South East Wales - Strategic Flood Consequence Assessment (Stage 1)

Final Report

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Contract

This report describes work commissioned by Lindsay Christion of Newport City Council, on behalf of all planning authorities in South East Wales, by a contract dated 18 October 2021. Clare Burnell, Hannah Booth, Peter Rook and Faye Tomalin of JBA Consulting carried out this work.

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Purpose

This document has been prepared as a Draft Report for the Councils (listed under acknowledgements). JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to the Councils.

Acknowledgements

JBA would like to acknowledge LPA and LLFA staff from the Local Planning Authorities listed below:

- Blaenau Gwent County Borough Council,
- Bridgend County Borough Council,
- Caerphilly County Borough Council,
- Cardiff Council,
- Merthyr Tydfil County Borough Council,
- Monmouthshire County Council,
- Newport City Council,
- Rhondda Cynon Taf County Borough Council,
- Torfaen County Borough Council,
- Vale of Glamorgan Council, and
- Brecon Beacons National Park Authority.

We would also like to thank Dŵr Cymru Welsh Water, Natural Resources Wales and the Welsh Government for their input into the SFCA.

Carbon Footprint

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Executive Summary

Project background

This Stage 1 Strategic Flood Consequence Assessment (SFCA) has been commissioned by a group of eleven Local Planning Authorities (the Councils) in South East Wales including:

- Newport City Council,
- Blaenau Gwent County Borough Council,
- Bridgend County Borough Council,
- Caerphilly County Borough Council,
- Cardiff Council,
- Merthyr Tydfil County Borough Council,
- Monmouthshire County Council,
- Rhondda Cynon Taf County Borough Council,
- Torfaen County Borough Council,
- Vale of Glamorgan Council, and
- Brecon beacons National Park Authority.

Typically, SFCAs are completed in three stages, with an increasing level of detail required in the analysis at each stage.

This Stage 1 SFCA is a desk-based study which collates existing information to undertake a broad assessment of potential flood risks across the entire study area from all sources of flooding. The study identifies areas at potential high risk from flooding as well as providing details of historical flood events and any details of any flood risk management structures or procedures present.

The SFCA also provides information on the opportunities to slow and store water as part of natural flood management schemes as well as guidance on implementing TAN-15 and managing flood risk in a development site.

Study area

South East Wales includes some of the main urban areas in Wales and is home to Wales's capital city, Cardiff. The area has a rich industrial history from mining in the South Wales valleys, exporting 13 million tons of coal at its peak in the 1880's, to the steel works in Newport and Cardiff docks. This industrial past of South Wales has shaped the landscape, influencing the location of settlements, channels of watercourses and location of vegetation across the area.

In the context of this report South East Wales covers approximately 2,800km² and stretches from Chepstow where it is bound to the east by the River Wye and River Monnow, along the South Wales coastline until Pyle where it is bound to the west by the River Kenfig. The Brecon Beacons National Park largely forms the northern boundary of the Local Authorities in South East Wales

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. Regional documents such as Shoreline Management Plans and Catchment Flood

Management Plans have also been reviewed to understand specific flood risk and coastal erosion policies in the region.

TAN15 and flood risk policy has also been reviewed and outlined with regard to flood risk in this section.

Flood risk

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. 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.

A review of flood risk has been undertaken from all sources of flooding in each of the ten Local Authority areas. This assessment should be used in conjunction with the mapping appendices in order to understand flood risk at a strategic scale.

Further TAN15 guidance

On the direction of the Minister for Climate Change, provided in guidance accompanying the decision notice to delay its implementation, this SFCA has been prepared in accordance with the updated TAN-15 due to be implemented from June 2023. Further clarifications and advice has subsequently been issued by Welsh Government and NRW. The following Chapter seeks to capture the latest advice and understanding of the new TAN-15. Additionally, guidance is provided on how LPA's within the region intend to interpret and apply the new TAN-15.

The guidance and recommendations within this chapter is based on the following:

- Ministerial letter; 23rd November 2021. Announcement of the suspension of the new TAN-15 to 1st June 2023.
- Chief Planner letter; 15th December 2021. Advice to LPA's on the suspension of TAN-15, key implications and actions for LPA's.
- Various consultations with WG and NRW during the preparation of the SFCA.

Requirements for Flood Consequences Assessment

Site-specific FCA's are carried out by (or on behalf of) developers to assess the risk and consequences of flooding to a proposed development site and the risk and consequences of that development to third party land. Advice on preparing an FCA has been provided as part of this report.

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 damage resistant measures to ensure the consequences of flooding are acceptable. Any new development in Zones 2 and 3 and the TAN-15 Defended Zones must have resilience to flooding built-in at site and property level. Where possible, development should still be directed to Flood Zone 1 (where there is a lower risk of flooding). Highly vulnerable development in Flood Zone 3 is not considered to be acceptable due to the associated consequences of flooding, and planning applications must not be proposed.

Flood response planning is one option to help manage 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.

Advice and guidance on Working with Natural Processes and Natural Flood Management has also been prepared.

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Abbreviations

	Definition
AEP	Annual Exceedance Probability - the chance of an event with a particular magnitude occurring in each and every year
AOD	Above Ordnance Datum
AONB	Area of Natural Beauty
CFMP	Catchment Flood Management Plan
CIL	Community Infrastructure Levy
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
FAA	Flood Alert Area
FCA	Flood Consequence Assessment
FCERM	Flood and Coastal Erosion Risk Management
FMfP	Flood Map for Planning
FRAW	Flood Risk Assessment Wales
FRMP	Flood Risk Management Plan
FSA	Flood Storage Area
FWMA	Flood and Water Management Act
FWA	Flood Warning Area
FWS	Flood Warning Service
GI	Green Infrastructure
JBA	Jeremy Benn Associates
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority - Local Authority responsible for taking the lead on local flood risk management
LPA	Local Planning Authority
Main River	A watercourse shown as such on the Main River Map, and for which NRW has responsibilities and powers
NFF	National Flood Forum
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NRD	National Receptor Database
NRIM	National Reservoir Inundation Mapping
NVZ	Nitrate Vulnerable Zones
Ordinary Watercourse	All watercourses that are not designated Main River. Local Authorities or, where they exist, IDBs have similar permissive powers as Natural Resources Wales in relation to flood defence work. However, the riparian owner has the responsibility of maintenance.
PFRA	Preliminary Flood Risk Assessment

	Definition
PPW	Planning Policy Wales
RBMP	River Basin Management Plan
SAB	SuDS Approval Body
SFCA	Strategic Flood Consequence Assessment
SMP	Shoreline Management Plan
SuDS	Sustainable Drainage Systems
TAN15	Technical Advisory Note 15 - Guidance for local planning authorities to reduce flood risk and develop away from high risk areas.
WFD	Water Framework Directive
WWNP	Working With Natural Processes

1 Introduction

1.1 Project Overview

1. This Stage 1 Strategic Flood Consequence Assessment (SFCA) has been commissioned by a group of ten Local Planning Authorities (the Councils) in South East Wales including:

   - Newport City Council,
   - Blaenau Gwent County Borough Council,
   - Bridgend County Borough Council,
   - Caerphilly County Borough Council,
   - Cardiff Council,
   - Merthyr Tydfil County Borough Council.
   - Monmouthshire County Council,
   - Rhondda Cynon Taf County Borough Council,
   - Torfaen County Borough Council, and
   - Vale of Glamorgan Council

2. The SFCA also covers areas where the Brecon Beacons National Park Authority is the Local Planning Authority. As these areas fall within existing Local Authority boundaries these are not covered separately.

3. This SFCA provides a robust evidence-base to inform the Councils individual Local Development Plans (LDP) and will inform the development of LDP policies and land allocation decisions. The SFCA has been carried out in accordance with the Welsh Government's development planning guidance, Planning Policy Wales (PPW), Technical Advice Note 15: Development, flooding and coastal erosion (TAN-15) and associated Welsh Government Chief Planning Officers letters and Welsh Government FCA Climate Change allowances.

1.2 Stages of SFCA's

4. 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.

5. 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:

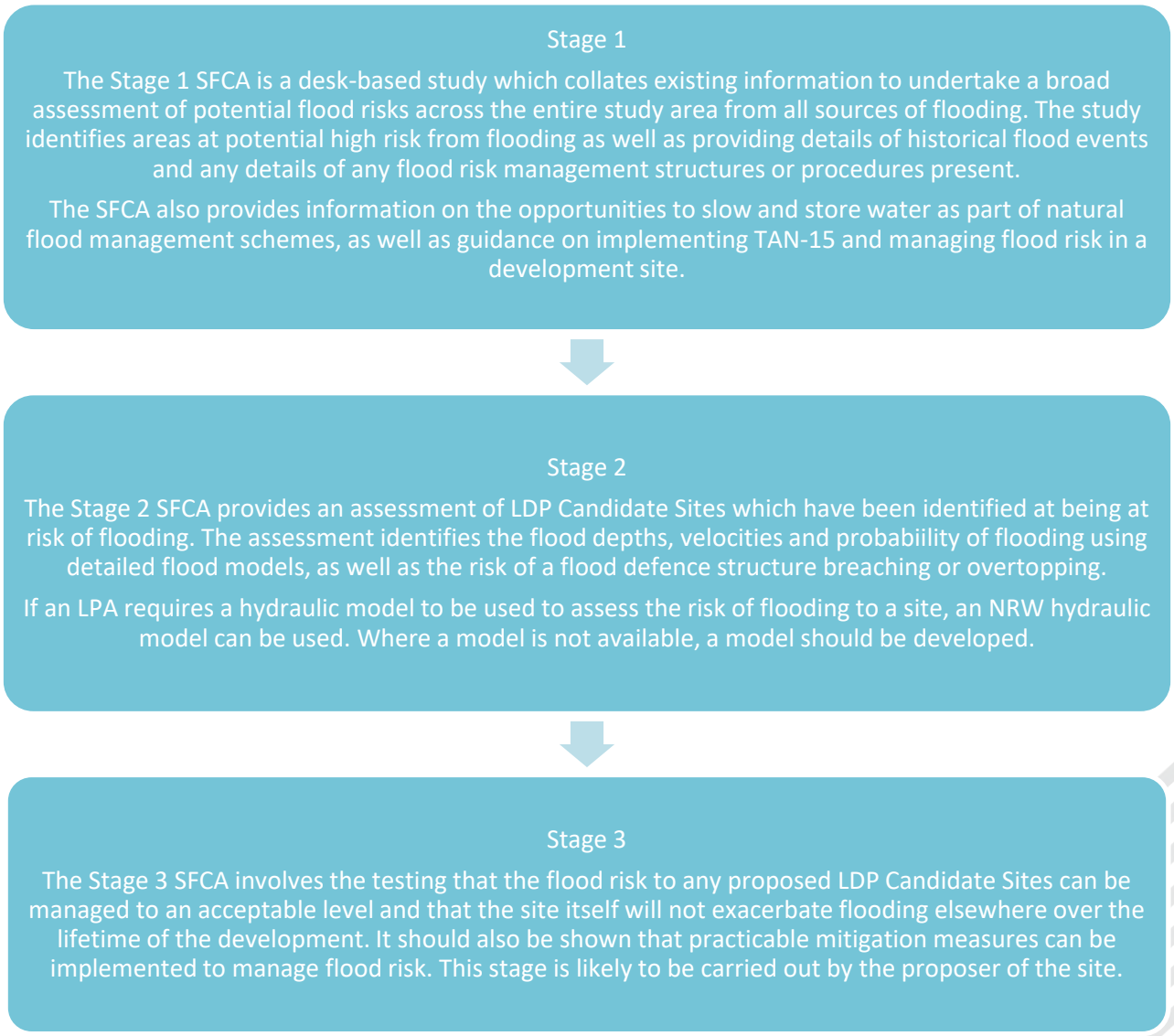

Figure 1-1 Outline of the SFCA process

1.3 SFCA Objectives

6. This report fulfils the aims and objectives of the Stage 1 SFCA:

- To inform development regarding the management of flood risk within the Councils individual Local Development Plans.
- 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 Council 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 fluvial, tidal and surface water sources, using Natural Resources Wales' recently published Flood Map for Planning (FMfP). Other sources of flooding including groundwater and artificial sources such as reservoirs and sewers are also considered.
- To enable the Councils to meet their obligations under PPW and Technical Advice Note 15: Development, flooding and coastal erosion (TAN-15).
- Considers the role and integrity of coastal defences and provides 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 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 Authority officers, 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 develop a report that forms the basis 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 Flood Consequence Assessments (FCAs) where necessary.
- To assist the Councils in identifying specific areas where further and more detailed flood risk data and assessment work may be required.
- To provide an update to the councils previous SFCA's (where applicable) using new and updated flood risk information to summarise flood risks to each Local Authority area to inform the councils individual Local Development Plans.

7. 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. It is also worth noting that the presence of flood zones in an area, be it fluvial, tidal or surface water, 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

8. The following stakeholders have been consulted during the preparation of this Stage 1 SFCA:

- The ten councils listed in Section 1.1 in their role as:
- Local Planning Authorities; and
- Lead Local Flood Authorities (including SAB)
- Natural Resources Wales
- Welsh Government
- Dŵr Cymru Welsh Water (DCWW)

1.5 Structure of the SFCA

Table 1-1: Stage 1 SFCA report structure

Section	Contents
1. Introduction	Provides a background to the study, defines objectives, outlines the approach adopted and the consultation performed.
2. Study Area	Includes an overview of the study area including information on the topography, geological and hydrological characteristics of the area
3. 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.
4. 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.
5. Flood risk review	Provides a review of flood risk from all sources for each Local Authority area.
6. Working with Natural Processes	Includes information on areas which could be suitable for implementing natural flood management measures.
7. Additional TAN-15 Guidance	Provides guidance on how Local Planning Authorities (LPA's) within the region can interpret and apply the new TAN-15.
8. Requirements for Flood Consequences Assessment	Outlines what an FCA is and the requirements for an FCA.
9. Emergency Planning and Flood Warning	Outlines the flood warning service in the Local Plan area and provides advice for emergency planning, evacuation plans and safe access and egress.
10. Summary	Provides a summary of the Stage 1 SFCA study

2 Study Area

2.1 Geographic Extent

9. South East Wales includes some of the main urban areas in Wales and is home to Wales's capital city, Cardiff. The area has a rich industrial history from mining in the South Wales valleys, exporting 13 million tons of coal at its peak in the 1880's, to the steel works in Newport and Cardiff docks. This industrial past of South Wales has shaped the landscape, influencing the location of settlements, channels of watercourses and location of vegetation across the area.

10. In the context of this report South East Wales covers approximately 2,800km² and stretches from Chepstow where it is bound to the east by the River Wye and River Monnow, along the South Wales coastline until Pyle where it is bound to the west by the River Kenfig. The Brecon Beacons National Park largely forms the northern boundary of the Local Authorities in South East Wales as shown in Figure 2-1.

Figure 2-1 Study area

11. The population of South East Wales as of mid 2020 is 1,552,5271 with the majority of this population residing in the cities of Cardiff and Newport. Population is also particularly dense in Caerphilly, Torfaen and Blaenau Gwent. South East Wales is home to 10 Local Authorities each with their own distinct settlements, a summary of which is provided in Table 2-1.

[1] https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Estimates/Local-Authority/populationestimates-by-localauthority-year

Table 2-1 Key settlements in South East Wales

County	Key Settlements	Other Settlements
Blaenau Gwent	Ebbw Vale	Brynmawr Tredegar Abertillery Nantyglo Blaina
Bridgend	Bridgend	Porthcawl Maesteg Pencoed Pyle/ Kenfig Hill/ North Cornelly Valley Gateway settlements of Aberkenfig/Bryncethin/ Brynmenyn/Sarn/Tondu/Ynysawdre
Caerphilly	Bargoed Blackwood Caerphilly Risca/ Pontymister Ystrad Mynach	Rhymney Nelson Newbridge Bedwas
Cardiff	Cardiff	N/A
Newport	Newport	N/A
Merthyr Tydfil	Merthyr Tydfil	N/A
Monmouthshire	Abergavenny (inc. Llanfoist) Monmouth Chepstow Severnside settlements including Magor/Undy, Caldicot, Rogiet, Portskewett and Sudbrook	Usk Raglan Penperlleni
Rhonda Cynon Taf	Aberdare Ferndale Hirwaun Llanharan Llantrisant Mountain Ash Pontypridd Porth Tonypandy Tonyrefail Treorchy	Aberaman South Abercynon Beddau Church Village Cwmbach Cymmer Efail Isaf Gilfach Glyncoch Llanharry Maerdy Penrhiwceiber Pentre Penywaun Rhigos Treherbert Tylorstown Ystrad Ynyshir

		Ynysybwl
Torfaen	Cwmbran Pontypool	Blaenavon
Vale of Glamorgan	Barry	Cowbridge Llantwit Major Penarth Dinas Powys Llandough Rhoose St Athan Sully Wenvoe

12. Land use outside the key settlement areas tends to be agricultural in Monmouthshire, Vale of Glamorgan and Newport. The county of Cardiff is almost entirely formed of the key settlement of the city of Cardiff, with other areas in South East Wales dominated by steep valleys. Land outside of the key settlements is often dominated by areas of forest and moorland.

13. Key infrastructure in the area includes the M4 which crosses from east to west in the southern part of South East Wales. Similarly, the A465 crosses from east to west in the northern part of the South East Wales area. The Swansea to London mainline is also present in addition to several 'valley line' train services which run from north to south serving each county and connecting to the main urban settlements of Cardiff and Newport

14. The Brecon Beacons National Park boundary envelops the northernmost areas of Rhondda Cynon Taf, Merthyr Tydfil and Blaenau Gwent. It also consists of part of Monmouthshire, and Torfaen. For planning purposes, the Brecon Beacons National Park area does not fall under the responsibility of these Local Authorities and is a Local Planning Authority in its own right. Therefore, flood risk within areas of the Brecon Beacons National Park will not be discussed in this report.

2.2 Topography

15. The topography varies from the low lying, fairly flat, coastal areas in the south (4mAOD), to the steep valleys to the north where elevations reach over 550mAOD. Cardiff, Newport and the Vale of Glamorgan are noticeably flatter than the other local authorities, with wider floodplains as a result. Isolated areas of slightly higher ground tend to be present in the northern areas of these Local Authority boundaries. Bridgend is characterised by very flat topography in the southern part of the catchment with ground levels rapidly rising in the north. Monmouthshire by contrast has low ground levels in the centre of the Local Authority boundary with ground levels increasing towards the furthest extent of the county boundary.

16. Rhondda Cynon Taf, Merthyr Tydfil, Blaenau Gwent, Torfaen and Caerphilly are characterised by several steep valleys which run in a southerly direction. Many of the highest areas of topography in South East Wales are found in the Local authority boundaries that cross into the Brecon Beacons National Park

17. All topographic information has been derived from LIDAR (Light Detecting and Ranging) data sourced from NRW which has a vertical RMSE (root mean square error) in the order of ±0.10m. The 2m LiDAR data covers the majority of South East Wales, with the exception of some small patches, as shown Figure 2-2.

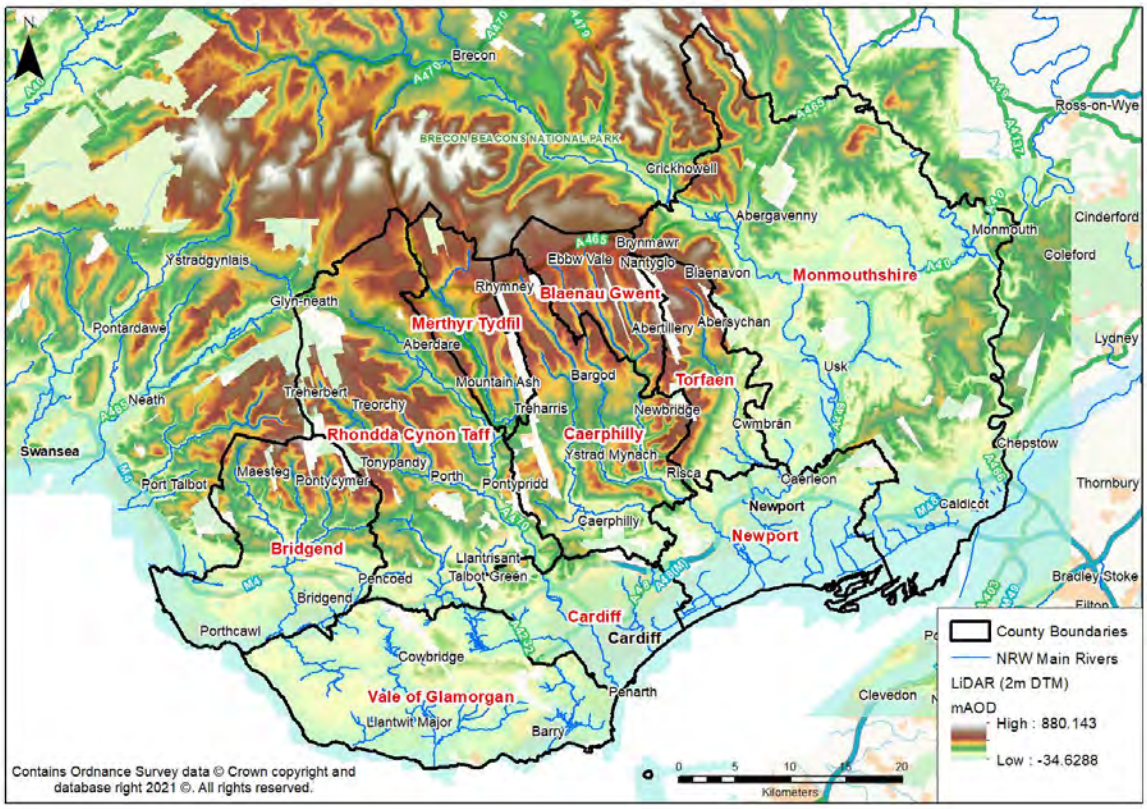

Figure 2-2 Natural Resources Wales 2m DTM LiDAR

2.3 Geology and Hydrogeology

18. Central and western areas of South East Wales are predominantly dominated by Coal Measure Formations. Mudstone, siltstone and sandstone with some areas of limestone form the dominant geology in the southern and eastern parts of South East Wales.

