change guidance was published in March 2026. The Replacement LDP will cover the period between 2021 and 2036, and therefore, future planning applications should refer to updated guidance as and when available.

3.3.3 Lifetime of development

The climate change uplifts detailed above are provided for different epochs. Consequently, the anticipated lifetime of development can be critical in the assessment of climate change impacts and future flood risk. This is most relevant to flooding from the sea, where sea level increases are estimated on an annual basis with increases accelerating over time. With river and surface water flood risk most climate changes effects are predicted to occur in the next 50 years, without further increases thereafter. Climate change uplifts are based on current Welsh Government guidance at the time of writing this report and may be subject to change.

TAN-15 states that "*Generally, it is appropriate to think of new dwellings as having a lifetime of 100 years. Lifetimes for other types of development will vary, but 75 years is considered a reasonable rule of thumb. Planning authorities should apply this principle in a precautionary manner in relation to all types of development. The Flood Map for Planning contains 100-year climate change scenarios. Where new developments will have shorter*

lifetimes, it is reasonable that the Flood Consequences Assessment focusses on potential risks during the development's expected lifetime."

Across the Cardiff Council local planning authority area, it is considered that 75 years is an appropriate rule of thumb for most development types (with the exception of residential), in line with the guidance contained within TAN-15. Any proposals for a shorter Lifetime of Development shall be considered on a case by case basis.

3.3.4 Form of Development

Section 8.3 of TAN15 states: "The National Strategy is clear that risk needs to be managed appropriately, and the TAN requires a proportionate response depending upon that risk. It is evident that many communities are located in areas at higher risk from flooding, but these communities must be allowed to adapt, change, and regenerate in the knowledge of what the science is showing."

TAN-15 recognises two key forms of development: New Development and Redevelopment. The definition of both terms is provided in Table 3-3.

Table 3-3 Form of Development

Form of Development	Definition
New Development	Any development on greenfield land
Redevelopment	Any development on previously developed land, as defined in Planning Policy Wales

3.3.5 Vulnerability classification

TAN-15 assigns one of three flood risk vulnerability classifications to a development, as shown below in Table 3-4.

Table 3-4 TAN-15 Vulnerability Classification

Development category	
Highly vulnerable development	All residential premises (including hotels, Gypsy and Traveller sites, caravan parks and camping sites). Schools and childcare establishments, colleges and universities. Hospitals and GP surgeries. Especially vulnerable industrial development (e.g. power generating and distribution elements of power stations, transformers, chemical plants, incinerators), and waste disposal sites. Emergency services, including ambulance stations, fire stations, police stations, command centres, and emergency depots. Buildings used to provide emergency shelter in time of flood.

Development category	
Less vulnerable development	General industrial, employment, commercial and retail development. Transport and utilities infrastructure. Car parks. Mineral extraction sites and associated processing facilities (excluding waste disposal sites). Public buildings including libraries, community centres and leisure centres (excluding those identified as in Highly Vulnerable category and emergency shelters). Places of worship. Cemeteries. Equipped play areas. Renewable energy generation facilities (excluding hydro generation).
Water Compatible Development	Boatyards, marinas and essential works required at mooring basins. Development associated with canals. Flood defences and management infrastructure. Open spaces (excluding equipped play areas). Hydro renewable energy generation.

3.3.6 Flooding and the plan-led system

Section 10 of TAN-15 provides a framework which outlines the principles of development in accordance with the flood zone within which that development is proposed. Considerations are provided separately within the policy document for both the Replacement LDP and for site specific applications. The requirements for each flood zone vary, and a differentiation in requirements is made depending on whether proposals are classified as 'New Development' or 'Redevelopment'.

It is understood that the requirements of Section 10 apply to the Flood Zones for river and sea only.

Cardiff Council considers that the requirements of Section 10 provide a useful framework for all sources of flood risk. However, recognising the greater inherent uncertainty of other sources of flood risk (from fluvial and tidal), the requirements of Section 10 will be applied with greater flexibility for other sources of flood risk, including surface water and small watercourses flooding. In such cases, proposals shall be considered on a case-by-case basis based on proportionate assessment, mitigation and justification.

3.3.7 Acceptability of flood consequences

If the planning authority is satisfied that a development proposed in a flood risk zone is acceptable, the justification will be in the knowledge that those developments may experience flooding and will need to be planned accordingly. A full understanding of the

potential risks and consequences will be required to inform the planning authority in its decision. Before the planning authority determines an application, a Flood Consequences Assessment must be undertaken, which is appropriate to the nature and scale of the proposed development. The assessment must provide the decision maker with sufficient information to consider flooding implications and to balance them against other considerations (further details of which are provided in Section 8 of this report).

Whether a development should proceed or not will depend upon whether the consequences of flooding can be safely managed, including its effects on flood risk elsewhere.

There are requirements that must be in place for any development that is permitted to be located in flood risk areas. In all circumstances, developers and planning authorities should ensure the following conditions are met:

- No increase in flooding elsewhere
- Occupiers are aware of flood risk
- Escape/evacuation routes are present
- Flood emergency plans and procedures are agreed and in place
- Flood resistant and resilient design
- Acceptable consequences for type of development proposed (see detailed guidance below)

To inform its planning decision, the planning authority will need to arrive at a judgement on the acceptability of the flooding consequences and will only permit development where the developer has demonstrated that the risks and consequences of flooding are manageable. For areas at risk of **river and sea** flooding, the criteria, as set out below, should be met.

The thresholds may be applied with more flexibility for redevelopment, changes of use, conversions and extensions, where the ability to substantially redesign a development is limited.

The TAN-15 FAQs, published in March 2026, acknowledges that whilst Figure 5 of TAN-15 (Table 3-5 below) does not explicitly define thresholds for small watercourse and surface water flooding, thresholds relating to river flooding can be applied.

Frequency thresholds: designing development to be flood free. The frequency at which flooding is regarded to be acceptable. TAN-15 states that all developments must be designed to be flood free during the 1% river flood and 0.5% flooding from the sea events, with an allowance for climate change over the lifetime of development. See Table 3-5 for frequency thresholds.

Tolerable conditions: managing consequences in an extreme flood event. The flood conditions that are regarded to be acceptable during an extreme flood event with allowance for climate change. See Table 3-6.

Table 3-5 Flood frequency requirements[7]

Vulnerability categories	Vulnerability categories	Flood event types - Rivers	Flood event types - Sea
Highly vulnerable development	Emergency services (command centres and hubs)	0.1% +CC (1 in 1,000)	0.1% +CC (1 in 1,000)
Highly vulnerable development	All other types	1% +CC (1 in 100)	0.5% +CC (1 in 200)
Less vulnerable development		1% +CC (1 in 100)	0.5% +CC (1 in 200)
Water compatible development that may be occupied by people		1% +CC (1 in 100)	0.5% +CC (1 in 200)

Table 3-6 Tolerable conditions in an extreme flood event[8]

Type of development	Maximum depth of flooding (mm)	Maximum velocity of flood waters (m/s)
Highly vulnerable development	600	0.15
Less vulnerable development	600	0.3
Infrastructure associated with highly vulnerable development e.g. car parks, access, paths and roads	600	0.3
Water compatible development (limited to those built elements of development that may be occupied by people)	600	0.3

Note: The extreme flood event is defined as the 0.1% AEP flood event plus climate change

The above figures are tolerances below which new development may be acceptable. Each site, however, must be considered individually, and a judgement taken in the context of the circumstances which could prevail at that site. Emergency services developments are not shown because they must be flood-free in a 0.1% event, as set out in Figure 3-5. For

7 Source: Figure 5, TAN-15
8 Source: Figure 7, TAN-15

emergency services developments other than command centres or hubs, the conditions for highly vulnerable development should be applied.

3.3.8 Surface water and ordinary watercourse flood risk

Flooding is not confined to floodplains, as heavy rain falling on waterlogged ground or impermeable surfaces can cause localised flooding almost anywhere. Heavy rain can also result in drainage systems and ordinary watercourses, such as streams, reens and brooks quickly becoming inundated, leading to localised flooding. As the climate changes, this type of flooding will become more commonplace and more severe.

The FMfP includes two surface water and small watercourse flood risk zones. Zone 3 contains areas at highest risk, with Zone 2 areas facing a lower risk. Areas considered at minimal risk of flooding from these sources are in Zone 1.

Surface water and ordinary watercourse flood risk management are the responsibility of Lead Local Flood Authorities (LLFAs). The LLFA has an important role in advising on surface water and ordinary watercourse flood risks for its area. The LLFA is a non-statutory consultee to all planning applications and will pay particular attention to applications affected by surface water and ordinary watercourse flood risk. Applicants are advised to seek the LLFA's input at pre-application stage. This is advised whether the flood risk is potentially a reason for refusal, or not, and where the risk is proposed to be managed or mitigated.

Flood Consequences Assessments are required for any development proposal located fully or partly in Surface Water and Small Watercourses - Flood Zones 2 and 3. Local Authorities may exercise some discretion for householder applications where the risk may be lower due to the nature of the development being proposed and the requirements should be proportionate to the development proposal. An assessment should also be undertaken for development on sites outside of these zones, but which have the potential to affect the course of surface water and/or excess water from ordinary watercourses. Planning authorities may provide specific local advice on this issue in Development Plans.

The principles for development set out in TAN-15 Section 10, and flood frequency and tolerable limits of Figures 5 and 6 in TAN-15, apply only to river and sea flooding. However, these requirements are likely to form the basis of the LLFA's assessment of flood risk acceptability. This is particularly true of small watercourse flooding as it is often indistinguishable from river flooding. The TAN-15 FAQs, published in March 2026, acknowledges that whilst Figure 5 of TAN-15 does not explicitly define thresholds for small watercourse and surface water flooding, thresholds relating to river flooding can be applied, further linking the application of this guidance to this source of risk. Further information and guidance on Flood Consequences Assessment is provided in Section 9.3.

3.3.9 Coastal Erosion

TAN-15 states that development and redevelopment should be avoided where there is a risk of being impacted by coastal erosion over the lifetime of the development. It notes that

the SFCA should include an assessment of the role and integrity of coastal defences and provide an understanding of the risks from flooding and coastal erosion in the plan area. Further information on coastal erosion is provided in Section 6 of this report.

Section 12 of TAN-15 further states that local planning policies in Development Plans for coastal areas should reflect and complement the long-term policy frameworks for the management of coastal risks and defences set out in SMPs. The Development Plan should clearly define coastal areas considered suitable for development and also those areas subject to significant constraints. Sites should not be allocated for development where there is a risk of flooding or land instability from coastal erosion over the development's lifetime.

Where sites are proposed by developers within coastal areas during Development Plan preparation, the developer is responsible for providing sufficient and appropriate information to demonstrate that the proposed sites can be safely developed without significant adverse effects.

3.4 Regional Policy

3.4.1 Flood Risk Management Plans

The Flood Risk Management Plan (FRMP) 2023-2029 is produced by NRW as part of a national strategy to manage flood risks from rivers, the sea, and reservoirs (not surface water or small watercourses). The FRMP is split into two sections, in the first section, information is provided on the priorities and measures set at the National (Wales) level. The second section is split according to NRW Operational areas, also known as NRW Places. The South Central Wales Place[9] covers the study area and provides information about the level of risk at a local scale, and describes what is planned for the communities of most concern.

Table 3-7 sets out the measures that NRW are undertaking, or plans to undertake, to help manage the risk of flooding for the community at risk.

The South Central Wales Flood Risk Management Plan[9] is an essential component of future flood risk management. The plans are also key to delivering the flood risk management outcomes of Welsh Government and Defra.

9 https://cdn.cyfoethnaturiol.cymru/302b314q/frmp-cycle-2-place-section-south-central.pdf

Table 3-7 Delivery plan of planned flood risk measures for the South Central Wales Place

Ref	Location	Source	Measure name	Timescale	Status
SC4	Canton	Sea	Maintain existing defences and inspection regime	Long Term	Ongoing
SC12	Grangetown	Sea	Maintain existing defences and inspection regime	Long Term	Ongoing
SC35	Riverside	Sea	Maintain existing defences and inspection regime	Long Term	Ongoing
SC36	River Taff Catchment	River	Develop an integrated catchment approach flood risk management	Medium Term	Ongoing
SC37	Roath	River	Maintain existing defences and inspection regime	Long Term	Ongoing
SC38	St Mellons	Sea	Maintain existing defences and inspection regime	Long Term	Ongoing
SC48	South Central Wales Place	River/Sea	Work with RMAs where we have a joint interest, to plan and undertake activities that reduce the risk of flooding to communities	Short Term	Ongoing

3.4.2 River Basin Management Plans

The study area is predominantly covered by the Severn River Basin Management Plan 2021-2027. A small area, which drains to the Thaw and Cadoxton catchment is covered by the the Western Wales 2021-2027 Plan. The extent of these areas is shown in Figure 3-3.

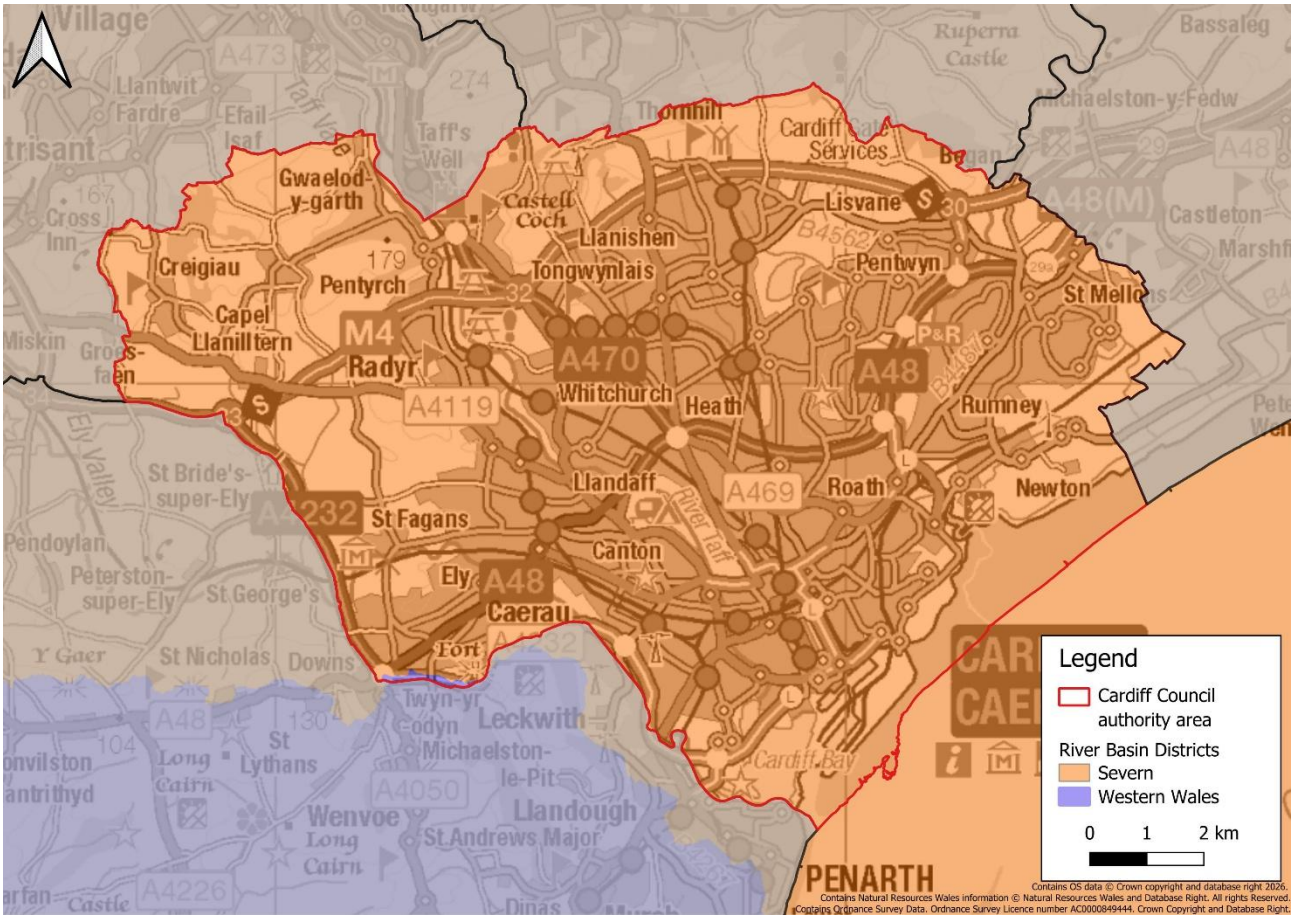

Figure 3-3 River Basin Districts

The focus of these plans is to provide a framework for protecting and enhancing the benefits provided by the water environment; which in turn informs decisions on land use planning. The plans contain four sets of key information:

- establish the baseline conditions of waterbodies;
- highlight areas of land and bodies of water that have specific uses that need special protection;
- sets out statutory objectives for waterbodies; and
- summary programme of measures to achieve statutory objectives.

3.4.3 Shoreline Management Plans

Shoreline Management Plans (SMP) provide a large-scale assessment of the risks associated with coastal processes and present a long-term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner. SMPs are ‘coastal’ companion documents to the ‘inland’ CFMP’s. SMPs are non-

statutory plans and are produced by Coastal Groups made up of NRW, maritime Local Authorities and other bodies with coastal defence responsibilities or interests.

