Replacement Local Development Plan 2018-2033

Background Paper

BP33: Strategic flood consequences assessment (stage 1)

Deposit Plan

November 2022

CONWY

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Conwy County Borough Council – Stage 1 Strategic Flood Consequence Assessment

Final Report

November 2022

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Revision History

Revision Ref/Date	Amendments	Issued to
Draft v1.0 October 2022	-	Richard Clarke
Final v1.0 November 2022	CCBC comments addressed	Richard Clarke

Contract

This report describes work commissioned by Richard Clarke, on behalf of Conwy County Borough Council, by an email dated 12 July 2022. Conwy County Borough Council's representative for the contract was James Harland. Sue Jones and Laura Thompson of JBA Consulting carried out this work.

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Purpose

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Acknowledgements

JBA thanks representatives of Conwy County Borough Council and Natural Resources Wales for information provided to inform this assessment.

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Executive summary

This Stage 1 Strategic Flood Consequences Assessment (SFCA) has been commissioned by Conwy County Borough Council (CCBC). 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, outside of the Snowdonia National Park, 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 details of any flood risk management structures or procedures present.

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

Study area

The SFCA study area consists of the administrative area in North Wales covering an area of approximately 1149 km². The County is bounded by Gwynedd Unitary Authority to the west and Denbighshire to the east. Snowdonia National Park covers an area of approximately 427 km² within the administrative area to the west. As Snowdonia National Park is a Local Planning Authority in its own right, the study area for this Stage 1 SFCA is focused on the administrative area excluding the National Park.

The main places of interest identified by CCBC include five strategic development sites at:

- Llanfairfechan
- Llanrhos
- Old Colwyn
- Abergele South East
- Llanrwst.

Policy and strategy

Key legislation and policies have been reviewed as part of the SFCA, this includes national policies and strategies such as the National Flood and Coastal Erosion Risk Management (FCERM) Strategy for Wales, Future Wales: The National Plan 2040 and Planning Policy Wales (Edition 11). Regional documents such as the Shoreline Management Plan and Catchment Flood Management Plans have also been reviewed to understand specific flood risk and coastal erosion policies in the region.

TAN 15 and other 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. This assessment should be used in conjunction with the GeoPDF mapping in Appendix A in order to understand flood risk at a strategic scale.

Further TAN 15 guidance

On the direction of the Minister for Climate Change, provided in guidance accompanying the decision note to delay the implementation of TAN 15, 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 Natural Resources Wales (NRW).

This SFCA provides guidance on how the LPA intends to interpret and apply the new TAN 15.

The guidance and recommendations within this chapter are 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 LPAs 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 a Flood Consequences Assessments (FCA)

Site-specific FCAs 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 on flood risk elsewhere. 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 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

AEP	Annual Exceedance Probability
	The probability of a flood event occurring in any one year
CC	Climate Change
	Long term change in global climate
CCBC	Conwy County Borough Council
CFMP	Catchment Flood Management Plan
	Considers all types of inland flooding from rivers, surface water, groundwater and tidal together with land management
DAM	Development Advice Map
	Shows all areas at risk of flooding for the purposes of land use planning in Wales based on the now extant 2004 TAN 15
CCBC	Conwy County Borough Council
	Governing body for the administrative area of Conwy in Wales
DCWW	Dwr Cymru Welsh Water
	Water supply and sewerage company
EA	Environment Agency
	Helps to protect and improve the environment in England including climate change adaptation and reducing its impacts, including flooding, drought, sea level rise and coastal erosion whilst improving the quality of water, land and air by tackling pollution
FCA	Flood Consequence Assessment
	Detailed assessment of flood risk and mitigation to be provided as part of a planning application
FMfP	Flood Map for Planning
	A revised TAN 15 is due to be implemented in June 2023. This will be supported by the new Flood Map for Planning, which includes climate change information to show how this will affect flood risk extents over the next century. It shows the potential extent of flooding assuming no defences are in place. The Flood Map for Planning has no official status for planning purposes until June 2023. However local authorities must review their Strategic Flood Consequence Assessments by November 2022 in line with the new TAN 15 and Flood Map for Planning
FRMP	Flood Risk Management Plan
	Include measures for the prevention and mitigation of floods
FWMA	Flood and Water Management Act
	UK Act of Parliament relating to the management of risk from flooding and coastal erosion. The Act aims to reduce the flood risk associated with extreme weather, compounded by climate change
LDP	Local Development Plan
	Sets out each local planning authority's proposals for future development and use of land in their area of Wales
LFRMS	Local Flood Risk Management Strategy
	Must be produced by each LLFA in Wales to assess local flood risk, set out objectives for managing local flood risk, and list costs and benefits of measures proposed to meet these objectives, and how the measures will be paid for

LLFA	Lead Local Flood Authority Leads in managing local flood risk such as from surface water, groundwater and ordinary watercourses. Usually made up of county councils or unitary authorities
LPA	Local Planning Authority Planning department of a local council
NFM	Natural Flood Management Use of natural processes to reduce the risk of flooding and coastal erosion
NRW	Natural Resources Wales Helps to protect and improve the environment in Wales including climate change adaptation and reducing its impacts, including flooding, drought, sea level rise and coastal erosion whilst improving the quality of water, land and air by tackling pollution
PFR	Property Flood Resilience Property level protection measures to help reduce flood risk
PFRA	Preliminary Flood Risk Assessment Carried out by Natural Resources Wales and Lead Local Flood Authorities in Wales to assess previous flood incidents and flood that could occur in future
PPW	Planning Policy Wales Sets out planning policy for Wales
RBD	River Basin District Area of land from which all the water flows into a particular river
RBMP	River Basin Management Plan Set out how organisations, stakeholders and communities will work together to improve the water environment
RMA	Risk Management Authority Authorities that work in partnership with other authorities to actively manage and reduce the risk of flooding
SAB	SuDS Approving Body A role of a local authority in Wales in approving SuDS schemes before development construction can begin
SFCA	Strategic Flood Consequence Assessment Non-statutory requirement of local planning authorities to strategically consider flood risk when planning for new development in the Local Development Plan
SLR	Sea Level Rise A result of climate change
SMP	Shoreline Management Plan Large-scale assessment of the risks associated with coastal processes and helps reduce these risks to people and the developed, historic and natural environments
SoP	Standard of Protection The return period of a flood event against which a flood defence should be effective
SPG	Supplementary Planning Guidance

	Further guidance about the implementation of specific planning policies or development
SuDS	Sustainable Drainage Systems
	Drainage systems designed to mimic natural water management processes
TAN 15	Technical Advice Note 15: Development, flooding and coastal erosion
	Provides technical guidance which supplements the policy set out in Planning Policy Wales in relation to development and flooding
SWMP	Surface Water Management Plan
	Non-statutory plans used to look at existing surface water flood risk issues and to inform planning decisions for new development
WFD	Water Framework Directive
	EU Directive for river basin management planning to help protect and improve the ecological health of rivers, lakes, estuaries and coastal and groundwaters
WG	Welsh Government
	Devolved government for Wales
WNMP	Welsh National Marine Plan
	Sets out Welsh Government policy for the next 20 years for the sustainable use of the seas
WwNP	Working with Natural Processes
	Use of natural processes to reduce the risk of flooding and coastal erosion

1 Introduction

The Welsh Minister for Climate Change's letter of 23 November 2021 entitled 'MA-JJ-3967-21 - MCC letter to local authorities TAN15 231101' which states "*to enable local planning authorities to consider fully the impact of the climate change projections on their respective areas, I am suspending the coming into force of the new TAN 15 and Flood Map for Planning until 1st June 2023. The existing TAN 15, published in 2004, and the Development Advice Map will continue in the meantime as the framework for assessing flood risk.*

Policy 8 of Future Wales – the national plan 2040 provides the context for local authorities to consider the impact of flooding on national and regional growth areas and devise appropriate mitigation strategies. It is imperative that local planning authorities use the suspension to develop a more detailed understanding of the consequences of flooding, and therefore I require every local planning authority to complete work to review, within the next 12 months, the Strategic Flood Consequences Assessments (SFCAs) for their area".

In preparation for this, Welsh Government has stated: "*When plans are reviewed, the flood risk considerations that feed into the settlement strategy and site allocations must be in accordance with the new TAN 15 and the Flood Map for Planning. The SFCA will be the principal source of evidence to inform those elements of the plan and locally specific flood risk policies*."

NRW are continuing to make improvements to the Flood Map for Planning and the possibility remains that Welsh Government may make changes to the new Technical Advice Note 15 (TAN 15). Therefore, the SFCA should remain 'live' and under constant review to account for any changes.

Planning in Wales is based on a Plan led system whereby development plans are prepared by each Local Planning Authority (LPA) in order to provide for the economic, social and environmental needs of the County. Development plans contain a framework of policies and proposals which seek to regulate and control the development and use of land, and to provide the basis for consistent and transparent decision making on individual planning applications. A Strategic Flood Consequence Assessment (SFCA) is designed to inform this decision-making process.

This Stage 1 SFCA is carried out in accordance with Welsh Government's planning policy and technical advice notes, Planning Policy Wales[1] (PPW), Technical Advice Note 15: Development, flooding and coastal erosion[2] (TAN 15) and Welsh Government (2021): Flood Consequences Assessment Climate Change Allowances[3]. Natural Resources Wales (NRW) produced a brief guidance note on SFCAs in May 2022 which is also considered in the preparation of this Stage 1 SFCA.

1.1 Commission

This Stage 1 SFCA has been commissioned by Conwy County Borough Council (CCBC) to encompass the following:

- An overview of the study area characteristics, including topography, geology and hydrology;
- A review of national, local and regional policies, plans and strategies;

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1 Planning Policy Wales, Edition 11, February 2021. Welsh Government

2 Technical Advice Note 15: Development, flooding and coastal erosion, December 2021. Welsh Government

3 Technical Advice Note 15: Development, flooding and coastal erosion, December 2021. Welsh Government

- Developing an Understanding of the risk of flooding from all sources in the study area;
- A high level review of flood risk and flood history;
- High level summaries of FCERM investment pipeline schemes and future aspirations / priorities within the study area;
- A summary of NRW planned programme of FMfP updates;
- Consideration to the requirements and implications of the new TAN 15 requirements;
- Guidance and recommendations for a Stage 2 SFCA and on producing site-specific Flood Consequence Assessments (FCAs);
- Consideration to the ways in which flood risk can be managed i.e. through flood resilience techniques and working with natural processes as well as engineered defence infrastructure.
- Interactive maps to show fluvial, tidal, surface water, groundwater and reservoir risk based on NRW's Flood Map for Planning, FRAW and hazard mapping and localised data provided by the LLFA and water companies. Mapping will also include the TAN 15 defended zones, locations of key flood defences, historic flood incidents and areas with Natural Flood Management potential.

It is important to highlight that this SFCA is strategic in nature and makes use of the most current available information. This Stage 1 SFCA should be used as a starting point for Councillors, Local Planning Authorities, developers and the public to initially consider development and flood risk and whether more detailed, site specific assessments of flood risk, such as a FCA, are required. It is also worth noting that the presence of flood zones in an area, be it fluvial or surface water, does not mean that development simply cannot happen. 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.

Note: This Stage 1 SFCA is concerned with the County of Conwy outside of the Snowdonia National Park.

1.2 SFCA future proofing

This SFCA update was developed using the most up-to-date data and information available at the time. The SFCA has been future proofed as far as possible though the reader should always confirm with the source organisation (Conwy County Borough Council) that the latest information is being used when decisions concerning development and flood risk are being made. Welsh Government policy documents Planning Policy Wales and Technical Advice Note 15: Development, flooding and coastal erosion (December 2021) are adhered to in the development of this SFCA, as requested by Welsh Government.

The reader should be aware this is a live document and can be updated by the Council as and when new information becomes available.

2 SFCA Study Area

The SFCA study area (see Figure 2-1) consists of the Conwy County Borough Council (CCBC) administrative area in North Wales covering an area of approximately 1149 km². The County is bounded by Gwynedd Unitary Authority to the west and Denbighshire to the east. Snowdonia National Park covers an area of approximately 427 km² within the administrative area to the west. As Snowdonia National Park is a Local Planning Authority in its own right, the study area for this Stage 1 SFCA is focused on the administrative area excluding the National Park.

The main places of interest identified by CCBC include five strategic development sites at:

- Llanfairfechan
- Llanrhos
- Old Colwyn
- Abergele South East
- Llanrwst

It is intended that these sites will provide the bulk of land to be allocated in the LDP.