19. Mudstone is formed from fine grains of clay and mud and is relatively impermeable. Siltstone is formed from larger particles which are predominantly silt. Sandstone is formed from even larger 'sand sized' particles. In contrast to mudstone and siltstone rock types, sandstone is usually porous enough to allow percolation and can store large volumes of water. These rocks underlie almost all of the southern and eastern parts of South Wales.

20. The large bands of coal that dominate the rest of South East Wales are formed of plants preserved and fossilised millions of years ago. The porosity of coal varies; however, it is generally considered a relatively porous rock. Due to the intensive coal mining that South Wales experienced since the start of the industrial revolution, large networks of tunnels are present in much of the South East Wales coal field. This alters the hydrogeology and natural flow paths within these catchments, making it challenging to understand flood flows in South East Wales.

21. Superficial deposits across South East Wales are dominated by Alluvium formed of clay, silt and sand along the South East Wales coastline. Small areas of river terrace deposits formed of sand and gravel are found dotted throughout this area. The Vale of Glamorgan contains a large band of glacial deposits comprised of sand and gravel. Rhondda Cynon Taf, Caerphilly and Torfaen in particular have large areas of Till throughout.

22. On average, soils in the southern parts of South East Wales tend to be loamy and clayey with poor permeability. Those in the upper areas of the catchment are more freely draining and have a good permeability.

23. Monmouthshire is almost entirely dominated by 'Freely draining slightly acid loamy soils' whereas Newport and east Cardiff are dominated by 'Slightly acid loamy and clayey soils with impeded drainage' and 'Loamy and clayey soils of coastal flats with naturally high groundwater'.

24. West Cardiff is characterised by freely draining soil with the Vale of Glamorgan and Bridgend comprising of a mix of freely draining to slowly permeable soils.

25. The remaining Local Authorities to the north have soils described as 'Very acid loamy upland soils with a wet peaty surface' and 'Freely draining acid loamy soils over rock'. Small areas of slowly permeable soil are also identified in these areas.

2.4 Watercourses and Catchments

26. The four key river catchments in South East Wales are The Ogmore to Tawe, South East Valleys, Usk and Wye as shown in Figure 2-3.

Ogmore to Tawe

27. The two main watercourses in this river catchment are the River Ogmore and the River Thaw. The River Tawe (which forms the name of this basin) does not cross the county boundaries listed in this report and is therefore not discussed further.

28. The River Ogmore is formed by the confluence of several rivers in the upper reaches of Bridgend, and flows in a predominantly south easterly direction towards Porthcawl where it discharges into the Bristol Channel. The River Thaw rises in the northern extents of the Vale of Glamorgan before flowing in a southerly direction through Cowbridge and releasing water into the Bristol channel.

South East Valleys

29. The South East Valleys catchment covers a number of counties in South East Wales and is formed by several major watercourses. The majority of these watercourses rise in the Brecon Beacons National Park before flowing southwards through South East Wales discharging into the Severn Estuary.

30. The River Rhondda and River Cynon start in Rhondda Cynon Taf, and join the River Taf before flowing towards Cardiff. The Rivers Rhymney, Sirhowy and Ebbw flow in approximately parallel valleys through the counties of Blaenau Gwent and Caerphilly before continuing to flow south towards Cardiff and Newport. The River Ely flows from Rhondda Cynon Taf, through the Vale of Glamorgan before entering the city of Cardiff. All of these watercourses continue to flow south through Cardiff (except the River Ebbw which flows in the River Usk) before discharging into the Bristol Channel.

Usk

31. The River Usk catchment covers parts of Newport, Monmouthshire and Torfaen. The River Usk has its source in Usk Reservoir in Trecastle in mid Wales. It flows in a south easterly direction through Crickhowell and Abergavenny before reaching Usk where it is joined by the Olway Brook. The river continues to flow south towards Newport before the water is released into the Bristol channel.

Wye

32. The River Wye catchment forms a large part of the eastern boundary of the county of Monmouthshire. The river's source is in the Cambrian Mountains in mid-west Wales before it flows south east into England before entering back into Wales at Monmouth. From here it travels southwards, largely following the eastern boundary of Monmouthshire County before entering the Bristol Channel at Chepstow.

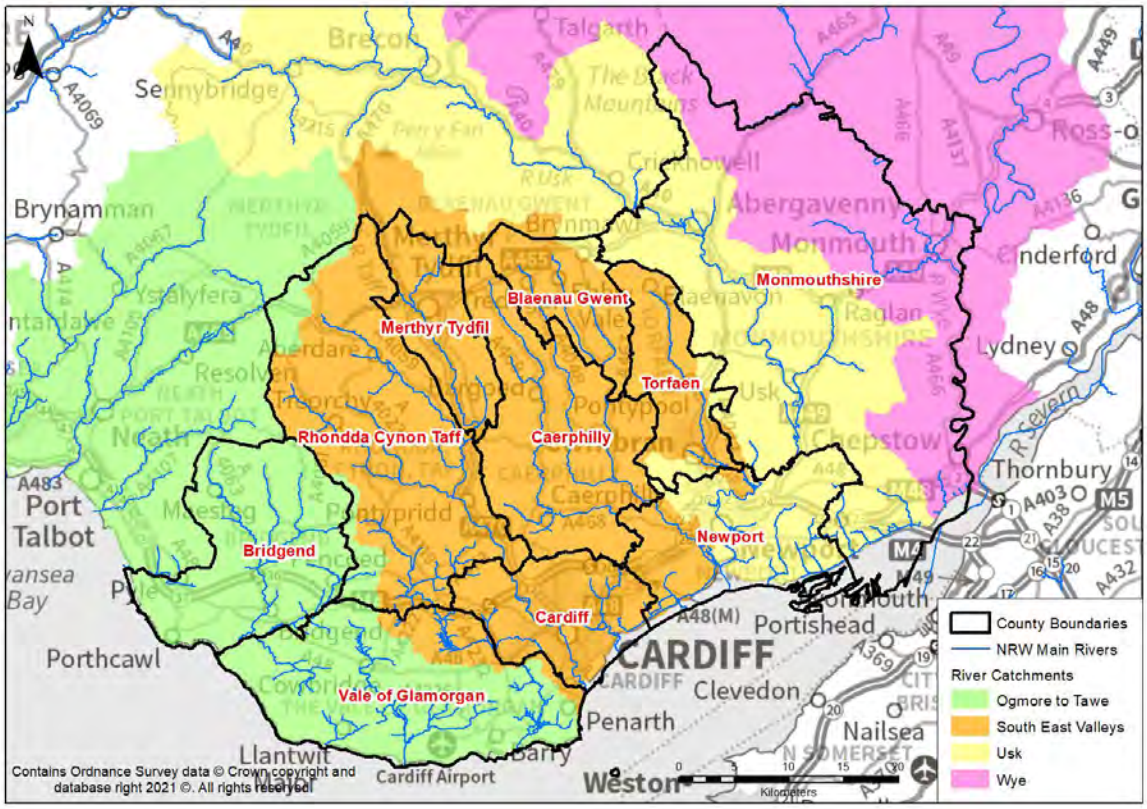

Figure 2-3 River catchments in South East Wales

3 Policy and Strategy

3.1 Legislation

3.1.1 EU Floods Directive and the Flood Risk Regulations

33. The European Flood 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.

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

35. 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 Flood Risk Management Plans (FRMPs). It should be noted that LLFAs are not required to update the FRMP if there are no nationally significant flood risk areas, as identified in the PFRA within their area.

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

37. 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, surface water and small watercourses. The maps show flood depth, velocity, hazard, and extent for high, medium, and low risk scenarios.

38. Natural Resources Wales (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

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

40. The FWMA creates clearer roles and responsibilities and instils a more risk-based approach. This includes a new lead role for Local Authorities in managing local flood risk (from surface water, groundwater and ordinary watercourses) and a strategic overview role of all flood risk for Natural Resources Wales.

41. 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 will build on information such as national risk assessments and will use consistent risk-based approaches across different Local authority areas and catchments. The Local Strategy will not be secondary to the National Strategy; rather it will have 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 Strategy for FCERM 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. This duty includes identifying risk management authorities and their functions and how they intent to exercise those functions in response to a flood. The responding risk management authority (RMA) must publish the results of its investigation and notify other relevant risk management authorities.
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 Minister will be able to make regulations about the content of the register and records. Assets included in LLFA asset registers may be included in the NRW National Asset Database.
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. 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 feature is designated, the owner must seek consent to alter, remove or replace it. Only those structures and features related to flood risk management in respect of ordinary watercourse, surface water and groundwater flooding can be designated by LLFA under this Act.
SuDS Approval Body	Schedule 3 of the Act establishes each LLFA as a SuDS Approval Body (SAB). The SAB has responsibility for the approval of proposed 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 will be responsible for maintaining SuDS in public roads, to National Standards.

3.1.3 Sustainable Drainage Systems (SuDS)

42. Disposal of surface water 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. 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 assets within the catchment.

43. 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.

44. 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, whilst providing water treatment benefits. SuDS also have the advantage of providing Blue and Green Infrastructure, ecology and recreational benefits when designed and maintained properly.

45. 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 need for significant interactions and alignment between the two processes.

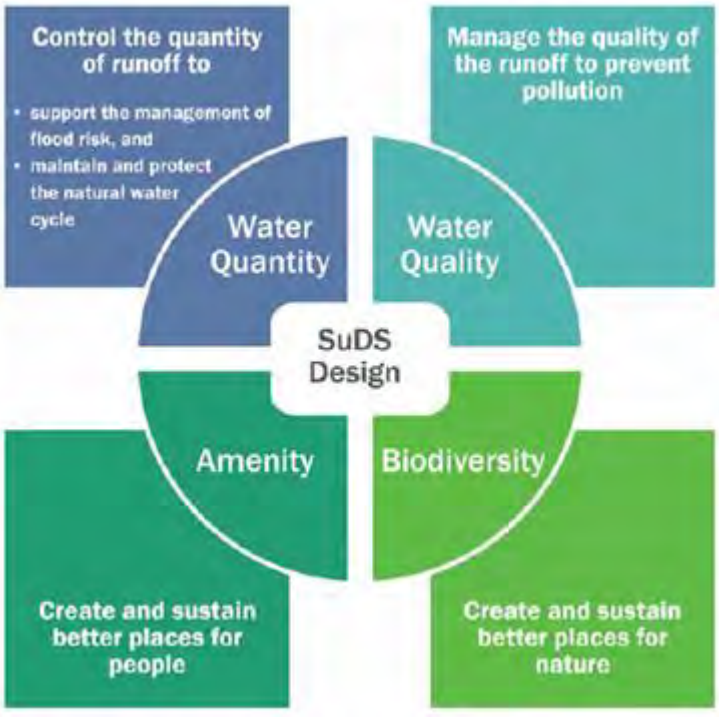

Figure 3-1 Four Pillars of SuDS (CIRIA, 2015)

46. There are a number of technical standards and design guidance for SuDS which is 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)
- PPW – Edition 11, February 2021
- The Building Regulations 2010 Part H: Drainage and Waste Disposal
- Design and Construction Guidance

3.1.4 Water Framework Directive and Water Environment Regulations

47. 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. Natural Resources Wales is leading on the delivery of the WFD in Wales.

48. The River Basin Management Plans for the Severn and Western Wales Basins are discussed in more detail in Section 3.2.2.

3.1.5 Well-being of Future Generations (Wales) Act 2015

49. 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.

50. 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. The impacts of flooding are significant, not only in economic and environmental terms but also with regard to social aspects. Flooding can severely impact the mental health of those affected, leading to anxiety depression and stress. Therefore, avoidance of flood risk must be a serious consideration for new developments.

3.2 National policy

3.2.1 Future Wales – The Nation Plan 2040

51. 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.

52. 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.

53. 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 ambition to grow and regenerate places within the National Growth Areas will require strategic decisions on the location of development, and it is not appropriate to develop flood risk management infrastructure to enable new development on greenfield land. 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 costal erosion (TAN-15) to direct development away from areas at risk of flooding.

3.2.2 Planning Policy Wales

54. PPW Edition 11 (PPW 11) 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).

55. 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.

56. 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.

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

58. 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."*

59. 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."*

60. 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.

3.2.3 National FCERM Strategy for Wales

61. The National FCERM Strategy for Wales[2] was published in October 2020 and sets out how the Welsh Government intends to manage flood and coastal erosion risks in Wales over the next ten years. 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 will work alongside other strategic plans for shoreline management, infrastructure and development planning.

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

A. Improving our understanding and communication of risk;

B. Preparedness and building resilience;

C. Prioritising investment to the most at risk communities;

D. Preventing more people becoming exposed to risk;

E. Providing an effective and sustained response.

63. Each of these objectives are related to specific measures and actions outlined in the national strategy. NRW will report on the application of the national strategy through a Section 18 report every two years. This will be reviewed by the Flood and Coastal Erosion Committee.

3.2.4 National Resources Policy

64. The focus of the Natural Resources Policy (NRP)3 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 set 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.

3.3 Technical Advice Note 15: Development, flooding and coastal erosion

65. 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.

66. TAN15 also states that Local Planning Authorities should ensure that development is set back appropriately from flood zones to allow for extreme surface water and small watercourse events.

67. TAN-15 was introduced in 2004 by the Welsh Government. It is 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, which is supported by the FMfP, was initially released in September 2021 for implementation from December 2021. However, on the 24th November 2021 Welsh Government suspended the implementation of the new TAN-15 until 1st June 2023.

On the direction of the Minister for Climate Change, provided in guidance accompanying the decision notice to delay its implementation, this SFCA has

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

3 https://gov.wales/sites/default/files/publications/2019-06/natural-resources-policy.pdf

been prepared in accordance with the updated TAN-15 and associated FMfP due to be implemented from June 2023.

68. TAN-15 reflects the core principles of the National Strategy for Flood and Coastal Erosion Risk Management in Wales4 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.

69. 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.

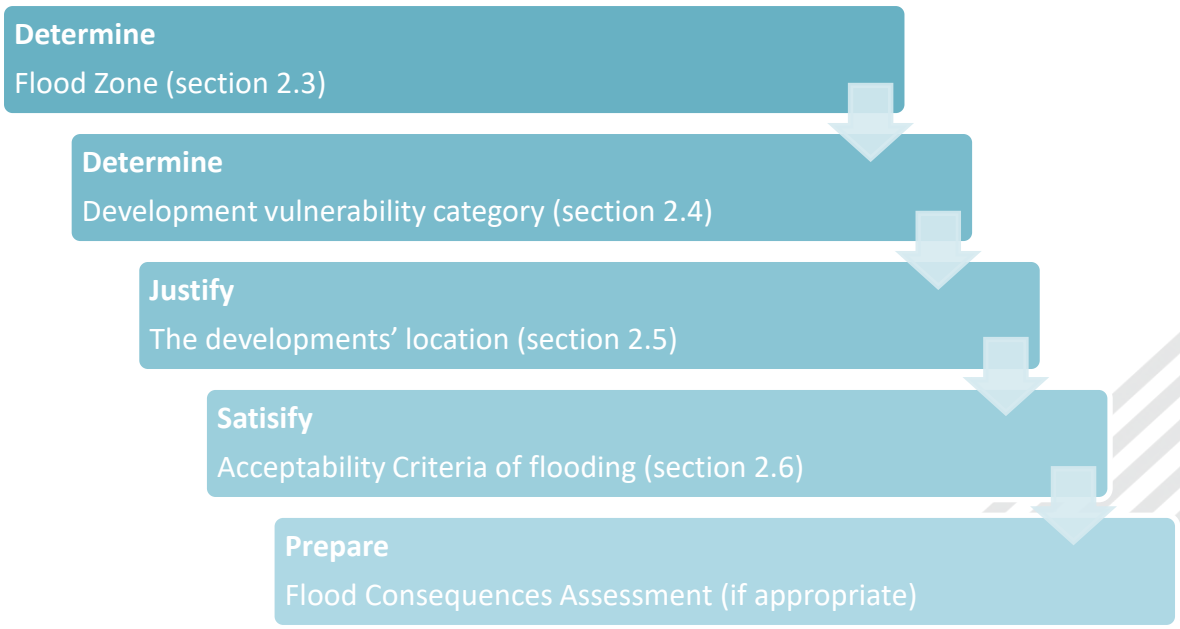

Figure 3-2: Navigating TAN-15 requirements

3.3.1 Flood Map for Planning

70. TAN-15 defines a number of flood zones based on the likelihood of flooding. Table 3-2 summaries the definition of the flood zones in the Flood Map for Planning (FMfP)[5]. The FMfP flood extents are based on the central estimates of climate change, assuming a 100 year lifetime of development.

Table 3-2: TAN-15 Definition of FMfP flood zones[6]

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,	Less than 1 in 200 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including

[4] National Strategy for Flood and Coastal Erosion Risk Management in Wales. Welsh Government (October 2020) https://gov.wales/national-strategy-flood-and-coastal-erosion-risk-management-wales

[5] https://flood-map-for-planning.naturalresources.wales

[6] Source: Figure 2, TAN-15

	including climate change	year, including climate change	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

71. 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 Natural Resources Wales, its predecessors or other Risk Management Authorities. The datasets include flooding records from rivers, the sea, surface water and small watercourses.

3.3.2 Climate change

72. Welsh Government publishes climate change guidance[7] for Flood Consequence Assessments. This was last updated in September 2021 to provide revised sea level allowances. Assessing the future effects of climate change is a key aspect of TAN-15 and any FCA required to support a planning application.

73. 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 end estimate (90th percentile). For the central estimate peak river flows in Wales are predicted to increase by 20-30% over the next 100 years, and by 45-75% for the upper end estimate over the next 100 years.
- Flooding from the sea – Estimated sea level rise is provided for each local authority area or can be calculated for specific sites through the UKCP18 User Interface. As a minimum, development proposals should be assessed against the higher central allowance (70th percentile) estimates to inform design levels. An assessment should also be made against the upper end allowance (95th percentile) to inform mitigation measures, access and egress routes and emergency evacuation plans. For the higher central estimate, sea levels along the Welsh coastline are predicted to increase by 0.91-1.01m over the next 100 years.
- Surface water and small watercourses flooding – Peak rainfall intensity allowances are provided for catchments less than 5km. 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 20% over the next 100 years, the upper end estimate is for and 40% for the upper estimate. The LLFA should be consulted where surface water and small watercourse flood risks are considered significant.

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

3.3.1 Lifetime of Development

74. 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.

75. 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.*"

76. It may be argued that many industrial developments have significantly shorter design lives than 75yrs. Therefore, in the cases of tidal flood risk there can be value in considering lifetimes of development less than 75yrs, although any deviation from the typical TAN-15 values will ultimately need to be agreed with the Local Planning Authority through the planning process.

3.3.2 Vulnerability classification

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

Table 3-3 Development vulnerability categories[8]

Development category	Types
Highly vulnerable development	All residential premises (including hotels, Gypsy and Traveller sites and 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, emergency depots. Buildings used to provide emergency shelter in time of flood
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 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.

[8] Source: Figure 3, TAN-15

3.3.1 Justifying the location of development

78. TAN-15 states that the Local Planning Authority will need to be satisfied that a development's location is justified. This is determined through the application of the 'Justification Test'. Table 3-2 below summaries the Justification Test for development within the various flood zones.

79. Where a site falls into two or more flood zones the planning authority must make an assessment of the proposal, taking into account each of its proposed land uses, against each of the flood zones to which it applies, in accordance with the Justification Tests.