Shoreline Management Plans split the coastline into small sections (called policy units) and describe how these sections will be managed over the:

- short-term (2005-2025)
- medium-term (2025-2055)
- long-term (2055-2105)

There are four approaches that can be applied to each policy unit, for each period of time, including:

- Hold the line (HTL) by maintaining or changing the existing standard of protection
- Advance the line (ATL) by building new defences on the seaward side of the original defences (although none applied in Wales)
- Managed realignment (MR) which allows the shoreline to move backwards and forwards, with management to control or limit the movement
- No active intervention (NAI) where there is no investment in coastal defences and natural processes are allowed to continue to create an evolving coastline

Local Planning Authorities should give regard to the locations where the SMP policies are for No Active Intervention / Managed Realignment. It would generally be inappropriate to see an intensification in development within areas that policy advises may be lost to coastal erosion or intentionally allowed to flood in the future.

Severn Estuary Shoreline Management Plan 2

The Severn Estuary SMP2 document sets out the results of the first revision to the original SMPs for the area of coast extending from Anchor Head to Lavernock Point, as shown in Figure 3-4. The Anchor Head to Lavernock Point SMP2 area is split into a number of policy units, four of which cover the Cardiff Council authority area. These policy units are grouped in the SMP by 'management areas', identifying areas that interact between policy units both in terms of coastal processes and essential issues.

The policy unit locations are shown in Appendix A, and a summary of the policies are contained in Table 3-8. The SMP policies for 2105 are shown in Figure 3-5.

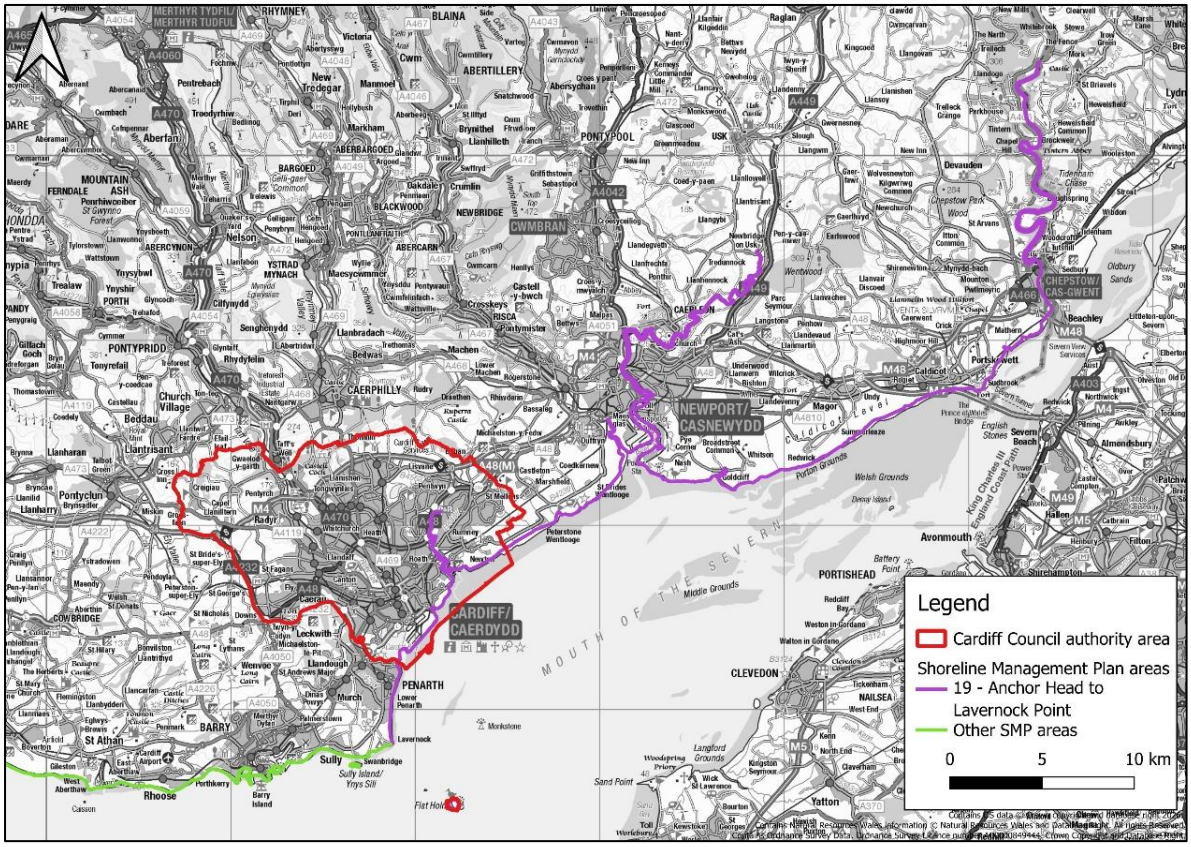

Figure 3-4 Severn Estuary Shoreline Management Plan area

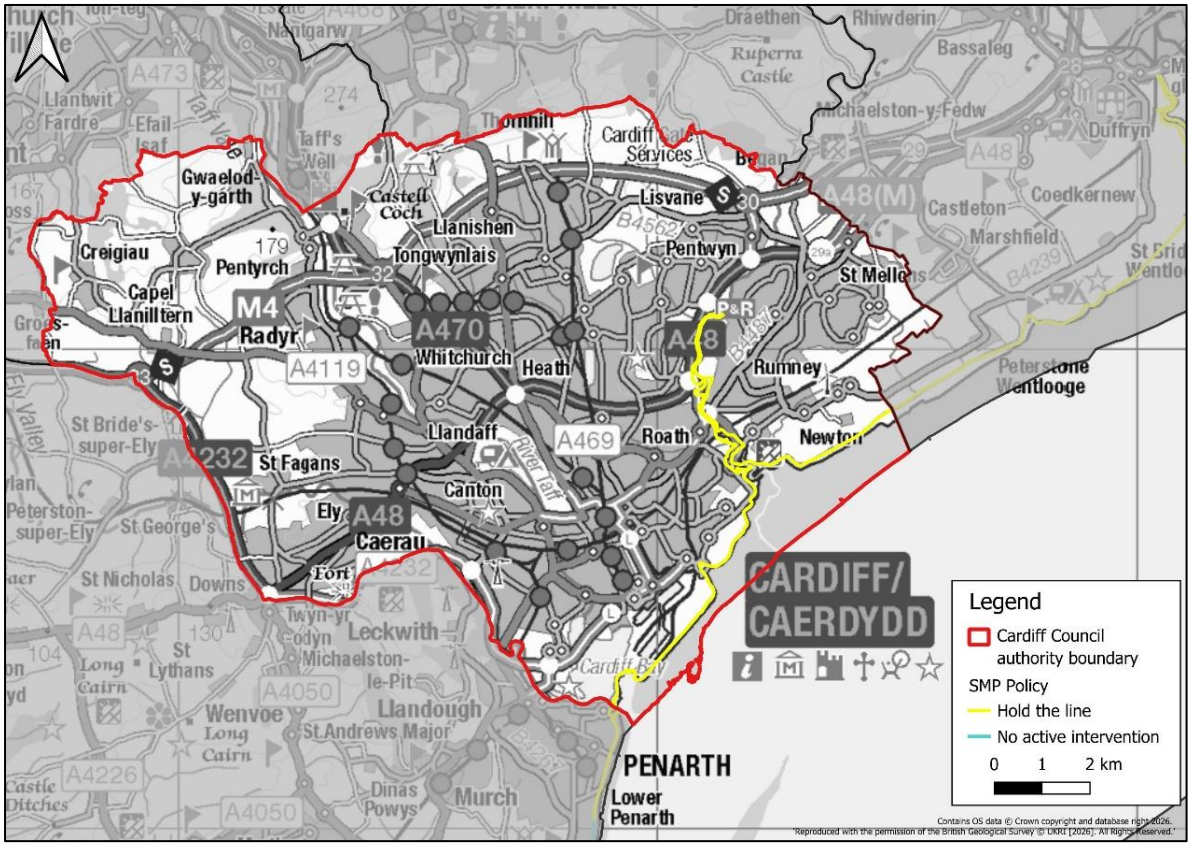

Figure 3-5 Severn Estuary Shoreline Management Plan policies 2105 (Long Term)

Table 3-8 Severn Estuary Shoreline Management Plan Policy options

Policy Unit	Location	Short-term Policy (0-20 years)	Medium-term policy (20-50 years)	Long-term Policy (50-100 years)
CAR1	Cardiff Bay Barrage	Hold the Line – Maintenance to Cardiff Bay Barrage	Hold the Line – Maintenance to Cardiff Bay Barrage	Hold the Line – Maintenance to Cardiff Bay Barrage
CAR2	Western end of Cardiff Bay Barrage to mouth of River Rhymney at Rover Way	Hold the Line – Maintenance needed to earth embankments	Hold the Line – Replace defences	Hold the Line - manage the risk of impacts from flooding and erosion to industrial and residential areas of Cardiff.
CAR3	Both banks of the River Rhymney from the mouth at Rover Way to the Lamby Way landfill site drain	Hold the Line - manage the risk of impacts from flooding and erosion to industrial and residential areas of Cardiff.	Hold the Line - manage the risk of impacts from flooding and erosion to industrial and residential areas of Cardiff.	Hold the Line - manage the risk of impacts from flooding and erosion to industrial and residential areas of Cardiff.
WEN1	Lamby Way landfill site drain to Sluice House Farm	Hold the Line - The existing defences will remain in place with some maintenance, managing the risk of flooding and erosion impacts to a large, mainly agricultural area.	Hold the Line - It is recommended that the existing defences are replaced.	Hold the Line - Defences are likely to be reconstructed and should be maintained.

3.5 Local Policy

The following documents have been published across the study area:

- Local Development Plan-2006-2026[10]
- Strategic Flood Consequences Assessments (2022)[11]

10 https://www.cardiffldp.co.uk/adopted-local-development-plan/

11 https://rctcbc.oc2.uk/docfiles/8/Strategic%20Flood%20Consequences%20Assessment%20SFCA%202022.pdf

- Preliminary Flood Risk Assessment 2011 and 2017 (Addendum only)[12]
- Local Flood Risk Management Strategy 2014[13]
- Flood Risk Management Plan 2015[14]

12 https://www.cardiff.gov.uk/ENG/resident/Community-safety/Flood-and-Coastal-Erosion-Risk-Management/Flood-Risk-Management-Plan/Preliminary-Assessment/Pages/default.aspx#:~:text=%E2%80%8B%E2%80%8B%20%E2%80%8BThe%20Preliminary,Wales%20on%2019th%20December%202017 .

13 https://www.cardiff.gov.uk/ENG/Your-Council/Strategies-plans-and-policies/Local-flood-risk-management-strategy/Pages/default.aspx

14 https://www.cardiff.gov.uk/ENG/resident/Community-safety/Flood-and-Coastal-Erosion-Risk-Management/Flood-Risk-Management-Plan/Pages/default.aspx

4 Understanding of flood risk

4.1 Likelihood and Consequence

Flood risk is a combination of the likelihood of flooding and the potential consequences. It is assessed using the source – pathway – receptor model, as shown in Figure 4-1. This is a standard environmental risk model common to many hazards and should be the starting point of any Flood Consequences Assessment. However, it should be noted that flooding could occur from many different sources and pathways, and not simply those shown in the illustration below.

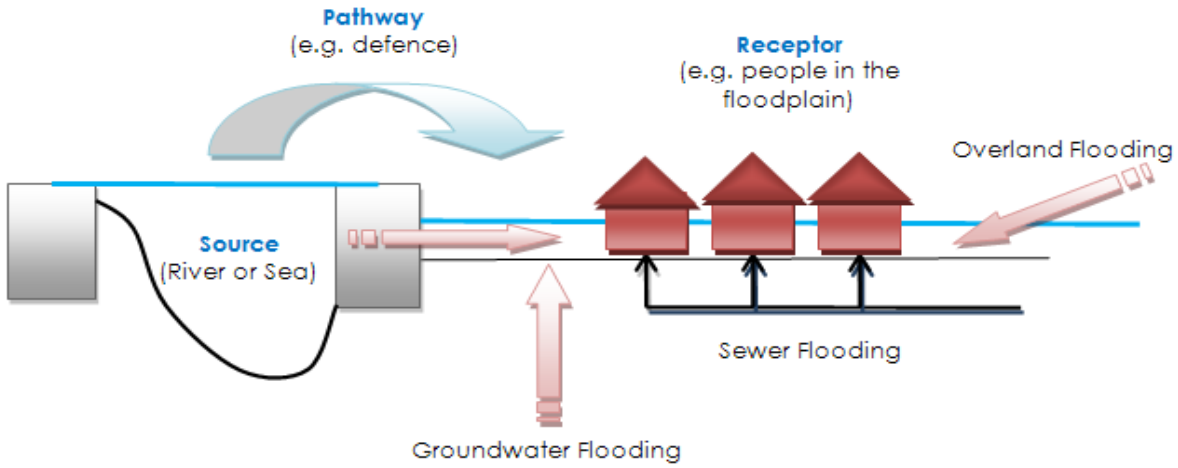

Figure 4-1 Source - Pathway - Receptor model

The principal sources are rainfall or higher than normal sea levels. The most common pathways are rivers, drains, sewers, overland flow, and river and coastal floodplains and their defence assets. The receptors can include people, their property, and the environment. All three elements must be present for flood risk to arise. Mitigation measures have little or no effect on sources of flooding, but they can block or impede pathways or remove receptors.

The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk. It is therefore important to define the components of flood risk in order to apply this guidance in a consistent manner.

4.1.1 Likelihood

Likelihood of flooding is expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached on average once in one-hundred years, i.e. it has a 1% chance of occurring in any one year, not that it will occur once every one-hundred years. Low probability events can occur on subsequent days and in quick succession, for example with storms Ciara, Dennis, and Jorge in 2020. This can

also lead to antecedent conditions (such as saturated soils) that can exacerbate the impacts of flooding.

4.1.2 Consequence

The consequences of flooding can result in fatalities, damage to property, disruption to lives and businesses, with severe implications for people (e.g. financial loss, emotional distress, health problems). Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures, etc).

4.1.3 Risk

Flood risk is expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding

Flood risk is not static; it cannot be described simply as a fixed water level that will occur if a river overtops its banks or from a high spring tide that coincides with a storm surge. It is therefore important to consider the continuum of risk carefully. Risk varies depending on the severity of the event, the source of the water, the pathways of flooding (such as the condition of the flood defences) and the vulnerability of receptors.

4.1.4 Actual Risk

This is the risk ‘as is’, taking into account any flood defences that are in place for extreme flood events (typically these provide a minimum Standard of Protection (SoP)). Hence, if a settlement lies behind a fluvial flood defence that provides a 1 in 100-year SoP then the actual risk of flooding from the river in a 1 in 100-year event is generally low.

Actual risk describes the primary, or prime, risk from a known and understood source managed to a known SoP. However, it is important to recognise that risk comes from many different sources and that the SoP provided will vary within a river catchment. Hence, the actual risk of flooding from the river may be low to a settlement behind the defence but the risk of surface water may be moderate, in instances where surface water may pond behind the defence in low spots and is unable to discharge into the river during high water levels.

4.1.5 Residual Risk

The existence of robust flood defences does not mean development should be allowed without further consideration of flood risks. Flood defences reduce the risk of flooding but do not eliminate it. The consequences of flooding can be particularly severe in the event of defences being overtopped or breached, resulting in rapid and hazardous flooding. Furthermore, hydraulic structures such as bridge and culverts can block, and pumps, sluices and flaps can fail to operate.

Although not a term used in TAN-15, amongst flood risk professionals the term ‘residual risk’ is often used to describe the risks associated with asset or system failure.

Whilst the actual risk of flooding to a settlement that lies behind a fluvial flood defence that provides a 1 in 100-year SoP may be low, there will be a residual risk from flooding if these defences overtopped or fail that must be taken into account.

Where appropriate, a Flood Consequences Assessment should demonstrate that in the event of overtopping, breach or blockage the consequences of flooding can be managed to an acceptable level. This will be needed for sites that benefit from the type of defences that can be breached or blocked, including flood embankments, sea walls and culverts. NRW and/or the LLFA should be consulted at an early stage to discuss the requirement for residual risk assessment, technical assumptions and the application to the acceptability criteria. It is also advisable to check the websites of NRW and the LLFA for up-to-date guidance and standing advice.

4.2 Sources of Flooding

4.2.1 Flood Risk from Rivers

Flooding from rivers occurs when water levels rise higher than bank levels, causing flood water to spill across adjacent land (floodplain). The main reasons that water levels can rise in rivers are:

- Intense or prolonged rainfall causing runoff rates and flow to increase in rivers, exceeding the capacity of the channel. This can be exacerbated by wet antecedent conditions and elevated groundwater tables.
- Constrictions in the river channel causing flood water to back-up.
- Blockage of structures or the river channel causing flood water to back-up.
- High water levels and/or flow locked flood (tide) gates preventing discharge at the outlet of the river.

The consequence of river flooding depends on how hazardous the flood waters are and what the receptor of flooding is. The hazard of river flood water is related to the depth and velocity which depends on the:

- Magnitude of flood flows
- Size, shape, and slope of the river channel
- Types of structures that cross the channel

Flood hazard can vary greatly throughout catchments and even across floodplain areas. The most hazardous flows generally occur in steep catchments, and towards the bottom of large catchments. Hazardous river flows can pose a significant risk to exposed people, property, and infrastructure.

Whilst low hazard flows are of less of a risk to life, they can disrupt communities, require significant post-flood clean up, and can cause superficial and possible structural damage to property.

4.2.2 Flood Risk from the Sea

Flooding from the sea occurs when water levels in the sea rise above ground levels of coastal land. This can occur during normal high tides, when there are extreme atmospheric effects, and when wind action causes water levels of the sea to rise. Sea flooding can be particularly severe, with rapid inundation, the possibility of multiple overtopping events and the increased damage caused by saltwater. These effects can be even more severe if a breach of sea defence occurs.