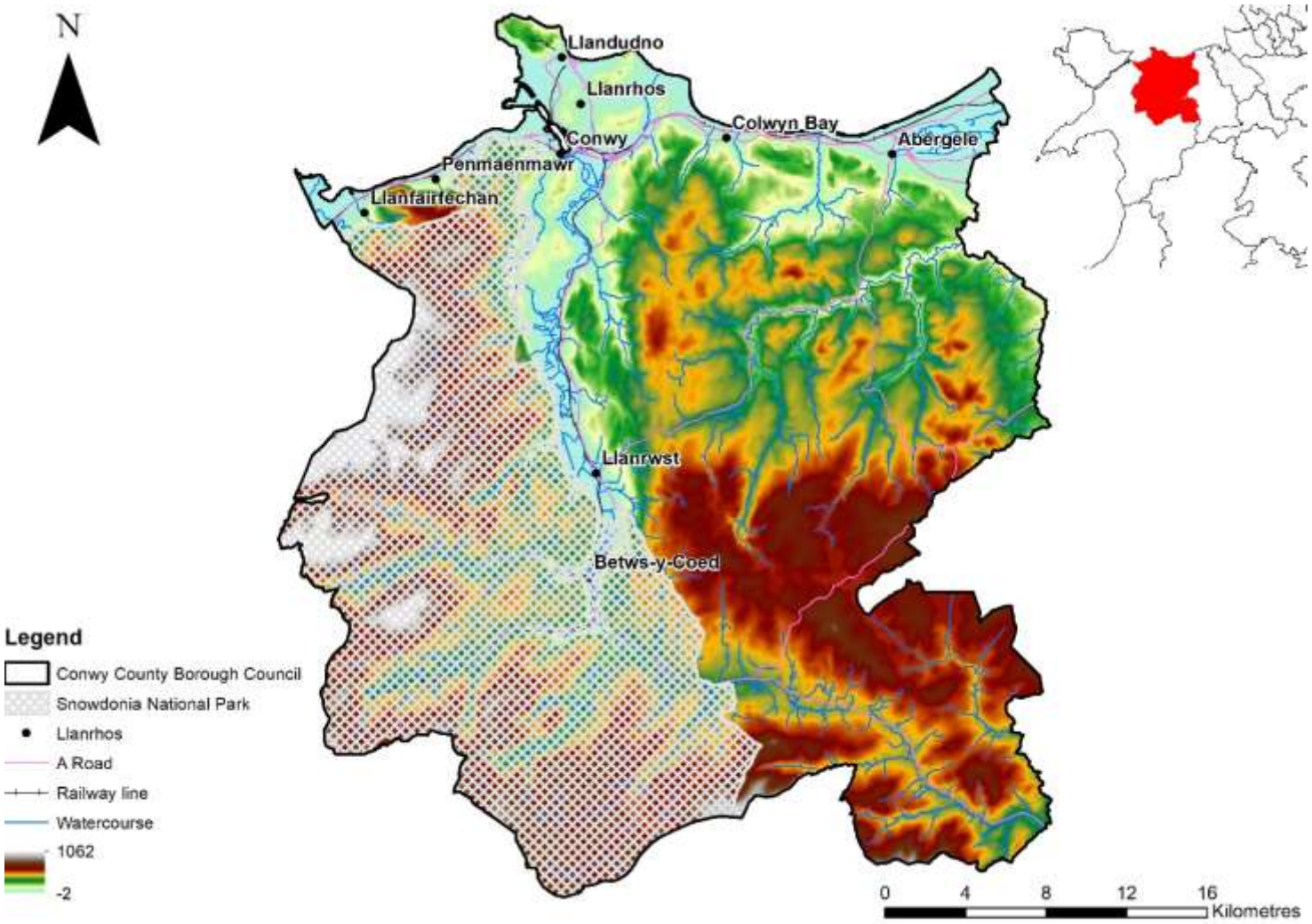

Figure 2-1 Conwy SFCA Study Area

The River Conwy is the largest Main River flowing through the administrative area. Rising in the uplands of Migneint Moor within the Snowdonia National Park, approximately 11km south of Betws-y-Coed, the River Conwy runs from south to north through the centre of Conwy County and the towns of Llanrwst and Conwy before discharging into the Irish Sea at Conwy Bay. The River Conwy is fed by a number of tributaries including the River Machno, which joins the River to the south of Betws-y-Coed and the Rivers Lledr and Llugwy which join at Betws-y-Coed from the south west. The topography of the study area is characterised by steep upland areas to the south and flatter areas associated with the River Conwy valley from Llanrwst to Conwy and the low lying coastal regions in the north including the towns of Llandudno, Colwyn Bay and Abergele.

2.1 River Catchments

The administrative area of Conwy is situated within four river catchments; the Conwy, Clwyd, Dee and Llŷn and Eryri (Figure 2-2).

Figure 2-2 CCBC River Catchments

Llŷn and Eryri

The Llŷn and Eryri management catchment covers a relatively small area of approximately 15 km^2 in the north west of the study area with the majority of the catchment falling within the Snowdonia National Park. Two main rivers, Afon Llanfairfechan and Afon Gyrach, flow a short distance north west through the study area before reaching the North Wales coast.

River Clwyd

The Clwyd management catchment covers an area of approximately 260 km^2 to the north east of the administrative area. The two main Rivers within this catchment and the administrative area of Conwy are the River Aled and the River Elwy. The River Elwy, a tributary of the River Clwyd, flows through the administrative area in a north easterly direction from its source in the uplands of the Denbigh Moors, south east of Llanrwst. The River Aled flows north east through the County before joining the River Elwy to the east of the village of Llanfair Talhaiarn.

River Dee

The Dee management catchment covers an area of approximately 130km^2 to the southeast of the administrative area. The main Rivers within the Dee catchment, which flow through the administrative area are the River Alwen a tributary of the River Dee and the River Ceirw. The rivers flow in a south easterly direction through the administrative area before crossing the Denbighshire border.

River Conwy

The majority of the administrative area is contained within the Conwy management catchment (Figure 2-3), which covers an area of 574km^2. The source of the Conwy is in the uplands of the Migneint Moor, an extensive area of blanket bog and part of a Special Area of Conservation. The Conwy discharges into Conwy Bay and is tidally influenced up to Tan-lan, near Llanrwst. Llandudno, Colwyn Bay and Conwy are the primary settlements along the coast, with Llanrwst the largest town in the main Conwy valley.

There has been a history of flooding within some of the communities and a major flood alleviation scheme was constructed in Llanrwst in 2009/2010. Much of the catchment above Llanrwst and the western side of the lower Conwy Valley lies within Snowdonia National Park. Agriculture and forestry dominate the Conwy catchment. The Conwy management catchment contains drinking water supply reservoirs including Llyn Conwy and Llyn Cowlyd. There is a legacy of mining activities particularly in the Gwydyr Forest with abandoned mine shafts, adits, soil heaps and site runoff influencing discharges of metals to surface waters.

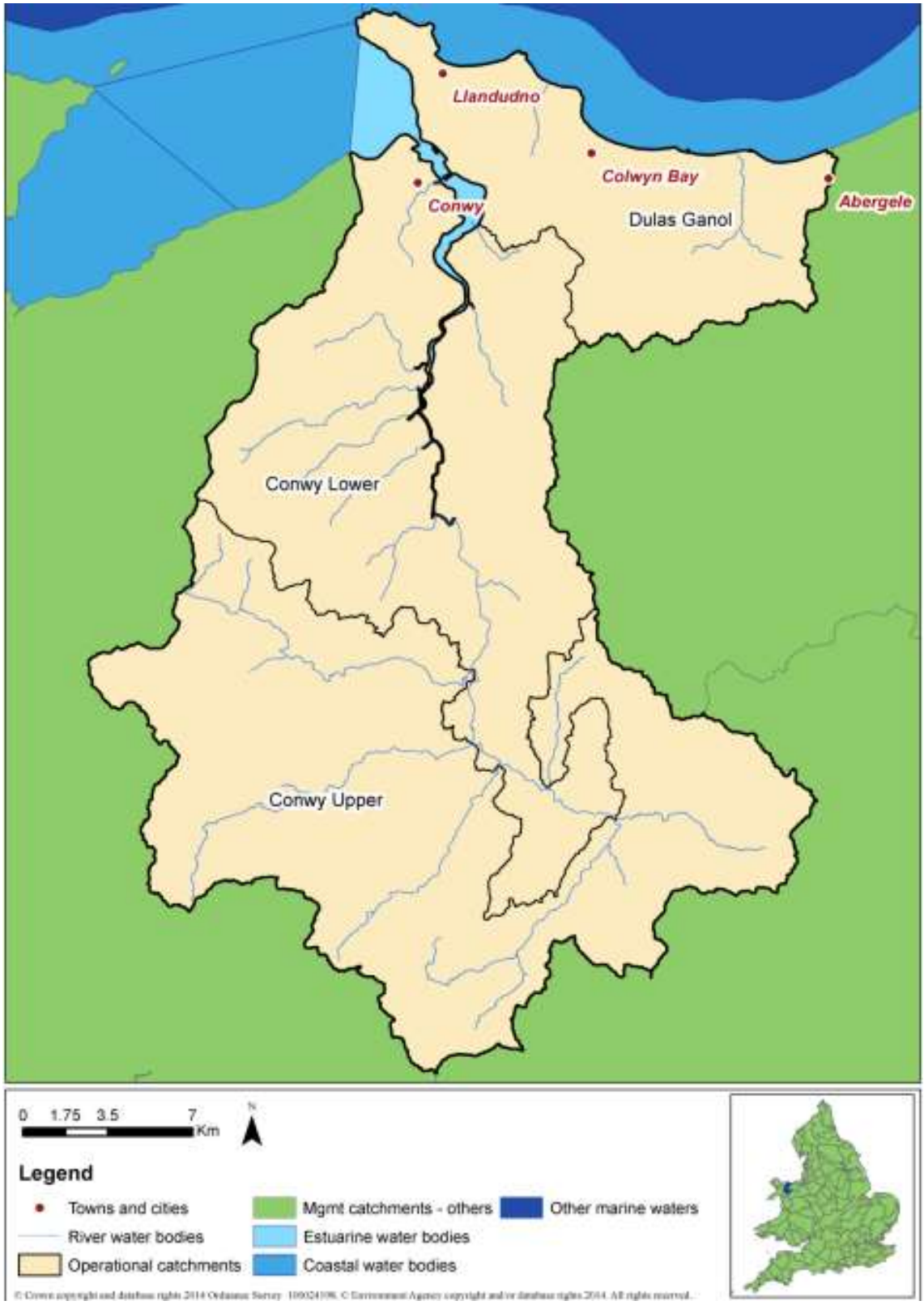

Figure 2-3 River Conwy Catchment [4]

4 https://naturalresources.wales/media/3226/conwy-management-catchment.pdf

3 The Planning Framework and Flood Risk Policy

3.1 Introduction

The main purpose of this section of the SFCA is to provide an overview of the key planning and flood risk policy documents that have shaped the current planning framework. This section also provides an overview and context of the County Council's responsibilities and duties in respect to managing local flood risk, including but not exclusive to, the delivery of the requirements of the Flood Risk Regulations (FRR) 2009 and the Flood and Water Management Act (FWMA) 2010.

Figure 3-1 illustrates the links between legislation, national policy, statutory documents and FCAs. The figure shows that whilst the key pieces of legislation and policy are separate, they are closely related, and their implementation should aim to provide a comprehensive and planned approach to improving flood risk management across the county and within local communities.

It is intended that the non-statutory Surface Water Management Plans (SWMP) and SFCAs can provide much of the base data required to support the delivery of statutory flood risk management tasks as well supporting local authorities in developing capacity, effective working arrangements and informing Local Flood Risk Management Strategies (LFRMS) and local Development Plan Documents (DPD), which in turn help deliver flood risk management infrastructure and new, sustainable development at a local level.