Table 3-4: Justification Test

Zone 1	TAN-15 Defended Zones	Zone 2 (rivers and sea)	Zone 3 (rivers and sea)
All types of development are acceptable in principle. Planning authorities should develop locally specific planning policies for localised areas at risk of flooding.	Development will be justified in the TAN 15 Defended Zones if:	Development will be justified in Zone 2 if:	Less vulnerable development will only be justified if:
-	Its location meets the definition of previously developed land; and	Its location meets the definition of previously developed land; and	Its location meets the definition of previously developed land; and
-		It will assist, or be part of, a strategy supported by the Development Plan to regenerate an existing settlement or achieve key economic or environmental objectives; and	There are exceptional circumstances that require its location in Zone 3, such as the interests of national security, energy security, public health or to mitigate the impacts of climate change; and
-	The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable in accordance with the criteria contained in section 11 of TAN-15.	The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable in accordance with the criteria contained in section 11 of TAN-15.	The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable in accordance with the criteria contained in section 11 of TAN-15.

3.3.2 Acceptability of flood consequences

80. If the planning authority is satisfied that proposed development is justified in a flood risk area (Section 3.3.1), this justification will be in the knowledge that development 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 making and to demonstrate that the criteria set out in the Justification Tests have been satisfied. This is demonstrated through the production of a Flood Consequence Assessment (FCA), which is appropriate to the nature and

scale of the proposed development (further details of which are provided in Section 7).

81. 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. This is with the exception of highly vulnerable development which is not permitted under any circumstances in Flood Zone 3.

82. It is not appropriate to permit new development (other than water compatible development) in areas subject to significant flood depths or velocities or where safe access or egress cannot be achieved.

83. Accordingly, the planning authority will need to arrive at a judgement on the acceptability of the flooding consequences and they should only permit development where the developer has demonstrated that the risks and consequences of flooding are manageable and meet the 'Acceptability Criteria'.

84. There are three principal aspects to the Acceptability Criteria:

1. Flood frequency requirements. The frequency at which flooding is regarded to be acceptable. TAN15 states that all development 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.
2. Tolerable conditions. The flood conditions that are regarded to be acceptable during an extreme flood event with allowance for climate change. See

4. Table 3-6.
5. Avoidance of third-party impacts. Development must not cause or exacerbate the nature and frequency of flood risk elsewhere up to and including the 0.1% extreme flood event plus climate change over the lifetime of development.

Table 3-5: Flood frequency requirements[9]

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

[9] Source: Figure 6, TAN-15

Table 3-6: Tolerable conditions in extreme flood event[10]

Type of development	Maximum depth of flooding (mm)	Maximum velocity of flood waters (m/s)
Highly vulnerable development	600	0.15
Less vulnerable development Infrastructure associated with highly vulnerable development e.g. car parks, access, paths and roads 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		

3.3.3 Surface water and ordinary watercourse flood risk

85. 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.

86. 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.

87. 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 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.

88. A Flood Consequences Assessment will be required for any new development proposal located fully or partly in Flood Zones 2 and 3 – Surface Water and Small Watercourses. An assessment should also be undertaken for development on sites outside of these zones, but which has 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.

89. The Justification Tests do not apply to development in Flood Zones 2 and 3 of the Surface Water and Small Watercourses flood map. However, there is an expectation that the Acceptability Criteria will generally be applied in demonstrating the acceptability of flood risk. However, the degree of assessment required will depend on the nature, extent, perceived accuracy of the flood mapping, the potential severity and consequences of flooding, and ultimately the requirements of the LLFA.

[10] Source: Figure 7, TAN-15

3.4 Regional Policy

3.4.1 The second State of Natural Resources Report (SoNaRR2020)

90. The second State of Natural Resources Report (SoNaRR2020)11 has been complied by NRW to illustrate some of the key challenges, priorities and opportunities for the sustainable management of natural resources in Wales. This report can then be used to compare where Wales is at the moment to where Wales needs to be. Of particular interest in this report is Aim 3 'Wales has healthy places for people, protected from environmental risks'. Under this aim the report highlights that 245,000 properties in Wales are at risk of flooding. The report highlights that there are opportunities for action to address the flooding issue by use of natural interventions, catchment wide approaches, maintaining sustainable flood defences and improving awareness and understanding of flood risk, to name a few.

3.4.2 Catchment Flood Management Plans

91. Catchment Flood Management Plans (CFMP) are an essential component of future flood risk management. The plans are key to delivering the flood risk management outcomes of Welsh Government and Defra. A CFMP is a high-level strategic planning tool, setting out the policies that will be adopted to manage flood risk for the next 50 to 100 years. The plans include actions that NRW, councils and others need to take now and, in the future, to ensure adequate response and adaptation to the increasing and changing flood risk.

92. CFMP's have been developed for the whole of Wales and England. Each plan covers a single large catchment or a combined number of smaller catchments, with boundaries aligned to catchment boundaries. The plans consider all types of flooding and are based on a standard approach to ensure they provide a consistent assessment of flood risk. They also cover tidally influenced flooding from rivers and estuaries.

93. The CFMPs look at the current level of flood risk and compare this to the predicted future flood risk. This allows a targeted approach in dealing with flood risk in areas that will need it the most. The CFMP process assesses how flooding might affect people, property and the environment. The CFMP policies should be considered when making land planning decisions.

94. Each CFMP is divided into a number of 'management units' which are defined as areas with similar sources, pathways and receptors of flooding. Each management unit is assigned a preferred flood risk management policy based on an appraisal of the social, economic and environmental damages of flooding.

95. For the 10 councils considered in this report the majority fall into the Eastern Valleys Catchment Flood Management Plan (Blaenau Gwent, Merthyr Tydfil, Caerphilly, Rhondda Cynon Taf and Cardiff) with Newport, Monmouthshire and Torfaen falling under the Wye and Usk catchment management plan. The remaining councils (Bridgend and the Vale of Glamorgan come under the Western Wales CFMP.

Eastern Valleys CFMP

96. Flood risk management in the Eastern Valleys catchment has traditionally focused on flood defence schemes to protect urban areas. Table 3-7 shows the different policy options for each policy unit in the Eastern Valleys catchment. Policy units have been derived from the policy unit plan from the CFMP, contained in Figure 3-3.

[11] https://cdn.cyfoethnaturiol.cymru/media/693612/165960736_8330461_1785381.pdf

Table 3-7 Eastern Valleys CFMP policy options

Council	Policy Unit	Policy options
Blaenau Gwent	PU4 – Mid and Upper Reaches	Policy Option 4 – Take further action to sustain the current level of flood risk into the future (responding to the potential increase in risk from urban development, land use change and climate change).
	PU5 – Upper Ebbw	Policy Option 4 – Take further action to sustain the current level of flood risk into the future (responding to the potential increase in risk from urban development, land use change and climate change).
Caerphilly	PU2 – Bedwas and Machen	Policy Option 3 – continue with existing or alternative actions to manage flood risk at the current level
	PU3 – Rhymney Corridor	Policy Option 5 – take further action to reduce flood risk (now and/or in the future)
	PU4 – Mid and Upper Reaches	Policy Option 4 – Take further action to sustain the current level of flood risk into the future (responding to the potential increase in risk from urban development, land use change and climate change).
	PU6 – Ebbw Corridor	Policy Option 4 – Take further action to sustain the current level of flood risk into the future (responding to the potential increase in risk from urban development, land use change and climate change).
Cardiff	PU1 - Cardiff	Policy Option 5 – take further action to reduce flood risk (now and/or in the future)
Newport (east of the River Usk only)	PU6 – Ebbw Corridor	Policy Option 4 – Take further action to sustain current risk
	PU7 - The Wentlooge levels	Policy Option 3 – continue with existing or alternative actions to manage flood risk at the current level

Figure 3-3 Extract of policy units from the South Wales CFMP Page 19[12]

12 https://apps.caerphilly.gov.uk/LDP/Examination/PDF/SEW5.pdf

Wye and Usk CFMP

97. The Wye and Usk CFMP highlights 7 sub areas in the CFMP of which have different policy options. Table 3-8 discusses how the policy options relate to the councils in this area. Policy units have been derived from the policy unit plan from the CFMP, contained in Figure 3-4.

Table 3-8 Wye and Usk CFMP policy options

Council	Sub area	Policy Options
Newport (west of the River Usk)	7 – Newport	Policy Option 5 - areas of moderate to high flood risk where we can generally take further action to reduce flood risk
Monmouthshire	1 - Cwmbran and the M4 Corridor	Policy Option 4 – 'Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change'.
	3 - Lower Usk	Policy Option 3 – 'areas of low to moderate flood risk where we are generally managing existing flood risk effectively'.
	4 - Lower Wye	Policy Option 6 – 'areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.'
Torfaen	1 – Cwmbran and the M4 Corridor	Policy Option 4 'Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change'.

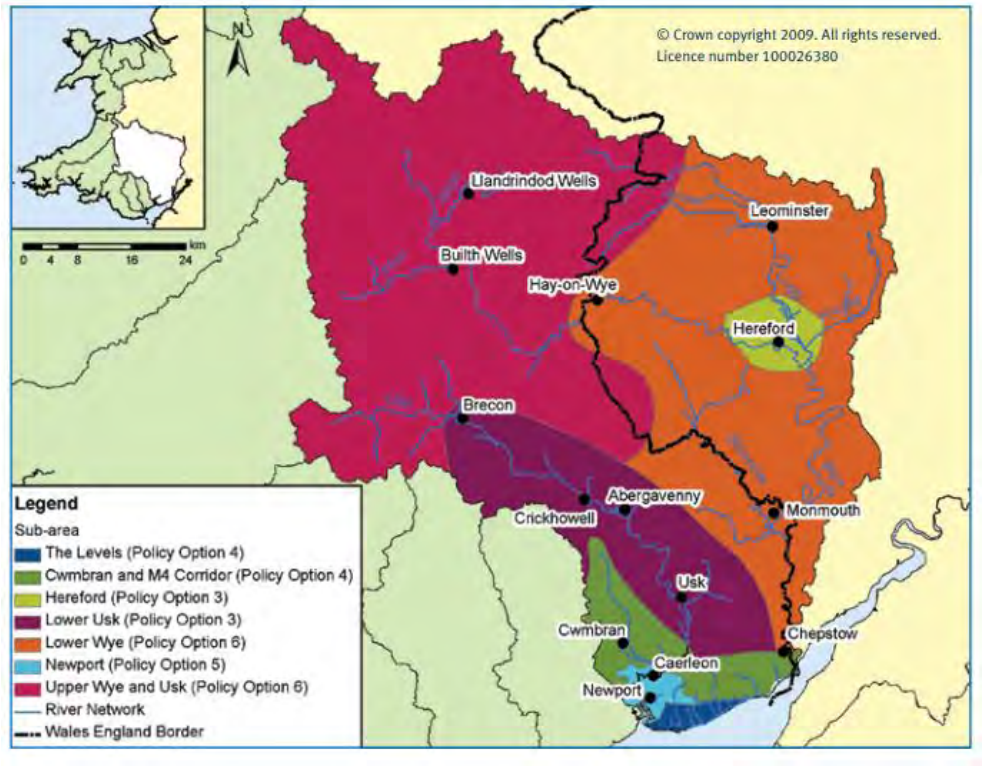

Figure 3-4 Extract of policy units from the Wye and Usk CFMP Page 12[13]

Western Wales Flood Risk Management Plan

98. A Western Wales CFMP could not be found, however within the Western Wales Flood Risk Management plan[14] it makes refence to a CMP and provides a figure of the Policy options which covers Bridgend and the Vale of Glamorgan, shown in Figure 3-5 below. A summary of the available information is provided in Table 3-9.

Table 3-9 Western Wales Flood Risk Management Plan policy options

Council	Sub area	Policy Options
Vale of Glamorgan	Unknown	Policy option 2 - Reduce existing flood risk management actions (accepting that flood risk will increase over time).
	Unknown	Policy option 5 - Take further action to reduce flood risk.
Bridgend	Unknown	Policy option 2 - Reduce existing flood risk management actions (accepting that flood risk will increase over time).
	Unknown	Policy option 3 - Continue with existing or alternative actions to manage flood risk at the current level.
	Unknown	Policy option 4 - Take further action to sustain the current level of flood risk into the future (responding to the potential increases in risk from urban development, land use change and climate change).

13 https://gat04-live-1517c8a4486c41609369c68f30c8-aa81074.divio-media.org/M4-Newport/C%20-%20Core%20Documents/11.%20Ecology%20and%20Nature%20Conservation/11.2.18%20-%20Environment%20Agency%20Wye%20and%20Usk%20Catchment%20Flood%20Management%20Plan%202010.pdf

14 https://naturalresources.wales/media/675146/final_frmp_-western-wales_pk26b82.pdf

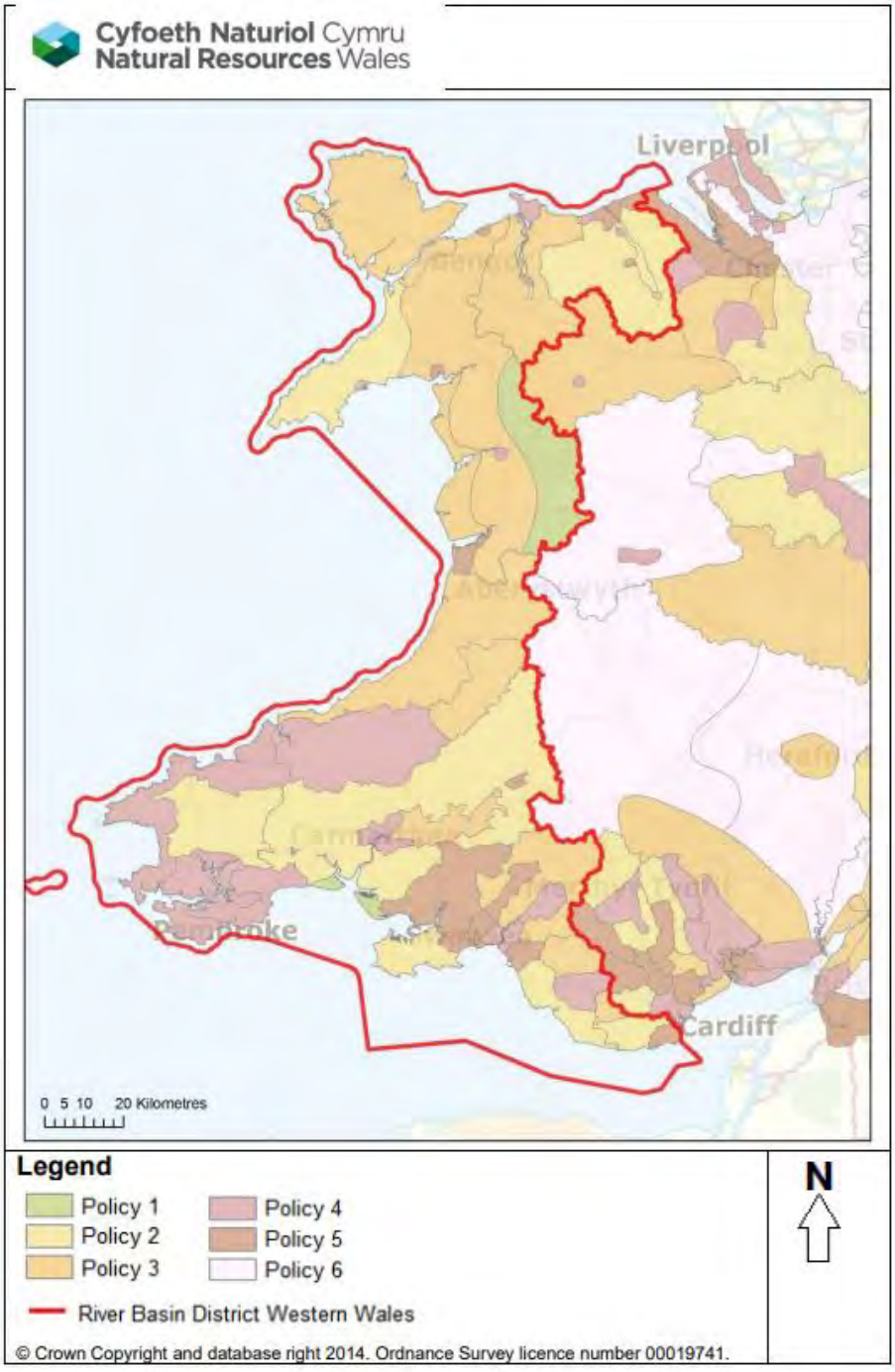

Figure 3-5 Extract of policy units from the Western Wales Flood Risk Management plan Page 48[15]

3.4.3 River Basin Management Plans

99. It should be noted that River Basin Management Plans are currently in the process of being updated in Cycle 3 (2021-2027). As a result, the plans listed below may be outdated and the latest plans should be referred to once these are published. NRW 'Water Watch Wales' will include the latest information and mapping.

15 https://naturalresources.wales/media/675146/final_frmp_-western-wales_pk26b82.pdf

Western Wales River Basin Management Plan 2015-2021 – December 2015

100. The plan focuses on the protection, improvement and sustainable use of the water environment in the river basin district for people and the environment. The report details the many actions needed be taken by NRW and the Welsh Government in order to manage issues such as pollution from towns, cities and wastewater, flooding and coastal erosions and invasive species.

Severn river basin district river basin management plan

101. The purpose of a river basin management plan is to provide a framework for protecting and enhancing the benefits provided by the water environment; it also informs decisions on land use planning. The plan contains 4 sets of key information:

- establish the base line 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.

102. The Severn River basin district is divided in to 10 catchments, as shown in Figure 3-6. The catchment for the main focus of this report is the South East Valleys catchment. The two local authorities not in this plan are Bridgend and the Vale of Glamorgan, these are contained on the Western Wales River Bains Management Plan. This plan also includes parts of the Ely catchment.

Figure 3-6 Adapted from an extract from Severn river basin district river basin management Plan page 71[16]

3.4.4 Shoreline Management Plans

103. 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 maritime Local Authorities and other bodies with coastal defence responsibilities or interests.

Severn Estuary Shoreline Management Plan

104. The Severn Estuary SMP covers the areas from Gloucester to Penarth/ Kingston on both banks of the Severn Estuary. The shoreline around the Severn Estuary has been divided into Theme Areas based on regions, towns and cities. These Theme Areas are then sub divided into policy units to provide information on shoreline

16 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718336/Severn_RBD_Part_1_river_basin_management_plan.pdf

management policies. The policies for each Local authority covered by the Severn estuary SMP is shown in Table 3-10 and Figure 3-7.