4.2.3 Surface Water Flood Risk

Surface water flooding occurs when intense, often short duration, rainfall is unable to soak into the ground or enter drainage systems, and can be exacerbated when soils are saturated. The excess water then ponds in low points, overflows or concentrates in minor drainage lines that are usually dry. This type of flooding is usually short lived and associated with heavy downpours of rain. Often there is limited warning before this type of localised flooding occurs.

Drainage basins or catchments vary in size and shape, which has a direct effect on the amount of surface runoff. The amount of runoff is also a function of geology, slope, climate, rainfall, saturation, soil type, and vegetation. Geological considerations include rock and soil types and characteristics, as well as degree of weathering. Porous material (sand, gravel, and soluble rock) absorbs water more readily than fine-grained, dense clay or unfractured rock and has a lower runoff potential. Poorly drained material has a higher runoff potential and is more likely to cause flooding.

Water flowing over the ground surface that has not entered a natural channel or artificial drainage system is classified as surface water runoff or overland flow.

Flooding from land can occur in rural and urban areas but usually causes more damage in the latter. Urban areas can be inundated by flow from adjacent farmlands. Flood pathways include the land and water features over which flood water flows. These pathways include minor drainage lines, roads, and even flood management infrastructure.

Developments that include significant impermeable surfaces, such as roads and car parks may increase the occurrence of surface water runoff.

Surface water flooding can affect all forms of the built environment, including property, infrastructure, agriculture, and the natural environment. It is usually short lived and will tend to last as long as the rainfall event. However, flooding may persist in low-lying areas where ponding occurs.

Flooding may occur as sheet flow or as rills and gullies causing increased erosion of agricultural land. This can result in ‘muddy floods’ where soil and other material are washed onto roads and properties, requiring extensive clean-up. Both rural and urban land use changes are likely to alter the amount of surface water in the future. Future development is also likely to change the position and numbers of people and/or developments exposed to flooding.

4.2.4 Groundwater Flooding

Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. Groundwater flooding can happen at point or diffuse locations, and it tends to be long in duration, developing over weeks or months and prevailing for days or weeks.

High groundwater levels can result from the combination of geological, hydrogeological, topographic, and recharge phenomena. Of the groundwater flooding mechanisms experienced in the SFCA area, rising groundwater levels in the Triassic Rocks and Dinantian Rocks Bedrock (which forms a Principal Aquifer) and the Alluvium, Glacial Sand and Gravel, River Terrace Deposits, superficial deposits (which form Secondary A Aquifers) because of long duration rainfall present the greatest and most extensive level of risk. The most common causes of groundwater flooding are:

- Rising groundwater levels in response to prolonged extreme rainfall
- Rising groundwater levels due to leaking sewers, drains, and water supply mains
- Increased groundwater levels due to artificial obstructions
- Groundwater rebound owing to rising water table and failed or ceased pumping
- Upward leakage of groundwater driven by artisan head
- Inundation of trenches intercepting high groundwater levels
- Other: alluvial aquifers, sea level rise, etc

The main impacts of groundwater flooding are:

- Flooding of basements of buildings below ground level – in the mildest case this may involve seepage of small volumes through walls, temporary loss of services, etc. In more extreme cases larger volumes may lead to the catastrophic loss of stored items and failure of structural integrity.
- Overflowing of sewers and drains and surcharging of drainage networks leading to overland flows causing significant but localised damage to property.
- Flooding of buried services or other assets below ground level, or prolonged inundation of buried services, leading to interruption and disruption of supply.

4.2.5 Sewer Flooding

Flooding from sewers occurs when rainfall exceeds the capacity of networks or when there is infrastructure failure. This includes combined and surface water sewers, sewer pumping stations and water treatment facilities.

The main causes of sewer flooding are:

- Lack of capacity in sewer drainage networks due to original under-design or an increase in demand (for example, due to climate change or new developments)
- Lack of capacity in sewer drainage network due to events larger than the system design event
- Lack of maintenance of sewer networks which lead to a reduction in capacity and can sometime lead to sewer blockage

- Water mains bursting/leaking due to a lack of maintenance or as a result of damage
- Groundwater infiltration into poorly maintained or damaged pipe networks
- Restricted outflow from the sewer systems due to high water levels in receiving watercourses or the sea

The impact of sewer flooding is usually confined to relatively localised areas. However, flooding associated with blockage or failure of the sewer network can be rapid and unpredictable.

Drainage systems often rely on gravity assisted dendritic systems which convey water in trunk sewers located at the lower end of the catchment. Failure of these trunk sewers can have serious consequences as water from surcharged manholes will flow into low-lying land that may already be suffering from other sources of flooding.

Consequences for affected properties and individuals can be particularly severe for those affected by sewer flooding. Sewer flooding is likely to have a high concentration of solid, soluble and insoluble contaminants. These contaminants can have serious health impacts on residents of flooded properties and are typically significantly more destructive to personal possessions. Flooding of sewers can also lead to contaminated water entering nearby watercourses, having an adverse effect on the biota in receiving environments.

4.2.6 Flooding from Artificial Sources

For the purpose of the SFCA, flooding from artificial sources has been defined as flooding from non-natural or artificial sources of flooding such as reservoirs, canals, and lakes where water is retained above natural ground level.

The spatial and temporal extent of flooding from artificial sources can be highly variable. For example, the likelihood of a new reservoir failing is very small compared to that of a canal embankment that is over one hundred years old. However, whilst the probability is low, the consequences of a reservoir failing could be catastrophic.

Reservoirs are artificially created ponds or lakes that are formed by building a dam across a watercourse. If a dam fails, then water can escape from the reservoir resulting in land or properties being flooded. In order to ensure that reservoirs are properly maintained and to minimise the possibility of reservoir failure, large reservoirs in Wales (those storing more than 10,000 cubic metres of water) are regulated under the Reservoirs Act 1975, where amended by the Flood and Water Management Act 2010. This legislation, which is enforced by Natural Resources Wales, requires reservoirs to be routinely inspected and maintained to an appropriate standard.

Provided that a reservoir is properly maintained, the likelihood of it failing and causing flooding is extremely low. However, in the very unlikely event of a dam collapse, a large volume of water could be released, quickly flooding a large area and possibly causing significant property damage.

4.3 Roles and responsibilities for managing flood risk

Flood and Coastal Erosion Risk Management in Wales involves a number of organisations. The roles and responsibilities of these organisations are outlined in The National FCERM Strategy in Wales[15]. There are 28 Risk Management Authorities (RMAs). These RMAs are:

- NRW (Including the Internal Drainage Districts [IDD])
- The 22 Local Authorities as Lead Local Flood Authorities (LLFA) and Highway Authorities
- Two water companies- Dŵr Cymru Welsh Water and Hafren Dyfrdwy.
- The Welsh Government (as highway authority for trunk roads)

The basic responsibilities of key stakeholders in Wales are set out below in Figure 4-2, taken from the National FCERM Strategy.

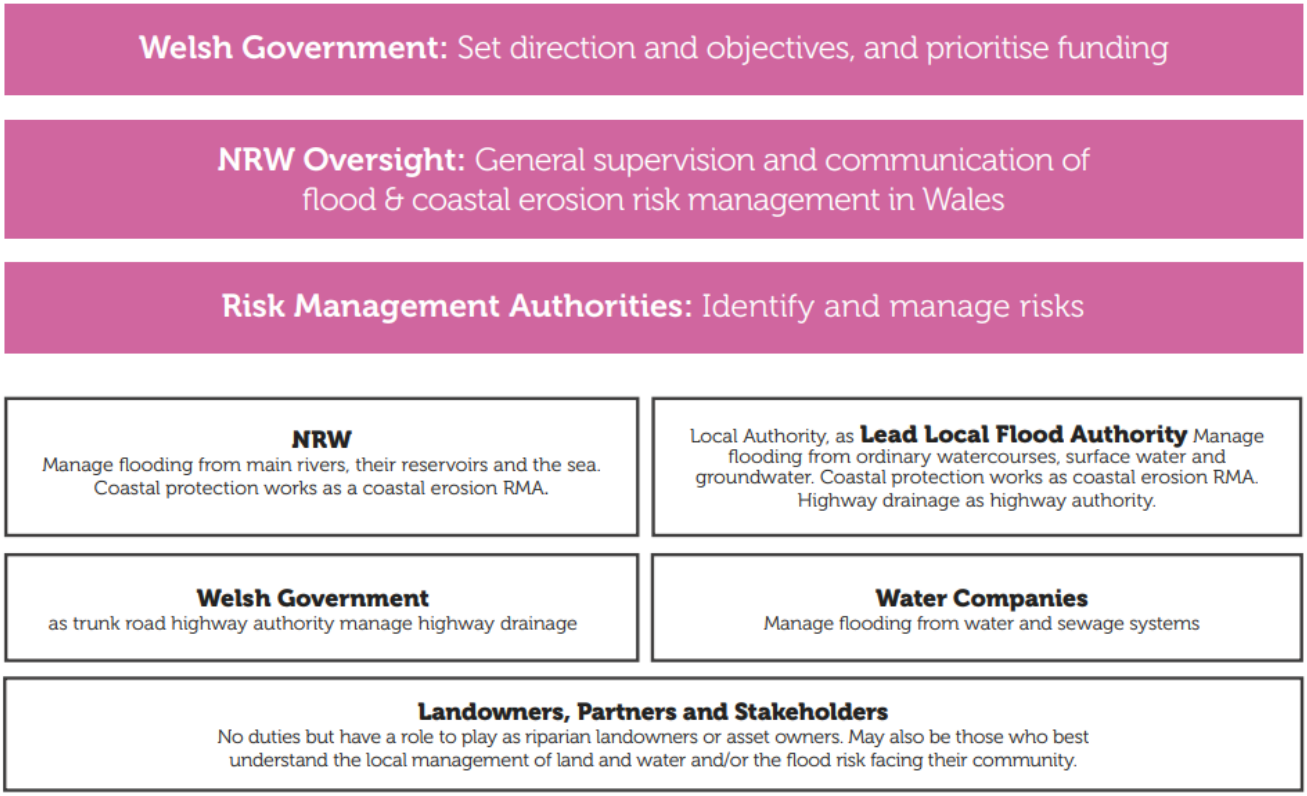

Figure 4-2 Overview of Roles and Responsibilities (taken from the National Strategy for Flood and Coastal Erosion Risk Management)

RMAs all have a duty to help deliver the objectives of the National FCERM Strategy, as well as powers and responsibilities in terms of the risks they manage. There are also places where these roles and responsibilities interact or are shared. The specific roles and responsibilities for each organisation are outlined in the National FCERM Strategy.

15 Welsh Government (2020) The National Strategy for Flood and Coastal Erosion Risk Management in Wales. Taken from: https://gov.wales/sites/default/files/publications/2021-03/the-national-strategy-for-flood-and-coastal-erosion-risk-management-in-wales.pdf

The 'Caldicot and Wentlooge Internal Drainage District' (under the governance of NRW) operates within the Cardiff LPA area, as shown in Figure 4-3. The IDD manages water levels for ordinary watercourses, drainage channels, pumping stations and control structures across the Caldicot and Gwent levels. The IDD operates in accordance with the Land Drainage Act (1991).

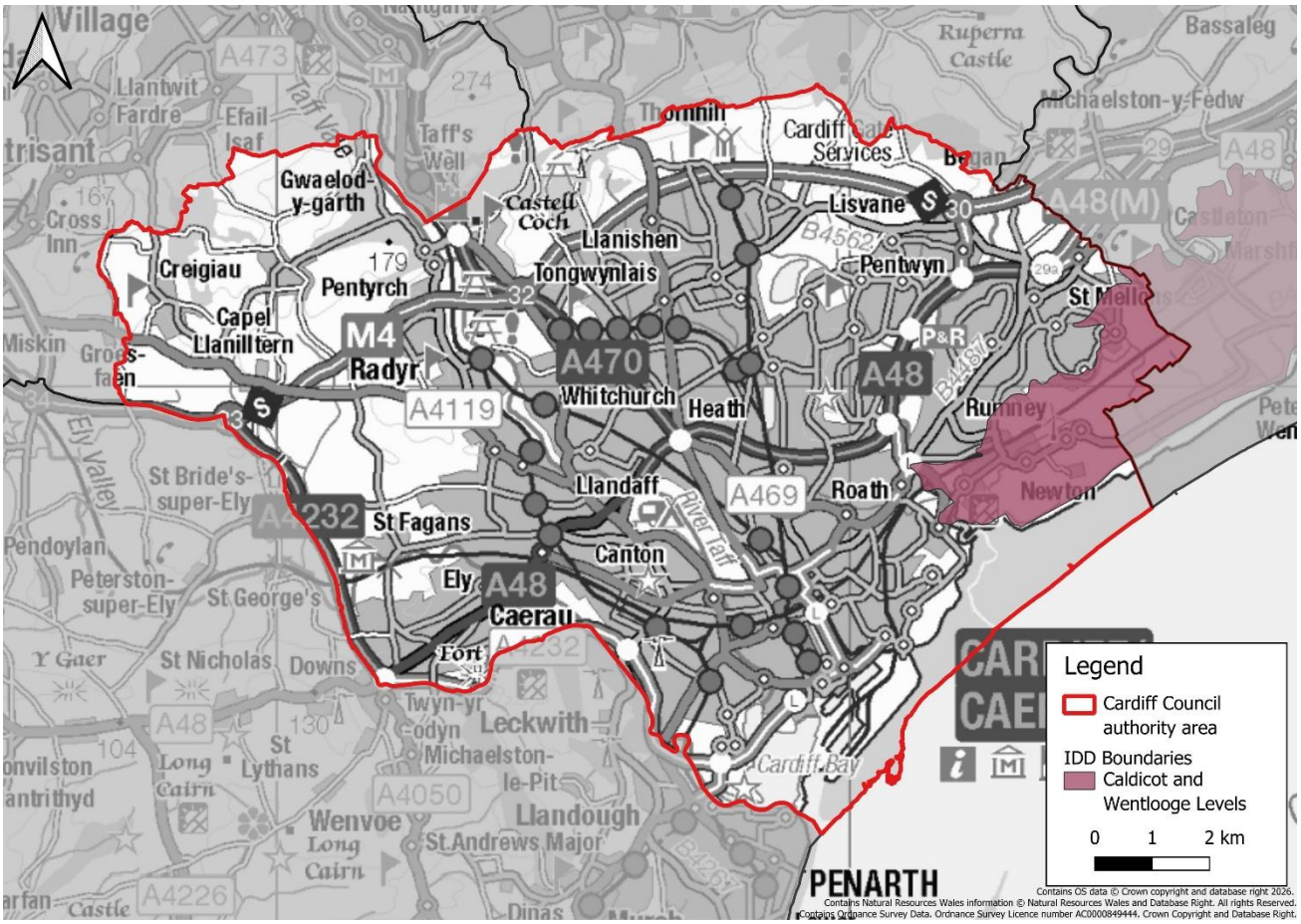

Figure 4-3 Caldicot and Wentlooge Levels IDD in Cardiff

4.4 Sources of information used in preparing the Strategic Flood Consequences Assessment

4.4.1 Historical flooding

The historical flood risk across the study area has been assessed using information of recorded incidents provided by the stakeholders of the SFCA, including flood reports from the LLFA and DCWW, and NRW's 'Recorded Flood Extents' dataset. This has been supplemented with other information from the existing SFCAs, PFRAs, LFRMPs, and Flood Investigation reports, which have either been provided by stakeholders or are publicly available.

4.4.2 Natural Resources Wales – Flood Map for Planning

The NRW FMfP Flood Zones (published November 2025) have been consulted for this SFCA and are described in Section 3.3.1. The FMfP Flood Zones 2 and 3 show the potential extent of flooding, assuming no defences are in place. The TAN-15 Defended Zones show areas that benefit from RMA flood defences with a minimum standard of protection of 1 in 100 years (present day) for rivers, and 1 in 200 year (present day) for the sea (plus climate change and freeboard). Climate change and freeboard allowances are required on any flood defence scheme planned and constructed since 2016. Freeboard refers to the uncertainty allowance applied within the design and implementation of flood risk management schemes, such as flood walls and earth embankments.

4.4.3 Flood Defences

The NRW FMfP Flood Defences GIS dataset has been consulted for this SFCA. The dataset identifies flood defences that have been built to mitigate against flooding from rivers and the sea. The defences dataset provides information on standard of protection and condition of the asset. Engineered defences usually have a standard of protection, which is the return period of a flood event against which the defence should be effective.

The National Flood Asset Database

The National Flood Asset Database (NFAD)[16] records flood infrastructure in Wales, including embankments, walls, flood gates, culverts, and debris screens. All RMA's in Wales are encouraged to enter onto the NFAD details of all assets that they are aware of, including privately owned assets. The NFAD is regularly updated to improve the accuracy of the data. However, at the moment NRW highlight the following uncertainties with the database:

- some of the data may be inaccurate, out-of-date or missing
- some of the underground assets might not be known or recorded accurately
- Property Flood Resilience (PFR) schemes are not included

4.4.4 Groundwater

JBA has developed a range of Groundwater Flood Map products at the national scale. The 5m resolution JBA Groundwater Map has been used within the SFCA. The modelling involves simulating groundwater levels for a range of return periods (including 75, 100, and 200-years). Groundwater levels are then compared to ground surface levels to determine the head difference in meters. The JBA Groundwater Map categorises the head difference (m) into five feature classes based on the 100-year model outputs. These are outlined in Table 4-1.

16 https://naturalresources.wales/flooding/managing-flood-risk/find-flood-defence-structures-near-you-the-national-flood-asset-database/?lang=en

Table 4-1 JBA Groundwater flood risk map categories

Flood depth range during a 1% AEP flood event	Groundwater flood risk
Groundwater levels are either at or very near (within 0.025m of) the ground surface.	Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
Groundwater levels are between 0.025m and 0.5m below the ground surface.	There is the possibility of groundwater emerging at the surface locally.
Groundwater levels are between 0.5m and 5m below the ground surface.	Groundwater may emerge into subsurface assets but surface manifestation of groundwater is unlikely.
Groundwater levels are at least 5m below the ground surface.	Flooding from groundwater is not likely.