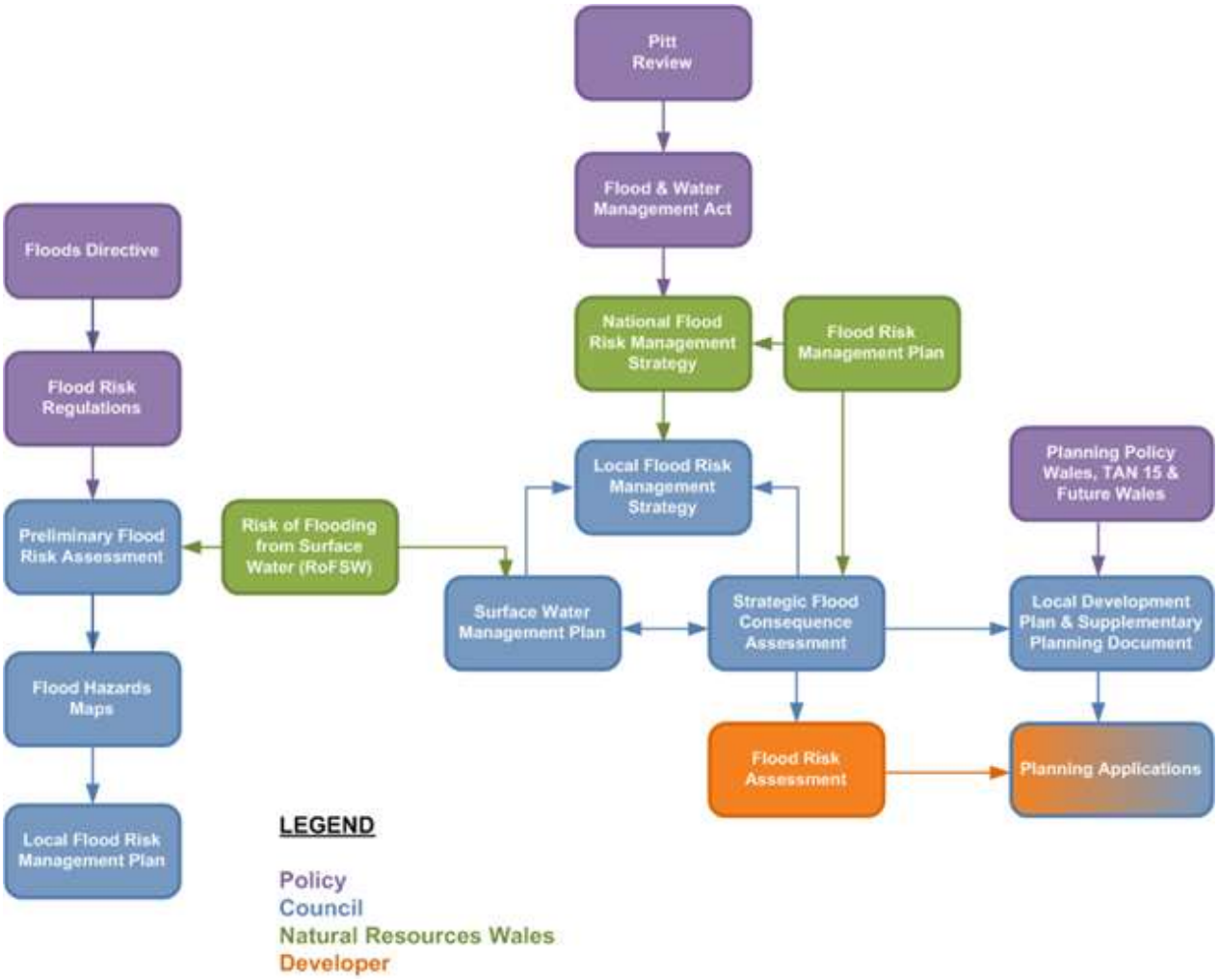

Figure 3-1 Key documents and strategic planning links with flood risk

3.2 Legislation

3.2.1 Floods Directive & the Flood Risk Regulations

The European Floods Directive (2007) sets out the EU's approach to managing flood risk and aims to improve the management of the risk that floods pose to human health, the environment, cultural heritage and economic activity. The Directive was translated into Welsh law by the Flood Risk Regulations in 2009, which require Lead Local Flood Authorities (LLFA) and NRW to produce Flood Risk Management Plans (FRMP).

The Directive puts in place a six-year cycle of producing Preliminary Flood Risk Assessments (PFRA) with the aim of identifying significant Flood Risk Areas; preparing flood hazard and risk maps; and preparing FRMPs. The Cycle 2 Flood Risk Areas were identified in December 2018, replacing the Cycle 1 Flood Risk Areas identified in 2011. The third year cycle is underway at the time of writing. Cycle 2 identified nine Flood Risk Areas in Wales, one of which is located in Conwy County and is called the North Wales Coast Flood Risk Area and covers the communities of Abergele, Towyn and Kinmel Bay. The North Wales Coast Flood Risk Area was identified through NRW's Western Wales PFRA.

Figure 3-2 Flood Risk Regulations

In 2017, all LLFAs in Wales reviewed their PFRAs and produced an addendum to the Cycle 1 PFRAs.

PFRAs should cover the entire LLFA area for local flood risk (focusing on ordinary watercourses, surface water and groundwater risk). Where significant Flood Risk Areas are identified using the national approach (and locally reviewed), the LLFA is then required to undertake flood risk hazard mapping and to produce FRMPs as illustrated in Figure 3-2.

By Welsh law, NRW must produce FRMPs for the whole of Wales every six years starting with the first production of FRMPs in 2015. These plans cover flood risk from main rivers, the sea and reservoirs.

The FRMP should consider objectives for flood risk management (reducing the likelihood and consequences of flooding) and measures to achieve those objectives. One significant Flood Risk Area has been identified in CCBC to include the communities of Abergele, Towyn and Kinmel Bay. The LLFA must therefore produce a FRMP for this Flood Risk Area. A FRMP has also been completed by NRW for the Western Wales RBD (see Section 3.5.8).

3.2.2 Conwy County Borough Council Preliminary Flood Risk Assessment (2011)[5]

The PFRA for CCBC was published in 2011. Based on NRW's national Flood Map for surface water (FMfSW), which in 2011 was the primary surface water flood map for Wales, approximately 2,276 properties in the administrative area of Conwy, were estimated to be at risk from flooding to a depth of 0.3 m during a rainfall event with a 1 in 200 annual chance of occurring. In terms of Flood Risk Area identification, NRW identified one Flood Risk Area for CCBC, covering Abergele, Towyn and Kinmel Bay.

5 https://www.conwy.gov.uk/en/Resident/Crime-and-emergencies/Preparing-for-Emergencies/Flooding/documents/Conwy-Preliminary-Flood-Risk-Assessment.pdf

An addendum to the 2011 PFRA (Cycle 1) was completed by the LLFA in 2017. However, this information is not available online.

3.2.3 Water Framework Directive & Water Environment Regulations

The purpose of the Water Framework Directive (WFD), which was transposed into Welsh Law by the Water Environment Regulations (2003), is to deliver improvements across Europe in the management of water quality and water resources through River Basin Management Plans (RBMP).

NRW is responsible for monitoring and reporting on the objectives of the WFD on behalf of Welsh Government. They work with Welsh Government, Ofwat, local government, non-governmental organisations (NGOs) and a wide range of other stakeholders including local businesses, water companies, industries and farmers to manage water.

At the time of writing, the third management cycle of the WFD is underway and the second cycle of RBMPs were completed in 2015, building upon the first set completed in 2009. RBMPs are designed to address the pressures facing the water environment in the RBMP districts and to formulate actions that will address them. The plans describe required objectives and measures to protect and improve the water environment over the next 20 years and aim to achieve WFD targets through each six year cycle.

The RBMPs, like the CFMPs, are important documents relevant to the development of the SFCA. The SFCA should take into account the wider catchment flood cell aims and objectives and understand how it can potentially contribute to the achievement of them through well thought out and sustainable development.

The main responsibility for CCBC is to work with NRW to develop links between river basin management planning and the development of local authority plans, policies and assessments. In particular, the general programme of actions (measures) within the RBMPs highlight the need for:

- Surface Water Management Plans
- Consideration of the WFD objectives (achieving good status or potential as appropriate) in the spatial planning process, including Local Development Documents and Sustainable Community Strategies, and
- Promotion of the wide-scale use of Sustainable Drainage Systems (SuDS) in new development (see Section 8.7).

3.2.4 Flood & Water Management Act (2010)

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

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 NRW.

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 regeneration and growth.

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

The Well-being of Future Generations (Wales) Act[6] 2015 places a duty on all public bodies to safeguard the well-being of future generations. The duty is based on the principle of sustainable development and requires public bodies to think about the long-term impact of their decisions, whilst collaborating with others, communities and each other. The seven well-being goals listed within the Act aim to present Wales with an opportunity to make a long-lasting and positive change to current and future generations.

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

3.2.6 Environment (Wales) Act 2016

The Environment (Wales) Act 2016 sets out the legislative requirements needed to plan and manage Wales' natural resources in a proactive, sustainable and joined-up way.

In Wales, the nature, land, water and air are the ultimate resource. However, demands on these natural resources are increasing and one of the greatest challenges is to find a way to secure healthy, resilient and productive ecosystems for the future whilst still meeting the challenges of creating jobs, housing and infrastructure. The Environment Act helps to meet this challenge.

Sustainable management of natural resources is about managing these resources in a joined-up way that delivers real outcomes for the environment, people, the economy and communities.

The aim is to make the most of the opportunities that Wales' natural resources presents while safeguarding and building the resilience of natural systems to continue to provide these benefits over the long term.

This Act also provides NRW with new tools to help manage Wales' natural resources sustainably. Land management agreements allow NRW to work with landowners to manage their land in a sustainable way. Experimental schemes allow NRW to trial new ways of working. A new biodiversity duty included in the Environment Act helps to reverse the decline and secure the long-term resilience of biodiversity in Wales.

For flood mitigation, Welsh Government will focus on using more natural flood management (see Section 6.7) solutions; increasing the uptake of SuDS, especially in new development (see Section 8.7); and improving the resilience of properties at risk of flooding and the time it takes them to recover should flooding occur.

3.3 Planning Policy

3.3.1 Planning Policy Wales

The PPW Edition 11[7] document, was published in February 2021, 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. The document is supported by several Technical Advice Notes (TANs).

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6 https://www.legislation.gov.uk/anaw/2015/2/contents

7 Planning Policy Wales Edition 11, Welsh Government https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

Planning Policy Wales contains national planning policy for LPA consideration when determining planning applications or preparing a local development plan. Detailed advice on the preparation of LDPs is contained in PPW and the Development Plans Manual – Edition 3 (2020). Section 3.4.14 of this report summarises LDP requirements and also the ongoing preparation of the CCBC LDP 2018-2033.

PPW, the TANs, circulars and policy clarification letters comprise national planning policy. National planning policy and the National Development Framework for Wales (see below) should be considered in the preparation of development plans. They may be material to decisions on individual planning applications and will be taken into account by Welsh Ministers and Planning Inspectors in the determination of called-in planning applications and appeals.

3.3.2 Future Wales – The National Plan 2040

Future Wales[8] is the National Development Framework (NDF) for Wales, setting the direction for development in Wales up to 2040. Published in August 2019 and previously updated in February 2021, at the time of writing, the NDF sets out a 20-year land use framework for Wales and will replace the Wales Spatial Plan[9]. Different to the Spatial Plan, the NDF will have development plan status. This means planning decisions must be made in accordance with the NDF, and the plans that sit below it, namely; regional Strategic Development Plans (SDPs) (which have yet to come forward at the time of writing) and Local Development Plans (LDPs), must be consistent with it. Sitting alongside Planning Policy Wales, the NDF is subject to review every five years, under the Planning (Wales) Act 2015.

The NDF will:

- Set out where nationally important growth and infrastructure is needed and how the planning system, national, regionally, and locally, can deliver it,
- Provide direction for Strategic and Local Development Plans and support the determination of Developments of National Significance,
- Sit alongside PPW to provide the context for land use planning,
- Support national economic, transport, environmental, housing, energy and cultural strategies and ensure they can be delivered through the planning system.

Spatial Strategy

Future Wales includes a spatial strategy for Wales which will guide where large scale and nationally important development will take place up to 2040, supporting the Future Wales Outcomes including sustainable development.

Policy 8 of the Spatial Strategy is concerned with flooding. It discusses the need for nature-based flood risk management solutions and the requirement for multiple associated social, economic and environmental benefits. CCBC considers wastewater management through its Supplementary Planning Guidance (SPG) note on design in 2015[10] whereby development should be designed to incorporate areas and facilities for rainwater harvesting / storage and grey water reuse for flood risk management.

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8 Future Wales: the national plan 2040, Welsh Government https://gov.wales/future-wales-national-plan-2040

9 https://gov.wales/sites/default/files/publications/2019-05/people-places-future-the-wales-spatial-plan-update-2008.pdf

10https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Conservation-and-Regeneration/Guidance/Supplementary-Planning-Guidance/Assets/Documents/LDP09-Design.pdf

Policy 8 states that it is not appropriate to look to develop flood risk management schemes and infrastructure to enable new development on previously undeveloped land.

3.3.3 National Resources Policy

The focus of the Natural Resources Policy[11] (NRP) is on improving the way Wales manages its natural resources and forms a key part of the delivery framework for the sustainable management of natural resources established by the Environment (Wales) Act. The NRP sets out the opportunities and challenges that face Wales's natural resources and how these will be monitored and addressed. In relation to flooding the NRP highlights how careful management of ecosystems can play a crucial role in building resilience to the impacts of climate change such as flooding. It also highlights that there are opportunities to manage flooding by using natural flood risk management techniques across Wales with NRW aiming to increase the role of nature-based solutions in flood and water management.

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

Technical Advice Note 15: Development, flooding and coastal erosion (TAN 15) sets out the criteria against which the consequences of a development in an area at risk of flooding can be assessed. TAN 15 Development and Flood Risk was introduced in 2004 by 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). A significant update to TAN 15, which is supported by the Flood Map for Planning (FMfP), was initially released in September 2021 for implementation from December 2021. However, on 24 November 2021 Welsh Government suspended the implementation of the new TAN 15 Development, Flooding and Coastal Erosion 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 been prepared in accordance with the updated TAN 15 and associated FMfP due to be implemented from June 2023.