- Cardiff falls in to SMP2 Theme Area:
- Newport falls in to SMP2 Theme Area: Newport, the River Usk and surrounding area.
- Monmouthshire falls into SMP2 Theme Areas: Caldicot Levels and Wye and Chepstow

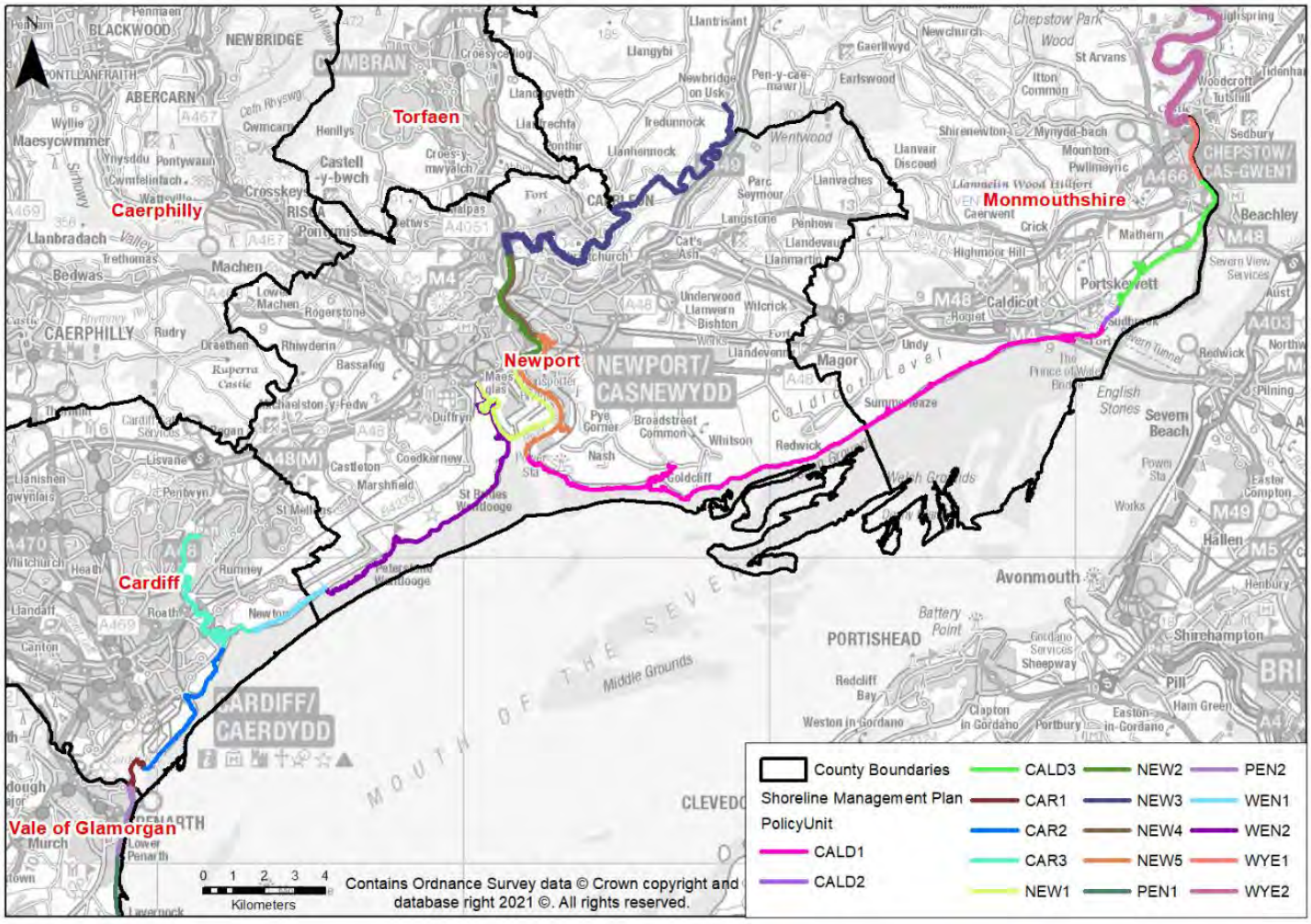

Figure 3-7 Severn Estuary Shoreline Management Plan policy units

Table 3-10 Severn Estuary Shoreline Management Plan Policy options

Cardiff					
Policy Scenario Area	Policy Unit	Location	Short-term Policy (0-20 years)	Medium-term policy (20-50 years)	Long-term Policy (50-100 years)
Cardiff	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.
Newport					
Policy Scenario Area	Policy Unit	Location	Short-term Policy (0-20 years)	Medium-term policy (20-50 years)	Long-term Policy (50-100 years)
Newport and the River Usk	NEW1	River Ebbw (east bank) at Maesglas Railway Bridge to River Usk at the transporter bridge (west bank)	Hold the line by replacing flood defences	Hold the line by maintain defences	Hold the line by maintain defences

	NEW2	River Usk at the transporter bridge (west bank) to River Usk at M4 crossing (west bank)	Hold the line by replacing flood defences	Hold the line by maintain defences	Hold the line by maintain defences
	NEW3	River Usk (both banks) from M4 crossing to Newbridge on Usk	No Active Intervention – Defences will remain in place for this epoch	No Active Intervention	Managed realignment – new realigned defences should be built
	NEW4	River Usk (east bank) at M4 crossing to Spytty Pill (north of A48 crossing)	Hold the Line – Replace defences	Hold the Line – Defences should be maintained	Hold the Line – Defences should be maintained
	NEW5	River Usk (East bank) at Spytty Pill (North of A48 crossing) to Uskmouth Power Station point	Hold the Line – Replace defences	Hold the Line – Defences should be maintained	Hold the Line – Defences should be maintained
Wentlooge	WEN1	Lamby Way landfill site drain to Sluice House Farm (Tarwick Rhyne)	Hold the line – the existing defences will remain in place	Hold the line – defences should be maintained	Hold the line – defences should be maintained
	WEN2	Sluice House Farm (Tarwick Rhyne) to the River Ebbw (west bank) at Maesglas Railway Bridge	Hold the line – defences should be maintained	Hold the line – defences should be replaced	Hold the line – defences should be maintained
Monmouthshire					
Policy Scenario Area	Policy Unit	Location	Short-term Policy (0-20 years)	Medium-term policy (20-50 years)	Long-term Policy (50-100 years)
Caldicott Levels	CALD1	Uskmouth Power Station point to Sudbrook Point	Hold the Line – Replace defences	Hold the line – defences should be maintained	Hold the line – defences should be maintained
	CALD2	Sudbrook Point to Black Rock	No Active Intervention - existing high ground and geology limit risk of flooding and erosion	No Active Intervention - existing high ground and geology limit risk of flooding and erosion	No Active Intervention - existing high ground and geology limit risk of flooding and erosion

	CALD3	Black Rock at Black Rock Road to River Wye at Park Redding, Thornwell	Hold the line – defences should be maintained	Hold the line – defences should be maintained	Hold the line – defences should be upgraded
Chepstow and River Wye	WYE1	River Wye at Park Redding to River Wye at Alcove Wood	No Active Intervention – Defences will remain in place for this epoch	No Active Intervention – Defences will remain in place for this epoch	No Active Intervention – Defences at end of serviceable life, high ground limits flooding in most areas
	WYE2	River Wye at Alcove Wood to Bigsweir Bridge to Bridge Street Bridge, Sedbury	No Active Intervention – Defences will remain in place for this epoch	No Active Intervention – Defences will remain in place for this epoch	No Active Intervention – Defences at end of serviceable life, high ground limits flooding in most areas
Newport and the River Usk	NEW3	River Usk (both banks) from M4 crossing to Newbridge on Usk	No Active Intervention – Defences will remain in place for this epoch	No Active Intervention	Managed realignment – new realigned defences should be built

105. The Lavernock Point to St Ann's Head SMP provides a large-scale assessment of the risks associated with coastal erosion and flooding at the coast. It also included policies to help manage these risks to people in a sustainable manner. The plan splits the coastline from Lavernock Point (Vale of Glamorgan) in the east and St Ann's Head (Pembrokeshire) in to 21 policy units. The units relevant to Bridgend and the Vale of Glamorgan are shown in

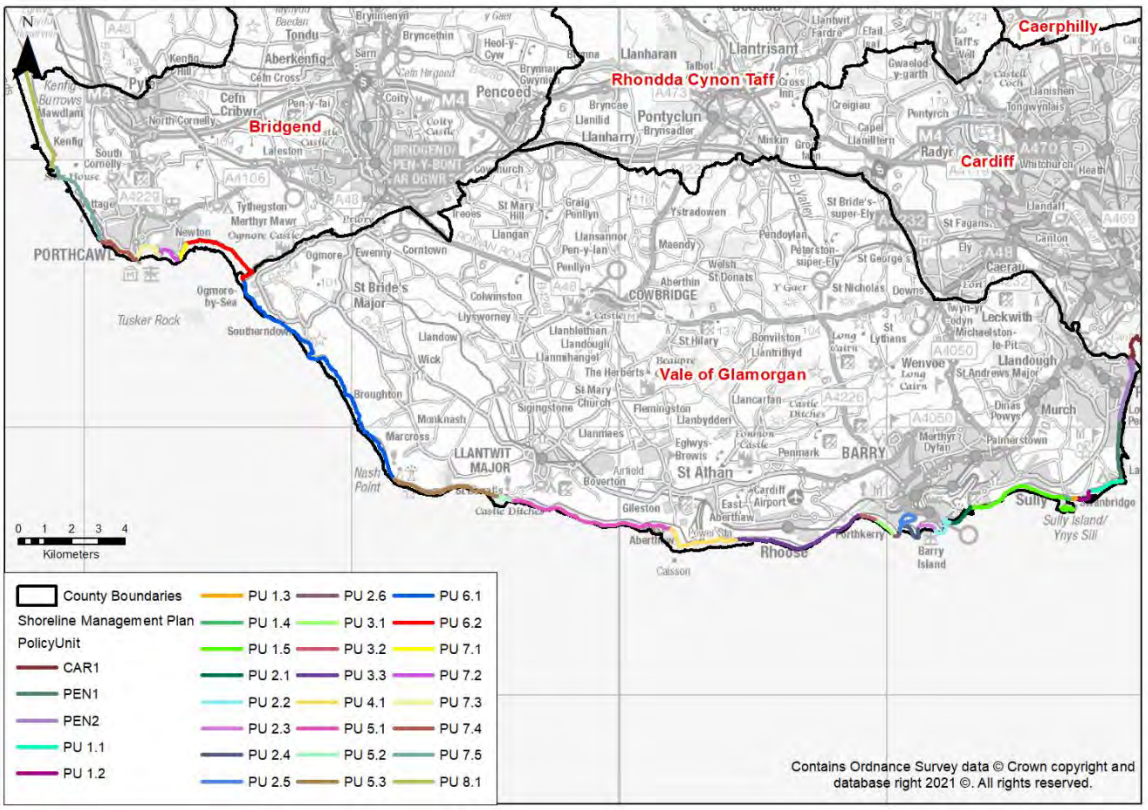

Figure 3-8 Lavernock Point to St Ann's Head Shoreline Management Plan policy units

Table 3-11 Lavernock Point to St Ann's Head Shoreline Management Plan SMP2

Bridgend		
Policy Units		Actions
PU7/1	Newton	The main policy driver for this frontage is to reduce the risk of coastal erosion and flooding to the developed area of Porthcawl, through a policy of hold the line by maintaining and upgrading defences at Trecco Bay, Sandy Bay, Town Beach and Marine Drive, subject to the future availability of public funding for coastal erosion and flood risk management and private funding for proposed future development at Trecco Bay and Sandy Bay. Current SMP policy for unit PU7/1 for both the medium and long term, is no active intervention.
PU7/2	Newton Point to Rhych Point (Trecco Bay)	
PU7/3	Rhych Point to Porthcawl Point (Sandy Bay)	
PU7/4	Porthcawl (Porthcawl Point to Hutchwns Point)	
PU7/5	Hutchwns Point to Sker Point (Rest Bay)	
Vale of Glamorgan		
Policy Units		Actions
PU1/1 to PU1/5	Lavernock Point to Bendrick Rock	Long term vision is to continue to allow natural erosion of the undefended coastline. In Swanbridge, it is recommended that best use is made of the existing defences by maintaining them as long as possible.
PU2/1 to PU2/6	Barry Island and Docks	Policies within this area vary. Along undefended frontages natural erosion will be allowed to continue. Along defended frontages, a policy of hold the line is recommended through maintenance and upgrading of existing defences.
PU3/1 to PU3/3	The Knap to Watch House Beach	The policy in this unit is to allow the undefended coastline to continue eroding naturally. At the Knap, the promenade will be maintained for as long as possible, followed by a policy of managed realignment in the medium and long term.
PU4/1	Aberthaw	This policy is hold the line to reduce the risk of coastal erosion and flooding to the power station.
PU5/1 to PU5/3	Limpet Bay to Nash Point	The policy in this area is to allow erosion of the undefended coastline to continue. At Cwm Col-huw (Llantwit Major) beach whilst there is a policy of hold the line in the short term, it is recommended that the defences and assets to the west of the river are also set back as soon as possible.
PU6/1 to PU6/2	Nash Point to Porthcawl	The policy in this area is for no active intervention to allow coastal erosion of the undefended coastline to continue

PEN1	Lavernock Point to the shore south of Forest Road	No active intervention for the short, medium and the long term. High ground and hard geology limit flood and erosion risk to this unit in the long term. Some, localised areas may be at risk in the longer term. This should be monitored and actions taken, if appropriate. Funding is not guaranteed.
PEN2	Nash Point to Porthcawl	Hold the line for the short, medium and long term. Wave overtopping along the Esplanade and at the Pier may increase with climate change. HTL in this policy unit should focus on the key areas of risk (along the Esplanade), rather than on the whole length of the policy unit. How HTL is implemented in these short lengths of shoreline needs to be determined - an in-depth economic investigation will be needed.

3.5 Local Policy

106. All 10 local authorities were asked to confirm the latest versions of documents available for local policy. Due to disruption from COVID19 some of the planned updates to these documents have not been carried out as yet; therefore, some of the information highlighted below may be out of date. Every endeavour has been made to find as accurate information as possible or highlight where information is likely to be out of date.

107. The vast majority of the councils have the following documents:

- Local Development Plan
- Local Flood Risk Management Strategy
- Flood Risk Management Plan
- Strategic Flood Consequence Assessment
- Preliminary Flood Risk Assessment

108. The dates of these documents for each council have been summarised in Table 3-12 below. Where possible links to each document are also provided.

109. The LDP policies related to flooding, coastal erosion and climate change have been summarised in Table 3-13 for each council.

Table 3-12 Local Authority Document Review

Local Authority	Adopted LDP	Local Flood Risk Management Strategy	Flood Risk Management Plan	Strategic Flood Consequence Assessment	Preliminary Flood Risk Assessment
Blaenau Gwent	2006-2012 Preferred Strategy (not yet adopted) 2018-2033	2013	2015-2021	2021	2017 Addendum
Bridgend	2013	None	2016	2012	PFRA 2009 and 2017 Addendum
Caerphilly	2006 - 2021	2013	2015 (currently being updated)	None	PFRA 2011 and 2017 Addendum
Cardiff	2006-2026	2014	2015	None	PFRA Addendum 2017
Newport	2011 - 2026	2014	2015	2013	PFRA 2011 & 2017 Addendum
Merthyr Tydfil	2016-2031	2013	2015	2018	PFRA 2011 & 2017 Addendum
Monmouthshire	2011-2021	2013	2016	2009	PFRA 2009 & Addendum 2017
Rhondda Cynon Taf	2011-2021	2013	2013-2019	2008	PFRA 2011 & 2017 Addendum
Torfaen	2006-2021	2013	2015	None	2017 Addendum
Vale of Glamorgan	2021-2026	2013	None	None	PFRA 2011 & 2017 Addendum

Table 3-13 Local authority LDP review

Local Authority	Adopted LDP	Adopted LDP Policies
Blaenau Gwent	2006-2012. Preferred Strategy (not yet adopted) 2018-2033	Challenge 12: Sustainable use of natural resources - highlights climate change means areas at risk of flooding are growing. Strategic Policy SP7: Climate Change 1.C. "Promoting efficient use of land through giving preference to brownfield land and development at higher densities on sites located close to transport corridors or town centres and mixed use allocations." SP7 2 a,b and c - Adapting to direct and indirect impacts of climate change through: Ensuring that developments accord with objectives of sustainability and good design; Directing new development away from those areas which are at high risk of flooding; Managing flood risk through incorporating measures in design and construction to reduce the effects of flooding. SP7: links to development management policies DM1 (new development), and Objectives 5 and 6 Preferred strategy Challenge 10: Environmental Quality – climate change means more areas are subject to flooding LDP Objective 4 Climate change: includes focusing development away from areas vulnerable to flooding SP3: Climate Change: 6. Avoid, or where appropriate, minimise the risk of flooding including the incorporation of measures such as Sustainable Urban Drainage Systems and flood resilient design.
Bridgend	2013	LS4: This local issue highlights that there is a flood risk to many of the settlements along the Main Rivers in the county. The areas of Aberkenfig and Pencoaed are constrained by flood plains. There is also a risk of tidal flooding in parts of Porthcawl. The replacement LDP for the period 2018 to 2033 is going through a review process and is not currently available to comment on. OBJ 2c: To manage development in order to avoid or minimise the risk and fear of flooding and enable and improve the functionality of floodplains. Policy PLA4 – Climate Change and Peak Oil: Avoiding or minimising the risk from flooding and/ or adapting to the increased risk of flooding, coastal erosion
Caerphilly	2006- 2021	Key Objective 15: Reduce the impact of flooding by ensuring that highly vulnerable development is directed away from areas of risk wherever possible. SP7: This policy focuses on the council seeking and securing planning obligations to remove obstacles to development. This includes flood defence measures to mitigate the risk of flooding.
Cardiff	2006-2026	Main Element 7: To deliver economic and social needs in a co-ordinated way that respects Cardiff's environment and responds to the challenges of climate change. KP15: Climate Change – To mitigate against the effects of climate change and adapt to its impacts, development proposals should take into account: v. Avoiding areas susceptible to flood risk in the first instance in accordance with the sequential approach set out in national guidance. EN14: Flood Risk – Development will not be permitted: i. Within tidal or fluvial flood plains unless it can be demonstrated that the site is justified in line with national guidance and an appropriate detailed technical assessment has been undertaken to ensure that the development is designed to alleviate the threat and consequences of flooding over its lifetime

		ii. Where it would increase the risk of flooding from fluvial and/or tidal flooding or from additional run-off from the development in any location iii. Where it would hinder future maintenance or improvement schemes of flood defences and watercourses iv. Where it would cause adverse effects on the integrity of tidal or fluvial defences v. Where ground floor bedrooms are proposed in areas at high risk of flooding.
Newport	2011 - 2026	Objective 2 – Climate Change highlights that the risks and consequences of flooding should be managed to make a positive contribution towards climate change. Policy SP3 – states that development is directed away from areas where flood risk is identified as a constraint and to ensure the risk of flooding is not increased elsewhere. Development in flood risk areas will only be approved if: It follows national guidance The development must be designed to cope with the threat and consequences of flooding over its lifetime Sustainable solutions to manage flood risk are prioritised General Policy CE9 – Coastal Zone - development will not be permitted in the coastal area or adjoining the tidal river unless: Development is required to be on the coast to meet an exceptional need which cannot reasonably be accommodated elsewhere; the area is not itself at risk nor will the proposed development exacerbate risks from erosion, flooding or land instability development which requires a coastal location should be sited within the developed coastal zone.
Merthyr Tydfil	2016-2031	Policy EnW4: Environmental Protection: 'Development proposals will be required to demonstrate they will not result in an unacceptable impact on people, residential amenity, property and / or the natural environment.' This includes that new developments will be expected to avoid unnecessary flood risk and meet the requirements of TAN-15. SA Objective 14: To minimise the risk of flooding
Monmouthshire	2011-2021	Objective 12: To ensure that new development takes account of the risk of flooding, both existing and in the future, including the need to avoid inappropriate development in areas that are at risk from flooding or that may increase the risk of flooding elsewhere and the need to design development to appropriately manage surface water run-off. Policy SD3 – Flood Risk – Proposals for highly vulnerable development or emergency services will not be permitted in areas which may be liable to flooding, unless the residential development is for the conversion of upper floors within defined settlement boundaries or the proposal is to extend an established tourism, leisure or educational establishment. Less vulnerable built development will be permitted within defined settlements or on sites allocated for uses such as employment. Development proposals within a flood plain will be required to demonstrate that: a) the development is or can be protected by approved engineering works and / or other flood protection measures; b) such remedial measures would not cause flooding or significantly increase the risk of flooding elsewhere; c) the development, including any remedial measures, can be sympathetically assimilated into the environment in terms of its siting, scale, design and landscaping; d) the development does not interfere with the ability of the Environment Agency or other bodies to carry out flood control works or maintenance; and e) the nature conservation interest of the water source corridor is protected and, where practicable, enhanced. Development resulting in additional surface water run-off and leading to an increased risk of flooding will only be permitted where adequate protection and mitigation measures are included as part of the proposal. Policy SD4 – Sustainable Drainage - Development proposals will be expected to incorporate water management measures, including Sustainable Urban Drainage Systems (SUDS), to reduce surface water run-off and minimise its contribution to flood risk elsewhere. TAN 15 Development and Flood Risk, requires development plans to include policies which promote the use of Sustainable Urban Drainage Systems (SUDS), and recommends their implementation wherever they will be effective, irrespective of whether the development is located in a flood zone. Policy SD4 aims to ensure that all new development proposals incorporate water management measures, including SUDS, in order to reduce surface water run-off and minimise flood risk. These should replicate as closely as possible the natural drainage on the site prior to construction or clearance.
Rhondda Cynon Taf	2011-2021	Policy AW 10 – Environmental Protection and Public Health: 'Development proposals will not be permitted where they would cause or result in risk of unacceptable harm to health and or local amenity because of … flooding'. Policy AW2 – Sustainable locations: 'the potential consequences of a flooding event have been considered and found to be acceptable in accordance with national guidance and meet the definition of previously developed land.'
Torfaen	2006-2021	Objective 3: To ensure that the location of development does not result in unacceptable risk from flooding, subsidence or health hazards. S3: Climate change – this policy relates to ensuring development does not occur in areas that are susceptible to flooding. Its also highlights that development and flood risk will align with TAN-15 and PPW. S8: Planning Obligations – A small part of this policy highlights the need for flood defence measures to mitigate the risk of flooding. BW1: General Policy – Development Proposals: Under the natural environment section of this policy the need for development not to increase the risk of flooding in an area is reiterated.
Vale of Glamorgan	2021-2026	Objective 2 – states the one of the ways the county will mitigate against the effects of climate change is to avoid development in areas that are susceptible

		to flooding. It goes on to acknowledge that this development policy will make developments demonstrate that there will not be an impact on people or the natural environment from coastal erosion or land stability. Policy MD7: Environmental Protection - Development will be expected to avoid areas of unnecessary flood risk and meet the requirements of TAN-15

4 Understanding of flood risk

4.1 Likelihood and Consequence

110. Flood risk is a combination of the likelihood of flooding and the potential consequences arising. 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 consequence 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.