It is important to note that the modelled groundwater levels are not predictions of typical groundwater levels. Rather they are flood levels i.e. groundwater levels that might be expected after a winter recharge season with 1% AEP, and so would represent an extreme scenario. The maps also assess the risk of groundwater emergence and not of resulting groundwater flooding. For groundwater flooding to occur it is often necessary for groundwater to have nowhere to go without ponding and flooding an area first.

It should be noted that as the JBA Groundwater Flood Map is based on national modelling it should only be used for general broad-scale assessment of the groundwater flood hazard in an area. It is not explicitly designed for the assessment of flood hazard at the scale of a single property. In high-risk areas a site-specific risk assessment for groundwater flooding is recommended to fully inform the likelihood of flooding. This may include review of historical flood records, historical borehole logs, consultation with the LLFA and groundwater monitoring.

A high-risk groundwater zone does not automatically preclude the use of infiltration techniques for Sustainable Drainage Solutions (SuDS), although they are less likely to be suitable. A site-specific assessment of the potential for infiltration techniques shall always be required by the SAB.

4.4.5 Sewers

Historical records of sewer flooding have been taken from historical flooding records provided by DCWW and considered on a broad spatial scale.

4.4.6 Reservoirs

The risk of inundation due to a reservoir breach or failure of reservoirs within the areas has been assessed using the NRW's 'Flood Risk from Reservoirs dataset'. The shading on the map shows the worst-case scenario for the area that could be flooded if a large reservoir were to fail and release the water it holds.

Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in Wales, NRW ensure that reservoirs are inspected regularly, and essential safety work is undertaken.

The reservoir flood maps do not indicate the likelihood of a flood occurring, rather the extent of flooding in the event of failure or breach.

4.4.7 Impact of Climate Change

Climate change is causing more frequent and more severe flooding to occur in Wales. The Climate Change Committee provides independent advice to the Welsh Government on setting and meeting carbon budgets and preparing for climate change. It has stated that it expects the climate in Wales to become warmer and wetter, with significant increases in the sea level around the coast and the frequency and intensity of storm events. This will increase the risk of flooding, and it is also reasonable to expect the incidence and seriousness of flood events to increase.

Table 4-2 below shows how Climate Change has been assessed for each source of flooding within the SFCA. Even if an area is not currently at flood risk, the impact of climate change on the extent of flooding should be considered.

Table 4-2 Assessment of Climate Change for all sources of flooding

Source	Data Source	Climate Change Allowance
Rivers	NRW FMfP for Rivers and the National Flood Hazard Mapping	The FMfP displays predicted future flood risk under the central climate change estimate. Detailed FCAs will be required to consider a range of climate change scenarios, including upper end estimates, making reference to the Welsh Government guidance on climate change allowances for planning purposes.
Sea	NRW FMfP for the Sea and the National Flood Hazard Mapping	The FMfP displays predicted future flood risk under the higher central climate change estimate. Detailed FCAs will be required to consider a range of climate change scenarios, including upper end estimates, making reference to the Welsh Government guidance on climate change allowances for planning purposes.
Surface Water and Small Watercourses	NRW FMfP for Surface Water and Small Watercourses and the National Flood Hazard Mapping	The FMfP displays predicted future flood risk under the central climate change estimate. Detailed FCAs will be required to consider a range of climate change scenarios, including upper end estimates, making reference to the Welsh Government guidance on climate change

Source	Data Source	Climate Change Allowance
		allowances for planning purposes.
Groundwater	No data sets available.	The impacts of climate change on groundwater flooding problems, and those watercourses where groundwater has a large influence on winter flood flows, is much more uncertain. Milder wetter winters may increase the frequency of groundwater flooding incidents in areas that are already susceptible, but warmer drier summers may counteract this effect by drawing down groundwater levels to a greater extent during the summer months. The effect of climate change on groundwater levels for sites in areas where groundwater is known to be an issue should be considered at the planning application stage.
Sewers	No data sets available.	Climate change is likely to result in an increase in sewer flooding incidences as a result of its interaction with other flood risk sources (including surface water and groundwater) where flooding from this source is increased as a result of climate change. Where sewer flooding is known to be an issue should be considered at the planning application stage.
Reservoirs	No data sets available.	Some reservoir functions (i.e. the use that the reservoir is put to) may be relatively vulnerable to climate change, particularly where they rely on existing yields, flood flows or water quality of source waters. However, there are a number of systems that are already in place (e.g. the Water Resources Management Plan) that contain methods for identifying impacts and adapting to climate change as part of the normal ownership and operation process. In most cases, the form of the dam is resilient to the effects of climate change if the reservoir structure is well engineered with an appropriate factor of safety.

4.4.8 Working With Natural Processes

Nature-based solutions should be considered as a way of managing flood risk where possible. More information and mapping to help identify potential areas for working with natural processes to reduce river flooding have been developed as part of the research project 'Working with Natural Processes – the evidence base'. More information can be found in the mapping appendices and Section 11. The Welsh Information for Nature-based solutions[17] website offers more detailed information on Natural Flood Management and its suitability for areas within Wales.

4.4.9 Future flood defence

Welsh Government have advised local authorities that they should prepare a pipeline of likely works as part of the local flood risk management strategy, with recognition of how the climate projections will bring more areas into flood risk and increase the depth and velocities of flooding in the future.

The Welsh Government flood and coastal erosion risk programme invites applications which reduce risk to communities as set out in the National FCERM Strategy and associated guidance. The programme does not provide funding to enable new development in areas at risk of flooding. Furthermore, TAN-15 states that developments reliant on the defences must not commence prior to the completion of construction work and the new Defended Zones being in place.

It is, however, recognised that there is a need to develop resilience in town centres and for nationally significant infrastructure, where they face new or increased flood risks as a result of climate change. It is likely a multi-agency approach, with the support of the private sector where appropriate, will be required to deliver such outcomes, whilst remembering that new flood defences will have to satisfy the qualifying criteria for Defended Zones.

Policy 8 of Future Wales – the National Plan 2040 demonstrates the Welsh Government's support for the sustainable management of flood risk in national and regional growth areas. Enabling areas in Zones 2 or 3 (Rivers and Sea) to become Defended Zones through the use of new nature-based solutions or improvements to existing flood defences, or other solutions is supported. This will provide important protection to existing development and enable redevelopment and renewal to take place in a sustainable and responsible way.

The SFCA can play a valuable role in identifying existing investment FCERM plans, as well as identifying flood investment opportunities and priorities that might align with development aspirations.

17 https://storymaps.arcgis.com/collections/036c04ccb85948d2abe7312de75ad318?item=1

5 Flood Risk Review

Section 5.3 of TAN-15 states that SFCAs will provide planning authorities with information on current and future flood risk, using the best available information about climate change and projected changes to the nature of flood risk. The risk of flooding from all sources must be considered as part of an SFCA, including flooding from the sea, rivers, land, groundwater, sewers, artificial sources and coastal erosion. Using the datasets identified in Section 4, this section provides a strategic assessment of the flood risk across the study area from each source. For each source of flooding, where appropriate, the impact of climate change on the source of flooding is described. These should be used in combination with the broad scale and individual area mapping provided in Appendix A.

5.1 Historical flooding

Cardiff has a history of recorded flood events caused by multiple sources of flooding. Significant flood events within the Cardiff LPA area (which have been taken from NRW's recorded flood extents dataset and, where available, Cardiff Council records and reports on historical flood incidents) are recorded below in Table 5-1.

Every effort has been made to include the most significant flood events within the county; however, the list is not exhaustive. Developers are encouraged to consult the LLFA and NRW about historical flood risk to a proposed development site.

A summary of the spatial distribution of historical sewer flooding incidents by electoral ward are shown in Table 5-1.

Table 5-1 Flooding incidents by year

Year of Flood Event	Flood Incident
1960	NRW's historic flood dataset indicates flooding from the River Taff around Gabalfa, Llandaff Pontcanna, Blackwier and Riverside.
1979	NRW's historic flood dataset indicates flooding occurred from the River Taff at Tongwlais, Radyr, Llandaff, Pontcanna, Blackwier, Canton, Riverside and Grangetown. Flooding also occurred from the River Rumney in Roath, Llanrumney and Old St Mellons.
1981	NRW's historic flood dataset indicates flooding occurred from the River Ely at Michaelston-super-Ely, Ely and Fairwater.
1995	NRW's historic flood dataset indicates flooding associated with the Roath Brook, Roath.
2008	NRW's historic flood dataset indicates flooding from the River Ely, Ely.
2009	NRW's historic flood dataset indicates flooding occurred from the Rhydwaedlyd Brook, Rhiwbina.
2014	NRW's historic flood dataset indicates flooding associated with the Roath Brook, Roath.
2020	NRW's historic flood dataset indicates flooding from the River Taff around Taff's Well and Melingriffith.

5.2 Flood Risk from Rivers

Many watercourses in Cardiff are designated as Main River by NRW. The following rivers, for which NRW are the Risk Management Authority (RMA) flow through urban areas in the authority area and present a risk of flooding to these areas, or to areas which are located in close proximity and may be developed:

- River Ely
- River Taff
- Roath Brook (downstream of Roath Lake)
- River Rhymney
- Nant Glandulais

The following watercourses are classified as an ordinary watercourse but fall, or partially fall, within the NRW FMfP-Rivers:

- Nant Cwmnofydd
- Nant y Briwnant
- Rhydwaedlyd Brook/Whitchurch Brook
- Llanishen Brook
- Nant-fawr

Maps showing the extent of the flood outlines from the NRW FMfP – Rivers are provided in Appendix A.

More detail on the flood risk from rivers which affect the authority area is provided below.

River Ely

The River Ely rises in the neighbouring borough of Rhondda Cynon Taf and flows through The Vale of Glamorgan Council authority area before entering the Cardiff City authority area to the north of Michaelston-super-Ely. The River Ely flows in an easterly direction through Cardiff before flowing south towards its confluence with the River Taff.

Flood Zones 2 and 3 associated with the River Ely extend across significant parts of Ely, Victoria Park Leckwith and the International Sports Village. The floodplain is extensive and is shaped by urban infrastructure and the local topography.

NRW flood defences are present along part of the riverbank in the International Sports Village. These flood defences result in an area of TAN-15 Defended Zone.

River Taff

The River Taff flows into the authority area from the neighbouring authority area of Rhondda Cynon Taf at Gwaelod-y-garth. It flows in a southerly direction before flowing into

Cardiff Bay and the Bristol Channel. The river is bordered by urban development for the majority of its course through the Cardiff Council authority area.

The floodplain of the River Taff is broad, opening up in the flatter urban areas resulting in parts of Gwaelod-y-garth, Morganstown, Forest Farm, Melingriffith, Llandaff North, Danescourt, Pontcanna, Gabalfa, Canton, Riverside, Butetown, Grangetown and Cardiff Bay being located within Flood Zones 2 and 3. Flood water is constrained in several locations by embanked roads and railway lines.

NRW flood defences are present along parts of the River Taff, including Forest Farm industrial estate and county park, Danescourt, Gabalfa, Pontcanna, Riverside, Butetown and Grangetown. These defences have a standard of protection of 1 in 100 years and result in TAN-15 Defended Zone for Rivers designation in this area.

Roath Brook (downstream of Roath Lake)

The Roath Brook begins as the outflow of the Nant Fawr stream from the Lisvane and Llanishen reservoirs in north Cardiff. As the stream travels south and feeds into Roath Park Lake, it becomes an NRW Main River, the Roath Brook. The river continues to flow in a south easterly direction towards Pengam, before it splits into two channels, one flowing in an open channel and the other culverted under the commercial area surrounding Newport Road. Both tributaries flow into the River Rhymney.

Upstream of the Roath Brook, between Roath Park and the Roath Park Recreation Ground, the majority of the floodplain of the Roath Brook does not affect urban development and is predicted to flood public open space. Downstream, the extent of flooding significantly increases, resulting in development in Pen-y-lan, and the commercial areas in Pengam, being situated in Flood Zones 2 and 3.

Flood defences are present along the Roath Brook in Roath and within the commercial area in Pengam. These do not form a TAN-15 Defended Zone.

River Rhymney

The River Rhymney flows into the Cardiff Council authority area from the neighbouring Caerphilly County Borough Council authority area. The river flows in a predominantly southerly direction through the authority area towards the Bristol Channel. The upper reaches of the River Rhymney within the Cardiff Council area are mostly rural, flowing under the M4 and A48 Eastern Avenue before and becoming more urbanised as the river flows along the edges of Llanrumney and Rumney before continuing south past Pengam and Tremorfa.

The majority of the floodplain of the River Rhymney is confined to areas of open space, comprising parks and recreation grounds. However, areas of Llanrumney, as well as commercial development along Newport Road, are located in Flood Zones 2 and 3.

NRW flood defences are present along the lower extent of the River Rhymney. These flood defences have a mixed standard of protection of 75 to 100 years. Consequently, an area to the west of Llanrumney forms part of the TAN-15 Defended Zone for Rivers.

Nant Glandulais

The Nant Glandulais rises to the north of Pontprennau and flows in a south westerly direction towards Lisvane before flowing in a southerly direction towards its confluence with the River Rhymney south of Pentwyn.

Its floodplain generally does not affect urban development and is predicted to flood public open space. Small areas of Flood Zones 2 and 3 are present in developed areas of Pentwyn and Pontprennau.

No NRW flood defences are present along its course.

Nant Cwmnfydd, Nant y Briwnant and Whitchurch Brook.

The Nant Cwmnfydd rises to the north of Thornhill, in the Caerphilly authority area, and flows in a southerly direction through the Cardiff authority area to its confluence with the Nant y Briwnant in Rhiwbina. The downstream extent within Rhiwbina, results in a confined floodplain with localised existing residential areas located within Flood Zones 2 and 3.

The Nant y Briwnant rises in the north of the authority area, and flows in a southerly direction, along the edge of Thornhill and through Rhiwbina, before its confluence with the Nant Cwmnfydd where it forms the Rhydwaedlyd Brook/Whitchurch Brook. Areas of Flood Zones 2 and 3, associated with the Nant y Briwnant, are present along its course in Rhiwbina.

The Rhydwaedlyd Brook/Whitchurch Brook flows in a southerly direction through Rhiwbina and Whitchurch before it enters a culvert to the south of Heol Gabriel in Whitchurch and continues to flow to its confluence with the River Taff to the south of Gabalfa. The Rhydwaedlyd Brook and the Whitchurch Brook form the same watercourse, with its name changing as it flows from Rhiwbina to Whitchurch.

Existing development in close proximity to the Rhydwaedlyd Brook/Whitchurch Brook in both Rhiwbina and Whitchurch are located within Flood Zones 2 and 3 for Rivers. The floodplain is shaped by urban development in these areas, with much of the floodwater channelled around the existing buildings and roads.

No NRW flood defences are present along the course of these watercourses.

Llanishen Brook/Nant Fawr

The Llanishen Brook rises to the north of Thornhill and flows in a southerly direction through Thornhill and Llanishen, where it is culverted for a stretch between Llanon Road and Ty Glas Avenue. It then continues towards its confluence with the Nant-Fawr in the Heath

area. Flood Zones 2 and 3 for Rivers are present from the south of Llanishen and result in small areas in close proximity to the Llanishen Brook being within Flood Zones 2 and 3.

The Nant-Fawr rises north of Lisvane and flows in a southerly direction through Lisvane and Heath before flowing into Roath Lake.

Fluvial flood zones are present forming a narrow corridor, but areas of existing development are located in Flood Zones 2 and 3.

5.2.1 Summary of the Risk of Flooding from Rivers and TAN-15

The risk of fluvial flooding in Cardiff is significant. The majority of urban areas are at some level of risk of fluvial flooding, with flooding most significant in Llandaff, Poncanna, Canton, Leckwith, Riverside, Butetown and Grangetown. Other settlements including Ely, Rhiwbina, Whitchurch, Roath and Pengam also have large areas within these flood zones.

Development proposals on Greenfield sites for highly vulnerable development within Flood Zone 3 are not acceptable, as stated within in the TAN 15 guidance.

In regard to the fluvial flood zones of ordinary watercourses, Flood Zones 2 and 3 are fairly confined and remain within close proximity to the watercourse. Development proposals within these zones should consider the risk of river flooding from the outset, including whether the site can be justified in the context of Section 10 of TAN-15.

Flood defences found along several rivers in the authority area are maintained by NRW. As a result of these flood defences, large areas of TAN-15 Defended Zones are present. The flood defences have a minimum 1% AEP event standard of protection. New development within the TAN-15 Defended Zone should be allocated within the LDP. Some flexibility is afforded to redevelopment opportunities in these areas, subject to development not resulting in an increase in flood risk to the site, the proposed site users, or third parties.

Some NRW flood defences do not meet the required standard of protection to form a TAN15 Defended Zone. Other RMA and private defences are also not included in the forming of TAN15 Defended Zone areas. In these instances, their standard of protection should be assessed within a site specific FCA, and in accordance with LLFA requirements. In the case of private defences, it is strongly recommended that further advice and information should be sought from the LLFA early in the development design process.

Development in TAN-15 Defended Zones and Flood Zones 2 and 3 are likely to be subject to site specific assessments and detailed flood modelling may be required. If a development is not protected from NRW flood defences, any proposed development in an undefended area is likely to require flood mitigation considerations and it may therefore be more challenging to meet TAN-15 requirements.

It should be noted that for sites within the Defended Zone, mitigation may also be required, and the designation of the Defended Zone does not preclude the need for a detailed

assessment of flood risk. It is highly likely that breach and blockage scenarios shall need to be considered, and in line with NRW guidance, be considered as the 'design event' for assessment.