TAN 15 reflects the core principles of the National Strategy for Flood and Coastal Erosion Risk Management in Wales[12] to adopt a risk-based approach in respect of new development in areas at risk of flooding and coastal erosion. TAN 15 comprises technical guidance related to development planning and flood risk and provides a framework within which the flood risks arising from rivers, the sea and surface water, and the risk of coastal erosion can be assessed.

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

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

12 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

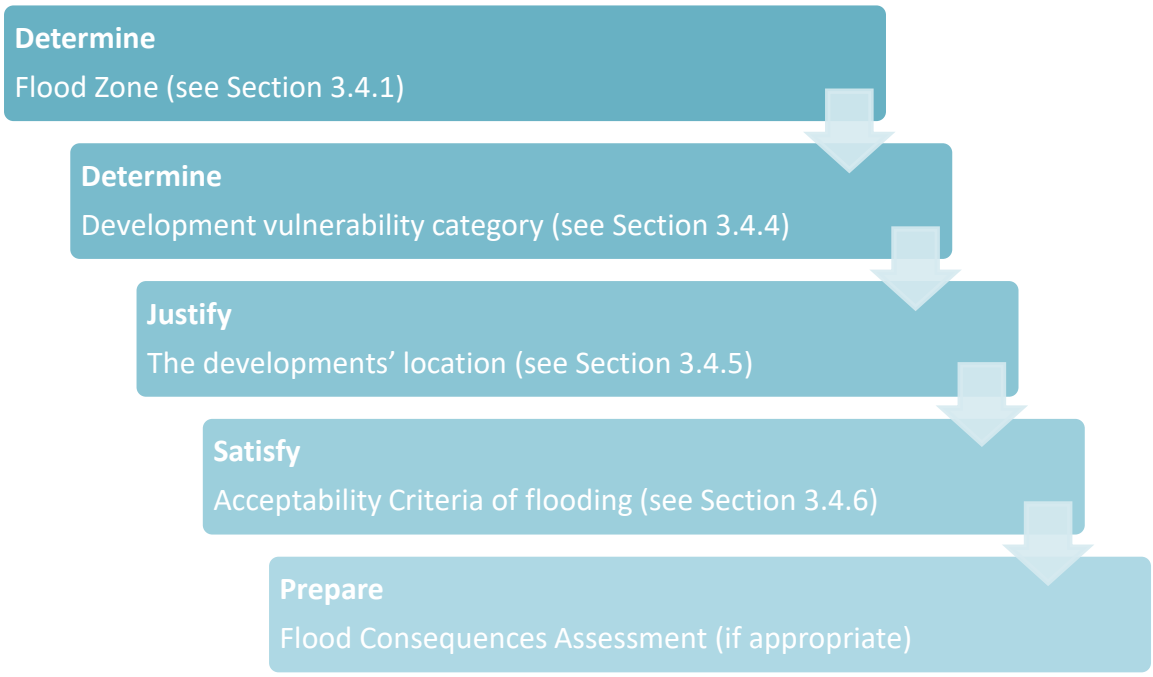

Figure 3-3 Navigating TAN 15 requirements

3.4.1 Flood Map for Planning (FMfP)

TAN 15 defines a number of flood zones based on the likelihood of flooding. Table 3-1 summarises the definition of the flood zones in the FMfP[13]. The FMfP flood extents include for climate change, assuming a 100-year lifetime of development.

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

Table 3-1 TAN 15 Definition of FMfP Flood Zones

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.

3.4.2 Flood Map Challenge

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

NRW publish online comprehensive guidance on the FMC process. 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

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

embarking on a FMC and it is likely that expert technical advice will be required to undertake most FMCs.

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

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 FMCs when applying the justification tests of TAN 15.

3.4.3 Climate change

Welsh Government publishes climate change guidance[14] for Flood Consequence Assessments (FCA). This was last updated in September 2021 to provide revised sea level allowances. The document states that allowances for fluvial/ peak rainfall will be updated in due course. Assessing the future effects of climate change is a key aspect of TAN 15 and any FCA required to support a planning application.

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.
- 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 Conwy County coastline are predicted to increase by 0.89 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.

3.4.4 Lifetime of Development

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

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14 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

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*."

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

3.4.5 Vulnerability classification

TAN 15 assigns one of three flood risk vulnerability classifications to a development, as shown in Table 3-2.

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.

Table 3-2 Development vulnerability categories

3.4.6 Justifying the location of development

TAN 15 states that the LPA will need to be satisfied that a development's location is justified. This is determined through the application of the 'Justification Test'. Table 3-3 summaries the Justification Test for development within the various flood zones. Where a site falls into two or more flood zones the LPA 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 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.

Table 3-3 Justification Test

3.4.7 Acceptability of flood consequences

If the LPA is satisfied that the proposed development is justified in a flood risk area, this justification will be in the knowledge that development may experience flooding and will need to be planned and mitigated accordingly. A full understanding of the potential risks and consequences will be required to inform the LPA in its decision making and to demonstrate that the criteria set out in the Justification Test has been satisfied. This is demonstrated through the production of a FCA, which is appropriate to the nature and scale of the proposed development (further details of which are provided in Section 8.4).

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. 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.

Accordingly, the LPA 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'.

There are three principal aspects to the Acceptability Criteria:

1 Flood frequency requirements. The frequency at which flooding is regarded to be acceptable. TAN-15 states that all developments must be designed to be flood free during the 1% river flood and 0.5% flooding from the sea events, with an allowance for climate change over the lifetime of development. See Table 3-4 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 Table 3-5.

3 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.

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)

Table 3-4 Flood frequency requirements

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		

Table 3-5 Tolerable conditions in extreme flood event

3.4.8 Definition of Defended Zones[15]

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

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

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

Flood defences built after 1 January 2016 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 the modelling)
- an allowance for the effects of climate change. The consequence of the above is that new Defended Zones will need to be of a higher standard than many existing Defended Zones. Furthermore, it may not be possible to assign a Defended Zone to new flood defence schemes that take a more adaptive approach to climate change, such as is commonly applied to coastal flood defence schemes.

Where new flood defences are planned for through a development, this will not result in new or extended defended Zones until NRW are satisfied that the qualifying defences provide an acceptable standard of protection, and it is strongly advised that NRW are consulted with at the earliest stage about the scheme.

3.4.9 Private flood defences

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

Where a local authority has confidence in the robustness of the defence and has aspirations for development in areas benefitting from such 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.

3.4.10 Adaptive Pathways

Climate change induced sea level rise is predicted to have significant consequences for many coastal areas within the administrative area of Conwy. 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.

Examples of this approach include the recently approved LLFA flood defence scheme at Llandudno and plans for future defence improvements at other key locations including Colwyn Bay; Penrhyn Bay; Llanfairfechan; Llanddulas to Kinmel Bay and Rhos on Sea. No specific locations for future investment are identified through the Shoreline Management Plan (SMP), however the importance of future investment and maintenance of existing flood defences is noted.

However, 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 assumed 100 year lifetime of development. Welsh Government's

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15 Advice from NRW's website. https://naturalresources.wales/flooding/challenging-our-flood-maps/?lang=en (updated October 2021)

FCERM strategy and TAN 15 are clear that new defences should not be seen as a means to create new developable areas. Their primary purpose is to defend existing communities.

3.4.11 Flood defences for development

Development should not rely on construction of new flood defences; particularly those that will remain in private ownership given the challenges of ensuring long term maintenance and renewal. However, there may be circumstances where an RMA may agree to adopt privately constructed defences if they provide a wider community benefit. However, areas will only be designated as Defended Zones if they meet the specific requirements of NRW and Welsh Government (See Section 3.4.8).

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.

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.

3.4.12 Resilience of existing communities

Change of use and conversions

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.[16]

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.

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.

Replacement development

For 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 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.

Recognising that TAN 15 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.

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16 TAN 15 para 14.10 & 14.11

- Compliance with Section 11 of TAN 15 applied in a manner commensurate with the scale and nature of the proposal.

3.4.13 Surface water and small watercourse flood risk

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

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

Surface water and ordinary watercourse flood risk management are the responsibility of LLFAs. The LLFA (CCBC) 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.

An appropriate FCA 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 have the potential to affect the flow of surface water and/or excess water from ordinary watercourses. Planning authorities may provide specific local advice on this issue in Development Plans.

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, which should be used as best evidence to steer development away from areas shown to be at significant surface water flood risk.

There is an expectation that the Acceptability Criteria will generally be applied in demonstrating the acceptability of flood risk though 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.

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 SuDS Approving Bodies (SAB) with regards to their requirements for SuDS across their local authority area.

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.

3.4.14 Local Development Plans

Local Development Plans set out where and what type of development will take place over the plan period. Each LPA in Wales is required to produce an LDP for its area. In determining where new development can take place, consideration must be given as to the need for employment land, housing, leisure facilities whilst also safeguarding the local environment.

Once prepared, the LDP is subject to examination by an independent Planning Inspector to consider the 'soundness' of the Plan, including public hearings. Once the LDP is adopted, the LPA must prepare an Annual Monitoring Report (AMR) demonstrating how the Plan is delivering against its objectives. A full review must be carried out every four years to ensure the Plan remains current. Community engagement is vital to the plan making

process. LPAs publish a Delivery Agreement at the start of the LDP process setting out the key stages and when people can get involved.

The LDP preparation process is set out online via several documents:

https://gov.wales/development-plans

3.4.15 Conwy Local Development Plan 2018 - 2033

At the time of writing, CCBC is preparing a replacement Local Development Plan (LDP 2018-2033) to replace the existing adopted LDP in terms of local policy formulation and the site selection process. Besides its prime focus on Planning, the document will also be of importance for other Council departments that are concerned, for example, with future flood defence works or regeneration programmes.

3.4.16 Supplementary Planning Guidance

SPG notes provide detailed guidance on a range of development issues and topics. CCBC has a number of adopted SPG notes providing additional advice on particular topics or policy areas, and also by expanding upon statutory policies, for example, guidance on the design of residential development. The SPG notes are therefore afforded considerable weight as a material planning consideration to support the LDP policies.

All development proposals should take account of the adopted SPG note where relevant, which includes detailed guidance concerning individual site allocations, development issues, and particular types of development and will be a material consideration in determining planning applications. In terms of material considerations, greater weight can be attached to a guidance note if it has been formally adopted as a SPG.

The currently adopted SPG notes, at the time of writing, are available online via:

https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Supplementary-planning-guidance-documents/Supplementary-planning-guidance-documents.aspx

3.5 Flood Risk Management Plans, Strategies and Policies

3.5.1 National and Local Flood Risk Management Strategies

The updated National Strategy for Flood and Coastal Erosion Risk Management in Wales was adopted in October 2020, superseding the original 2011 version.

The National Strategy sets out the principles for how flood risk should be managed and provides strategic information about different types of flood risk and which organisations are responsible for their effective management.

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.

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.

LLFAs have responsibility for developing a LFRMS for their area covering local sources of flooding. The Local Strategy produced must be consistent with the National Strategy. The Local Strategy should set out the framework for local flood risk management functions and activities and should raise awareness of local organisations with responsibilities for flood risk management in the area. The strategy should also facilitate partnership arrangements to

ensure co-ordination between local organisations and an assessment of flood risk and plans and actions for managing risk, as set out under Section 9 of the FWMA.

The following link provides guidance from Welsh Government for developing LFRMSs:

https://gov.wales/local-flood-risk-management-strategy-guidance

3.5.2 CCBC Local Flood Risk Management Strategy, 2013

The CCBC Local Flood Risk Management Strategy was published in February 2013. An updated LFRMS for Conwy is required to be published by October 2023 in line with the National Strategy, for which new guidance was published in 2020[17]. CCBC is currently awaiting further guidance from Welsh Government in response to this. The current 2013 Strategy however cites the following flood risk management objectives:

- Reduce the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion
- Raise awareness of, and engage people, in the response to flood and coastal erosion risk
- Provide an effective and sustained response to flood and coastal erosion events; and
- Prioritise investment in the most at risk communities.

The LFRMS sets out proposed outcomes as follows;

- Improved understanding of local flood and coastal risks
- Working in partnership with other Risk Management Authorities, stakeholders and the public
- Increased awareness and preparedness from individuals and the community
- To reduce the impact and consequences of flooding and coastal erosion on individuals, communities, businesses and the environment
- To ensure that flooding issues and the impacts of flood risk management associated with future and long term developments are considered when making planning decisions
- Improved maintenance of existing drainage systems
- Ensure a sustainable approach to flood risk management
- Promote the use of methods, which incorporate the natural environment
- Increased development of flood risk management skills
- Identify affordable projects and programmes whilst maximising funding opportunities and sources

These objectives and outcomes broadly align with national strategy objectives, and NRW plans and strategies.