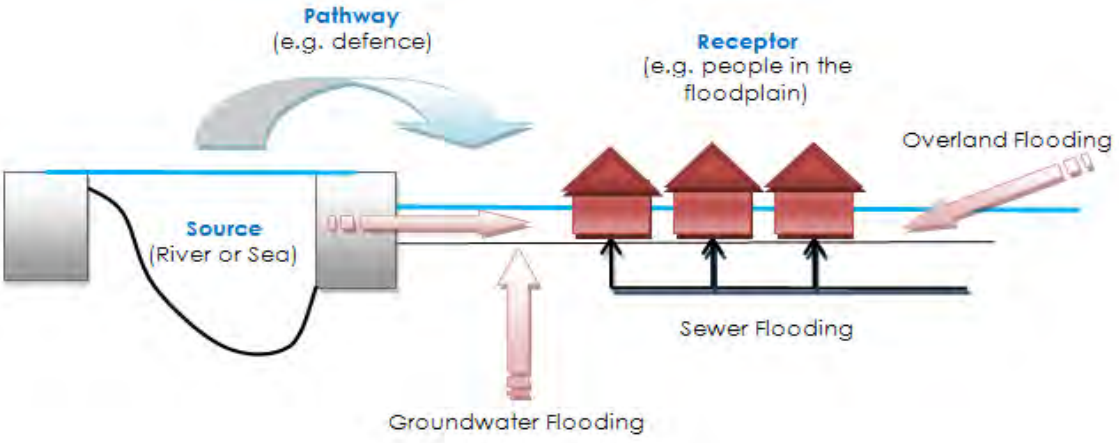

Figure 4-1 Source-Pathway-Receptor Model

111. 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.

112. 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

113. 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 a hundred years, i.e. it has a 1% chance of occurring in any one year, not that it will occur once every 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

114. 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

115. Flood risk is expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding

116. 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 flood defences) and the vulnerability of receptors as mentioned above.

4.1.4 Actual Risk

117. 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.

118. 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 moderate from surface water, which 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

119. 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.

120. Although not a term used in TAN15, amongst flood risk professionals the term 'residual risk' is often used to describe the risks associated with asset or system failure.

121. 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 failed that must be taken into account. Because of this, it is never appropriate to use the term "flood free".

122. 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.

4.2 Sources of Flooding

4.2.1 Fluvial Flood Risk

123. Flooding from rivers occurs when water levels rise higher than bank levels, causing floodwater 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 backup;
- blockage of structures or the river channel causing flood water to backup; and
- high water levels and/or locked flood (tide) gates preventing discharge at the outlet of the river.

124. 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;
- width and roughness of the floodplain; and
- types of structures that cross the channel.

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

126. 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 possibly structural damage to property.

4.2.2 Tidal Flood Risk

127. 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. Tidal 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 defences occurs.

128. The risks posed by wave action during storm events, including the risks of overtopping of defences should be considered when assessing tidal flood risk. Consideration should also be made to joint probability flooding events, such as when high tide levels may occur at the same time as large fluvial flows and can be an important consideration in many locations.

4.2.3 Surface Water Flood Risk

129. 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.

130. 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.

131. 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.

132. 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 floodwater flows. These pathways include minor drainage lines, roads and even flood management infrastructure.

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

134. 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.

135. 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

136. 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.

137. 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 major aquifers as a result 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

138. 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

139. 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.

140. The main causes of sewer flooding are:

- Lack of capacity in sewer drainage networks due to original under-design or an increase in demand (such as from climate change or due to new developments)
- Lack of capacity in sewer drainage networks due to events larger than the system design event
- Lack of maintenance of sewer networks which leads to a reduction in capacity and can sometimes leads 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

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

142. 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.

143. 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

144. 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.

145. 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.

146. 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.

147. 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.

4.2.7 Impact of Climate Change

148. Coastal development is limited by risks including flooding, erosion, and land instability, with over 400 homes at risk due to coastal erosion in Wales. TAN-15 states that development should be avoided where coastal erosion presents a risk over the lifetime of development. Additionally, local planning policies for coastal areas should reflect Planning Policy Wales, Future Wales – The National Plan 2040, the Welsh National Marine Plan, the National Strategy for FCERM, and other relevant strategies. Where coastal erosion does present a risk, Risk Management Authorities must be consulted to provide advice.

149. 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.

150. Table 4-1 below shows how Climate Change has been assessed for each source of flooding within the SFCA. Even if an area is currently not at flood risk, the impact of climate change on the extent of flooding should be considered.

Table 4-1 Assessment of Climate Change for all sources of flooding

Source	Data Source	Climate Change Allowance
Rivers	TAN-15 FMfP for Rivers	The FMfP displays predicted future flood risk under the central climate change estimate. Detailed Flood Consequences Assessments 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	TAN-15 FMfP for the Sea	
Surface Water and Small Watercourses	TAN-15 FMfP for Surface Water and Small Watercourses	

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.

4.3 Roles and responsibilities for managing flood risk

151. Flood and Coastal Erosion Risk Management in Wales involves a number of organisations. The roles and responsibilities of these organisations is outlined in The National Strategy for Flood and Coastal Erosion Risk Management in Wales[17]. There are 26 Risk Management Authorities (RMA's). These RMA's are:

- NRW,
- The 22 Local Authorities as Lead Local Flood Authorities (LLFA) and highway authorities.
- Two water companies
- The Welsh Government (as highway authority for trunk roads)

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

Figure 4-2 Overview of Roles and Responsibilities (taken from the National Strategy for Flood and Coastal Erosion Risk Management[17])

153. RMA's all have a duty to help deliver the objectives of the National Strategy as well as the 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 of each organisation are outlined in the National Strategy.

17 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

4.4 Sources of information used in preparing the SFCA

4.4.1 Historic flooding

154. The historic 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 LLFA and DCWW, and NRW's 'Recorded Flood Extents' dataset. This has been supplemented with other information from the existing SFCA's, PFRA's and, LFRMP and Flood Investigation reports which have either been provided by the stakeholders or are freely available to view.

4.4.2 NRW FMfP

155. The NRW FMfP Flood zones 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 year (present day) for rivers and 1 in 200 year (present day) for the sea.

4.4.3 Flood Defences

156. The NRW FMfP Flood Defences GIS data set has been consulted for this SFCA. The data set identifies flood defences that have been built to protect 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 (SoP), which is the return period of a flood event against which the defence should be effective.

157. Flood defence information has also been provided by some of the LLFA's in the study area and has been consulted as part of the SFCA.

4.4.4 Groundwater

158. 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 metres. 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 4-2.

Table 4-2 - 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.	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. 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.	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
Groundwater levels are between 0.5m and 5m below the ground surface.	There is a risk of flooding to 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.

No Risk	This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.

159. 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.

160. 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 and 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.

161. 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

162. Historic records of sewer flooding have been taken from historic flooding records provided by DCWW and considered on a broad spatial scale.

4.4.6 Reservoirs

163. The risk of inundation due to reservoir breach or failure of reservoirs within the area 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.

164. 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.

165. The reservoir flood maps do not indicate the likelihood of a flood occurring.

4.4.7 Working With Natural Processes

166. 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 fluvial flood risk 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 8.3. The Welsh Information for Nature-based solutions website offers more detailed information on Natural Flood Management and it's suitability for areas within Wales.

5 Flood & Coastal Erosion Risk Review

167. Under Section 7.4 of TAN-15, the risk of flooding from all sources must be considered as part of an SFCA, including flooding from the sea, rivers, land, groundwater, sewers and artificial sources. 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, details of any historical incidents are provided, and where appropriate, the impact of climate change on the source of flooding is described.

168. A high-level review of flood risk has been undertaken for each of the ten Local Authorities in South East Wales, these reviews can be found in the appendices and assess the risk of flooding from all sources for each area. These should be used in combination with the broad scale and individual area mapping for each authority. These appendices and the predominant flood risk for each Local Authority are summarised in Table 5-1.

Table 5-1: Summary of flood risk information

Local Authority	Appendix	Predominant flood risks
Blaenau Gwent	Appendix A	Fluvial flood risk, surface water flood risk
Bridgend	Appendix B	Fluvial and tidal flood risk
Caerphilly	Appendix C	Fluvial flood risk, surface water flood risk
Cardiff	Appendix D	Fluvial and tidal flood risk, surface water flood risk
Merthyr Tydfil	Appendix E	Fluvial flood risk, surface water flood risk
Monmouthshire	Appendix F	Fluvial and tidal flood risk, surface water flood risk, groundwater flood risk
Newport	Appendix G	Fluvial and tidal flood risk, surface water flood risk, groundwater flood risk
Rhondda Cynon Taff	Appendix H	Fluvial flood risk, surface water flood risk, groundwater flood risk
Torfaen	Appendix I	Fluvial flood risk
Vale of Glamorgan	Appendix J	Fluvial and tidal flood risk, surface water flood risk, groundwater flood risk

6 Further TAN-15 Guidance

6.1 Introduction

169. On the direction of the Minister for Climate Change, provided in guidance accompanying the decision notice to delay its implementation, this SFCA has been prepared in accordance with the updated TAN-15 due to be implemented from June 2023. Further clarifications and advice have subsequently been issued by Welsh Government and NRW. The following Chapter seeks to capture the latest advice and understanding of the new TAN-15. Additionally, guidance is provided on how LPA's within the region intend to interpret and apply the new TAN-15.

170. The guidance and recommendations within this chapter is based on the following:

- Ministerial letter; 23rd November 2021. Announcement of the suspension of the new TAN-15 to 1st June 2023.
- Chief Planner letter; 15th December 2021. Advice to LPA's on the suspension of TAN-15, key implications and actions for LPA's.
- Various consultations with WG and NRW during the preparation of the SFCA.

6.2 Flood Map Challenge

171. 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.

172. NRW publish through their website comprehensive guidance on the FMC process[18]. 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 a FMC and it is likely that expert technical advice will be required to undertake most FMC's.

173. Currently there is no agreed process for challenging the flood map for small watercourses and surface water.

174. Where a 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. As such the LPA may give material weight to accepted FMC's when applying the justification tests of TAN15.

6.3 Use of Defended Zones and Flood Defences

6.3.1 Definition of Defended Zones19

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

176. Flood defences built before 1 January 2016 must have the following level of protection:

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

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

19 Advice from NRW's website. https://naturalresources.wales/flooding/challenging-our-flood-maps/?lang=en (accessed 03/05/2022)

- 1 in 200 (0,5% AEP) chance of occurring in any given year for the sea

177. Flood defences built after 1 January 2016 must meet the previous level 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

178. 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.

179. Where new flood defences are planned for through a development, this will not result in a new or extended Defended Zone 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.

180. Further guidance around this matter may be forthcoming and we recommend that NRW's website is consulted for the latest guidance.

6.3.2 Private flood defences

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

182. Where a Local 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.

6.3.3 Adaptive Pathways

183. Climate change induced sea level rise is predicted to have significant consequences for many coastal areas within the region. Risk Management Authorities often respond to this risk, the inherent uncertainties, and engineering and investment challenges by taking a 'managed adaptive' approach to FCERM investment. This approach allows for staged investment in flood defences, planning for and implementing measures as sea levels increase. There are a range of economic, engineering, maintenance and practical advantages to this approach.

184. Examples of this approach include several areas in Newport, including NRW's recent schemes at Crindau (2021), Riverside (2012) and Stephenson Street (2023), and Cardiff City Council's coastal defence scheme (2023). Further locations for future investment are identified through the Shoreline Management Plan (SMP).

185. It currently appears that no regard can be given to future investment plans for flood defence improvements, as future FCERM investment cannot be assured. Consequently, it is recognised that it may be difficult to satisfy the Acceptability Criteria of TAN-15 over the lifetime of development in these areas. This has particular significance for residential development, with its 100 year lifetime of development.

186. Whilst TAN-15 is currently clear how this will impact on new development, an LPA may give consideration to probable FCERM improvements when considering the merits of change of use, conversions and replacement development (refer to Section 6.4).

6.3.4 Future flood defence

187. Welsh Government have advised local authorities that they should prepare a pipeline of likely works as part of the local flood 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.

188. The Welsh Government flood and coastal erosion risk programme invites applications which reduce risk to communities as set out in the National Strategy and associated guidance. The programme does not provide funding to enable new development in areas at high 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. Identification of new localised defended zones would take place as part of a Stage 2 or Stage 3 SFCA where this is required.

189. 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.

190. 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 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.

191. 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.

Current pipeline of FCERM projects

192. NRW and LLFA's have been approached to provide details of any significant FCERM plans within the region that are likely to be delivered in the next five years. Details of the projects are summarised in Table 7-1. 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 considered a material consideration.

193. It should be noted that whilst this provides an indication of a pipeline projects, this list is not exhaustive and is subject to frequent change. Details of FCERM investment plans is regularly published by Welsh Government, NRW and RMA's. Further work to establish a detailed pipeline of projects for each Local Authority will be undertaken for a Stage 2 SFCA or as a separate piece of work if a Stage 2 SFCA is not required. Identification of pipeline projects should be undertaken in consultation with NRW, WG and other RMA's.

Table 6-1 Pipeline of FCERM Projects

Project name	Location / extent	RMA	Timescales
Stephenson Street FAS	Newport, east bank of the Usk	NRW	Construction to commence 2022
Liswerry Pill Fluvial Defences	Newport	NRW	Appraisal stage, construction estimated to commence in 2025
Taff Strategic Masterplan	Taff, Rhondda Cynon Taff	NRW	Appraisal stage is ongoing
Aberkenfig - Initial Assessment	Aberkenfig	NRW	Development and Construction work likely in the next 10 years
Maesteg - Initial Assessment	Maesteg	NRW	Development and Construction work likely in the next 10 years
Pencoed - Initial Assessment	Pencoed	NRW	Development and Construction work likely in the next 10 years
Aberbargoed - Initial Assessment	Aberbargoed	NRW	Development and Construction work likely in the next 10 years
Bedwas - Initial Assessment	Bedwas	NRW	Development and Construction work likely in the next 10 years
Caerphilly Tributaries - Data Assessment and Potential NFRM Options	Caerphilly Tributaries	NRW	Development and Construction work likely in the next 10 years
Crumlin - Initial Assessment	Crumlin	NRW	Development and Construction work likely in the next 10 years
Llanbradach - Initial Assessment	Llanbradach	NRW	Development and Construction work likely in the next 10 years
River Ebbw Model Review	River Ebbw Model Review	NRW	Likely in the next 10 years
Began Farm/Cefn Mabley - Initial Assessment	Began Farm/Cefn	NRW	Development and Construction work likely in the next 10 years
Cardiff Bay - Siltation Monitoring	Cardiff Bay	NRW	Development and Construction work likely in the next 10 years
Cardiff Taff Scheme Review	Cardiff Taff	NRW	Development and Construction work likely in the next 10 years
Llanrumney - Defence Realignment	Llanrumney	NRW	Development and Construction work likely in the next 10 years
Melingriffith Feeder Siltation Monitoring	Melingriffith	NRW	Development and Construction work likely in the next 10 years
Pentwyn - Initial Assessment	Pentwyn	NRW	Development and Construction work likely in the next 10 years
Rumney Great Wharf - Foreshore Management	Rumney Great Wharf	NRW	Development and Construction work likely in the next 10 years

Merthyr Tydfil - Initial Assessment	Merthyr Tydfil	NRW	Development and Construction work likely in the next 10 years
Treharris - Initial Assessment	Treharris	NRW	Development and Construction work likely in the next 10 years
Troedyrhiw (Right Bank) - Initial Assessment	Troedyrhiw (Right Bank)	NRW	Development and Construction work likely in the next 10 years
Cibi Brook - Culvert Improvements	Cibi Brook	NRW	Development and Construction work likely in the next 10 years
Forge Road, Osbaston - Initial Assessment	Forge Road, Osbaston	NRW	Development and Construction work likely in the next 10 years
Llanbadoc - Initial Assessment	Llanbadoc	NRW	Development and Construction work likely in the next 10 years
Llanfair Kilgeddin - Initial Assessment	Llanfair Kilgeddin	NRW	Development and Construction work likely in the next 10 years
Llanover - Initial Assessment	Llanover	NRW	Development and Construction work likely in the next 10 years
Llanvihangel Gobion - Initial Assessment	Llanvihangel Gobion	NRW	Development and Construction work likely in the next 10 years
Monmouth River Wye - Initial Assessment	Monmouth River Wye	NRW	Development and Construction work likely in the next 10 years
River Usk Catchment - Isolated areas upstream of Abergavenny - Initial Assessment	River Usk Catchment - Isolated areas upstream of Abergavenny	NRW	Development and Construction work likely in the next 10 years
Severn Estuary (Portland Grounds - Sudbrook) - Initial Assessment	Severn Estuary (Portland Grounds - Sudbrook)	NRW	Development and Construction work likely in the next 10 years
Skenfrith - Initial Assessment	Skenfrith	NRW	Development and Construction work likely in the next 10 years
Caerleon - River Usk & Lwyd - Initial Assessment	Caerleon - River Usk & Lwyd	NRW	Development and Construction work likely in the next 10 years
Dyffryn - Review of Maintenance	Dyffryn	NRW	Development and Construction work likely in the next 10 years
Goldcliff Seawall - Structural Assessment	Goldcliff Seawall	NRW	Development and Construction work likely in the next 10 years
Pillgwenly - Severn Estuary Strategy Review	Pillgwenly - Severn Estuary	NRW	Development and Construction work likely in the next 10 years
Ponthir - Initial Assessment	Ponthir	NRW	Development and Construction work likely in the next 10 years
Aberdare - Initial Assessment	Aberdare	NRW	Development and Construction work likely in the next 10 years

Ely/Clun Model Review/Initial Assessment (Ynysddu Est)	Ynysddu Est	NRW	Development and Construction work likely in the next 10 years
Glyntaff - Initial Assessment	Glyntaff	NRW	Development and Construction work likely in the next 10 years
Hawthorn - Initial Assessment	Hawthorn	NRW	Development and Construction work likely in the next 10 years
Hirwaun - Initial Assessment	Hirwaun	NRW	Development and Construction work likely in the next 10 years
Mountain Ash - Initial Assessment	Mountain Ash	NRW	Development and Construction work likely in the next 10 years
Nant Aman Culvert Screen Assessment	Nant Aman	NRW	Development and Construction work likely in the next 10 years
Nant Clydach, Ynysybwl - Initial Assessment	Nant Clydach, Ynysybwl	NRW	Development and Construction work likely in the next 10 years
Nant Muchudd - Withdrawal of Maintenance	Nant Muchudd	NRW	Development and Construction work likely in the next 10 years
Nantgarw - Initial Assessment	Nantgarw	NRW	Development and Construction work likely in the next 10 years
Llancarfan - Initial Assessment	Llancarfan	NRW	Development and Construction work likely in the next 10 years
River Cadoxton - Sheet Piling Assessment	River Cadoxton	NRW	Development and Construction work likely in the next 10 years
Sir Ivors Road, Pontllanfraith	Sir Ivors Road, Pontllanfraith	CCBC	Business Justification Case due to complete 2022/23
Van Road, Caerphilly	Van Road, Caerphilly	CCBC / DCWW / NRW	Outline Business Case in development
Gwaun Fro, Penpedairheol	Gwaun Fro, Penpedairheol	CCBC	Business Justification Case submitted to WG for review in 2021/22 financial year
Jubilee Road, New Tredegar	Jubilee Road, New Tredegar	CCBC	Business Justification Case submitted to WG for review in 2021/22 financial year
Mill Road, Deri	Mill Road, Deri	CCBC	Business Justification Case submitted to WG for review in 2021/22 financial year
Lon-yr-Afron, Llanbradach	Lon-yr-Afon, Llanbradach	CCBC / DCWW / NRW	Outline Business Case in Development

Future FCERM Opportunities and Priorities

194. LPA's and LLFA's have been contacted to identify a pipeline of potential FECRM projects that may support the setting of future FCERM investment opportunities, as summarised in Table 7-2. Transparency in these priorities is hoped to bring forth investment and partnership working opportunities, and generally facilitate collaborative working.

195. Commensurate with the high level nature of a Stage 1 SFCA, the list is not definitive. In most cases, Stage 2 assessments will be required to develop this list and provide additional details.

Table 6-2 Future FCERM Opportunities

Location	Local Authority	Description
Pillgwenlly	Newport	West bank of the River Usk. Recent OBC available with a strong economic case. Potential to align with riverside development.
Roath Brook Gardens	Cardiff	Roath Brook Gardens and Mill Gardens FAS

6.3.5 Flood defences for development

196. Development should generally not rely on construction of new flood defences 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 Defended Zones if they meet the specific requirements of NRW and Welsh Government (See Section 6.3.1).

197. Development proposals may also be considered more favourably where they form part of a strategy of flood risk reduction to existing development. An example would be the redevelopment of previously developed riverside sites in such a way as to benefit existing properties set back further from the river. An example would be the redevelopment of previously developed riverside sites, such as the previous redevelopment of the Eastbank area of Newport that benefited existing properties set back further from the river.

198. 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.

6.4 Urban Centres and Land-Use – Resilience of Existing Communities

6.4.1 Change of use and conversions

199. The redevelopment of existing buildings in flood risk areas can present decision makers with difficult decisions. There may be circumstances where the planning authority may be sympathetic to changes of use or conversion proposals which bring clear benefits to the area and the building.[20]

200. Change of use or conversion proposals that would introduce (or intensify) highly vulnerable development into Zone 3 (Rivers and Sea) must be considered carefully, and the risk of flooding to potential occupants and the property thoroughly assessed. This is particularly important with regard to safe access and egress.