It is recommended that Redevelopment proposals consider how to incorporate resilience measures to development plans from the outset.

5.3 Risk of Flooding from Seas

The Severn Estuary and the tidally influenced rivers in Cardiff are potential sources of tidal flooding within the Cardiff Council authority area. Tidal flooding is most likely to occur during storm surge conditions, characterised by wind-driven waves, low atmospheric pressure, and high spring tides. In areas protected from flooding by sea defences, tidal flooding can occur due to a breach in the flood defences, failure of a mechanical barrier, or overtopping of the flood defences.

Maps showing the extent of the flood outlines from the NRW FMfP – Sea are provided in Appendix A.

Tidally influenced rivers, with the extent of the floodplains affecting the urban areas in Cardiff, include:

- River Ely
- River Taff
- River Rhymney
- Roath Brook

A summary of the risk of tidal flooding from each tidal flood risk source is provided below.

Open Coastline

Flooding is predicted to occur in several areas along the coastline of Cardiff. These include the Cardiff Docks at Cardiff Bay and along the Wentlooge Levels.

At Cardiff Docks, flooding occurs through the ingress of tidal flood water into the Queen Alexandra Dock and Roath Dock. Surrounding areas are located in Flood Zones 2 and 3 for the Sea. The water levels in Roath Dock and Queen Alexandra Dock are managed through lock gates controlled by ABP.

Tidal flooding from the open coastline is predicted along the Wentlooge Levels to the east of Cardiff. Flooding in this area is extensive, due to the low lying and flat nature of the topography. The Wentlooge Levels in Cardiff are located in Flood Zone 3 of the FMfP. Areas around the edge of Rumney, Trowbridge and St Mellons are located in Flood Zone 3.

NRW coastal flood defences are present along the eastern Cardiff coastline, and these flood defences have a standard of protection of 1 in 200 years. The flood defences form a

TAN-15 Defended Zone for the Sea over the Wentlooge Levels, including Trowbridge and St Mellons.

River Ely

The River Ely flows through the western area of Cardiff and is tidally influenced between Cardiff Bay and western Fairwater. Its floodplain through Cardiff is extensive, with large areas of Ely, Victoria Park, Leckwith, Ninian Park and Grangetown within Flood Zone 3, where the tide would naturally influence the water levels in the River Ely.

Water levels in the River Ely are managed via the Cardiff Bay Barrage. The barrage is 1.1km long and extends from Cardiff Docks to the north of Penarth. The Cardiff Bay Barrage was created to meet two needs: create a 2km^2 permanent freshwater lagoon that would attract investment into the Cardiff docklands area and; provide a flood defence structure that protects the area behind from rising sea levels and water levels in the River Taff and River Ely. The barrier has a standard of protection of 1 in 1,000 years. The protection given by the barrier forms part of the TAN-15 Defended Zone in this area, resulting in the majority of the tidal flood zone being defined as the TAN-15 Defended Zone.

River Taff

The River Taff flows through the centre of Cardiff and is tidally influenced up to Pontcanna Fields. The floodplain of the River Taff is broad, with large areas of Canton, Riverside, Grangetown, Butetown as well as Cardiff Bay and Cardiff City Centre located within it. The majority of the floodplain is Flood Zone 3, with small areas on the outskirts classified as Flood Zone 2.

As with the River Ely, the tidal water levels of the River Taff are managed via the Cardiff Bay Barrage, which has a standard of protection of 1 in 1,000 years. As a result, the protection provided forms a TAN-15 Defended Zone for the majority of the floodplain.

River Rhymney

The River Rhymney flows through the east of Cardiff and is tidally influenced from the west of Llanrumney to its confluence with the Severn Estuary.

Upstream to the west of Llanrumney and Rumney, the tidal floodplain is wide but is generally confined to undeveloped areas along its course. Areas along its course, including the western extent of Llanrumney and an area along the A48 are located within Flood Zones 2 and 3. Llanrumney is partially located in a TAN-15 Defended Zone for the sea.

Downstream, commercial development in north Pengam and urban areas of southern Rumney are in Flood Zone 3 for the Sea. Fluvial/tidal flood defences are present along the River Rhymney in Pengam but do not form a TAN-15 Defended Zone.

Large areas of southern Pengam, Tremorfa, Pengam Moors, East Moors and a small area of Splott are located in Flood Zones 2 and 3 for the Sea. Tidal flood defences for the River Rhymney and along the Severn Estuary (the Cardiff Coastal Defence Scheme) are currently under construction and are due to be completed in 2027/2028. The flood defences form a TAN-15 Defended Zone for the above areas.

Roath Brook

The Roath Brook flows through the east of Cardiff and is tidally influenced between Blenhim Road, Roath and its confluence with the River Rhymney. Developed areas along its course in Roath and Pen-y-lan are located in Flood Zones 2 and 3.

Fluvial/tidal flood defences are present along its course, but do not form a TAN-15 Defended Zone.

5.3.1 Summary of the Risk of Flooding from Seas and TAN-15

Due to the large areas of open coastline around Cardiff and variations in topography, the tidal floodplain is varied, with some areas wide and flat, allowing water to cover large areas, and others of higher topography limiting the extent of tidal flood water.

The floodplain from tidally influenced rivers and the submersion of lower-lying coastal areas along the open coast forms Flood Zones 2 and 3, impacting several areas of Cardiff. Flood defences found along the tidal rivers in Cardiff and around its coastline are maintained by NRW. As a result of these flood defences, most of the tidal floodplain is categorised as a TAN-15 Defended Zone. Development proposals within these zones should consider the risk of flooding from the sea from the outset, including whether the site can be justified in the context of Section 10 of TAN-15. Where development is proposed within a TAN-15 Defended Zone or is located behind a flood defence, further consideration of the risk of breach or overtopping of the defence should be given.

Development in Flood Zones 2, 3 and the TAN-15 Defended Zone is likely to be subject to site-specific assessment, and detailed flood modelling may be required.

5.4 Surface Water and Small Watercourses

Maps showing the extent of the flood outlines for surface water and small watercourse flood risk across Cardiff are provided in Appendix A.

The NRW FMfP – Surface Water and Small Watercourses indicates extensive surface water flooding due to the dense urban infrastructure and the significant volume of impermeable surfacing in Cardiff. Surface water ponding is present in many areas. The predicted flood extents predominantly follow the local topography, resulting in flowpaths following existing roads, with ponding present in topographic depressions. Some isolated ponding occurs on topographic depressions and around embanked and elevated urban

infrastructures like railway lines and roads. Flow paths and large areas of ponding may also be formed where culverts may not be accurately represented in the underlying model.

Several ordinary watercourses are present within Cardiff. The flood zones associated with these small watercourses is indicated by both the FMfP for Surface Water and Small Watercourses flood zones and the FMfP for RiversThose defined by the FMfP - River have been detailed above. Those defined by the FMfP - surface water and small watercourses are dsicussed below:

- Llanishen Brook between Thornhill and southern Llanishen
- Nant Fawr between northern Lisvane/Thornhill to Coedyfelin
- Nant Pontprennau

Llanishen Brook

The Llanishen Brook rises to the north of Thornhill and flows in a southerly direction through Thornhill and Llanishen towards its confluence with the Nant-fawr in Heath. The brook is culverted to the north of Llanishen. Part of the Llanishen Brook is designated Main River and results in flood zones associated with the FMfP - Rivers zones. These have been detailed is Section 5.2.

The floodplain is generally confined by the local topography and is not extensive. A small area to the south of Thornhill and Llanishen is within the FMfP Surface Water and Small Watercourses flood zones 2 and 3 and may be at risk of small watercourse flooding as flood water overtops the banks of the Llanishen Brook. An area to the north of Ty Glas Avenue is within Flood Zone 2 and may also be at risk from the overtopping of the Llanishen Brook.

Nant Fawr

The Nant Fawr rises to the north of Lisvane and flows in a southerly direction through Lisvane. The floodplain shown by the FMfP Surface Water and Small Watercourses dataset shows that the floodplain is generally confined to undeveloped areas and is not extensive.

Nant Pontprennau

The Nant Pontprennau is an NRW Main River which rises as a small watercourse to the north of Pontprennau and flows in a southerly direction through Pontprennau and Pentwyn. The Main River designation commences upstream of the A48 Eastern Avenue. Due to the catchment size, the watercourse is modelled through the surface water and small watercourse dataset as opposed to the fluvial dataset.

The floodplain shown by the FMfP Surface Water and Small Watercourses dataset shows that the floodplain is generally confined to undeveloped areas and is not extensive.

5.4.1 Summary of Risk of Flooding from Surface Water and Small Watercourse and TAN-15

The management of surface water runoff is a key consideration, whether a development site falls within a flood risk area or not. Intense development within a catchment could result in increased runoff, which, if not appropriately managed, could result in increased flooding within and downstream of the study area.

New developments can also increase pressure on sewer systems and urban drainage. It is therefore important to manage the impact of developments in a sustainable manner. As of 7th January 2019, all construction work in Wales with drainage implications, of 100 square metres or more, is required to have Sustainable Drainage Systems (SuDS) to manage on-site surface water (whether they require planning permission or not). These SuDS must be designed and constructed in accordance with the Welsh Government Standards for Sustainable Drainage.

Developments within the floodplain of small watercourses should consider flood risk from the outset, considering the principles of development against the risk of flooding. Whilst Section 10 of TAN-15 does not strictly apply, the principles for development should be used as a guide.

5.5 Groundwater flood depths

The bedrock geology across Cardiff is varied, with geological formations predominantly dominated by Triassic Rocks, Lower Devonian Rocks and Pridoli Rocks formations, with smaller formations present around the rest of the authority area. These formations generally comprise mudstone, siltstone, sandstone and limestone.

Mudstone and siltstone tends to have low porosity and permeability, whilst sandstone and limestone are regarded as more permeable and allow for the storage and movement of groundwater. Part of the Triassic Rocks formation around Llandaff, Danescourt, Ely and St Fagans and the Lias Group formation around St Fagans forms a Principal Aquifer indicating an area capable of storing groundwater. The Lower Devonian Rocks and Pridoli formation form a Secondary A aquifer and may store local water supplies. As a result, upward percolation of groundwater and subsequent flooding should be considered in these areas.

The superficial deposits overlaying the bedrock in Cardiff Council authority area comprise include Alluvium, Glacial Sand and Gravel, River Terrace Deposits and Till, which are generally permeable and suggest that groundwater rise could present a localised risk in these areas.

Maps showing the indicative groundwater flood depth in Cardiff are provided in Appendix A. The map assesses the risk of groundwater emergence, and not of resulting groundwater flooding. For groundwater flooding to occur it is often necessary for groundwater to have nowhere to go without ponding and flooding an area first.

The majority of the Cardiff Council authority area shows areas where groundwater levels are at least 5m below the ground surface, suggesting an overall low risk of groundwater flooding. The north-western extent of Cardiff has a large area where the groundwater is between 0.025 and 5m below the surface, making groundwater flooding more likely in these areas. Areas of shallow groundwater depths are present in a small part of the north of Cardiff in Forest Farm Industrial Estate and Tongwynlais. To the south of Cardiff, St Fagans, Victoria Park, Canton, Llandaff, Catays, Ely, Roath, Splott and Adamsdown are shown to have groundwater flood depths close to the surface. These areas generally align with the extents of aquifer designations, as detailed above. Areas around Llanrumney and St Mellons are also shown to have high groundwater levels of between 5m and at or very near (0.025m) of the ground surface

It is recommended that further assessment be undertaken to identify the risk of groundwater emergence as part of a site-specific FCA if development is proposed in these areas.

A high-risk groundwater zone does not automatically preclude the use of infiltration techniques for Sustainable Drainage Solutions (SuDS), although they are less likely to be suitable. A site-specific assessment of the potential for infiltration techniques shall always be required by the SAB.

5.6 Sewer flooding

DCWW are responsible for sewer infrastructure across the study area and recording sewer flooding incidents.

DCWW have provided detail of historical incidents and active risk areas. Historical flooding incidents are recorded relating to public foul, combined, or surface water sewers. These records display the number of properties that experience internal and/or external flooding. A summary of the spatial distribution of historical sewer flooding incidents by electoral ward is summarised in Table 5-2. The data has been displayed at this level to avoid individual properties being identified at risk of sewer flooding. Wards recorded as having 'no data' are not listed in Table 5-2.

This data shows that the wards with the highest number of flood incidents are in Splott and Penylan electoral wards with 174 and 114 incidents of sewer incidents recorded, respectively. The remaining wards have all experienced 62 incidents or less of sewer flooding since this record began.

DCWW are working to reduce the number of sewer flood incidents by investing in maintenance and improvements of the sewer network.

DCWW have not provided any information regarding the predicted flood risk from the sewerage network.

Table 5-2 Sewer Flooding Incidents by Electoral Ward

Electoral Ward	Number of sewer flooding incidents
Canton	2
Cathays	62
Cyncoed	6
Ely	16
Fairwater	9
Lisvane and Thornhill	6
Llandaff	12
Llanishen	14
Llanrumney	5
Pentyrch and St. Fagans	14
Penylan	114
Radyr	10
Rhiwbina	3
Riverside	3
Rumney	8

Electoral Ward	Number of sewer flooding incidents
Splott	174
Trowbridge	2
Whitchurch and Tongwynlais	45

5.7 Flooding from artificial sources

Artificial sources of flooding include reservoirs which could pose a flood risk to the Cardiff LPA area. Maps showing the predicted flood extent in the event of reservoir breach/failure from reservoirs are provided in Appendix A. The reservoirs which pose a flood risk to the county are:

- Beacons
- Cantref
- Cefn Mably - Lodge Lake
- Lisvane
- Llanishen
- Lluest-Wen
- Llwyn-On
- Pontsticill (Taf Fechan)
- Roath Park Lake
- Wenallt

The NRW FMfP – Reservoirs mapping indicates that parts of the following areas are at risk if a breach/failure were to occur.

- Pentwyn
- Cyncoed
- Llanrumney
- Pengam
- Roath
- Splott
- Adamsdown
- Butetown
- Grangetown
- Leckwith
- City centre
- Riverside
- Canton
- Pontcanna

- Llandaff
- Radyr
- Whitchurch
- Ely
- Rhiwbina
- Heath
- Lisvane
- Llanishen

The failure of a reservoir can cause catastrophic damage due to the sudden release of large volumes of water. Reservoirs in the UK have an excellent safety record, and NRW is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large (reservoirs with a raised capacity of 10,000 cubic metres, or more, above natural ground level which have not been designated as high-risk reservoirs) and designated high risk by NRW must be inspected and supervised by reservoir panel engineers.

Reservoirs in Wales are categorised according to the risk they pose to the public and environment in the unlikely event of a breach. The amount of development in the inundation catchment is an important factor in determining a reservoir's risk category. Land use planning can inadvertently lead to a reclassification of risk if new development is located within the inundation area of a reservoir. This brings additional maintenance and insurance implications for owners and operators of reservoirs. Any potential implications for reservoir owners or operators, such as allocating development in inundation areas, should be raised by the planning authorities openly and constructively.

5.8 Current pipeline of Flood and Coastal Erosion Risk Management (FCERM) projects

Details of any significant FCERM plans within the region that are likely to be delivered in the next five years have been taken from the Welsh Government Flood and Coastal Erosion Risk Management Programme 2026-27[18]. Details of the projects are summarised in Table 5-3. Some of these projects may be in or nearing construction, whereas others may be in their infancy without secure funding. Any proposed development within these areas would be advised to contact the relevant RMA to obtain up to date information.

However, it should be noted that planning applications can only be assessed against defences currently in place, and aspirations to construct or improve defences would not be regarded as a material consideration. It should be noted that whilst this provides an indication of pipeline projects, this list is not exhaustive and is subject to frequent change.

18 https://www.gov.wales/flood-and-coastal-erosion-risk-management-programme-2026-2027

Details of FCERM investment plans are regularly published by Welsh Government, NRW and RMAs.

Identification of pipeline projects should be undertaken in consultation with NRW, WG and other RMAs.

Table 5-3 Current pipeline of FCERM projects[19]

Project name	RMA	Timescales
Cardiff Coastal Defence Scheme	LLFA	Completion scheduled for 2027
Radyr, Court Road	NRW	Continued commitment from 2025-26
Rumney South	NRW	Continued commitment from 2025-26
Whitchurch - Brook	NRW	Continued commitment from 2025-26

5.8.1 FCERM Capital Investment

Cardiff Council has a further programme of FCERM investment projects that are preferred for managing flood risk across the county. These projects include the following:

- Greener Whitchurch
- Greener Rumney

Further information on these schemes has been provided below.

Greener Whitchurch

Greener Whitchurch is a project undertaken by Cardiff Council to reduce flood risk in Whitchurch while transforming key public spaces to make them greener, more attractive, and more enjoyable for the community. The scheme focuses on the small watercourse risk associated with the Whitchurch Brook, which has recorded more than 10 flood events since 1990, alongside surface water flooding associated with a lack of capacity within local drainage infrastructure.

The project is centred in Whitchurch, in the north of the authority area. The scheme area runs from Caedelyn Park to Heol Gabriel in southern Whitchurch. The works propose improvements to contain, convey and slow flows along the course of the Whitchurch Brook. In addition, retrofitting of raingardens will be undertaken in local streets to absorb and slow the flow of surface water and limit the volume of water flowing into the local drainage network.

19 https://www.gov.wales/flood-and-coastal-erosion-risk-management-programme-2025-2026-html#167902

At the time of writing this SFCA, the scheme has been launched for Pre Application Consultation. Further information on the scheme and its timescales is available from its website[20].

Greener Rumney

An outline business case, and a full business case have been undertaken by Cardiff Council for the Greener Rumney project.