3.5.3 Shoreline Management Plan

The Shoreline Management Plan (SMP2) is a non-statutory, high level, policy document for coastal flood and erosion risk management planning. This dataset is shown on the SFCA maps in Appendix A.

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17 40996 Summary: National Strategy for Flood and Coastal Erosion Risk Management in Wales (English) (gov.wales)

Local planning authorities should consider SMP2 policies when formulating their statutory land use development plans. There are three shoreline management policies in place along CCBC's coastline, namely 'hold the line', 'managed realignment' and 'no active intervention'.

The CCBC coastline is covered by two Shoreline Management Plans. The West of Wales Shoreline Management Plan 2 (SMP2)[18] and the North West England and North Wales Shoreline Management Plan SMP2[19]. The West of Wales SMP stretches from St Anne's Head, Pembrokeshire to the Great Orme on the CCBC coastline. Sub-Cell 11a of the North West England and North Wales SMP covers the CCBC coastline from Great Orme's Head and extends to Southport, North West England. The dune frontages west of the Point of Ayr are to be maintained through a 'Managed Realignment' policy, allowing natural processes to continue while monitoring whether beach recharge or secondary defences are required in the future. This policy will also be explored in the medium to long term where there may be opportunities for habitat creation elsewhere along the coast. Along the CCBC shoreline, a 'Hold the Line' policy has been adopted where significant development, infrastructure or other assets are located. A 'No Active Intervention' policy is in place in coastline areas, which are allowed to develop naturally without any management. Along the CCBC coastline, this includes the Great Orme and Little Orme headlands, which are designated Sites of Special Scientific Interest (SSSIs) and Special Areas of Conservation (SACs).

Hold the line

Where hold the line has been proposed, the intent is to manage the risk from coastal flooding or erosion to important assets and interests in an appropriate way. This could be achieved by maintaining current defences or by constructing new defences in the future. When upgrading defences or significant changes in management practice is required, this is progressed through a Strategy or Scheme and will be subject to more detailed appraisal, consultation and consenting.

Managed realignment

Managed realignment provides the opportunity to create a more natural coastline by allowing sediment movement which helps maintain beaches or provides space for natural landward roll-back of saltmarsh, beaches or dunes in response to ongoing coastal change and sea level rise. The SMP2 recognises that there are a number of opportunities to move defences landward, or to remove defences so the shoreline realigns back to higher ground, in order to create more space for salt marshes and hence improve the natural defence and provide environmental benefits. In theory, the shoreline could be moved inland up to where the area at risk of coastal flooding ends.

No active intervention

No active intervention is a policy option which allows the coast or estuary frontage to develop naturally without any management. This policy applies to areas of the natural shoreline where there is no need for intervention to manage risks or to enable sustainable intervention to be achieved elsewhere through coastline erosion and sediment deposition. The policy may also be proposed in locations where there is insufficient funding for the building and maintenance of defences.

3.5.4 Welsh National Marine Plan (WNMP)[20]

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18 https://www.grwparfordirolgorllewincymru.cymru/page/smp2/main-document

19 https://www.mycoastline.org.uk/shoreline-management-plans/

20 Welsh National Marine Plan, Welsh Government, November 2019 - https://gov.wales/sites/default/files/publications/2019-11/welsh-national-marine-plan-document_0.pdf

The WNMP is the first marine plan for Wales and represents the process of supporting the Welsh marine areas to reach economic, social, cultural and environmental objectives. First published in November 2019, the plan takes a 20-year view with the effects of the policies laid out within the plan being reviewed and reported on at least every three years. The document has been prepared under Section 51 and in accordance with Schedule 6 of the Coastal Access Act 2009[21] and in conformity with the UK Marine Policy Statement. This plan and all supporting material should be used by developers to shape proposals and license applications, public authorities to guide decision making and other users to understand Welsh Government's policy for the sustainable development of the area. The WNMP covers approximately 32,000km^2 of sea and 2,120km of coastline, covering both inshore and offshore regions of Wales.

3.5.5 Catchment Flood Management Plans

The Catchment Flood Management Plans (CFMPs) were carried out by Environment Agency Wales (now NRW) in 2009 and were designed to establish flood risk management policies which will deliver sustainable flood risk management for the long term. CFMPs have been superseded by FRMPs, although many of the policies and actions from the CFMPs are still current and have been transferred to the FRMPs.

The CFMP provides a broad overview of flood risk mainly from main river and tidal sources and develop complementary policies for long-term management of flood risk within the catchment that take into account the likely impacts of climate change, the effects of land use and land management, to deliver multiple benefits and contribute towards sustainable development. This is critical when areas under development pressure coincide with high flood risk.

Chosen policies and actions highlight where to avoid development in those areas deemed inappropriate to reduce flood risk now and in the future. They also indicate when water should be allowed to flood or where current flood risk measures should be reduced. Development should therefore be focused towards the more 'sustainable' areas in terms of lower risk of flooding or where flood risk management is considered viable within the short and long-term plans. Therefore, if development has been proposed in flood risk areas and the chosen policy is not to take further action to reduce flood risk, then developments will find it difficult to rely on Natural Resources Wales led FRM infrastructure investment and there will be a great reliance on private (developer) funding to reduce risk. In this instance, development may not be viable.

As part of the CFMP process each CFMP area was divided up into broad areas (known as 'policy units'), which represent areas of similar characteristics, flood mechanisms and flood risks. Each policy unit was then assessed to decide which policy will provide the most appropriate level and direction of flood risk management both now and in the future. Whilst the policy unit simplifies direct action over vast areas of land, in reality, the chosen policy may only focus on a small urban or rural area within that policy unit. The administrative area of Conwy is covered by the Western Wales and River Dee CFMPs.

The Policies adopted within Conwy County include:

Policy 2 - Areas of low to moderate flood risk where existing flood risk management actions can generally be reduced

Policy 3 - Areas of low to moderate flood risk where existing flood risk is generally managed effectively

Policy 4 - Areas of low, moderate or high flood risk where flood risk is already managed effectively but where further action may need to be taken to keep pace with climate change

21 Coastal Access Act 2009

Policy 5 – Areas of moderate to high flood risk where further action can generally be taken to reduce flood risk.

3.5.6 Welsh Government: Flood risk and insurance

In 2014 DEFRA and Welsh Government set out proposed changes to the insurance industry, to provide flood cover to domestic properties in the future. The new scheme adopted is based upon introducing "Flood Re[22]". This is a reinsurance pool of funding for high-risk households and in effect caps flood insurance premiums. Premiums are set according to a property council tax band, and therefore homeowners, and perspective purchasers, will know the maximum they could be asked to pay for flood insurance cover.

This scheme only applies to properties built before 2009, and therefore new developments built since this date will be subject to uncapped risk reflective premiums. Consequently, in order to ensure that insurance cover will be obtainable, new developments should only be permitted in a flood risk area where it can be made safe, resistant and resilient to flooding for a given flood event (e.g. 1 in 100 chance or 1 in 200 chance of occurring in any year), and does not increase flood risk elsewhere.

The provision of flood insurance can affect development viability and is a material planning consideration because the development needs to demonstrate that the consequences of flood risk are acceptable for the lifetime of development.

3.5.7 Hazard Mapping and Flood Risk Management Plan

Hazard maps for all of Wales were published by NRW, and whilst the legislation only requires FRMPs to be produced for the significant Flood Risk Areas, there is a commitment in Wales from all LLFAs to publish a FRMP and NRW first published flood risk management plans in 2015 at the river basin district scale.

NRW's core flood risk management objectives include:

- Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
- Raising awareness of and engaging people in the response to flood and coastal erosion risk;
- Providing an effective and sustained response to flood and coastal erosion events;
- Prioritising investment in the most at risk communities.

From the main objectives, there are a further eight objectives:

- To improve the understanding of local flood risk.
- Ensure that local communities understand their responsibilities in relation to local flood risk management.
- Work in partnership with other Risk Management Authorities and stakeholders.
- Actively manage flood risk associated with new development proposals.
- Encourage proactive, responsible maintenance of privately-owned flood defence and drainage assets.
- Investigate opportunities to reduce surface water runoff from the upper catchments and for flood storage in floodplain areas.
- Identify affordable, sustainable flood risk management projects.

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22 https://www.floodre.co.uk/householders-wales-struggled-find-affordable-flood-insurance-now-choice-thanks-flood-re/

- Ensure local FRM knowledge is aligned with the Council's emergency planning procedures.

3.5.8 Western Wales and Dee River Basin District Flood Risk Management Plans

FRMPs have been produced by NRW as part of the Flood Risk Regulations 2009, which introduced a statutory requirement for FRMPs to be produced by 2015 (first cycle). The administrative area of Conwy sits within two FRMP areas. The majority of the County lies within the Western Wales FRMP and the South East of the County within the Dee FRMP. These high-level documents cover flooding from main rivers, reservoirs and the sea. These plans were produced separately from the LLFA FRMPs. These FRMPs cover the period December 2015 to December 2021 and are based on a six-year cycle of reviews and updates, as per the FRR requirements. Updates are therefore required at the time of writing. NRW are working to produce an updated FRMP that covers all of Wales and will be ready for consultation at some stage in 2022.

Based on the 2015 FRMPs, the following measures are largely the same between both relevant FRMPs:

Preventing risk:

- Provision of advice and support to Government.
- Regulation of all 'high risk' reservoirs in accordance with the Reservoirs Act 1975.
- Close working relationships with local planning authorities, developers, businesses and infrastructure operators to help them understand the consequences of flood risk in the locations they choose for development. Including providing advice on how new development can be designed to be more resilient to flooding. This helps to prevent inappropriate development through the planning process and ensures there is no increase in runoff from new developments.
- Ensuring works in, over, under and next to main rivers do not increase flood risk or cause pollution through effective consenting, using the consenting process to identify opportunities to improve the water environment.
- A prioritised programme of mapping and modelling to ensure flood risk information remains up-to-date and fit for purpose and to prioritise and allocate funding in high risk locations, and to influence sustainable development and emergency response.
- Research and development, and work with partners to identify best practice for reducing runoff through land use change, whilst contributing wider benefits where possible (biodiversity, soil conservation and water quality improvements).

Preparing for risk:

- Hydrometric monitoring to inform the flood warning service.
- Flood forecasting and alerting of households and individuals of potential flood events.
- Work to maintain and improve flood forecasting, flood warning and flood incident management services.
- A risk-based programme is in place to increase awareness of flood risk, what actions need to be taken in the event of a flood and encourage registration to Floodline.
- Consideration of climate change.
- Review of Asset System Management Plans regularly with regard to maintenance, funding requirements and asset condition related works.

- Provision of a flood incident response service 24 hours a day, 7 days a week, 365 days a year.
- On-site reservoir plans are in place for all 'high-risk' reservoirs.
- Working collaboratively with partners to find innovative approaches to managing flood risk.

Protecting from risk:

- Maintenance of high risk flood and coastal risk management assets, prioritising those at highest risk.
- Asset inspection programmes to ensure flood risk management assets are at the appropriate standard.
- Maintenance programmes to replace / refurbish flood risk management assets, including pumping stations and outfalls, prioritising efforts on those which have the highest flood risks.
- The Flood and Coastal Risk Management Capital Programme includes building flood defences and implementing innovative ways of managing the landscape to hold and slow down water to help reduce flood risk to communities.
- Seeking of opportunities to undertake Natural Flood Management by using all appropriate tools available, such as Woodland Creation maps.

3.5.9 Clwyd Flood Risk Management Strategy (2010)

The tidal Clwyd strategy covers the North Wales coastline and inland tidal area between Abergele and the Denbighshire-Flintshire border near Prestatyn. It covers the main centres of population around Rhyl, Kinmel Bay and Prestatyn.

NRW states its overarching strategy is to continue to protect all properties in the area protected to current standards or better, through a combination of improvements to existing flood defences in the short term, and by realigning embankments in the medium to long term to make space for water. The existing coastal defences are to be maintained and improved in future as necessary. Both the tidal defences on the River Clwyd and the coastal defences will be maintained at a defence level to provide protection against a flood with a 0.5% (1 in 200) chance of occurring in any one year.

3.6 Roles and responsibilities

Section 6 of the FWMA 2010 defines the roles and responsibilities of the RMAs. In Wales these include NRW, all 22 Welsh local authorities (who act as LLFAs), highway authorities and water and sewerage companies. There are other bodies that have a non-statutory role in FCERM, including private landowners and owners of infrastructure assets such as Network Rail and the National Trust.

The basic responsibilities of key stakeholders in Wales are set out below in Figure 3-4, taken from the National Strategy.

Figure 3-4 Overview of Roles and Responsibilities (taken from the National Strategy for Flood and Coastal Erosion Risk Management).