[20] TAN-15 para 14.10 & 14.11

201. In assessing change of use and conversion proposals in any location outside Zone 1, decision makers should apply the section 11 test to satisfy themselves that the consequences of flooding have been considered and are acceptable. A Flood Consequences Assessment commensurate with the scale and nature of the proposal will be required to enable the planning authority to reach its decision. If the proposed change of use or conversion is not resilient and there is an unacceptable risk from flooding to people, the planning application will be refused.

6.4.2 Replacement development

202. Like applications for change of use and conversion, there may be circumstances where the planning authority may be sympathetic to replacement development that will result in no intensification of vulnerability and an overall reduction in risk. 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.

203. Recognising that TAN15 does not address the scenario of replacement development, the SFCA advises that LPA may wish to adopt a locally specific approach to considering replacement development. In doing so it is advised, that like change of use and conversion application, the Justification Tests are not applied, but that the LPA consider the following:

- Justification for the sustainability of continuing development on the site.
- Risks associated with intensification of development.
- Compliance with Section 11 of TAN-15 applied in a manner commensurate with the scale and nature of the proposal.

6.5 Surface Water and Small Watercourses Risk

204. 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 is remains broad-scale the intricacies of local topography, drainage, and small watercourse features means that the flood map for surface water and small watercourse flood risk is 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.

205. 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 Justification Tests do not apply to the development proposals in surface water flood zones, although the risks should be taken seriously and , appropriately investigated and managed. Development should be located away from areas of surface water flooding risk where possible.

206. In cases of more than the very most minor surface water flood risk the LPA will expect planning applications to be supported by a proportionate FCA. The LLFA will be able to provide advice on the requirement and scope of an FCA for surface water and small watercourse flood risk.

207. Where the flood risk is related directly to the ponding of rainfall on the surface of a site it may be appropriate to assess and manage this risk through a Drainage Statement as described in TAN-15. There is a requirement for all Drainage Statements to demonstrate compliance with the Statutory Standards for SuDS in Wales. It is advisable for developers to consult with individual SABs with regards to their requirements for SuDS across their Local Authority area.

208. Where the flood risk is attributed to a small watercourse, this is likely to require an assessment similar to if the flood risk were from a Main River.

6.5.1 Critical drainage areas

209. 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.

210. CDAs may be identified in Stage 2 SFCA's or Local Flood Risk Management Plans. No CDAs are identified in this Stage 1 SFCA.

6.6 Climate Change – lifetime of development

211. The planning authority should be satisfied that any development it allocates will be resilient to flooding and coastal erosion for the duration of its lifetime. Using the most up to date national climate change projections, coastal erosion maps and SMP policies, planning authorities should ensure new development will be safe places to live now and in the future.

212. 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 development21.

213. The FMfP has been prepared based on an assumed lifetime of development of 100 years. Consequently, in coastal areas development of a lower lifetime may result in flood risk mapping quite different that indicated by the FMfP. In the case of non-residential development, it may be appropriate for the LPA to give consideration to how the Flood Zone would appear with a matching lifetime of development when evaluating the Justification Tests, whilst always ensuring that development must be on previously developed land if in Zone 2 and 3 and giving due regard to coastal erosion risks and SMP policies.

214. In line with SMP policy, proposals to develop areas at risk of flooding/erosion and with a 'no active intervention' or 'managed alignment' policy in the SMP for any epoch relevant to the lifetime of the development should not be permitted.

21 TAN-15 para 7.15

7 Coastal Erosion Risk Management

7.1 Coastal erosion and flooding

215. It is acknowledged that coastal areas have unique characteristics which can provide opportunities for new development, this is particularly relevant to South-East Wales where there are a number of major coastal settlements, including Cardiff and Newport. However, opportunities for further development may be constrained by flooding, coastal erosion, ground stability and the impacts of climate change.

216. Considering the sensitivity of these areas and the important of development in coastal areas, this SFCA considers the role and integrity of coastal defences and provides an understanding of the risks posed by coastal flooding and 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, and flood risk mapping in the appendices.

7.2 Coastal erosion and development

217. As stated in TAN15, 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.

218. 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 and any such works are likely to be the responsibility of the developer. Particular regard to residual flood and erosion risks may also be required.

219. The National Coastal Erosion Risk Management mapping produced by the Environment Agency covers some parts of the region along the Severn Estuary, although the majority of Wales is not included in this. This indicates that there will be no coastal retreat in Cardiff with the relevant long-term SMP policy in place (hold the line). Cosmeston and areas to the south of Cardiff have a 'no active intervention' long-term SMP policy, if this remains the case then there may be between 3.40 – 6.60m of coastal retreat in this area.

220. 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 area with particular attention paid to SOC_08 (Resilience to coastal change and flooding) and SOC_09 (Effects on coastal change and flooding).

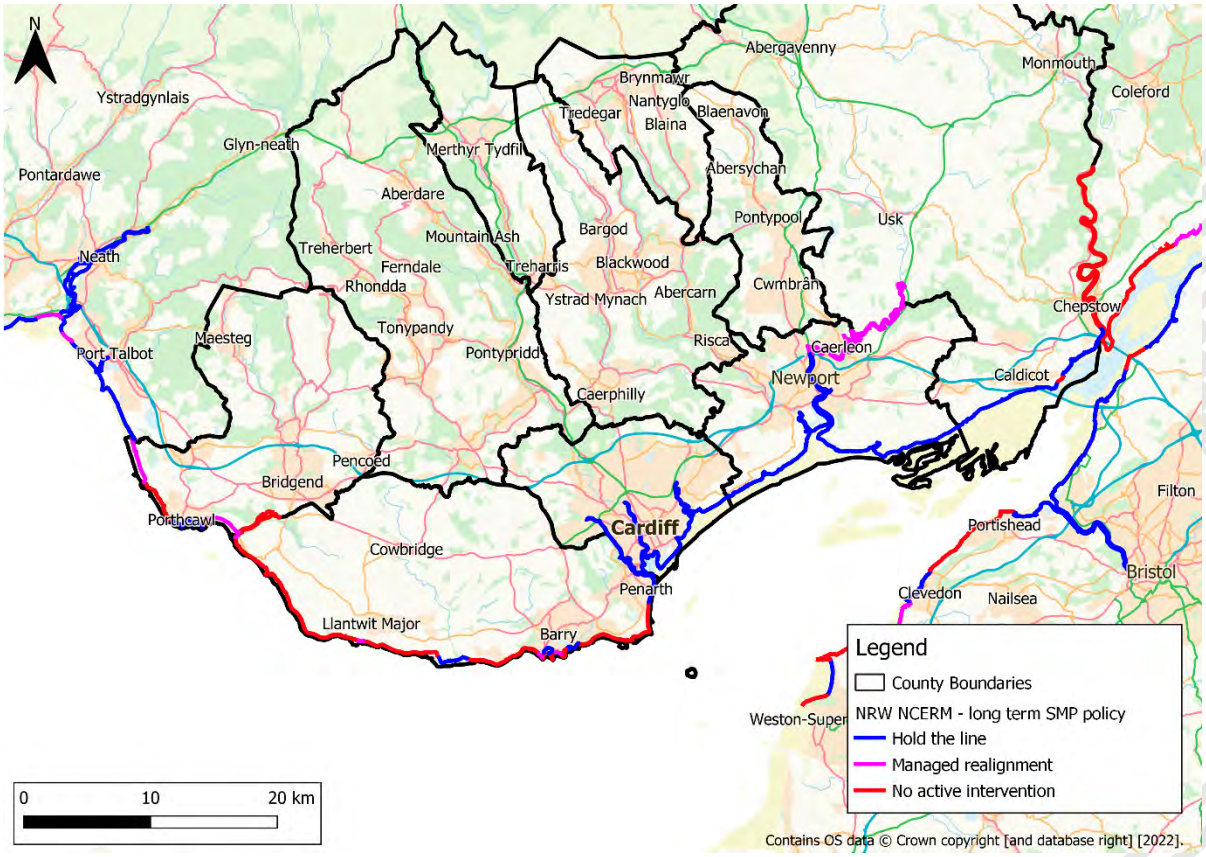

Figure 7-1 National Coastal Erosion Risk Mapping for South East Wales showing the long-term Shoreline Management Plan policy

221. 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 it. LPAs may wish to provide further detailed guidance in the form of Supplementary Planning Guidance where it may have a particular strategy for coastal areas.

8 Requirements for a Flood Consequence Assessment

8.1 What is site-specific FCA?

222. Site-specific FCA's are carried out by (or on behalf of) developers to assess the risk and consequences of flooding to a proposed development site and the risk and consequences of that development to third party land.

223. FCA's are submitted with planning applications to demonstrate how the requirements of TAN-15 have been satisfied. An FCA should demonstrate how flood risk will be managed over the development's lifetime, 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 FCA's required?

224. Site-specific FCAs are required in the following circumstances:

- Proposals for development (including minor development and change of use) in Flood Zones 2 and 3 of the FMfP, with the exception of highly vulnerable development in Flood Zone 3 which is not permitted;
- Proposals for development within TAN-15 Defended Zones;
- Proposal for development within critical drainage areas identified by the LLFA or LPA; and
- At the request of the LPA, NRW, or LLFA where there are reasonably flood risk concerns to proposed development not otherwise covered by the triggers above.

225. In the case of minor flood risk from Surface Water and Small Watercourses, the LLFA may waive the requirement for a FCA although there remains a requirement to consider flood risk in a SuDS approval application.

226. 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 watercourses. In these circumstances the Justifications Tests do not apply and the LLFA or NRW will be able to provide guidance on their requirements for a proportionate FCA.

8.3 Requirements of a site-specific FCA

227. Section 12 of TAN-15 sets out the requirements of an FCA.

228. 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 current Welsh Government guidance.

229. FCA's for development sites should follow the approach set out in Figure 9 of TAN-15 and guidance provided by NRW[22]. It would be prudent for developers to contact NRW and the LLFA to gather further information on any specific flood risks to the proposed development site.

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

9 Flood Risk Mitigation and Flood Response Planning

9.1 Flood Risk Mitigation

230. 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 damage resistant measures to ensure the consequences of flooding are acceptable if the development can be justified. Any new development in Zones 2 and 3 and the TAN-15 Defended Zones must have resilience to flooding built in at site and property level, as stated in TAN-15 Section 13.2 (Resilient Design). Where possible, development should still be directed to Flood Zone 1 (where there is a lower flood risk of flooding).

231. Potential measures to reduce and manage flood risk on a site are outlined below. Although 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.

9.1.1 Site Level Flood Risk Mitigation

232. 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.

233. 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.

9.1.1.1 Site layout and design

234. A sequential, risk-based approach should be applied to try to locate more vulnerable development use 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 with parking areas so accumulated hydrocarbons and other vehicle related pollutants are not released to the aquatic environment.

235. Waterside areas, or areas along known flow routes, can be incorporated into the masterplan as multi-functional green infrastructure, being 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.

9.1.1.2 Raised floor levels

236. 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 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.

237. 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. The flood levels of development which is proposed within an area at risk of flooding should be set based on these requirements.

238. 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. This should be considered as part of a site specific Flood Consequences Assessment.

239. 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 7 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.

9.1.1.3 Modification of ground levels

240. Modifying ground levels to raise the land above the required flood level is an effective way of reducing flood risk to a particular site. 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.

241. In most areas of fluvial flood risk, 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.

242. 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 tidal flooding is not affected by volume or conveyance changes, and this may require hydraulic modelling.

9.1.1.4 Buffer strips

243. 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. Additionally, keeping an open space alongside a development to segregate the built development from the watercourse is supported 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 having to construct 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 river much more difficult.

244. It is recommended that an undeveloped buffer strip alongside main rivers and ordinary watercourses is provided for maintenance purposes and that developers

would explore opportunities for riverside restoration or public open space as part of any development.

245. 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

246. Further guidance on obtaining a flood risk activity permit and activities requiring a flood risk activity permit are available from the NRW website[23]. Buffer strips are also likely to apply in relation to land drainage consenting for ordinary watercourses and LLFAs may have similar requirements.

9.1.1.5 Surface water management

247. 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.

248. 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. The vast majority of new developments 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 website[24].

9.2 Flood Response Planning

249. Flood response planning is one option to help manage 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 7.6) states that development plans must be based on a sound understanding of the emergency services' ability to respond to flooding, therefore key stakeholders and the emergency services should be consulted at SFCA stages 2 and 3 when considering specific allocations and policies.

250. Safety is a key consideration for any new 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.

251. Further guidance 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[25].

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

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

25 The CIRIA Code of practice for property flood resilience C790 is available from

9.2.1 Property Level Flood Risk Mitigation

252. 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 flood water is still likely to enter a property with PFR measures, this is where resilience measures come in. 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 off the floor, raising kitchen units and electric sockets and using tiles for flooring instead of carpets.

253. Property Flood Resilience measures may be acceptable as a form of mitigation, but only in the context that the development passes the justification test and meets the acceptability criteria, as set out in the new TAN15.

254. Developers should consider PFR measures for any new developments which flood in the 0.1% AEP plus climate change event to ensure the safety and security of residents. Further information on PFR can be found on the BeFloodReady[26] website and the National Flood Forum[27].

9.2.2 Access and egress

255. TAN-15 requires 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 (0.1% AEP plus climate change) of TAN-15 Figure 7. For any development where there is a flood risk to the development or the associated highways a Flood Emergency Plan should be compiled to inform site occupants of a safe access and egress route to and from the site.

9.2.3 Emergency Plans

256. 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 take 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.

9.2.4 Flood Alerts and Warnings

257. NRW operates a Flood Warning Service[28] for some areas deemed to be at a risk of fluvial or coastal flooding. This service covers approximately 60% of properties at risk from these sources of flood risk, and NRW is continually working to extend this service. These warnings have been designed to give the public advance notice of flooding. Figure 9-1 shows the areas across South East Wales that fall in to flood alert and flood warning areas. Large parts of Newport and Cardiff are located in flood alert and flood warning areas, due to the risk of coastal flooding. Each flood alert and warning area is assigned an individual code to allow NRW to make flood alerts

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www.ciria.org/Resources/Free_publications/CoP_for_PFR_resource.aspx

26 https://www.befloodready.uk/

27 National Flood Forum

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

and warnings specific to areas at risk. There are too many areas and codes used in South East Wales to list in this report, but the NRW FRAW mapping[29] can be used to show the specific codes that cover a potential development site.

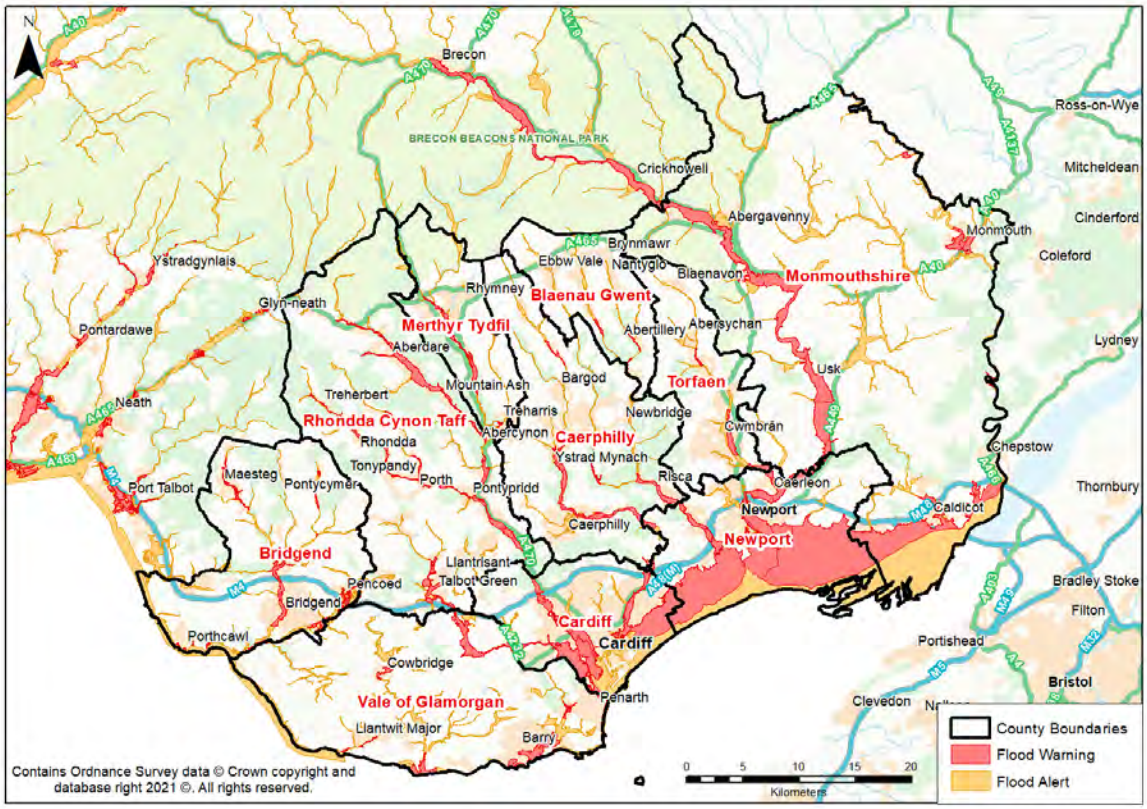

Figure 9-1 Flood alert and flood warning areas across South East Wales

258. 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 to receive Flood Alerts, Flood Warnings and Severe Flood Warnings if available. If a flood event is forecast, alerts and warnings are issued by landline, mobile, text or email using a set of four easily recognisable codes, as shown in the table below. Generic advice and examples of actions to be taken on receipt of the alert of warning are shown in the table below. Using these warnings, along with local knowledge, site occupants are able to take effective action, to reduce the consequence of flooding.

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

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

261. 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.

29 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

9.3 Working With Natural Processes and Natural Flood Management

262. 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:

- Nature Based Solutions (NBS) – broad terms referring to the sustainable management and use of natural features to tackle socio-environmental challenges.
- 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.
- 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 and coastal erosion risk and will refer to the use of WWNP and NFM in the SE Wales region. 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 in each Local Authority area.

263. 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[30] 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.

264. Nature-based solutions such as Natural Flood Management Techniques (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.

265. 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)[31]. NFM techniques can include:

- Floodplain restoration and reconnection
- Re-naturalising rivers and removing redundant in-channel structures
- Daylighting of culverts and restoration of open channels
- Installing run-off attenuation features such as large woody debris, leaky dams and cross-slope hedges
- 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

Table 9-1: Examples of WWNP and NFM[32]

[30] https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/working-with-natural-processes-to-reduce-flood-risk
[31] https://www.ciria.org/ItemDetail?iProductCode=C802F&Category=FREEPUBS&WebsiteKey=a054c7b1-c241-4dd4-9ec1-38afd4a55683
[32] https://assets.publishing.service.gov.uk/media/6036c730d3bf7f0aac939a47/Working_with_natural_processes_one_page_summaries.pdf

	
Leaky dam	Riparian woodlands
	
River restoration	Floodplain storage

9.3.1 WWNP in Wales

266. 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[33] emphasises the use of NFM and WWNP as a sustainable, catchment based approach to managing flood risk in a more sustainable way.

267. The new 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.

268. The Minister for Environmental and Rural Affairs announced in her written statement of 3rd April that there would be at least £1m funding for NFM schemes in Wales that Risk Management Authorities could apply for. The aim of these pilot studies is to encourage both the understanding and delivery of NFM and provide a learning opportunity for RMAs and the Welsh Government.

[33] https://gov.wales/national-strategy-flood-and-coastal-erosion-risk-management-wales

9.3.2 WWNP for new development

269. 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 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.

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

271. Local Authorities can set their own local policies on the use of nature based solutions, this could be done through the Local Plan or through the Local Flood Risk Management Strategy. Consideration could be made to working WWNP more generally, for example through implementing policies on daylighting of culverts or through achieving multiple benefits in new developments such as nature conservation and biodiversity.

272. 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 runoff, 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.

9.3.3 WWNP Opportunity Mapping

273. As part of the WWNP evidence base, opportunity mapping[34] 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 RMA's, developers, 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 are to be used as a starting point for consideration towards WWNP opportunities.

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

- floodplain reconnection
- run-off attenuation features and gully blocking
- woodland planting covering, floodplain planting, riparian planting and wider catchment woodland.

275. The WWNP maps are based entirely on open data and highlight the potential for WWNP derived from national fluvial, tidal and surface water flood risk 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.

[34] http://wwnp.jbahosting.com/BrowserUnsupported.aspx

9.3.4 Using the WWNP opportunity mapping

9.3.4.1 Floodplain reconnection map

276. The floodplain reconnection map identifies areas of the floodplain that have become disconnected from their river and are either no longer capable of, or have a reduced ability to, store water during times of flood.

277. Areas suitable for floodplain reconnection tend to be rural areas at low risk of flooding (using the Risk of Flooding from Rivers and Sea maps) close to a watercourse.

9.3.4.2 Run-off attenuation features and gully blocking map

278. 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.

279. 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 are areas where the run-off hydrograph may be influenced by temporary storage (if designed correctly).

280. 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.