The scheme proposes measures to mitigate surface water flooding within the study area, by creating wetlands, widening of the northern brook, construction of swales and ponds, creation of a new surface water pipe network and implementing rain gardens.

20 https://greenerwhitchurch.virtual-engage.com/

6 Coastal risks – erosion and flooding

6.1 Coastal erosion and flooding

It is acknowledged that coastal areas have unique characteristics which can provide opportunities for new development. This is particularly relevant to Cardiff as its southern boundary is formed by the Severn Estuary. However, opportunities for further development may be constrained by flooding, coastal erosion, ground stability and the impacts of climate change.

Considering the sensitivity of these areas and the important of development in coastal areas to the authority, this SFCA considers the role and integrity of coastal defences and provides an understanding of the risks posed by coastal erosion. Reference should also be made to the Shoreline Management Plan (SMP) policies set out in Section 3.4.3, the Welsh National Marine Plan (discussed in Section 6.2), and flood risk mapping in the appendices.

6.2 Coastal erosion and development

As stated in Section 12 of TAN-15, Local Development Plans should clearly define coastal areas suitable for development and those that are subject to significant constraints. Sites should not be allocated for development in areas where there are risks from flooding, ground instability or coastal erosion over the lifetime of the development. LPA's should ensure they have sufficient information and have considered all relevant technical advice.

In instances where sites are proposed by developers within coastal areas, the onus rests on the developer to provide sufficient and appropriate information to demonstrate that proposed sites can be safely developed without significant adverse effects in line with SMP policies. Upgraded or strengthened coastal defences may be required in coastal areas where a 'hold the line' approach is advised in the SMP and reflected in the Development Plan. Any such works are likely to be the responsibility of the developer. Particular regard may also be required for residual flood and erosion risks.

The National Coastal Erosion Risk Management mapping produced by the Environment Agency covers some parts of the region along the Severn Estuary. This indicates that there is unlikely to be areas of coastal retreat in Cardiff with the relevant long-term SMP policy in place (hold the line).

Construction of sea defences often leads to increased development pressures in an area. Local Planning Authorities should be mindful that defences only reduce the risk of floods or erosion, and do not eliminate these risks. LPAs may wish to provide further detailed guidance in the form of Supplementary Planning Guidance where they have a particular strategy for coastal areas.

The Welsh National Marine Plan produced by the Welsh Government acts as a guide for the sustainable development of Wales's marine area by setting out how proposals will be considered by decision makers. This plan should be considered by developers and LPA's for development in coastal areas, with particular attention paid to the following policies:

SOC_08: Resilience to coastal change and flooding: *Proposals should demonstrate how they are resilient to coastal change and flooding over their lifetime.*

SOC_09: Effects on coastal change and flooding: *Proposals should demonstrate how they:*

- *avoid significant adverse impacts upon coastal processes; and*
- *minimise the risk of coastal change and flooding;*

Proposals that align with the relevant Shoreline Management Plan(s) and its policies are encouraged

6.3 Coastal Flood Defences

NRW and LLFA owned coastal flood defences are present around the following areas:

- Wentlooge Levels (NRW)
- Pengam Moors (NRW)
- Cardiff Bay Barrage (NRW)
- Cardiff Coastal Defence Scheme (LLFA)

Other privately owned flood defences may be located around the coastline of Cardiff, but the location of these was not provided for this SFCA.

7 Flood Risk Appraisal

As discussed in Section 1.2, typically, SFCAs are completed in three stages, with an increasing level of detail required in the analysis at each stage. This assessment fulfils the criteria for a Stage 2 SFCA, incorporating a high-level assessment of LDP candidate sites.

An independent Flood Risk Appraisal has been undertaken for candidate sites identified as having potential flood risk and currently under consideration for allocation in the Replacement Local Development Plan. The Flood Risk Appraisal has assessed the risk of flooding from all sources, using the datasets noted in Section 4.4 as well as detailed flood model data where available. The purpose of the Appraisal is to assess whether sites are likely to comply with the requirements of TAN-15 and, as necessary, make recommendations for further evaluation and management of flood risk.

Flood Risk Appraisals are included for the 18 candidate sites in Appendix B and a summary of the sites which have been assessed are provided in Table 7-1. Candidate sites included within the appraisal process are those which have been identified as at some level of risk following initial flood risk screening. If a site has not been reviewed within the assessment process, it has been screened as acceptable in principle on the basis of the Flood Map for Planning.

Table 7-1 Site Summary

Site ID	Site Name	Proposals	Flood Risk Source	Likely to Comply with Requirements of TAN-15
79	Velindre Station	Metro Station	Surface Water	Yes
76	Velindre Cancer Centre	Residential and ancillary mixed use	Surface Water	Yes
80	Land at Cwym Farm	Residential	Surface Water and Small Watercourses	Yes
81	Land at Llwynioli Farm	Mixed use	Surface Water and Small Watercourses	Yes
84	Land off Forest Road	Residential	Surface Water and Small Watercourses	Yes
82	The Manor, Druidstone Road	Employment	Surface Water and Small Watercourses	Yes
N/A	Allied Bakeries	Residential and commercial	Surface Water and Small Watercourses	Yes
N/A	Dwryln Cottage	Residential	Surface Water and Small Watercourses	Yes
66	Land at Rover Way (business and industrial)	Commercial	Sea and Surface Water and Small Watercourses	Yes
10	Bute East Dock	Mixed use	Sea	Yes
65	Image House, East Tyndall Street	Residential	Sea and Surface Water	Yes
N/A	Proposed extension to Rover Way Gypsy and Traveller site	Gypsy and traveller site extension	Sea and Surface Water and Small Watercourses	Yes
N/A	Land at Areas 9-12 St Mellons (Housing)	Residential	Sea and Surface Water and Small Watercourses	Yes

Site ID	Site Name	Proposals	Flood Risk Source	Likely to Comply with Requirements of TAN-15
N/A	Cardiff Central Enterprise Zone	Residential	Rivers, Sea and Surface Water and Small Watercourses	Yes
32	Wholesale Fruit Market, Bessemer Road	Residential	Rivers, Sea and Surface Water and Small Watercourses	Yes
N/A	Former Gas Works, Ferry Road (Housing)	Residential	Rivers, Sea and Surface Water and Small Watercourses	Yes
4	Porth Teigr and Alexandra Head	Retail, residential and transport	Rivers, Sea and Surface Water and Small Watercourses	Yes
83	Land at Wentloog Avenue	Residential	Rivers, Sea and Surface Water	Highly Vulnerable Development shall require mitigation measures to be incorporated into the site design. Less Vulnerable and Water Compatible Development would likely be more appropriate at this location.
19	International Sports Village	Residential	Surface Water	Yes

8 Requirements for a Flood Consequences Assessment

8.1 What is a site-specific Flood Consequences Assessment?

Site specific FCAs are carried out by (or on behalf of) developers to assess the risk and consequences of flooding to a development, and on flood risk elsewhere.

An FCA is submitted with planning applications to demonstrate how the requirements of TAN-15 shall be satisfied.

An FCA should demonstrate how flood risk will be managed over the lifetime of the development, taking into account climate change and the vulnerability of site users. The assessment can also be used to establish whether appropriate avoidance or mitigation measures can be incorporated within the development design. This ensures that over its lifetime, development minimises risk to life, damage to property and disruption to people living and working on the site, as well as not increasing flood risk elsewhere.

8.2 When are site-specific Flood Consequences Assessment's required?

Site specific FCAs are required in the following circumstances:

- Any proposals for development in Flood Zones 2 and 3 of the FMfP for Rivers, Sea and Surface Water and Small Watercourses[21].
- Proposals for development within a TAN-15 Defended Zones;
- Proposals for development within Critical Drainage Areas identified by the LLFA or LPA[22;] and/or
- At the request of the LPA, NRW, or LLFA where there are reasonable concerns that the development will be at flood risk or has the potential to increase the flood risk for others.

An assessment of flood risk (sometimes referred to as an FCA) may also be required by the LLFA for Ordinary Watercourse Consent or by NRW for a Flood Risk Activity Permit for Main River works. However, as these consents are separate to the planning system TAN-15 does not strictly apply but may provide a useful framework for assessment. In these circumstances the LLFA or NRW will be able to provide guidance on their requirements for a proportionate assessment of flood risk.

21 No highly vulnerable development on greenfield land in Flood Zone 3 should be proposed as this is contrary to the requirements of TAN-15

22 It should be noted that Monmouthshire County Council do not currently have any CDA's

8.3 What are the requirements of a site-specific Flood Consequences Assessment?

Section 6 of TAN-15 sets out the requirements of an FCA.

The assessment of flood risk in the FCA should help the planning authority determine whether the risk and consequences of flooding are acceptable and can be appropriately managed over the lifetime of development. An assessment of a range of potential flooding scenarios up to and including the 0.1% AEP flood event should be included, with an allowance for climate change in line with Welsh Government guidance.

FCAs for development sites should follow the approach set out in Figure 2 of TAN-15 and technical guidance provided by NRW[23]. Whilst this SFCA includes local policies and guidance for the Cardiff Council authority area, there is no 'one size fits all' approach to managing flood risk. It is strongly advised that Developers contact NRW and the LLFA to gather further information on any specific flood risks to the proposed development site.

Section 9 provides further guidance and information on the need for FCAs across the Cardiff Council LPA area.

23 https://naturalresources.wales/flooding/modelling-for-flood-consequence-assessments/?lang=en

9 Flood Consequences Assessment Guidance

The following chapter seeks to capture the latest advice and understanding of TAN-15. Additional guidance is provided on how Cardiff Council interpret and apply the policy, including locally specific approaches to managing flood risk on developments.

9.1 Use of Defended Zones and Flood Defences

9.1.1 Definition of Defended Zones

TAN-15 Defended Zones show areas of land that benefit from formal flood defences that are owned and maintained by Risk Management Authorities.

Flood defences built before 1 January 2016 must have the following level of protection against flooding:

- 1 in 100 (1% AEP) chance of occurring in any given year for rivers
- 1 in 200 (0.5% AEP) chance of occurring in any given year for the sea

Flood defences built after 1 January 2016 should meet the same levels of protection but also include:

- An allowance for a design freeboard (an added allowance for defence height to cover uncertainty in modelling)
- An allowance for the effects of climate change

The consequence of the above is that new Defended Zones will need to be of a higher standard than many existing Defended Zones. Furthermore, it may not be possible to assign a Defended Zone to new flood defence schemes that take a more adaptive approach to climate change, such as is commonly applied to coastal flood defence schemes (further outlined in Section 9.1.4). Further guidance around this matter may be forthcoming and we recommend that NRW's website is consulted for the latest guidance.

Where new flood defences are planned for through a development, this will not result in new or extended Defended Zones until NRW are satisfied that the qualifying defences provide an acceptable standard of protection, and it is strongly advised that NRW are consulted with at the earliest stage about the scheme. The TAN15 Defended Zone designations and associated mapping on the FMfP is reviewed on a 2-3 year basis, and where SoPs are shown to have reduced, Defended Zone designation may be removed.

9.1.2 Breach and blockage risk

The consequences of flooding can be particularly severe in the event of defences being overtopped or breached. Land protected by defences can be extremely vulnerable in the event of overtopping or breach because of the speed of flooding in such circumstances. In addition, flood water can carry a significant amount of debris, which has the potential to cause blockage at structures.

Where appropriate, the FCA should demonstrate that in the event of overtopping, breach or blockage the consequences of flooding can be managed to an acceptable level. If a development site benefits from existing flood alleviation measures, the FCA should assess the impact and consequences of any breach/overtopping event. Consideration should also be given to the standard of protection provided by such measures over the whole lifetime of development. NRW breach and blockage guidance suggests that in some instances, such breach and blockage events should be considered as the 'design event' to be assessed.

NRW should be consulted for advice on breach and blockage scenarios to be assessed for flood defences and structures which may influence flooding locally. NRW most recently published breach and blockage guidance (GN 043) in March 202624. Detailed guidance on climate change allowances for planning purposes is published separately by the Welsh Government.

The Cardiff Council authority area has a number of small watercourses, often culverted to facilitate highway crossings. Blockage of these assets can cause or exacerbate flooding to a development site. This risk may not be immediately obvious from the Flood Map and may have its source some distance from a site. Developers are advised to consider all potential sources and flow paths for flooding, and to consult with the LLFA for information and guidance. The LLFA may request hydraulic modelling where there are reasonable concerns of proposed development being placed at flood risk or increasing the risk of flooding elsewhere.

9.1.3 Private flood defences

Private defences and other defences not managed by an RMA do not generate TAN-15 Defended Zones, but in some instances deliver a similarly robust standard of protection.

Where an authority has confidence in the robustness of the defence and have aspirations for development in areas benefitting from those defences, they are encouraged to use their powers as an RMA, as stated in the Flood and Water Management Act 2010, using the 'Designation of 3rd Party Assets' to take responsibility for the asset. There are no known designated assets across the Cardiff Council area. It is strongly advised that developers contact the LLFA for further information and guidance in such areas.

9.1.4 Flood defences for development

New development should not rely on construction of new flood defences; particularly those that will remain in private ownership, given the challenges of ensuring long term maintenance and renewal. However, there may be circumstances where an RMA may agree to adopt privately constructed defences if they provide a wider community benefit. However, areas will only be designated as TAN-15 Defended Zones if they meet the specific requirements of NRW and Welsh Government (See Section 9.1.1).

24 NRW GN 043 Flood risk management: modelling breach and blockage scenarios: https://cdn.cyfoethnaturiol.cymru/j35d4rha/gn-043-flood-risk-management-modelling-blockage-and-breach-scenarios-2.pdf

Development proposals are also unlikely to be approved where defences are likely in the future but not yet in place, with decision making most likely to be based on the most up to date mapping available at the time of a planning application.

Development within a flood zone will often require some form of flood mitigation, although it is essential that this is achieved without increasing flood risk to others. Flood mitigation approaches used should, wherever possible, be simple and passive, requiring little or no maintenance. Such approaches would include raising floor and ground levels, whilst recognising the need to not increase flood risk to others.

9.2 Urban Centres and Land Use – Resilience of Existing Communities

TAN-15 recognises that there may be circumstances where the planning authority may be sympathetic to changes of use, conversions and redevelopment proposals which bring benefits to an area, building or community. Potential examples include a replacement dwelling that is designed to raise the property above predicted flood levels, or a replacement industrial unit that incorporates flood resilient design measures.

TAN-15 advises the following for 'Redevelopment':

- sites within TAN-15 Defended Zone are acceptable where proposals do not over intensify use and are consistent with the acceptability considerations of Section 11 of TAN-15;
- residential proposals within Flood Zones 2 and 3 should not occur at ground floor level; and
- when considering the acceptability considerations of Section 11, the flood frequency thresholds and tolerable conditions may be applied with more flexibility, where the ability to substantially redesign a development is limited.

Across the Cardiff Council authority area, it is considered that the flexibility afforded to 'Redevelopment' opportunities within TAN-15 should not preclude the need for sustainable development which manages flood risks to an acceptable level. Future Wales: The National Plan 2040 encourages sustainable growth and efficient patterns of development and regeneration based on existing communities. Flood risks should therefore not blight existing communities, whilst also being a key consideration on the suitability and form of development in existing settlements. The TAN15 FAQs reiterates that the intent of the national planning policy is clear but cannot address every conceivable circumstance.

Consequently, Cardiff Council have provided additional guidance for redevelopment proposals and suggest the following aspects are also considered:

- Redevelopment sites in the TAN-15 Defended Zone should not over-intensify the use of a site. In considering this advice, Cardiff Council will give regard to the general intensity and nature of development in an area, along with the level of flood risk associated with the development once risk mitigation and management measures have been implemented. For example, a greater intensity of Redevelopment may be allowed in an already built-up area or where floor or ground raising results in an extremely low residual flood risk.

- TAN-15 advises that residential development should not occur on the ground floor of redevelopment proposals within Flood Zones 2 and 3. Whilst on small developments the entire curtilage of residential sites should be considered as a whole, on redevelopment sites this is rarely practical where existing buildings are to be repurposed or passive defences such as ground raising mitigates flood risks to the site. The frequency thresholds of TAN-15 Figure 5 indicate that residential development is permissible where frequency thresholds are met, and the tolerable conditions of Figure 6 indicate that access paths to Highly Vulnerable development can be considered separately. Consequently, there may be instances where ancillary development such as undercroft parking, bin/bike storage and maintenance areas (i.e. less vulnerable elements of the development) can be sited on the ground floor. In rare instances, residential ground floor development may be permitted where the frequency thresholds and tolerable conditions are met in their entirety and where ridged application of this requirement would run contrary to the LDP's placemaking objectives.

- Where redevelopment proposals propose to rely on the flexibility of the frequency thresholds and tolerable conditions to justify a development, comprehensive justification should be provided for why the ability to substantially redesign a development is limited. Where this justification is accepted, further details should be submitted with regard to how resilient and resistant design has been incorporated into the proposals. Resilient design should be considered in line with Ciria Code of Practice (further details in Section 9). Flood Response Plans should not be relied upon to justify a redevelopment site at risk of flooding but should be provided to demonstrate how proposed site users can respond safely during a flood event.

9.3 Surface Water and Small Watercourse Risk and TAN-15

Recent advances in methods, data availability, and software have delivered significant improvements in the accuracy of surface water and small watercourse flood mapping in Wales, showing a good degree of correlation to known flood events. However, as the risk mapping remains broadscale the intricacies of local topography, drainage, and small watercourse features means that the flood map for surface water and small watercourse flood risk can be prone to inaccuracies, although it is generally precautionary. Therefore, areas in the surface water and small watercourse flood zones should be carefully reviewed with knowledge of the location and limitations of the broadscale modelling approaches used. The LLFA can be an important source of knowledge in this regard.