4 Understanding Flood Risk

4.1 Sources of flooding

Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land not normally covered by water and presents a risk when people and human or environmental assets are present in the area that floods. Assets at risk from flooding can include housing, transport and public service infrastructure, commercial and industrial enterprises, agricultural land and environmental and cultural heritage. Flooding can occur from many different and combined sources and in many different ways. Major sources of flooding include (also see Figure 4-1):

- **Fluvial** (Main River and Ordinary Watercourse) - inundation of floodplains from rivers and watercourses; inundation of areas outside the floodplain due to influence of bridges, embankments and other features that artificially raise water levels; overtopping or breaching of defences; blockages of culverts; blockages of flood channels/corridors.
- **Tidal** - sea; estuary; overtopping of defences; breaching of defences; other flows (e.g. fluvial surface water) that could pond due to tide locking; wave action.
- **Surface water** - surface water flooding covers two main sources including sheet runoff from adjacent land (pluvial) and surcharging of piped drainage systems (public sewers, highway drains, etc.)
- **Groundwater** - water table rising after prolonged rainfall to emerge above ground level remote from a watercourse; most likely to occur in low-lying areas underlain by permeable rock (aquifers); groundwater recovery after pumping for mining or industry has ceased.
- **Infrastructure failure** - reservoirs; canals; industrial processes; burst water mains; blocked sewers or failed pumping stations.

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

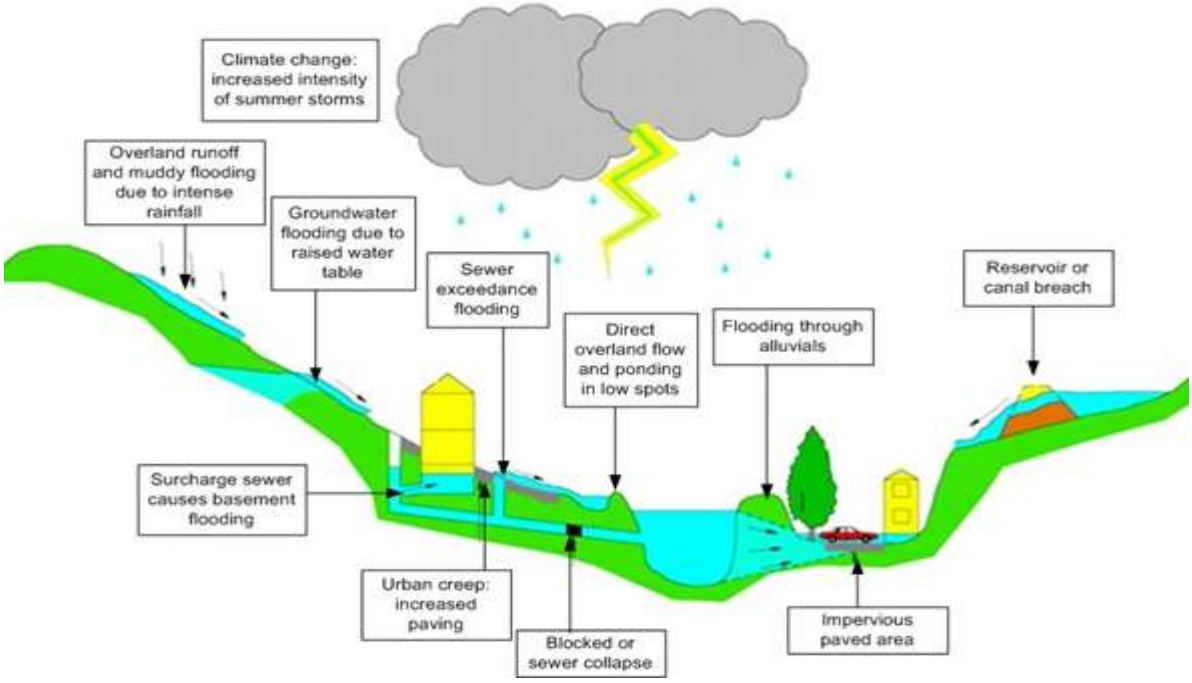

Figure 4-1 Flooding from all sources

4.2 Likelihood and consequence

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 4-2 below. This is a standard environmental risk model common to many hazards and should be the starting point of any flood risk assessment. However, it should be remembered that flooding could occur from many different sources and pathways, and not simply those shown in the illustration below.

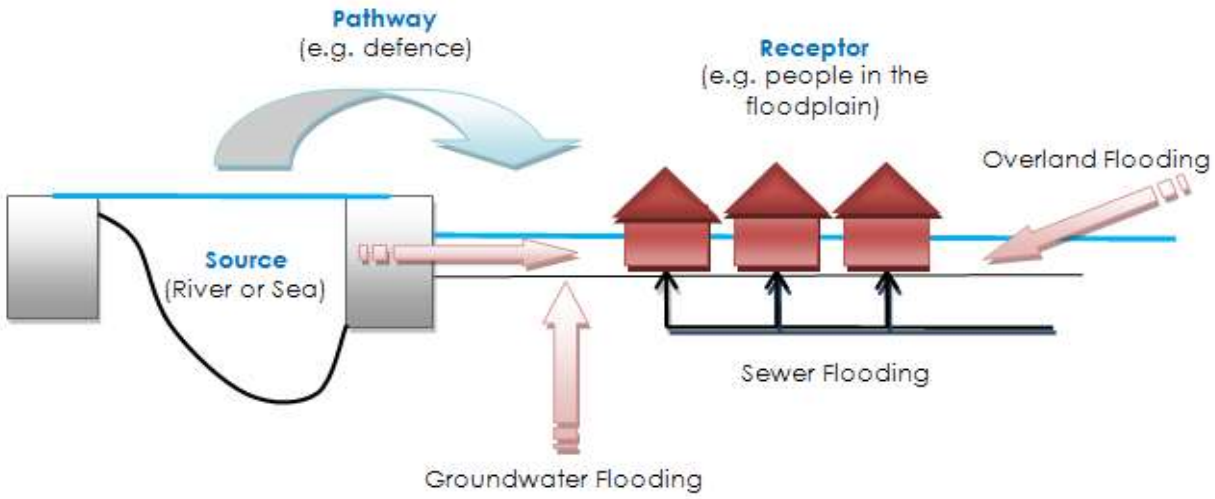

Figure 4-2 Source-Pathway-Receptor Model

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

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

4.2.1 Likelihood

Likelihood of flooding is expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached on average once in 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.

Considered over the lifetime of development, such an apparently low frequency or rare flood has a significant probability of occurring. For example:

- A 1% flood has a 26% (1 in 4) chance of occurring at least once in a 30-year period - the period of a typical residential mortgage
- And a 49% (1 in 2) chance of occurring in a 70-year period - a typical human lifetime

4.2.2 Consequence

The consequences of flooding can result in fatalities, damaging 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).

4.3 Risk

Flood risk is expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding

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

4.3.1 Defended risk

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

Defended 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.

4.3.2 Risk of defence breach or failure

Defended areas, protected by flood defence infrastructure, remain at some level of risk as there is a risk of overtopping or defence breach during significant flood events. Whilst the potential risk of failure may be reduced, consideration of inundation and the impact on development needs to be considered.

Examples include:

- The failure of flood management infrastructure such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system,
- Failure of a reservoir, or
- A severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

Even when flood defences are in place, there is always a likelihood that these could be overtopped in an extreme event or that they could fail or breach. Defence failure can lead to rapid inundation of fast flowing and deep floodwaters, with significant consequences to people, property and the local environment behind the defence. 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 always be 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".

TAN 15 (Section 12) states that land protected by defences can be extremely vulnerable in the event of overtopping or breach because of the speed of flooding in such circumstances. In addition, floodwater can carry a significant amount of debris, which has the potential to cause blockage at structures. Where appropriate, a FCA 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.

Consideration should always be given to the behaviour of any new or modified defences in extreme events greater than those for which they are designed, and information should be provided on the consideration given to minimising risks to life in such circumstances.

4.4 Flood risk datasets

Table 4-1 provides a strategic overview of the key flood risk datasets used in this SFCA according to the source of flooding within Conwy County. The information contained is the best available at the time of publication and is intended to provide the Council with a strategic overview of risk.

All spatial datasets are presented on the interactive GeoPDF Maps in Appendix A.

Source	Datasets / information
Fluvial	NRW Flood Map for Planning Flood Zones 2 and 3 (May 2022) – see Section 3.4.1
	NRW Main Rivers (detailed Flood Map for Planning) (May 2022) – see Section 4.4
Pluvial (surface water runoff)	NRW Surface Water and Smaller Watercourses (detailed Flood Map for Planning) (May 2022) – see Section 3.4.13
Groundwater	JBA 5m Groundwater flood map (2017) – see Section 4.7.3
Reservoir	NRW Flood Risk from Reservoirs (detailed Flood Map for Planning) (May 2022) – see Section 4.8.2
Flood Risk Management infrastructure	NRW Flood Defences with Standardised Attributes (detailed Flood Map for Planning) (March 2022) – see Section 6.1
	TAN 15 Defended Zones (detailed Flood Map for Planning) (May 2022) – see Section 3.4.8
	Flood Storage Areas (Flood Risk Assessment Wales (FRAW)) (March 2022) – see Section 6.6
	Working with Natural Processes (2017) – see Section 6.7
Historic	NRW Recorded Flood Extents (detailed Flood Map for Planning) (May 2022) – see Section 5.1
Flood warning	NRW Flood Warning Areas (Flood Risk Assessment Wales (FRAW)) (2022) see Section 7.5.1
	NRW Flood Alert Areas (Flood Risk Assessment Wales (FRAW)) (2022) – see Section 7.5.2

Table 4-1 Flood source and key datasets

4.5 Fluvial flood risk

Fluvial flooding is associated with the exceedance of channel capacity during higher flows. The process of flooding from watercourses depends on a number of characteristics associated with the catchment including geographical location and variation in rainfall; steepness of the channel and surrounding floodplain; and infiltration and rate of runoff associated with urban and rural catchments.

NRW's FMfP is used to assess fluvial risk across Conwy County in this SFCA, as directed by TAN 15. See Section 3.4.1. NRW has also 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.

4.5.1 Main River

NRW decides which watercourses are Main Rivers. It consults with other risk management authorities and the public before making these decisions. NRW describes Main Rivers as usually being larger rivers and streams with other rivers known as ordinary watercourses. NRW carries out maintenance, improvement or construction work on Main Rivers to manage flood risk and will carry out flood defence work to Main Rivers only.

The Conwy administrative area covers roughly 1149 km². The county lies within four river catchments to include the Clwyd, Conwy, Dee and Llŷn and Eryri. The northeast of the County lies within the River Clwyd catchment. There are two Main Rivers within this catchment, the River Elwy, which acts as a tributary to the River Clwyd and the River Aled a tributary of the River Elwy and joins the River approximately 6km south of Abergele. The River Dee catchment covers the south east of the County. The Main Rivers within the Dee catchment include the River Alwen, a tributary of the River Dee and the River Ceirw, a tributary of the River Alwen. The majority of the County lies within the River Conwy catchment. Several Main Rivers act as tributaries to the River Conwy such as the River Machno, which joins the River approximately 9km south of Llanrwst and the Rivers Lledr and Llugwy which join the River Conwy 5km south of Llanrwst at Betws-y-Coed in the Snowdonia National Park. The Llŷn and Eryri river catchment covers the north west of the County, however there are no main rivers within this catchment located within the County boundary.

4.5.2 Ordinary watercourses

Ordinary watercourses are any watercourse not designated as Main River. These watercourses can vary in size considerably and can include rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows. LLFAs, district councils and internal drainage boards carry out flood risk management work on ordinary watercourses.

4.6 Tidal flood risk

Tidal flooding is caused by storm surge and wave action in times of high astronomical tides. Such conditions can lead to the overtopping or breaching of coastal flood defences. The probability of a breach is dependent on four main factors: weather conditions (generating large waves); wind direction (onshore); high tides (particularly during spring tides) and the condition of the coastal defences. When these conditions combine the risk of flooding can be greatly enhanced as the predicted tide level can be raised by several metres.

NRW's FMfP is used to assess tidal risk across the coastal regions of the County in this SFCA, as directed by TAN 15. See Section 3.4.1.

4.6.1 Coastal Flood Boundaries Dataset (2018)

A GIS dataset providing design/extreme sea level and typical surge information around the UK coastline. The previous dataset used a baseline from 2011 though it was recently updated. The information is now relevant under 'present day' (2018) conditions and does not account for future changes due to climate change (SLR). Extreme Sea Level values describe the extreme sea levels for 16 different annual probabilities of exceedance. Confidence levels relating to the 5% and 95% lower and upper bounds of confidence are included. Mean High Water Spring (MHWS) and Highest Astronomical Tide (HAT) predicted tide levels are also included in the dataset. This dataset provides level information for estuaries, tidal rivers and harbours. Levels for open coastal areas are provided separately in Extreme Sea Levels. It is used to inform work commenced on the coast ranging such as coastal flood modelling, scheme design, strategic planning and flood consequence assessments.