9.3.5 Tree planting

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

282. 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

9.3.6 Areas of working with Natural Processes in the South East Wales

283. Maps showing the WWNP are provided in the appendices for each Local Authority area.

9.3.6.1 Blaenau Gwent

284. The map shows small areas across the county borough are suitable for runoff attenuation features during the 1% AEP flood event. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the River Sirhowy watercourses to the north of Nantybwch and Dukestown as well as along the lower reaches of the river to the south of Tredegar. There are also many small areas around Blaenau Gwent which are suitable for riparian woodland. These areas are predominantly on small watercourses and tributaries of the Main Rivers.

285. Several areas in Blaenau Gwent have the potential for Floodplain Woodland Planting. These areas include the upstream reach of the River Sirhowy, an area to the west of Garn Fach along the River Sirhowy, an area south of Troed Rhiw along the River Sirhowy and an area to the south of Waun Lwyd along the River Ebbw.

286. Areas suitable for Wider Catchment Woodland Planting Potential are present in the upper reaches of the River Sirhowy and its tributaries, to the north of Nantybwch and

Dukestown. Additional areas of wider catchment woodland potential are also present to the west of the River Sirhowy, to the south of Tredegar. Small areas of wider catchment woodland are also present along the course of the Ebbw Fawr, Ebbw Fach, and in small areas around Blaenau Gwent.

9.3.6.2 Bridgend

287. The map shows small areas across the borough are suitable for runoff attenuation features during the 1% AEP flood event.

288. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the River Ogmore as well as along the River Kenfig, Nant Brynglas, River Ewenny and Nant Crimlyn. There are also many small areas around Bridgend County Borough which are suitable for riparian woodland. These are predominantly on small watercourses and tributaries of the Main Rivers upstream of the urban areas the watercourses flow into.

289. Several areas in Bridgend are suitable for Floodplain Woodland Planting Potential. These areas include the River Ogmore, the River Llynfi, the River Ewenny as well as upstream of the Bryncethin Brook. Several other smaller areas are also present around Bridgend.

290. Areas suitable for Wider Catchment Woodland Planting Potential are present around the outskirts of the urban areas of the county borough. Significant areas include land around Maesteg and to the north of Pencoed.

9.3.6.3 Caerphilly

291. The map shows very small areas across the borough are suitable for runoff attenuation features during the 1% AEP flood event.

292. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the River Rhymney, Nant Bargoed and other small watercourses across the county borough. There are also many small areas, located upstream of the urban areas around the Caerphilly County Borough, which are suitable for riparian woodland.

293. Several areas in Caerphilly are suitable for Floodplain Woodland Planting Potential. These areas include the River Rhymney around Abertysswg Tirphil, Ystrad Mynach Llanbradach and Pwllypant as well as the River Ebbw in Cwmcarn and Pontywaun. Several other smaller areas are also present around Caerphilly.

294. Areas suitable for Wider Catchment Woodland Planting Potential are present around the outskirts of the urban areas of the county borough. Significant areas include land around Rhymney, Nelson, Bargoed, Ystrad Mynach and Llanhilleth.

9.3.6.4 Cardiff

295. The map shows very small areas across Cardiff are suitable for runoff attenuation features during the 1% AEP flood event.

296. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the River Rhymney, the upper reaches of the Nant Glandulais as well as the western part of the River Ely and other small watercourses across the county borough. There are also many small areas around Cardiff which are suitable for riparian woodland.

297. Several areas in Cardiff are suitable for Floodplain Woodland Planting Potential. These areas include areas around the River Taff, River Rhymney and River Ely. Several other smaller areas are also present around Cardiff.

298. Areas suitable for Wider Catchment Woodland Planting Potential are present around the outskirts of the urban areas of Cardiff. Significant areas include land around east of Lisvane, east of Pontprennau, St Fagans and north of Cyncoed.

9.3.6.5 Merthyr Tydfil

299. The map shows small areas across the county borough are suitable for runoff attenuation features during the 1% AEP flood event.

300. Areas suitable for Wider Catchment Woodland Planting Potential are present around the outskirts of the urban areas of the county borough. Significant areas include land north and west of the town of Merthyr Tydfil and land around Cwmfelin.

301. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the Taff Bargoed as well as along the River Taff. The majority of these areas are found in the upper catchments of these watercourses.

302. Several localised areas in the county borough are suitable for Floodplain Woodland Planting Potential. These areas tend to be in the upper reaches of the Taff Bargoed and isolated areas of the River Taff. There are also several localised areas in Troedyrhiw that are considered suitable for floodplain woodland planting.

9.3.6.6 Monmouthshire

303. It has been noted that Monmouthshire County Council has received WG grant funding to undertake an NFM Opportunity Assessment in Monmouthshire. This work has identified specific locations where the council is looking to deliver future NFMschemes.

304. The map shows very small areas across Monmouthshire are suitable for runoff attenuation features during the 1% AEP flood event.

305. Areas suitable for Wider Catchment Woodland Planting Potential are present around the outskirts of Abergavenny, Penperlleni and Llanarth and cover significant areas. This is likely to be due to the rural nature of land in these areas. Areas in the south and east of the county are not considered suitable for woodland planting.

306. Areas suitable for Riparian Woodland Planting Potential are present across the county particularly round the tributaries that flow into the River Usk and River Wye.

307. Due to the wide flat catchments in Monmouthshire, there are several extensive areas that have been identified as suitable for Floodplain Woodland Planting Potential. These include areas around the River Usk in Abergavenny and Llangattock as well as land between Usk and Newbridge on Usk. Land surrounding Monmouth is also considered suitable for floodplain woodland planting.

9.3.6.7 Newport

308. The map shows small areas across Newport are suitable for runoff attenuation features during the 1% AEP flood event. Areas suitable for Riparian Woodland Planting Potential are present along the Monks Ditch, Mill reen the upper reaches of the Nant Glandulais as well as other small watercourses across the Newport area. There are also many small areas around Newport which are suitable for riparian woodland.

309. Several areas in Newport are suitable for Floodplain Woodland Planting Potential. These include areas around the River Rymney and Monks Ditch. Several other smaller areas are also present around Newport.

310. Areas suitable for Wider Catchment Woodland Planting Potential are present in the western part of Newport, outside of the urban area.

9.3.6.8 Rhondda Cynon Taf

311. The map shows small areas across the county borough that are suitable for runoff attenuation features during the 1% AEP flood event. Areas suitable for Wider Catchment Woodland Planting Potential are present around the outskirts of the urban areas of the county borough. Significant areas include land around Llantrisant and Talbot Green in the east of the county borough.

312. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the River Rhondda especially around Hirwaun. Some smaller isolated areas are also identified around the River Cynon downstream of Mountain Ash.

313. Several areas isolated around the county borough are suitable for Floodplain Woodland Planting Potential. These areas are generally where the floodplains are flat and wider, particularly around the River Cynon in Aberdare and downstream in Abercynon. There are also small areas that are identified as suitable for woodland floodplain planting around Llantrisant.

9.3.6.9 Torfaen

314. The map shows small areas across the county borough that are suitable for runoff attenuation features during the 1% AEP flood event. Areas suitable for Wider Catchment Woodland Planting Potential are scarce across the county borough. Isolated areas are found in Blaenavon and Trevethin.

315. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the River Lwyd especially around Blaenavon and Abersychan. Some smaller isolated areas also identified around Cwmbran towards the south of the county borough.

316. Areas suitable for Floodplain Woodland Planting Potential are also scarce with the majority of the extents found in and around Abersychan and Cwmbran to Ponthir.

9.3.6.10 Vale of Glamorgan

317. The map shows small areas across the vale that are suitable for runoff attenuation features during the 1% AEP flood event. The map shows large parts of the north eastern vale are suitable for Wider Catchment Woodland Planting Potential. These areas are largely rural and are found around the settlements of Pendoylan and north of Cowbridge.

318. Areas suitable for Riparian Woodland Planting Potential are present along tributaries of the River Ely in the north east of the vale. Areas around the River Cadxton, the River Thaw and their surrounding tributaries are also considered suitable for Riparian Woodland Planting.

319. The most extensive areas suitable for Floodplain Woodland Planting Potential are found to the north of Cowbridge surrounding the River Thaw and in and around the River Ely. Several of the tributaries on the Kenson River are also considered suitable for Floodplain Woodland Planting.

10 Conclusion and Recommendations

10.1 Conclusion

320. This Stage 1 SFCA delivers a strategic assessment of all sources of flooding across the South-East Wales region. It also provides an overview of policy and guidance for planners, developers and other stakeholders. This SFCA provides a robust evidence-base to inform the Council's individual Local Development Plans (LDP) and will inform the development of LDP policies and land allocation decisions.

321. The Stage 1 SFCA also sets out flood risk to each of the ten Local Authority areas in South-East Wales (Appendices A-J), this is based on the best available information such as the Flood Map for Planning and the latest climate change projections. It identifies ways of mitigating flood risk where appropriate and identifies opportunities to slow and store water through utilising WWNP/ NFM techniques.

10.2 Recommendations

322. It is anticipated that many of the Local Authorities in the South-East Wales region will need to progress to a Stage 2 or Stage 3 SFCA to provide a sufficiently robust evidence base to support their Local Development Plans.

323. A Stage 2 SFCA will provide an assessment of LDP Candidate Sites which have been identified as being at risk of flooding. The assessment considers the application of the Justification Test, including the potential for a site to satisfy the acceptability criteria. This may be informed by detailed flood risk information on flood depths, velocities and probability of flooding, as well as the risk of a flood defence structure breaching or overtopping.

324. The Stage 3 SFCA will involve testing whether the flood risk to any proposed LDP Candidate Sites can be managed to an acceptable level and that the site itself will not exacerbate flooding elsewhere over the lifetime of the development. It should also be shown that practicable mitigation measures can be implemented to manage flood risk. This stage is likely to be carried out by the proposer of the site to support development proposals in high or complex flood risk areas.

325. It is anticipated that the majority of Local Planning Authorities in the region are likely to require a Stage 2 assessment but not all may need to progress to a Stage 3 assessment.

Appendices

A Blaenau Gwent

A.1 Flood Risk Review

A.2 Overview Maps

Flood Map for Planning- Rivers and Sea

Flood Map for Planning- Rivers

Flood Map for Planning- Surface Water and Small Watercourses

Flood Risk from Groundwater

Flood Risk from Reservoirs

Historic Flooding

Working with Natural Processes- Potential Mapping

A.3 Individual Maps

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Flood Map for Planning- Surface Water and Small Watercourses

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B Bridgend

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C Caerphilly

C.1 Flood Risk Review

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C.3 Individual Maps

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Flood Map for Planning- Surface Water and Small Watercourses

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D Cardiff

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G Newport

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G.3 Individual Maps

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H Rhondda Cynon Taff

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I Torfaen

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J Vale of Glamorgan

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J Appendix J1 – Vale of Glamorgan Flood Risk Review

1.1 Historical Flooding

The Vale of Glamorgan has a history of recorded flood events caused by multiple sources of flooding. Significant flood events within the county borough (which have been taken from NRW's recorded flood outlines dataset and Vale of Glamorgan County Borough Council records and reports on historic flood incidents) are recorded below in Table 5 19. The Vale of Glamorgan noted in the Local Flood Risk Management Strategy that river flooding accounts for the majority of recorded flood events and that surface water flooding also occurs fairly frequently.

No records of groundwater flooding or flooding from artificial sources were made available at the time of writing. A summary of the spatial distribution of historic sewer flooding incidents by electoral ward is summarised in Table 5 20.

Table 5 19 Flooding Incidents by year

Year of Flood Event	Flood Incident
March 1981	NRW's historic flood dataset indicates flooding in Peterston-super-Ely and the surrounding area. Source of flooding was from exceedance of channel capacity of the River Ely. Flooding also experienced in Llancadle from the River Thaw during this time.
January 1995	NRW's historic flood dataset indicates flooding in Llanblethian, Cowbridge when the River Thaw exceeded capacity.
October 1998	The Local Flood Risk Management Strategy described flooding in many settlements across the county including Llantwit Major, Cowbridge and Dinas Powys during this event. The primary source of flooding was from Main Rivers and ordinary watercourses overtopping their banks with a secondary cause of surface water flooding.
October/ November 2000	The Local Flood Risk Management Strategy described widespread flooding across the vale, with Dinas Powys, Sully Moors Road, Cowbridge and Llanblethian being particularly affected. The source of flooding was from Main Rivers in the area.
July 2007	The Local Flood Risk Management Strategy described flooding of Gibbonsdown, Cadoxton and Palmerston areas of Barry, when the Coldbrook overtopped with 100 residential properties and 4 schools reported to have flooded.
December 2012 and January 2013	The Local Flood Risk Management Strategy described widespread flooding across the Vale of Glamorgan from a combination of Main River, ordinary watercourse, groundwater, sewer and surface water flooding. Main river flooding was reported in Boverton and Llantwit Major. Other serious flooding incidents, directly impacting on properties, included Broughton, St. Athan, St. Mary Church, Llanmaes, Llancadle and Rhoose.
2012-2019	168 flood reports have been supplied by the Vale of Glamorgan Council for this timeframe. Incidents mainly relate to flooding from blocked gullies, surface water or highways. The incidents tend to focus on the urban areas of Barry, Penarth and Cowbridge, with sheeting overland flows evidenced across the county.

December 2020	A Section 19 report[1] describes flooding in Sully as a result of Storm Dennis, affecting 18 properties internally and 26 externally. The source of the flooding was from surface water. Flooding in Dinas Powys as a result of Storm Dennis caused internal flooding of 98 properties in the area. The River Cadoxton and the East Brook overtopped their banks at multiple locations across Dinas Powys. Surface water and sewerage systems were overwhelmed and surcharged causing property flooding in several residential areas in Dinas Powys, exacerbating fluvial flooding.

Table 5 20 Sewer Flooding Incidents by Electoral Ward

Electoral Ward	Number of sewer flooding incidents
Baruc	26
Buttrills	4
Cadoc	16
Cornerswell	6
Court (Gibbonsdown)	9
Cowbridge	13
Dinas Powys	17
Dyfan	2
Ely	1
Gibbonsdown	5
Illtyd	6
Llandough	2
Llandow/Ewenny	17
Llantwit Major	23
Peterston-super-Ely	1
Plymouth	4
Rhoose	7
St. Athan	19
St. Augustine's	3
St. Bride's Major	15
Stanwell	2
Sully	16
Wenvoe	8

1.2 Fluvial

The Rivers Alun, Colhugh, Thaw, Cadoxton and Ely are the main watercourses in the Vale of Glamorgan. These watercourses are all classified as NRW Main Rivers. Maps showing the extent of the flood outlines from the NRW FMfP- Rivers are provided in Appendix J.

1 Vale of Glamorgan. Section 19 Flood Investigation. https://www.valeofglamorgan.gov.uk/Documents/Living/Flooding/Section-19/Sully-Section-19-Report-23-12-2020.pdf

The River Alun is formed of several smaller watercourses (River Clemingston, Nant Y Brychau, Sutton Brook, Llandow Brook and Stembridge Brook) and rises in the west of the catchment around Llysworney. It flows in a westerly direction through several small villages before joining with the River Ewenny outside of the Vale of Glamorgan boundary. Flood Zone 3 tends to cover rural agricultural land rather than settlements for this watercourse.

The Ogney Brook flows to the west of the urban centre of Llantwit Major with the Boverton Brook and River Hodnant flowing to the east. These watercourses combine to the south of Llantwit Major to form the River Colhugh which flows south before discharging into the Severn Estuary. Flood Zone 3 in this area is largely confined to the watercourse.

The River Thaw is the longest watercourse in the Vale of Glamorgan, rising in the northern part of the Vale of Glamorgan, below the M4. The watercourse flows in a southerly direction towards Cowbridge where it is joined by several smaller watercourses from the east and west. The River Thaw continues to flow in a south easterly direction where it is joined by the Nant Y Creek, River Llanbethery and several other small watercourses. At Aberthaw, the Kenson River joins the River Thaw where it continues to flow south towards the Severn Estuary. Due to the wide and flat nature of the floodplains in the area Flood Zone 3 is extensive around this watercourse. Much of this area is rural land with small settlements with Cowbridge being the only large settlement in this flood zone. Areas of Cowbridge fall into the TAN-15 Defended Zone due to the NRW flood defences found to the north of the town. These flood defences have a standard of protection of 1 in 100 years.

The River Ely crosses the north-eastern area of the catchment near St Brides-super-Ely. Due to the flat topography in this area the floodplains are wide and flat allowing flood water to propagate a great distance from the river. As a result, Flood Zone 3 is extensive in this area, although it covers largely rural parts of the vale.

The River Cadoxton forms north-east of Dinas Powys. The River Cadoxton flows through Dinas Powys where it is joined by the East Brook and continues to flow south-west towards Barry. To the east of Barry, a large network of watercourses enter the River Cadoxton from the Sully Moors, including the Sully Brook. The River Cadoxton then continues to flow west towards the Severn Estuary. Due to the large number of confluences along this watercourse and the wide and flat floodplains, large areas of Dinas Powys and Sully are located within Flood Zone 3. No NRW flood defences are found in this area.

There are several Vale of Glamorgan managed flood defences in the county, these are:

- The Coldbrook scheme, Barry
- B4265 culvert enhancement, Boverton

The Coldbrook scheme covers a wide area and comprises of a range of watercourse improvements, culvert enhancements, trash screen upgrades and a flood storage area. It has a standard of protection of 1 in 100 years. The areas benefitting from these defences do not contribute to the TAN-15 Defended Zones. The Boverton scheme comprised on enhancing the existing culvert beneath the B4265 and downstream widening works. The areas benefitting from these works does not form part of the TAN-15 Defended Zone.

Schemes involving localised drainage improvements and Property Flood Resilience (PFR) measures have not been included.

Fluvial Flood Risk & TAN-15

Fluvial flooding in the Vale of Glamorgan is predominantly confined to rural areas, with limited areas of Flood Zones 2 and 3 within the existing urban areas.

Flood defences are found along the River Cadoxton in a small area of Dinas Powys and to the east of Cadoxton as well as the River Thaw upstream of Cowbridge. These flood defences are maintained by NRW. The flood defences on the River Thaw benefit large areas of Cowbridge and form part of the TAN-15 Defended Zone. Therefore, all forms of development are possible if the requirements of the Justification Test can be satisfied. The flood defences have a standard of protection of 1 in 100 years, making areas behind the flood defences favourable to the requirements of TAN-15.

Areas of Dinas Powys and Barry in the Vale of Glamorgan are currently at flood risk with no significant protection from flood defences. Consequently, development in these areas will have to be carefully located away from flood risk areas, particularly areas of Flood Zone 3. Development within these floodplain areas will only be justified where land is previously developed.

Less vulnerable development in Flood Zones 2 and 3 is suitable subject to the stringent Justification Tests outlined in TAN-15. Development in these areas shall be subject to site specific assessment and detailed flood modelling shall be required. Due to the lack of protection from NRW flood defences in the majority of the areas, any proposed development is likely to require flood mitigation considerations and may be more challenging to meet TAN-15 requirements.

1.3 Tidal

The Severn Estuary is a potential source of tidal flooding to the southern parts of the Vale of Glamorgan. Tidal flooding is most likely to occur during storm surge conditions that is characterised by wind-driven waves and low atmospheric pressure and high spring tides. In areas protected from flooding by sea defences, tidal flooding can occur as a result of a breach in the defences, failure of a mechanical barrier or overtopping of defences.

The NRW FMfP - Sea, shown in Appendix J, identifies that West Aberthaw, Barry and south of the Cadoxton area (Barry) are the main areas at risk of flooding from the sea. Flooding is most extensive on south of the Cadoxton areas in mainly industrial areas. NRW flood defences are present in Barry at Whitmore Bay with a standard of protection of 1 in 200 years and a wall in West Aberthaw with a 1 in 50 year standard of protection. The areas behind these flood defences are classified as TAN-15 defended areas. There are also TAN-15 defended areas around Penarth and the borough's border with Cardiff due to the Cardiff Bay Barrage.

Tidal Flood Risk & TAN-15

Flood defences found along the coastline of the Vale of Glamorgan are maintained by NRW. As a result of these flood defences, a significant part of the tidal floodplain in Cadoxton is categorised as a TAN-15 Defended Zone. Therefore, all forms of development are possible if the requirements of the Justification Test can be satisfied. The flood defences should protect the town from a 1% AEP event, making areas behind the flood defences favourable to the requirements of TAN-15.

No tidal TAN-15 defended zones are present in West Aberthaw, making highly vulnerable development in this area challenging. Less vulnerable development should only be considered in Flood Zone 3 subject to the application of the Justification Test and acceptability of consequences. It is likely that flood mitigation measures will be required for developments in these areas. Development in these areas shall be subject to site specific assessment and detailed modelling shall be required. Opportunities for highly vulnerable development should be located in areas outside Flood Zone 3.

1.4 Surface water and smaller watercourses

Maps showing the extent of the flood outlines for the surface water flood risk in the Vale of Glamorgan are provided in Appendix J. The NRW FMfP- Surface Water and Small Watercourses shows predicted flood extents that predominantly follow topographical flow paths of existing watercourses or dry valleys.