Given the limitations in the accuracy of surface water and small watercourse flood risk and the varied nature of flooding (from sizable streams and culverts to localised depressions), the risks should be taken seriously, appropriately investigated and managed. Development should be located away from areas of surface water flood risk where possible.

Across the Cardiff Council LPA area, surface water and small watercourse flooding is a significant source of risk that should be carefully considered against development proposals.

Development proposals should be supported by an assessment of flood risk which considers small watercourses, surface water flow paths and the potential for ponding on site. In some instances, it may be possible to better define the flood zones associated with small watercourses to gain greater understanding of the baseline risk to a site, though this will not always be necessary. In such instances, evidence of hydraulic modelling and an FCA shall be required to support any application for development.

In line with the Welsh Government Sustainable Drainage (SuDS) Statutory Guidance, Cardiff Council will exercise some discretion for householder / single property applications where the risk of surface water flooding may be lower due to the nature of the development proposed and the requirements of the FCA will be proportionate to the development proposal. In cases of more than the most minor surface water flood risk the LPA and LLFA will expect planning applications to be supported by a proportionate FCA. Where the flood risk is attributed to a small watercourse, this is likely to require an assessment similar to if the flood risk were mapped as river flooding, with the requirements of Sections 10 and 11 of TAN-15 considered against the proposals.

Where flood risk is associated directly with surface water ingress to a site, the requirements of Section 10 do not apply. However, the acceptability criteria as set out in Section 11.4 of TAN-15 must still be satisfied. In line with the TAN-15 FAQs, published March 2026, Cardiff Council consider that in instances of small watercourse flooding, the frequency thresholds of Figure 5 of TAN-15 should be applied, though strict application in relation to surface water and small watercourse risk may be considered onerous in some circumstances, to be considered on a case by case basis.

Development proposals should be accompanied by a comprehensive surface water drainage strategy that demonstrates how SuDS shall be used to manage surface water flows across a development site, in line with the Statutory Standards for SuDS in Wales. Where the planning and the SAB process do not align, planning submissions should be accompanied by a Drainage Statement, in line with Section 7.6 of TAN-15. It is advisable for developers to consult with the SAB with regards to their requirements for SuDS across the Cardiff Council LPA area.

There may be instances in which developments have the potential to result in a change in surface water flow regime in the wider catchment. Such changes to flow regime may result from developments located close to the watershed, where surface water strategies propose to convey flows towards alternative catchments, for example. In any such instance, the LLFA may request an FCA to demonstrate that any such proposals shall not result in detriment or downstream capacity concerns.

The LLFA will be able to provide further advice on the requirement and scope of an FCA for surface water and small watercourse flood risk, if required. Guidance may also be published on the LLFA website.

9.3.1 Critical drainage areas

An LLFA may choose to identify areas that have particularly significant drainage and/or surface water flood risk issues. These areas will be identified as Critical Drainage Areas (CDAs). In these areas an FCA will always be required, and specific requirements or guidance may apply. At the time of this report no CDAs are identified in the Cardiff Council LPA area.

9.4 Groundwater Flood Risk and TAN-15

TAN-15 does not specify any requirements for groundwater flood risk, other than the risk of groundwater flooding should be considered as part of an FCA. However, it would be advisable to locate developments away from areas where groundwater is less than 0.025m below the ground surface, or alternatively, further groundwater monitoring and detailed assessment should be undertaken to demonstrate the risk of groundwater flooding has been mitigated.

In instances where groundwater levels may interact with development proposals, or there is considered a risk of groundwater flooding, developers are advised to engage with the LLFA to determine site specific requirements for determining and managing flood risks.

9.5 Flood Risk from Sewers and TAN-15

TAN-15 does not specify any requirements for sewer flood risk, other than that it should be considered as part of an FCA. The LLFA and DCWW should be consulted to provide specific advice on any known history of sewer flooding and any remedial action taken.

10 Development and Resilience to Flood Risk

Improving the resilience of communities at risk of flooding now and under potential climate change scenarios is a priority for planning authorities. Design considerations will be a key factor when determining whether development is acceptable in flood risk areas. The most effective solutions will combine both site-level and property-level resilience measures.

Wherever possible, development should be directed to Flood Zone 1, where there is a lower risk of flooding. Section 13.2 of TAN-15 advises that any development in Zones 2 and 3, and the TAN-15 Defended Zones, must have resilience to flooding built in at site and property level

Section 13.6 of TAN-15 guides assessments to industry-standard advice on incorporating resistance and resilience into development through design. Advice on incorporating resistance and resilience into development through design is available from the Construction Industry Research and Information Association (CIRIA), including a Code of Practice and Guidance for Property Flood Resilience. The code of practice sets out recommendations for mitigation in categories defined as: realignment, resistance, resilience and response.

Potential measures to reduce and manage flood risk on a site, in line with these Codes of Practice are outlined below. It should be recognised that even with such measures it will not be possible to develop all sites in compliance with TAN-15 and the Acceptability Criteria.

10.1 Realignment

Realignment explores opportunities to reorient the flood receptor (i.e. the proposed development) and amend the flood pathways.

10.1.1 Site level flood risk mitigation

Flood risk from all sources should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development. Site level resistance and resilience measures should have the twin aim of reducing the amount of flood water that can enter the site and effectively managing any water that does reach the site, so it does not impact on households and other occupiers/users.

Flood mitigation and resilience can involve the use of blue and green infrastructure and SuDS to deliver wider benefits alongside flood mitigation such as water quality, amenity and biodiversity.

10.1.2 Sequential Approach to Site Layout

A sequential, risk-based approach should be applied to try and locate more vulnerable development uses away from flood zones to higher ground, while more flood compatible development (e.g. landscaping, recreational space) is located in higher risk areas. However, water compatible or less vulnerable uses in floodplains should consider the

nature of the development, flood depths and hazard, including evacuation procedures and flood warning. The nature of risk to water quality may also need to be considered and mitigated in some cases; particularly within parking areas where there is the potential for accumulated hydrocarbons and other vehicle related pollutants to be released to the aquatic environment.

Waterside areas, or areas along known flow routes, can be incorporated into the masterplan as multi-functional green infrastructure. These areas could be used for recreation, amenity and environmental purposes, allowing the preservation of flow routes and flood storage, and at the same time providing valuable social and environmental benefits contributing to other sustainability objectives. Landscaping should ensure safe access to higher ground from these areas and avoid the creation of isolated islands as water levels rise.

10.1.3 Modification of ground levels

Modifying ground levels to raise the land above the required flood level is an effective way of reducing flood risk to a particular site in circumstances where the land does not act as conveyance for flood waters. However, care must be taken at locations where raising ground levels could adversely affect existing communities and property as this can result in significant changes to how flood water moves around the site, introducing flood risk to areas that were not at flood risk previously. Where ground levels are modified, mitigation measures must be considered to stop the introduction of new flood risk or off-site effects.

In most areas at risk of river flooding, raising land above the floodplain would reduce or alter conveyance or flood storage in the floodplain and would likely impact flood risk downstream or on neighbouring land. Compensatory flood storage should be provided, and would normally be on a level for level, volume for volume basis on land that does not currently flood but is adjacent to the floodplain (in order for it to fill and drain). It should be in the vicinity of the site and ideally within the red line of the planning application boundary.

Compensatory flood storage may not be required for tidal inundation given the effectively infinite volume of the sea. However, it must be demonstrated that the flooding from the sea is not affected by volume or conveyance changes, and this may require hydraulic modelling.

10.1.4 Redirect Flow Pathway and Introduction of Buffer strips

To mitigate the risk of flooding on a proposed development site, opportunities to realign the flood receptor (i.e. the proposed development) and realign the flood pathways could be sought. These could include:

- Redirecting flow pathways
- Changing ground levels
- Using SuDS to manage surface water flows on the site

Opportunities to incorporate these measures into the site should be explored during the site design stage and identified within a site specific FCA. This should be supported by hydraulic modelling, where appropriate.

The provision of a buffer strip to 'make space for water' allows additional capacity to accommodate climate change and ensure access to the watercourse, structures, and defences is maintained for future maintenance purposes. Retaining a watercourse within open space is the preferred approach as it removes the responsibility from property owners to maintain (physically and financially) riverbanks. It also enables the avoidance of disturbing riverbanks, adversely impacting ecology and the need to provide engineered riverbank protection. Building adjacent to riverbanks can also cause problems to the structural integrity of the riverbanks and the building itself, making future maintenance of the watercourse much more difficult.

It is recommended that an undeveloped buffer strip alongside Main Rivers and ordinary watercourses is provided for maintenance/access purposes, and that developers explore opportunities for riverside restoration or public open space as part of any development.

A flood risk activity permit may be required for all works:

- On or near a Main River
- On or near a flood defence structure
- On or near a sea defence
- In a floodplain

Further guidance on obtaining a flood risk activity permit and activities requiring a flood risk activity permit are available from the NRW website[25].

Ordinary watercourse consent and/or land drainage consent may be required for ordinary watercourses.

10.1.5 Raised floor levels

When designing the layout for a development, consideration should be given to the potential effects of flood risk and great care must be taken so that development is safe and there are no adverse effects elsewhere, including to existing land, property, or people. In areas potentially at risk from surface water flooding particular attention should be given to proposed ground levels, drainage design, and provisions for exceedance flows.

Where there is a residual risk of flooding (from any source) to properties within a development, the measures to address the effects would normally include raising internal floor levels above the minimum level specified by the building regulations so that potential risks are addressed. The raising of internal floor levels and threshold levels within a development reduces the risk of damage occurring to the interior, furnishings, and electrics in times of flood.

25 https://naturalresources.wales/permits-and-permissions/flood-risk-activity-permits/environmental-permits-for-flood-risk-activities/?lang=en

Section 11 of TAN-15 provides guidance on the frequency thresholds in which development must be flood free and the tolerable conditions for extreme flood events. It is advisable that the floor levels of development which is proposed within an area at risk of all sources of flooding should be set based on these requirements.

The additional height that the floor level is raised above the maximum water level is referred to as the 'freeboard'. Additional freeboard may be required because of risks relating to blockages to the channel, culverts, or bridges or climate change. For example, TAN-15, and the Welsh Government Climate Change Guidance, advises that an assessment of risk should be undertaken using the upper end estimate of climate change (alongside the central estimate) to inform mitigation measures to ensure the long-term resilience of developments.

Single storey buildings such as ground floor flats or bungalows are especially vulnerable to rapid rise of water (such as that experienced during a breach). Figure 6 within TAN-15 displays the tolerable conditions in an extreme flood event (0.1% AEP), below which development may be acceptable. This risk can be reduced by use of multiple storey construction and raised areas that provide an escape route. However, access and egress can still be an issue, particularly when flood duration covers many hours or days. Similarly, the use of basements in areas at risk of flooding should be avoided.

10.1.6 Restrict Use of the Building

When determining where development should be placed, it is essential to identify the vulnerability of a development and to attempt to locate more vulnerable development uses away from areas at risk of flooding.

A sequential approach to site masterplanning can therefore be beneficial to locate more vulnerable land uses away from flood risk areas. However, in instances such as re-use of an existing building, such measures may not be as easily identifiable. For redevelopment opportunities within flood risk areas where the ability to substantially redesign a development is limited, it is likely to be most practicable to place all more vulnerable aspects of the development on the upper storeys, retaining less vulnerable or ancillary development to the ground floor.

Section 10 of TAN-15 notes that where proposals for redevelopment in Flood Zones 2 and 3 include residential use, local authorities should ensure that there is no residential use on the ground floor and therefore development is restricted to less vulnerable uses. Section 9.2 of this report sets out Cardiff Councils considerations for the flexibility afforded to 'Redevelopment' opportunities within TAN-15, with particular regard to the siting of residential development on the ground floor of redevelopment proposals within Flood Zones 2 and 3. Further clarity to this stance has been provided by the TAN-15 FAQs published by Welsh Government in March 2026, which highlights that whilst the intent of national policy is clear, it cannot address every conceivable circumstance. Consequently, in rare instances, residential ground floor development may be permitted where ridged application of this requirement would run contrary to the LDP's placemaking objectives. Such instances shall be considered on a case by case basis and will likely be subject to requirements for

appropriate property level resilience measures to be incorporated into development proposals.

New development proposals for emergency services must avoid flood risk areas. Local authority and emergency services command centres and hubs for the emergency services should be designed to be flood free during any 0.1% event including an allowance for climate change and therefore located solely in Flood Zone 1. Whilst TAN-15 offers some flexibility for redevelopment opportunities, consideration should be given to the scale and nature of the proposals and their suitability in areas of flood risk.

10.1.7 Surface Water Management

Suitable surface water management measures should be incorporated into new development designs in order to reduce and manage surface water flood risk to, and posed by, the proposed development. This should be achieved by incorporating SuDS. SuDS are typically softer engineering solutions inspired by natural drainage processes such as ponds and swales which manage water as close to its source as possible.

The integration of SuDS into developments is an opportunity to achieve multiple positive outcomes by combining crucial drainage and flood defence assets with green infrastructure and high-quality public realm. All new developments in Wales are now required to include Sustainable Drainage Systems which comply with National Statutory SuDS Standards. Developers must gain approval for their drainage from a SuDS Approval Body (SAB) before construction can begin. Further guidance on SuDS is available from the Welsh Government[26] website and published by NRW[27].

10.2 Resistance and Resilience

Property Flood Resilience (PFR) measures can be used to reduce the impact of flooding to a development where traditional flood defence schemes are not a viable option. PFR takes two forms, resistance and resilience measures. Resistance measures focus on trying to keep water out of a property using door barriers, flood doors, automatic airbricks, pumps and non-return valves. It is acknowledged that these measures do have a seepage allowance and so a small volume of water is still likely to enter a property with PFR measures.

Resilience measures focus on accepting that water will enter the property and looks at ways to quickly return the property back to normal after a flood. This can include raising white goods and boilers above floor level, raising kitchen units and electric sockets, and using tiles for flooring instead of carpets.

Property Flood Resilience measures may be acceptable as a form of mitigation, but only if the development meets the criteria set out in TAN-15. It is unlikely that any application shall

26 https://www.gov.wales/sites/default/files/publications/2026-03/sustainable-drainage-suds-statutory-guidance.pdf

27 https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/advice-for-developers/sustainable-drainage-systems-suds/?lang=en

be approved based on the addition of PFR as the sole means of flood mitigation to a site comprising 'new development'. It may, however, be a consideration in instances of 'redevelopment'.

Further information on PFR can be found on the BeFloodReady[28] website and the National Flood Forum[29]. Flood resistance measures should be adopted in accordance with the CIRIA Property Flood Resilience Code of Practice[30].

10.3 Flood Response Planning

Flood response planning is essential for managing flood related incidents. From a flood risk perspective, flood response planning can be broadly split into three phases: before, during, and after a flood. These measures involve developing and maintaining arrangements to reduce, control or mitigate the impact and consequences of flooding and to improve the ability of people and property to absorb, respond to, and recover from flooding. TAN-15 (Section 5.6) states that development plans must be based on a sound understanding of the emergency services' ability to respond to flooding, therefore the views of key stakeholders such as Emergency Planning teams and the emergency services should be sought at this stage.

Safety is a key consideration for any development and includes residual risk of flooding, the availability of adequate flood warning systems for the development, safe access and egress routes, and evacuation procedures.

10.3.1 Access and egress

TAN-15 requires that safe access and egress is available to and from the development in all modelled scenarios. This should consider all sources of flood risk, including surface water. As a minimum, safe access and egress routes should comply with the tolerable conditions of TAN-15 Figure 6, though TAN-15 acknowledges that flexibility can be applied to these conditions for Redevelopment proposals.

For any development where there is a flood risk to the development or the associated highways, a Flood Response Plan (Section 11 of TAN-15) may be required to inform site occupants of a safe access and egress route to and from the site. Such requirements shall be considered on a case-by-case basis, and early engagement with the LLFA is encouraged.

10.3.2 Flood Response Plans

Section 11.4 of TAN-15 identifies the acceptability criteria which developers and planning authorities should ensure are met. Within this criteria, it identifies that flood emergency

28 https://www.befloodready.uk/
29 National Flood Forum
30 https://www.ciria.org/CIRIA/Resources/Free_publications/CoP_for_PFR_resource.aspx

plans and procedures should be in place. This should be applied to all sources of flooding (river, sea and surface water flooding).

A Flood Response Plan should be created for any development where there is a flood risk to the development itself or the surrounding highways. The plan should detail the flood risk to the development, the actions occupants of the site should take before, during, and after flooding and the safe access and egress routes available during a flood under all conditions.

The plan should always favour a proactive rather than reactive approach; i.e. if buildings on the site are at risk of flooding occupants should have already left their properties before flood water enters.

The plan should be easy to follow giving clear instructions on what actions should be taken before, during, and after a flood.

Flood Response Plans should be considered in line with the Association of Directors of Environment, Economy, Planning and Transport (ADEPT) guidance on flood risk emergency plans for new developments[31]. Flood Response Plans should be communicated to all future residents and users of a site, and regularly tested and revised to ensure familiarity in the event of a flood.

10.3.3 Flood Alerts and Warnings

NRW operates a Flood Warning Service[32] for some areas deemed to be at risk of flooding from rivers and seas and does not cover other sources of risk. This service covers approximately 60% of properties at risk from these sources of flood risk across Wales, and NRW is continually working to extend this service. These warnings have been designed to give the public advance notice of flooding. Each flood alert and warning area is assigned an individual code to allow NRW to make flood alerts and warnings specific to areas at risk. The NRW FRAW mapping[33] can be used to show the specific codes that cover a potential development site.

A summary of the coverage of flood warning and alert areas covering the Study Area is provided below in
Table 10-1 and Table 10-2.