The 2018 update was carried out for the UK Coastal Flood Forecasting partnership, which, as well as NRW, also includes the Environment Agency (EA), Scottish Environment Protection Agency (SEPA) and Department for Infrastructure Northern Ireland (DfNI).

4.7 Surface water flood risk

Surface water flooding, in the context of this SFCA, includes:

- Surface water runoff (also known as pluvial flooding); and
- Sewer flooding

There are certain locations, generally within urban areas, where the probability and consequence of pluvial and sewer flooding are more prominent due to the complex hydraulic interactions that exist in the urban environment. Urban watercourse connectivity, sewer capacity, and the location and condition of highway gullies all have a major role to play in surface water flood risk.

It should be acknowledged that once an area is flooded during a large rainfall event, it is often difficult to identify the route, cause and ultimately the source of flooding without undertaking further site-specific and detailed investigations.

4.7.1 Pluvial flooding

Pluvial flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. In these instances, the volume of water from rural land can exceed infiltration rates in a short amount of time, resulting in the flow of water over land. Within urban areas, this intensity can be too great for the urban drainage network resulting in excess water flowing along roads, through properties and ponding in natural depressions. Areas at risk of pluvial flooding can, therefore, lie outside of the fluvial or tidal flood zones.

Pluvial flooding within urban areas across the country will typically be associated with events greater than the 1 in 30 AEP design standard of new sewer systems. Some older sewer and highway drainage networks will have a lower capacity than what is required to mitigate for the 1 in 30 AEP event. There is also risk associated with these networks due to possible network failures, blockages or collapses.

NRW's FMfP is used to assess pluvial surface water flood risk and the risk from small watercourses across the Conwy administrative area in this SFCA, as directed by TAN 15. See Section 3.4.13.

4.7.2 Sewer flooding

Combined sewers spread extensively across urban areas serving residential homes, business and highways, conveying waste and surface water to treatment works. Combined Sewer Overflows (CSOs), provide an NRW consented overflow release from the drainage system into local watercourses or large surface water systems during times of high flows. Some areas may also be served by separate waste and surface water sewers which convey wastewater to treatment works and surface water into local watercourses.

Flooding from the sewer network mainly occurs when flow entering the system, such as an urban storm water drainage system, exceeds its available discharge capacity, the system becomes blocked or it cannot discharge due to a high water level in the receiving watercourse. Pinch points and failures within the drainage network may also restrict flows. Water then begins to back up through the sewers and surcharge through manholes, potentially flooding highways and properties. It must be noted that sewer flooding in 'dry weather' resulting from blockage, collapse or pumping station mechanical failure (for example), is the sole concern of the drainage undertaker.

Welsh Water (DCWW) is the water company responsible for managing and maintaining drainage systems, including surface water and combined sewers that serve the administrative area. DCWW are also responsible for flooding from sewage. Records of historic flooding from sewers exist within DCWW's DG5 Register and were supplied for the 2021 SFCA.

4.7.3 Groundwater flooding

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

There are several mechanisms that increase the risk of groundwater flooding including prolonged rainfall, high in-bank river levels, artificial structures, groundwater rebound and mine water rebound. Properties with basements or cellars or properties that are located within areas deemed to be susceptible to groundwater flooding are at particular risk. Development within areas that are susceptible to groundwater flooding will generally not be suited to SuDS; however, this is dependent on detailed site investigation and risk assessment at the FCA stage.

There is currently limited research which specifically considers the impact of climate change on groundwater flooding. The mechanisms of groundwater flooding are unlikely to be affected by climate change, however if winter rainfall becomes more frequent and heavier, groundwater levels may increase. Higher winter recharge may however be balanced by lower recharge during the predicted hotter and drier summers.

Further investigation should be carried out as part of any site-specific FCA, for any site deemed to be at risk of groundwater flooding. The FCA should incorporate a site-based assessment of the potential risk of groundwater flooding to the site, confirming from borehole data whether groundwater is a source of flood risk for the site, and setting out any mitigation measures proposed. Onsite infiltration testing should also be carried out; however, it is unlikely that any areas within these categories would be suitable for infiltration-based SuDS.

JBA Groundwater Flood Risk Map

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 to illustrate possible flood risk from groundwater across Conwy County. 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.

Groundwater head difference (m)*	Grid Code	Class label
0 to 0.025	4	Groundwater levels are either at very near (within 0.025m of) the ground surface in the 100-year return period flood event. 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.
0.025 to 0.5	3	Groundwater levels are between 0.025m and 0.5m below the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
0.5 to 5	2	Groundwater levels are between 0.5m and 5m below the ground surface in the 100-year return period flood event. There is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely.
>5	1	Groundwater levels are at least 5m below the ground surface in the 100-year return period flood event. Flooding from groundwater is not likely.
N/A	0	No risk. This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.
***Difference is defined as ground surface in m AOD minus modelled groundwater table in m AOD.**		

Table 4-2 JBA Groundwater flood risk map categories

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.

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.

4.8 Flooding from artificial sources (canal and reservoir)

4.8.1 Canals

The risk of flooding along a canal is dependent on a number of factors. As canals are manmade systems that are heavily controlled, it is unlikely they will respond in the same way as a natural watercourse during a storm event. Flooding is more likely to be associated with overtopping of canal banks, breaching of embanked reaches or asset (gate) failure as highlighted in Table 4-3. Canals can also have a significant interaction with other sources, such as watercourses that feed them and minor watercourses or drains that cross underneath.

Potential Mechanism	Significant Factors
Leakage causing erosion and rupture of canal lining leading to breach	Embankments Sidelong ground Culverts Aqueduct approaches
Collapse of structures carrying the canal above natural ground level	Aqueducts Large diameter culverts Structural deterioration or accidental damage
Overtopping to canal banks	Low freeboard Waste weirs
Blockage or collapse of conduits	Culverts

Table 4-3 Canal flooding mechanisms

The risks associated with these events are also dependent on their potential failure location with the consequence of flooding higher where floodwater could cause the greatest harm due to the presence of local highways and adjacent property. The focus should be on areas adjacent to raised embankments. The pound length of the canal also increases the consequence of failure, as flows will only cease due to the natural exhaustion of supply. Stop plank (log) arrangements, stop gates and the continued inspection and maintenance of such assets by the Canal & River Trust help to manage the overall risk of a flood event.

There are no major canalised watercourses in Conwy County.

4.8.2 Reservoirs

A reservoir can usually be described as an artificial lake where water is stored for use. Some reservoirs supply water for household and industrial use, others serve other purposes, for example, as fishing lakes or leisure facilities. Like canals, the risk of flooding associated with reservoirs is residual and is associated with failure of reservoir outfalls or breaching. This risk is reduced through regular maintenance by the operating authority. There are no records of reservoir failure occurring in Conwy County Borough in nearly 100 years. Reservoirs in the UK have an extremely good safety record with no incidents resulting in the loss of life since the Dolgarrog Dam disaster in 1925.

NRW is the enforcement authority for the Reservoirs Act 1975 which includes reservoirs that hold over 10,000 cubic meters of water. The FWMA 2010 updated the Reservoirs Act and targeted a reduction in the capacity at which reservoirs should be regulated from 25,000m³ to 10,000m³. This law was further amended on 1 April 2016, introducing three important changes which dealt with the introduction of some reservoirs into regulation, some stated reservoirs seeing reduced regulation and any all incidents affecting reservoir safety needing to be reported to NRW. All large, raised reservoirs must be regularly inspected and

supervised by reservoir panel engineers. Reservoir undertakers in Conwy County include NRW, DCWW and private undertakers.

The reservoir undertaker manages and controls the use of the reservoir and is responsible for maintaining compliance with the law. The undertaker is the person, people or company that uses a reservoir for a particular purpose. If there is no use, the owners or lessees are the undertakers. The operator may be different from the owner.

NRW has produced online guidance for reservoir owners and operators which should be consulted regularly for any updates:

https://naturalresources.wales/ReservoirSafety?lang=en

NRW Flood Risk from Reservoirs dataset

The risk of inundation due to reservoir breach or failure of reservoirs within the area has been assessed using NRW's 'Flood Risk from Reservoirs dataset' and is shown on the SFCA maps in Appendix A. 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.

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

5 Historic Flooding in Conwy County

There are a number of datasets and sources of information that record incidents of historic flooding across Conwy County. Records of historic flood events help to build a picture of where flooding occurs most frequently. This can then help to direct flood risk management actions to those places that need them the most. A record of the flood source is also crucial to determining the kind of flood risk management actions that are appropriate.

The LLFA has a responsibility to investigate and record details of "locally significant" flood events within its area. This responsibility includes owning and maintaining a flood incident register which records such information as flood location, receptors, date and time, flood duration and flood source. The current CCBC register details major events up to 2012. This information is provided within the Conwy LFRMS as outlined in Table 5-1. Information regarding more recent events up to and including 2015 can be found within the Flood Investigation Reports, which can be accessed via the CCBC website[23]. The most significant event to have occurred since this time was in early 2020 during which time Llanrwst was particularly affected. .

DCWW, as a UK Water and Sewerage Company, are obliged to record and report incidents of sewer flooding by the industry regulator, OFWAT, Section **Error! Reference source not found.** contains further details.

Year of Flood	Area Effected	Type of Flood	Consequence
1990	Towyn	Coastal Storm	A combination of gale-force winds, a high tide and rough seas caused Towyn's flood defences to be breached in February 1990, 4 square miles of land was flooded, affecting 2,800 properties and causing areas to be evacuated.
1993	Llandudno, Llandudno Junction, Conwy	Surface Water	Torrential rainfall estimated as having a 1 in 1000 chance of occurrence per year in Llandudno caused surface water flooding to much of Llandudno and to a lesser extent to surrounding towns. Problems were exacerbated in Llandudno due to pumping station failures caused by the flooding.
2000	Old Colwyn	Surface Water	Surface Water flooding occurred at Peulwys Estate due to lack of capacity in the drainage system. 25 properties were affected.
2001	Abergele, Glan Conwy, Old Colwyn, Mochdre, Glanwydden, Melin y Coed, Penmaenmawr, Towyn, Conwy Morfa and Llanfairtalhaiarn	Fluvial	River flooding affected many areas of the county with some surface water problems also in Abergele, Melin y Coed and Glan Conwy. Over 100 properties affected with Abergele (39 properties), Glan Conwy (18 properties) and Old Colwyn (16 properties) worst affected.

23 https://www.conwy.gov.uk/en/Resident/Crime-and-emergencies/Preparing-for-Emergencies/Flooding/documents/Completed-Flood-Investigations.pdf

Year of Flood	Area Effected	Type of Flood	Consequence
2002	Penmaenmawr, Abergele, Glan Conwy, Llanrwst	Fluvial	River flooding affected 14 properties mostly in Penmaenmawr (9 properties)
2004	Conwy Valley, Llanrwst, Trefriw, Llandudno, Colwyn Bay, Llanfairfechan, Penmaenmawr, Conwy, Mochdre, and Abergele.	Fluvial Fluvial /Surface Water	Flooding of approximately 80 properties in the Conwy Valley occurred in February due to overtopping of the River Conwy. A combination of river and surface water flooding occurred throughout the county during October affecting approximately 100 properties. The worst affected areas were Llanrwst (20 properties – fluvial), Penmaenmawr/Dwygyfylchi (27 properties – surface water), Colwyn Bay / Mochdre (14 properties – fluvial and surface water), Llandudno (13 properties – surface water) Llanfairfechan (12 properties – fluvial and surface water) and Conwy (8 properties – surface water).
2005	Dolwyddelan, Betwys Y Coed, Llanrwst and Trefriw.	Fluvial Coastal Storm	Overtopping of the River Conwy in January caused flooding to 32 properties in the Conwy Valley. A coastal storm caused damage to a number of sea defences in February, most notably at Old Colwyn where major repairs were required.
2006	Colwyn Bay and Llandudno Junction.	Surface Water	Surface Water flooding due to lack of capacity in sewer and gully systems affected 5 properties.
2009	Llandudno, Conwy Valley, Trefriw, Betws y Coed, and Penmachno	Combined Causes (Surface Water, Fluvial)	Mainly caused by fluvial flooding following prolonged and heavy rain in the upper catchment of the Conwy River. Surface water flooding in Llandudno in the Conwy Valley occurred four days after due to a pump station failure. Approximately 50 properties were affected in total.
2010	Llanddulas, Llanfairfechan and Colwyn Bay	Coastal Storm	A coastal storm caused flooding to properties in Llanfairfechan and Llanddulas and damaged sea defences across the county. Major repairs were required at Llanfairfechan due to a breached sea wall and at Old Colwyn where the sea wall was undermined.
2011	Abergele, Llanddulas	Combined Causes (Surface Water,	River and surface water flooding occurred due to a brief period of intense

Year of Flood	Area Effected	Type of Flood	Consequence
	Llanrwst, and Dolwyddelan	Fluvial)	rainfall on highly saturated catchments. Approximately 20 properties were affected including 11 in Llanrwst.
2012	Colwyn Bay, Rhos on Sea, Llanddulas, Abergele, Llandudno Junction, Dwygyfylchi, Kinmel Bay		River and surface water flooding occurred across the county in July. The worst affected areas were Colwyn Bay where a blocked trash screen caused flooding to 19 properties, and Rhos on Sea where a main pumping station exceeded its capacity and Llanddulas where a combination of high river levels and lack of capacity in drainage systems caused flooding to 3 properties. Prolonged heavy rainfall caused flooding throughout the county, but mostly confined to the coastal towns, in September. Most flooding was due to surface water with some river flooding in Abergele and Colwyn Bay. 65 calls were received by Environment & Technical services, but internal flooding of properties was prevented in the vast majority of cases.