Due to the largely rural nature of Vale of Glamorgan, Flood Zone 3 for surface water and small watercourse flooding tends to be located in areas of rural or agricultural land, following the flow paths of existing small watercourses. Some localised areas of Flood Zone 3 are present in Llantwit Major and Cowbridge. Areas of Barry and Dinas Powys show the most extensive areas of surface water and small watercourse flooding which are located in Flood Zone 3. This is likely to be due to the dense urban infrastructure and the significant impermeable areas of these towns.

Surface Water Flood Risk & TAN-15

All development types are permissible in Flood Zone 2 and 3 provided that acceptability criteria in TAN-15 can be met. Development in these areas shall be subject to site specific assessment which should consider flow pathways, potential ground levelling for topographic depressions and how SuDS can be used to

manage surface water flow across a development site. Where proposed developments are located in Zones 2 and 3 as a result of flood risk from small watercourses, an FCA is likely to be required, whilst surface water flood risk as a result of topographic depressions are likely to be sufficiently managed through the use of SuDS. Developers should consult the LLFA for any specific knowledge related to surface water and small watercourse flooding at a proposed development site. Due to the localised surface water flooding in the main settlements of Dinas Powys, Barry and Cowbridge, developments should be located outside of Zone 2 and 3 where possible.

1.5 Groundwater

The bedrock geology across the Vale of Glamorgan is predominantly comprised of areas of Mudstone and areas of Sandstone, with a small areas comprised of Limestone. Mudstone tends to have low porosity and permeability whilst sandstone is regarded as more permeable and allows for the storage and movement of groundwater. Limestone is more permeable and allow for the storage and movement of groundwater. As a result, upward percolation of groundwater and subsequent flooding should be considered.

Areas of superficial deposits in are predominantly present in the northern part of the Vale of Glamorgan. The superficial deposits overlaying the bedrock in this area are comprised of glacial sand and gravel which is generally permeable. In small areas across the south of the Vale of Glamorgan, superficial deposits are comprised of clay which is predominantly impermeable. The variation of superficial deposits throughout the Vale of Glamorgan suggest that groundwater flooding could present a localised risk to some areas. Maps showing the indicative Groundwater flood depth in the Vale of Glamorgan County Borough are provided in Appendix J.

The available data for the Cadoxton area of Barry shows that a large portion of the area has groundwater that is 0.025m to 0.5m below the ground surface. Similarly, in Cowbridge groundwater levels fluctuate between 5m and 0.025m below the ground surface. These are areas that are more likely to be at risk from groundwater flooding due to the high water table in the area. Several other areas in the Vale of Glamorgan are shown to have groundwater levels less than 5m below the ground surface, however these are mainly rural and agricultural areas.

The Local Flood Risk Management Strategy states that 'Localised groundwater flooding is reported to have occurred in Ewenny Village, St Brides Major, Monkton, Rhoose and Barry.'

Groundwater Flood Risk & 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 the 0.025m below the ground surface without further groundwater monitoring and detailed assessment being undertaken.

1.6 Sewer flooding

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

DCWW have provided detail of historic 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 experienced internal and/or external flooding. A summary of the spatial distribution of historic sewer flooding incidents by electoral ward is summarised in Error! Reference source not found. of Section Error! Reference source not found.. This data shows that the wards with the highest number of flood incidents are the Baruc and Llantwit Major wards with 26 and 23 sewer flood incidents recorded, respectively. St Athan, Dinas Powys, Sully and Llandow/ Ewenny have all experienced between 16-17 incidences of sewer flooding. DCWW are working to reduce the number of sewer flood incidents by investing in maintenance and improvements to the sewer network.

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

Flood Risk from Sewers & TAN-15

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

1.7 Artificial flooding

Artificial sources of flooding in the Vale of Glamorgan have been identified as two large lakes. Maps showing the potential flood risk from these lakes are provided in Appendix J. The lakes are:

- Hensol Lake – northern part of the catchment close to the M4
- NRW Flood Defence, Middlegate Walk – Cowbridge

It should be noted that modelling has recently been undertaken for the Coldbrook FAS storage area at Dyfan Road and breach modelling in Barry. This information has been provided to NRW.

Should the Hensol Lake overtop or breach, flooding will occur to large areas of rural land adjacent to the River Ely. No urban areas are located within this predicted flood extent.

The flood extent of a breach or overtopping of the unnamed lake on Middlegate Walk shows that large areas of Cowbridge around the River Thaw are likely to be flooded. As the flood water propagates downstream rural land only tends to be affected as water is predicted to stay close to/ within the river channel.

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 must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected, and essential safety work is carried out. These reservoirs, therefore, present minimal risk.

1.8 Changes in understanding of flood risk

FCERM Capital Investment

Llanmaes has suffered several recorded flood events over recent years, dating back to the 1990's. A number of small civil engineering construction schemes have been undertaken in an attempt to alleviate the problems. Following studies and hydraulic modelling, plans for a Flood Alleviation Scheme have been created and were submitted for public consultation in April 2021. The Flood Alleviation Scheme aims to protect properties within the village from flooding. The scheme proposes to reduce flooding by constructing a series of ditches, swales and flood bunds within the fields to the north/northwest of the village, as well as reprofiling the roads through the village and amendments to the village green. Construction is planned for 2022.

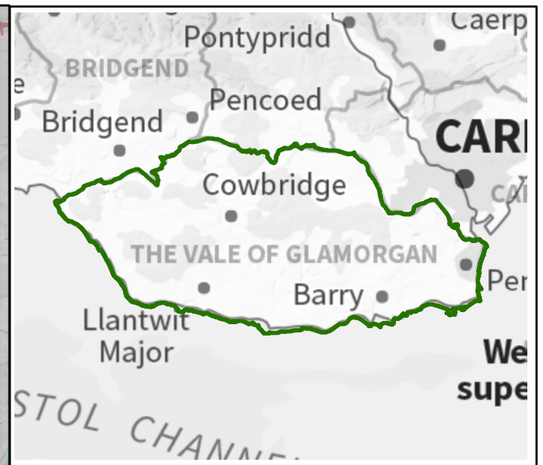
In addition, Dinas Powys has experienced flooding from the River Cadoxton several times over recent years. NRW are continuing to explore options for a flood alleviation scheme for the area, in conjunction with the LLFA.

Future FMfP improvements

The locations listed below are covered by existing detailed NRW flood models which are expected to be incorporated into the Flood Map for Planning through future routine updates. Where NRW have provided an indication of timescales for these updates, this is provided in brackets.

- Cadoxton River (December 2021)
- Barry Docks (December 2021)
- River Taff and River Ely (December 2021)
- Tidal Flood Mapping (unknown)

N



KEY

- Vale of Glamorgan Council
- Flood Defences-Rivers and Sea

FMFP Rivers and Sea

- Zone 2
- Zone 3

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Notes

The TAN15 Defended Zones have been created for the areas behind flood defences managed and maintained by Risk Management Authorities that have a minimum, Present Day Standard of Protection of 1% (1 in 100) annual event probability (AEP) for rivers, or 0.5% (1 in 200) annual event probability (AEP) for the sea plus climate change and freeboard.

VALE of GLAMORGAN
BRO MORGANNWG

JBA consulting

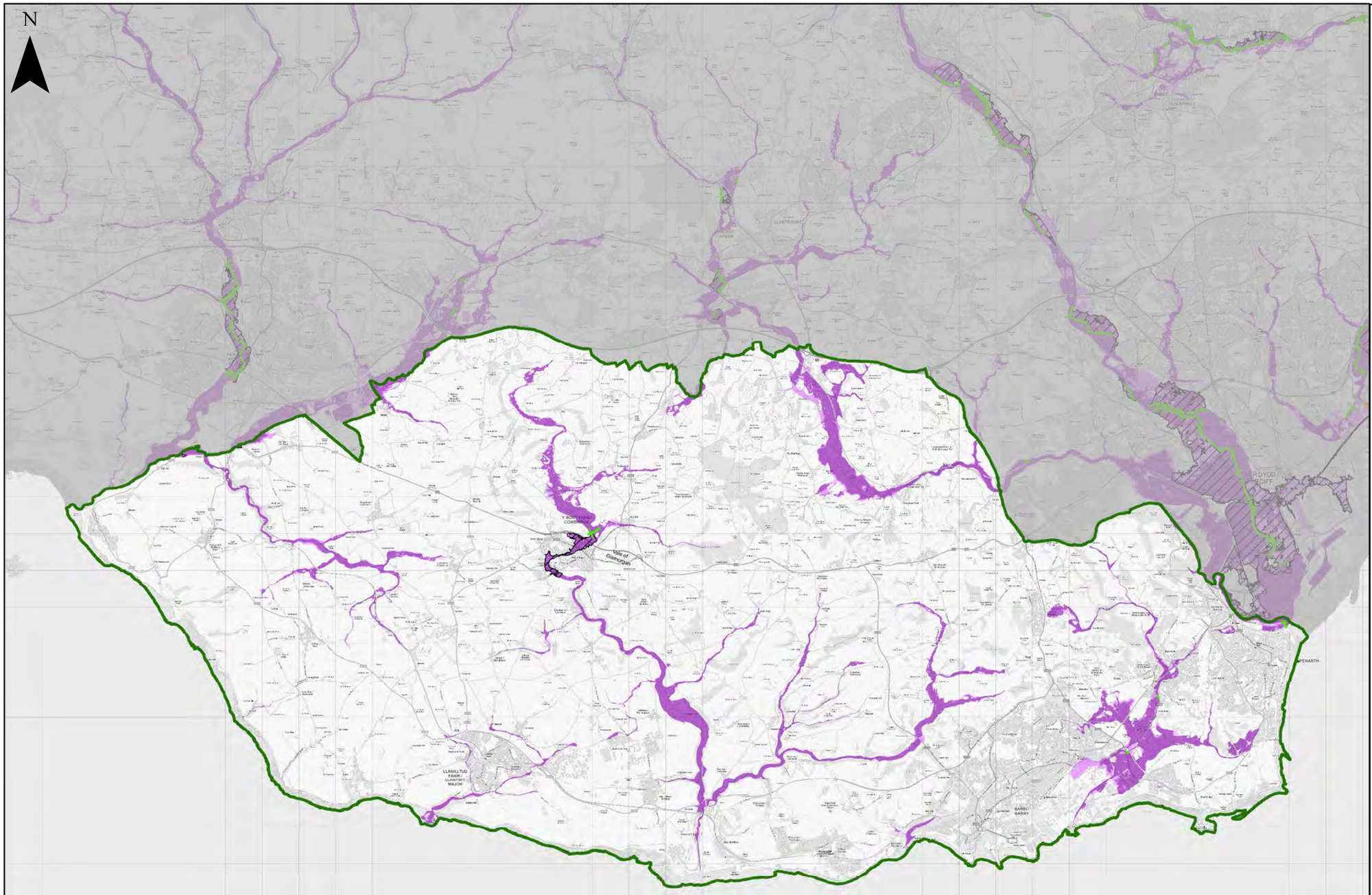
Vale of Glamorgan Council

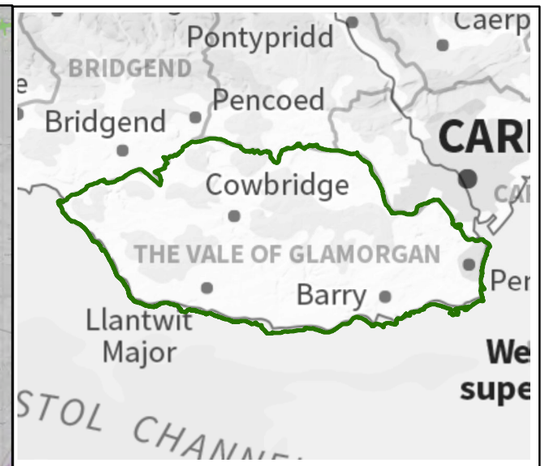
Stage 1 Strategic Flood Consequences Assessment

Flood Map for Planning – Rivers and Sea

Drawn	HB	06/12/2021
Checked	DB	08/12/2021
Approved	GB	10/12/2021

0 1 2 4 Kilometers





KEY

- Vale of Glamorgan Council

Rivers

- Zone 2
- Zone 3

TAN15 Defended Zones

- Rivers

Flood Defences

- Fluvial
- Fluvial and Tidal

Notes

The TAN15 Defended Zones have been created for the areas behind flood defences managed and maintained by Risk Management Authorities that have a minimum, Present Day Standard of Protection of 1% (1 in 100) annual event probability (AEP) for rivers plus climate change and freeboard.

Vale of Glamorgan Council

Stage 1 Strategic Flood Consequences Assessment

Flood Map for Planning- Rivers

	Drawn	HB	09/12/2021
	Checked	DB	10/12/2021
	Approved	GB	14/12/2021

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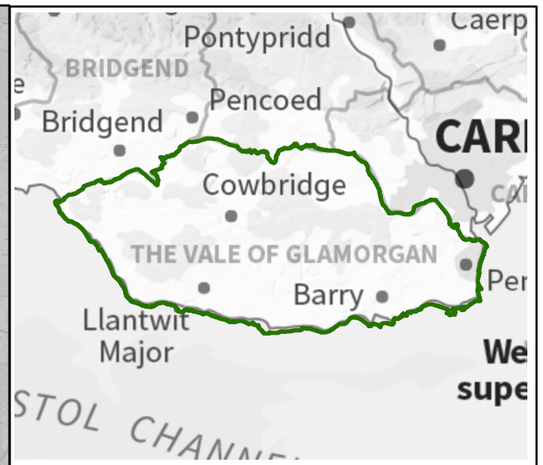

KEY

Vale of Glamorgan Council

Sea

Flood Zone 2

Flood Zone 3

TAN15 Defended Zones

Sea

Flood Defences

Coastal

Tidal

Fluvial and Tidal

Notes

The TAN15 Defended Zones have been created for the areas behind flood defences managed and maintained by Risk Management Authorities that have a minimum, Present Day Standard of Protection of 0.5% (1 in 200) annual event probability (AEP) for the sea plus climate change and freeboard.

VALE of GLAMORGAN
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JBA consulting

Vale of Glamorgan Council

Stage 1 Strategic Flood Consequences Assessment

Flood Map for Planning- Sea

Drawn	HB	06/12/2021
Checked	DB	08/12/2021
Approved	GB	10/12/2021

0 1 2 4 Kilometers

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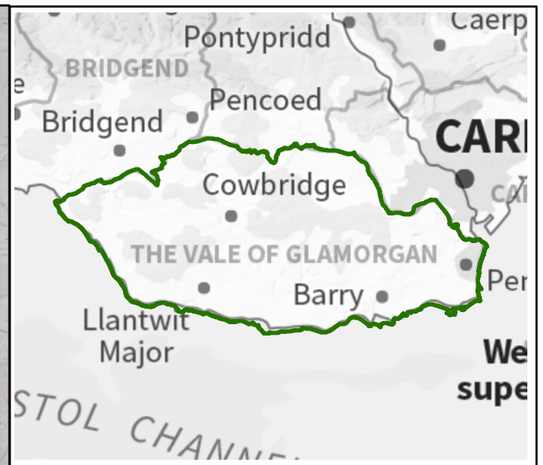

KEY

Vale of Glamorgan Council

Surface Water and Small Watercourses

Zone 2

Zone 3

0 1 2 4 Kilometers

VALE of GLAMORGAN
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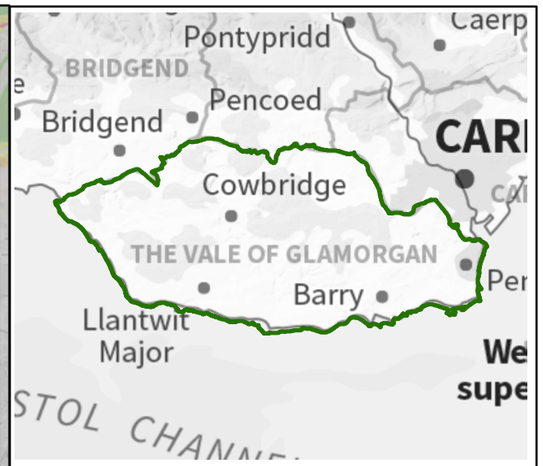
JBA consulting

Vale of Glamorgan Council

Stage 1 Strategic Flood Consequences Assessment

Flood Map for Planning- Surface Water and Small Watercourses

	Drawn	HB	06/12/2021
	Checked	DB	08/12/2021
	Approved	GB	10/12/2021



KEY

Vale Of Glamorgan Council

Groundwater Flood Depth

Indicative Groundwater flood depth

- Groundwater levels are at least 5m below the ground surface.
- Groundwater levels are between 0.5m and 5m below the ground surface.
- Groundwater levels are between 0.025m and 0.5m below the ground surface.
- Groundwater levels are either at or very near (within 0.025m of) the ground surface.
- Low risk.

Notes

The map provides an indicative assessment of groundwater flood depth on a 5m grid.Please refer to Section 4 of the SFCA Report for further detail of the dataset used to define the potential for groundwater emergence.

0 1 2 4 Kilometers

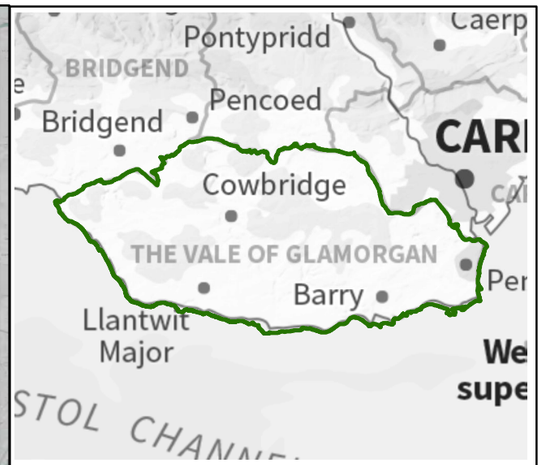
Vale Of Glamorgan Council

Stage 1 Strategic Flood Consequences Assessment

Flood Risk from Groundwater

	Drawn	HB	18/01/2022
	Checked	DB	20/01/2022
	Approved	GB	24/01/2022

N



KEY

- Vale of Glamorgan Council
- Flood Risk from Reservoirs

0 1 2 4 Kilometers

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Vale of Glamorgan Council

Stage 1 Strategic Flood Consequences Assessment

Flood Risk from Reservoirs

Drawn	HB	06/12/2021
Checked	DB	08/12/2021
Approved	GB	10/12/2021

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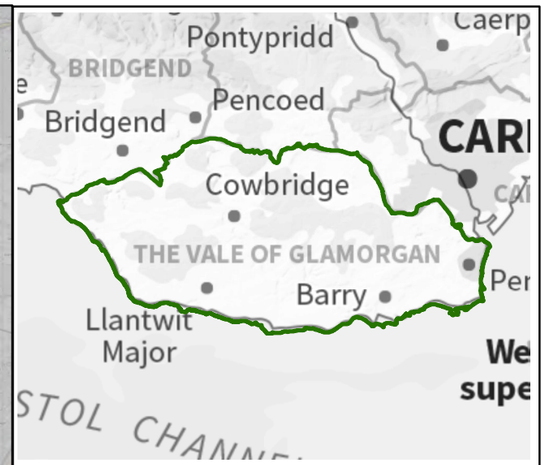

KEY

Vale of Glamorgan Council

NRW Recorded Flood Extents

0 1 2 4 Kilometers

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Vale of Glamorgan Council

Stage 1 Strategic Flood Consequences Assessment

Historic Flooding

	Drawn	HB	06/12/2021
	Checked	DB	08/12/2021
	Approved	GB	10/12/2021

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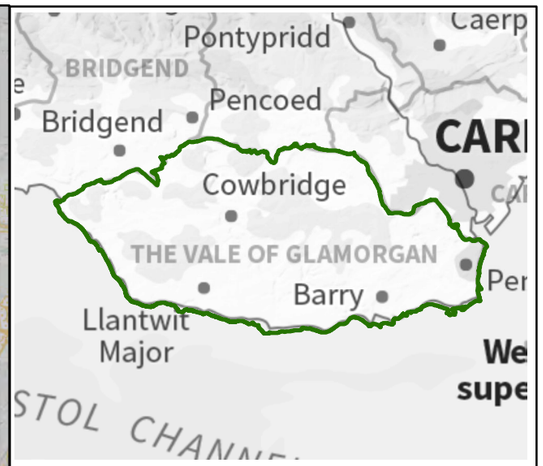

KEY

- Vale of Glamorgan Council
- Wider Catchment Woodland Potential
- Riparian Woodland Planting Potential
- Floodplain Woodland Planting Potential

Notes

This map shows areas for woodland planting potential. Further data relating to areas for potential attenuation features is provided as part of the Natural Resources Wales Working with Natural Processes dataset, but these potential attenuation features aren't visible on this scale of mapping. The attenuation features are shown on the local maps.

VALE of GLAMORGAN
BRO MORGANNWG

JBA consulting

Vale of Glamorgan Council

Stage 1 Strategic Flood Consequences Assessment

Working with Natural Processes - Potential Mapping

	Drawn	HB	06/12/2021
	Checked	DB	08/12/2021
	Approved	GB	10/12/2021

0 1 2 4 Kilometers