31 ADEPT Flood Response Plan Guidance: https://www.adeptnet.org.uk/documents/adeptea-flood-risk-emergency-plans-new-development

32 https://naturalresources.wales/flooding/preparing-for-a-flood/?lang=en

33 https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood_Risk/viewers/Flood_Risk/virtualdirectory/Resources/Config/Default&layerTheme=0

Table 10-1 Flood Warning Areas in Cardiff

Flood Warning Area name	Urban areas within the Flood Warning Area
Coast at the Wentlooge Levels in the Cardiff Area	Rumney, Trowbridge and St Mellons
River Ely at Ely Bridge	Ely
River Ely at Ely in Cardiff	Ely, Fairwater, Victoria Park, Leckwith and Grangetown
River Ely at St. Fagans	St Fagans
River Rhymney at Industrial area near Rumney Bridge	Pengam and Roath
River Rhymney at Llanrumney	Llanrumney
River Taff at Cardiff City	City centre, Canton, Poncanna, Riverside, Grangetown, Butetown
River Taff at Forest Farm and Melingriffith	Forest Farm and Melingriffith
River Taff at Longwood Drive Industrial Estate	Forest Farm
River Taff at Pontcanna Fields, Cardiff	Pontcanna and Gabalfa
River Taff at Radyr Court Road, Cardiff	Llandaff North and Gabalfa
River Taff at Taffs Well and Industrial Areas of Gwaelod y Garth	Morganstown and Taffs Well
Tidal Rhymney at Industrial area near Rumney Bridge, including Roath	Pengam, Rumney and Roath

Table 10-2 Flood Alert Areas in Cardiff

Flood Alert Area name	Urban areas within the Flood Alert Area
Coast from Aberthaw to Severn Bridge	Butetown, City Centre, Adamsdown, Pengam Moors, Rumney, Trowbridge, St Mellons
River Ely	St Fagans, Fairwater, Victoria Park, Ely, Leckwith, Grangetown
River Rhymney	Llanrumney, Pentwyn, Pengam, Roath

Flood Alert Area name	Urban areas within the Flood Alert Area
River Taff	Taffs Well, Morganstown, Forest Farm, Llandaff, Rhiwbina, Whitchurch, Gabalfa, Pontcanna, Riverside, City centre, Grangetown

A requirement of TAN-15 is that for proposed developments that are at risk of flooding, effective warning is provided. Therefore, occupants of these sites should be encouraged to sign up and receive Flood Alerts, Flood Warnings, and Severe Flood Warnings if available. If a flood event is forecast, alerts and warnings are issues by landline, mobile, text, or email using a set of four easily recognisable codes, as shown in Table 10-3. Generic advice and examples of actions to be taken on receipt of the alert or warning are also shown in Table 10-3. Using these warnings, along with local knowledge, site occupants are able to take effective action, to reduce the consequences of flooding.

To identify when heavy rain is forecasted, which could result in surface water flooding, the Met Office National Severe Weather Warning Service can be used[34].

34 https://weather.metoffice.gov.uk/warnings-and-advice/seasonal-advice/when-and-why-do-we-issue-warnings

Table 10-3 Flood codes and meanings

Flood code	What it means	What to do
 Flood Alert	Flooding is possible, be prepared	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.
 Flood Warning	Flooding is expected, immediate action is required	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.
 Severe Flood Warning	Severe flooding and danger to life	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.
Warning no longer in force	Warning has been removed in the last 24 hours	Be careful. Floodwater may still be around for several days and could be contaminated If you've been flooded, ring your insurance company as soon as possible.

More information on how to register for flood alerts and warnings is available from the NRW website at: https://naturalresources.wales/flooding/sign-up-to-receive-flood-warnings

Alternatively, occupants can register by calling the 24-hour Floodline on: 0345 988 1188

It should be noted that the flood warning service is continually reviewed. It is recommended that site occupants check annually that they are signed up to receive the correct warnings by checking the website above.

11 Working With Natural Processes and Natural Flood Management

It should be noted that there are several terms for measures involving natural solutions to managing flood and coastal erosion risk, for clarity these are:

1. Nature Based Solutions (NBS) – broad terms referring to the sustainable management and use of natural features to tackle socio-environmental challenges.
2. Working With Natural Processes (WWNP)– terms for reducing flood and coastal erosion risk through implementing measures to protect, restore and emulate the natural functions of catchments, floodplains, rivers and the coast.
3. Natural Flood Management (NFM) – Use of natural processes to reduce the risk of flooding and coastal erosion.

This SFCA will focus on specific measures that can be used to manage flood risk and will refer to the use of WWNP and NFM across Cardiff. This section will provide an overview of different WWNP/ NFM measures that can be implemented and will provide a review of the WWNP mapping to understand the potential for using these techniques.

WWNP aims to protect, restore and emulate the natural functions of catchments, floodplains, rivers, and the coast. NRW has worked in partnership with the Welsh Government, Department for Environmental Food & Rural Affairs (DEFRA) and other public bodies to build an evidence base[35] setting out the current state of evidence for WWNP and outlining the effectiveness of different measures with regard to managing flood risk and delivering other benefits. Further research has been undertaken since the publication of this evidence report, leading to the development of knowledge and understanding around WWNP.

Nature-based solutions, such as NFM, are part of WWNP and can be used to retain water and attenuate flows that can otherwise contribute to flooding. Installation of temporary detention features, such as leaky dams and large woody debris in watercourses, across a catchment can help mitigate flood risk and improve the capability of the catchment to manage more extreme events.

NFM techniques can also involve restoring floodplains and river channels to a more natural state, and retaining water in catchment headlands. These techniques often deliver multiple benefits such as habitat creation and improving water quality, making them sustainable solutions. Reference should be made to the CIRIA Natural Flood Management Manual (C802F)[36]. NFM techniques can include:

35 https://www.gov.uk/flo.ciria.org/ItemDetail?iProductCode=C802F&Category=FREEPUBS&WebsiteKey=a054c7b1-c241-4dd4-9ec1-38afd4a55683

36 https://www.ciria.org/ItemDetail?iProductCode=C802F&Category=FREEPUBS&WebsiteKe

- Floodplain restoration and reconnection
- Re-naturalising rivers and removing redundant in-channel structures
- Installing run-off attenuation features such as large woody debris and leaky dams
- Planting riparian or catchment woodlands
- Land and soil management measures
- Restoring moorland, peatland, and woodland habitats in the headwaters
- Restoration and management of sand dunes, saltmarshes and mudflats

Examples of WWNP and NFM which can be implemented are provided in Table 11-1.

Table 11-1 Examples of WWNP and NFM[37]

	
Leaky dam	Riparian woodlands
	
River restoration	Floodplain storage

y=a054c7b1-c241-4dd4-9ec1-38afd4a55683

37 https://assets.publishing.service.gov.uk/media/6036c730d3bf7f0aac939a47/Working_with_natural_processes_one_page_summaries.pdf

11.1 Working with Natural Processes in Wales

Policy 8 of Future Wales – the National Plan 2040 demonstrates the Welsh Government's support for nature-based solutions. The National FCERM Strategy for Wales[38] emphasises the use of NFM and WWNP as a sustainable, catchment based approach to managing flood risk in a more sustainable way.

TAN-15 also acknowledges that natural flood and water management schemes can provide opportunities to slow and store water, along with appropriate land management. It recognises that this will become increasingly important with regard to the impacts of climate change and that options such as managed coastal realignment and floodplain restoration can contribute to the sustainable management of natural resources, mitigate future flood risk, and protect and enhance natural heritage.

The Minister for Environmental and Rural Affairs announced in a statement of 24 January 2025 that following the NFM Pilot Programme (2020-2023) and the subsequent NFM Accelerator (2023-2025), Welsh Government have secured £2m capital funding for an additional 12 months, with future funding still being explored[39]. Welsh Government aims to further accelerate the delivery of NFM by continuing to offer 100% funding for the delivery of NFM schemes within this programme.

Applications for funding for schemes up to £300,000[40] can be submitted through the Welsh Government website[41] for funding between March 2026 to March 2027.

11.2 Working with Natural Processes for new development

Developments can provide opportunities to work with natural processes of catchments, floodplains, rivers, and the coast to reduce flood and erosion risk, benefit the natural environment, and reduce the costs of schemes. Natural flood management requires integrated catchment management and involves those who use and shape the land. It also requires partnership working with neighbouring authorities, organisations and water management bodies.

It should be acknowledged that the use of NFM/WWNP techniques in isolation are unlikely to fundamentally alter a flood risk at a given site. However, when implemented on a catchment scale NFM/WWNP may be effective in combination with other measures.

38 https://gov.wales/national-strategy-flood-and-coastal-erosion-risk-management-wales

39 https://www.gov.wales/natural-flood-management-guidance-undertake-natural-flood-management-works-html

40 Schemes over £300,000 may still be eligible but Welsh Government FCERM branch should be contacted first to discuss whether these could be classed as exceptions

41 https://www.gov.wales/natural-flood-management-guidance-undertake-natural-flood-management-works-html#120594

Local Authorities can set their own local policies on the use of nature based solutions; this could be done through an LDP or through the Local Flood Risk Management Strategy.

Conventional flood prevention schemes may be preferred, but consideration of 're-naturalising' rivers and land upstream could provide cost efficiencies as well as considering multiple sources of flood risk; for example, reducing peak flows upstream such as through felling trees into streams or building earth banks to capture run-off, could be cheaper and smaller-scale measures than implementing flood walls for example. It should be noted that in some locations traditional flood defence schemes may be required where conventional schemes are most appropriate; however, WWNP can and should complement conventional schemes where possible.

11.3 Working with Natural Processes Opportunity Mapping

As part of the WWNP evidence base, opportunity mapping[42] has been developed to help identify opportunities for WWNP and NFM. The maps are intended to be used alongside the Working with Natural Processes Evidence Directory to help RMAs, developers, and planners think about the types of measures that may work best and potentially the best place to locate them. These maps require further work and development; however, initially they can be used as a starting point for consideration towards WWNP opportunities.

The maps cover a range of different WWNP measures, including:

- Floodplain reconnection
- Run-off attenuation and gully blocking
- Woodland planting covering, floodplain planting, riparian planting, and wider catchment woodland

The WWNP maps are based entirely on open data and highlight the potential for WWNP derived from national river, sea, and surface water flood risk NRW datasets. As such, further work and studies would still be required to support the use of NFM at a particular location and the understanding of WWNP potential should be supplemented by local knowledge. The maps also do not cover all measures for working with natural processes, and users may wish to refer to other relevant information sources when identifying areas of opportunity.

11.3.1 Using the Working with Natural Processes opportunity mapping

Floodplain reconnection map

The floodplain reconnection map identifies areas of the floodplain that have become disconnected from their river and are no longer capable of, or have a reduced ability to, store water during times of flood. Areas suitable for floodplain reconnection tend to be rural areas at low risk of flooding (using the NRW FRAW Risk of Flooding from Rivers and Seas map) close to a watercourse.

42 http://wwnp.jbahosting.com/BrowserUnsupported.aspx

Run-off attenuation features and gully blocking map

The run-off attenuation features map identifies areas where surface water naturally flows or accumulates and could help identify locations to temporarily hold back and intercept the flow using soft engineering approaches.

The run-off attenuation feature locations identified on the mapping are based on the premise that areas of high flow accumulation in the Surface Water Flooding maps (from NRW mapping) are areas where the run-off hydrograph may be influenced by temporary storage (if designed correctly).

The gully blocking potential is based on run-off attenuation features on steeper ground with a gradient >6%. These are areas where leaky barriers may be more beneficial than a deepened pond, raised bund, or grip blocking.

11.3.2 Tree Planting

Catchment woodland can intercept, slow, store, and filter water. This can help reduce flood peaks, flood flows (from 3% to 70%) and flood frequency.

Interventions involving tree planting seek to:

- Slow overland flow through the development of rougher ground surfaces
- Largely eliminate overland flow through enhanced infiltration rates via increased topsoil permeability and enhanced soil drying from enhanced evapotranspiration
- Remove water from the streamflow generating system via enhanced wet canopy evaporation ('interception loss') and enhanced transpiration.

11.3.3 Areas of working with Natural Processes in Cardiff

Maps showing the WWNP is provided in Appendix A. It should be noted that the mapping is broadscale therefore it should be used as a guide for areas where WWNP may be possible. Due to the broadscale nature of the mapping not all areas identified may be suitable for use with WWNP, i.e. there is an existing development in the area.

The maps show very small, localised areas across Cardiff are suitable for runoff attenuation features during the 1% AEP flood event.

Areas suitable for Riparian Woodland Planting Potential are present across the outskirts of Cardiff, particularly around the River Ely in Michaelston-super-Ely and Ely, as well as the River Taff in Radyr and Pontcanna. Other areas include around the Roath Brook in the Roath Recreational Gardens and the River Rhymney at Llanrumney and Pengam.

The majority of the rural areas on the outskirts of Cardiff, across the majority of catchments of the principal watercourses, have been identified as being suitable for wider catchment woodland planting.

Areas identified as suitable for Floodplain Woodland Planting Potential are present around various stretches of the River Ely, River Taff, River Rhymney and the Roath Brook.

11.4 Ongoing NFM schemes

The Welsh Government and Natural Resources Wales are in the process of delivering a restoration project to restore the Nant Dowlais, a tributary of the River Ely in the west of the authority area. The stream has suffered from pollution, low fish populations, and historic straightening resulting in erosion. The scheme involves reconnecting the river to its historic channel and floodplain, restoring natural bends, and improving habitats for salmon, eels, and trout. It also includes new fencing, cattle drinking bay, and a replacement bridge to improve upstream connectivity.

There are no known further NFM schemes across Cardiff at this time.

12 Summary

This SFCA has been undertaken to inform the Cardiff Council Replacement LDP (2021 – 2036) and aims to enhance the understanding of flood risk, as well as inform the development of policies to support land allocation decisions.

The SFCA has been carried out in accordance with the Welsh Government's development planning guidance, Planning Policy Wales Edition 12 (PPW), Technical Advice Note 15: Development, Flooding and Coastal Erosion (TAN-15) (2025), and Welsh Government Flood Consequences Assessment (FCA) Climate Change allowances. The requirements of TAN-15 are outlined in this report and supplemented where appropriate with locally specific requirements and guidance.

The report provides a summary of the risk of flooding from all sources, identifying that flooding from rivers, tidal and surface water, as well as small watercourse flooding, pose the most significant risk to the LPA area. The identification of the risk of an increase in tidal flooding has also been undertaken.

Further guidance has been provided on the requirements of FCAs as well as methods to identify ways of mitigating flood risk where appropriate and identify opportunities to slow and store water through utilising WWNP/NFM techniques.

This report also provides an overview of policy and guidance for planners, developers, and other stakeholders. Recommendations for local approaches to flood risk have been made throughout the report, which will inform the development of the Replacement LDP policies and land allocation decisions.

A Flood Risk Mapping

B Flood Risk Appraisal

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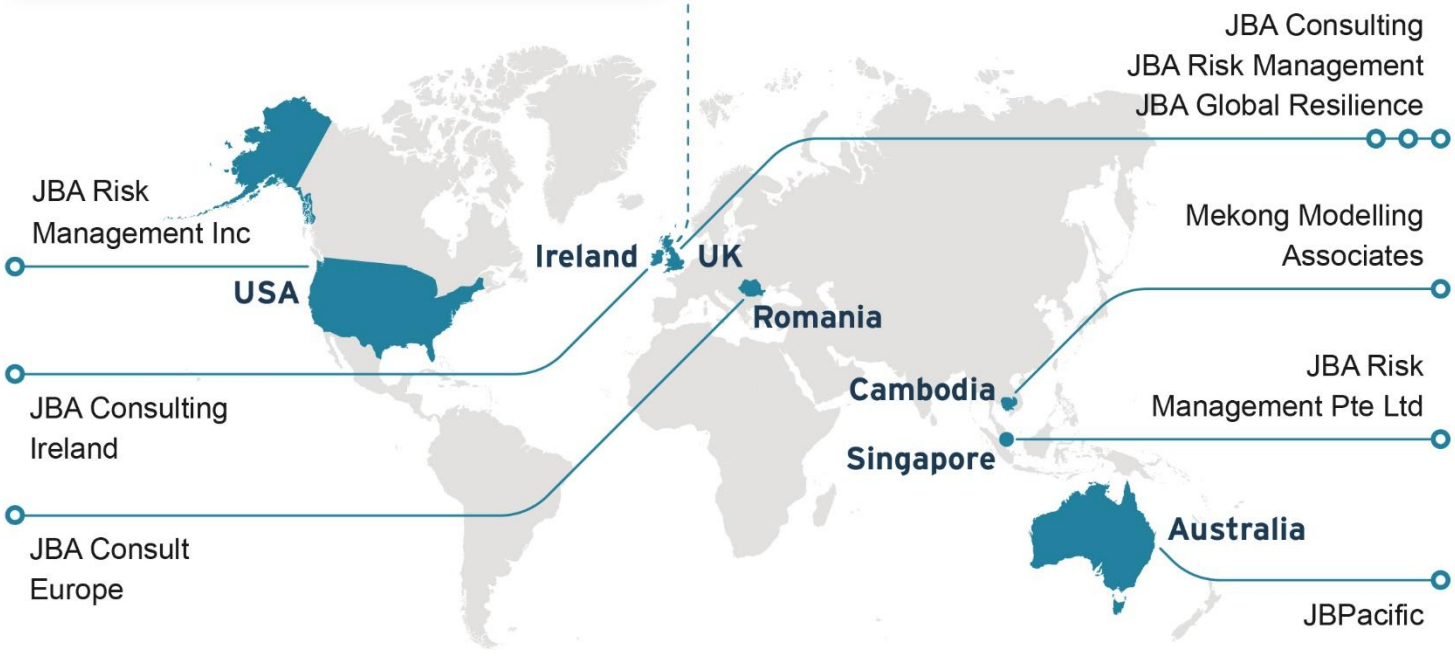

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