Table 5-1 Significant flood events in Conwy up to 2012[24]

24 https://www.conwy.gov.uk/en/Resident/Crime-and-emergencies/Preparing-for-Emergencies/Flooding/documents/Conwy-Local-Flood-Risk-Management.pdf

5.1 NRW Recorded Flood Extents

The Recorded Flood Extents (RFE) dataset is a spatial dataset showing the maximum extent of all recorded historic flood outlines from river, sea and groundwater, and shows areas of land that have previously been flooded across Wales. Records began in 1946 when predecessor bodies to NRW started collecting information about flooding incidents.

The RFE accounts for the presence of defences, structures, and other infrastructure where such things existed at the time of flooding. It includes flood extents that may have been affected by overtopping, breaches or blockages. It is also possible that historic flood extents may have been changed and that some areas would not flood at present i.e. if a flood defence has since been built.

A number of communities are within the RFE outline along these reaches. Historic flooding events are focused mainly alongside the Rivers Conwy and Elwy and their associated tributaries. Significant flood events have also been recorded along the CCBC coastline at Kinmel Bay, Llanddulas and Llandudno.

The absence of the RFE in an area does not mean that the area has never been flooded, only that records of historic flooding do not exist. The RFE is shown on the SFCA maps in Appendix A.

5.2 Historic tidal and fluvial flooding

Historic tidal flooding has been documented at Towyn and Kinmel Bay, caused by a breach of sea defences in 1990. The Conwy LFRMS notes that nearly 2,800 properties were impacted during this flood event. Historic tidal flood risk is also highlighted at Llanddulas, Llanfairfechan, Kinmel Bay, Llandudno, Old Colwyn and the town of Conwy.

The Conwy LFRMS highlights previous historic fluvial flood risk along main rivers at Trefriw and Llanrwst. It is also noted that there has been historic fluvial flood risk from ordinary watercourses at Mochdre, Abergele, Llanfair Talhaiarn, Llanrwst and Trefriw. The Conwy PFRA (2011) states there have been a number of very high magnitude historic fluvial flood incidents, flooding more than 40 properties, occurring in Abergele.

5.3 Effects of Storm Ciara 2020

Storm Ciara brought strong winds and heavy rainfall leading to flooding and widespread disruption to North Wales on 9 February 2020. The Met Office subsequently reported February 2020 to be the wettest month on record for North Wales with the highest rainfall totals recorded in North Wales and the North West of England.

The administrative area of Conwy suffered significant impacts as a result of the storm in which 172 properties were flooded. Significant flooding was experienced by several communities including Llanrwst where 72 properties were flooded, Llanfair Talhaiarn where 31 properties were flooded and Old Colwyn where 19 properties were impacted by flooding.

5.4 Effects of Storm Christoph 2021

Storm Christoph caused heavy rainfall which resulted in significant flooding and widespread disruption to North Wales on 20th January 2021. The Met Office reported 96% of the monthly average rainfall fell during the 2-day period of Storm Christoph.

NRW issued 46 flood warnings across Wales, with two severe flood warnings indicating a potential threat to life. As a consequence of Storm Christoph, the River Conwy burst its banks causing widespread flooding to Llanrwst. A number of roads were closed as a result of heavy flooding across Conwy, notably Waun Road in Glanwydden and Aber Road in Llanfairfechan causing widespread disruption.

5.5 Historic flooding from intense rainfall events

Figure 5-1 highlights locations that have experienced historic surface water flooding, taken from the Conwy PFRA. Notable high magnitude surface water flooding events, flooding 20 properties or more, have occurred in Colwyn Bay and Llandudno. A high intensity rainfall

event in 1993 has been documented to have caused surface water flooding across Llandudno, Llandudno Junction, Deganwy, Conwy, Glan Conwy and Gyffin.

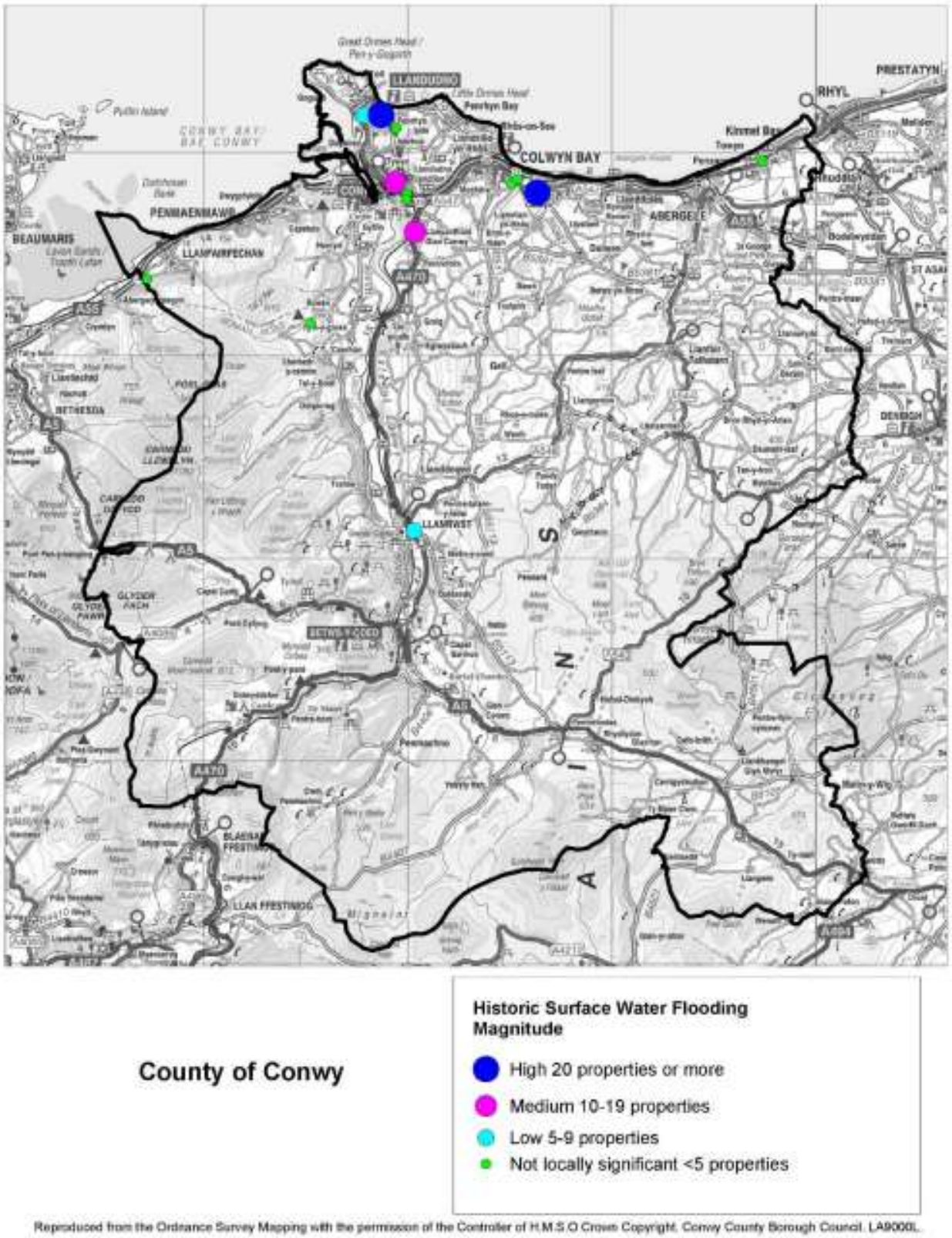

Figure 5-1 Historic surface water flood events across Conwy (Source: Conwy Preliminary Flood Risk Assessment)

6 Flood Risk Management and Alleviation

The aim of this section of the SFCA is to identify existing Flood Risk Management (FRM) assets and previous / proposed FRM schemes in the administrative area of Conwy. The location, condition and design standard of existing assets will have significant impact on actual flood risk mechanisms. Whilst future schemes in high flood risk areas carry the possibility of reducing the probability of flood events and reducing the overall level of risk. Both existing assets and future schemes will have a further impact on the type, form and location of new development or regeneration through the County.

6.1 NRW assets – Flood Defences with Standardised Attributes dataset

This dataset is part of the FRAW maps and contains information on a number of flood defence structures in the administrative area of Conwy including asset type (embankments, walls, dunes, demountable defences, flood gates), asset maintainer (NRW, Local Authority, private) and asset description. The locations of these assets can be viewed on the SFCA Maps in Appendix A. The main areas include the coastal defences at Towyn; Kinmel Bay and Llandudno; fluvial defences on the Conwy, defending Llanrwst and Trefiw; and fluvial / tidal defences on the Conwy estuary, defending Trefiw.

This national dataset contains such information as:

- Asset type (flood wall, embankment, high ground, dunes, demountable defence);
- Flood source (fluvial, tidal, fluvial and tidal);
- Design standard (SoP);
- Asset length;
- Asset age;
- Asset location; and
- Asset condition.

See Figure 6-1 for condition assessment grades using the Environment Agency's (EA) Condition Assessment Manual[25] (CAM).

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no impact on performance
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce the performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation needed.
5	Very Poor	Severe defects resulting in complete performance failure.

Figure 6-1 EA flood defence condition assessment grades

25 Environment Agency. (2012). Visual Inspection Condition Grades. In: Condition Assessment Manual. Bristol: Environment Agency, pg9

In total, there are 138 manmade raised flood defences in the administrative area of Conwy, of these, 72 are embankments and 51 are walls. The remaining 15 include flood gates, areas of high ground, dunes and demountable defences. Of the total 138 assets, 31 are coastal; 10 are tidal; 71 for fluvial flooding; and 26 from combined fluvial and tidal flooding. The majority of combined fluvial and tidal defences are located along the Conwy Estuary from Tal-y-cafn to Llanrwst. The majority of fluvial defences are located along the River Conwy as it flows northwards through the administrative area from Llanrwst to Trefiw.

The tidal defences are located along the shorefront at Llanfairfechan; Conwy; Llandudno; Penrhyn Bay and from Llanddulas to Kinmel Bay. The NRW assets shown on the SFCA Maps are colour coded by their condition assessments as per the gradings shown in Figure 6-1.

6.2 NRW Flood Risk Management Activities and Flood and Coastal Erosion Risk Management Research and Development

As well as the ownership and maintenance of a network of formal defence structures, NRW carries out a number of other flood risk management activities that help to reduce the probability of flooding, whilst also addressing the consequences of flooding. These include:

- Maintaining and improving existing flood defences, structures and Main River channels.
- Enforcement and maintenance where riparian owners unknowingly carry out work that may be detrimental to flood risk.
- Identifying and promoting new flood alleviation schemes (FAS) where appropriate.
- Working with local authorities to influence the location, layout and design of new and redeveloped property and ensuring that only appropriate development is permitted relative to the scale of flood risk, i.e. through this SFCA.
- Operation of flood warnings and flood alerts for areas within designated Flood Warning Areas (FWA) or Flood Alert Areas (FAA). FWAs are shown on the SFCA Maps in Appendix A.
- Promoting awareness of flooding so that organisations, communities and individuals are aware of the risk and are therefore sufficiently prepared in the event of flooding.
- Promoting resilience and resistance measures for existing properties that are currently at flood risk or may be in the future as a result of climate change.

The Flood and Coastal Erosion Risk Management (FCERM) Research and Development programme is run by NRW in collaboration with Welsh Government, the EA and Defra and aims to serve the needs of all flood and coastal operating authorities in England and Wales. The programme provides the key evidence, information, tools and techniques to:

- Inform the development of FCERM policy and strategy,
- Understand and assess coastal and flood risks and the processes by which these risks arise,
- Manage flood and coastal erosion assets in a sustainable way,
- Prepare for and manage flood events effectively.

Based on information publicly available from NRW, there are a number of completed, ongoing and proposed national flood risk management work programmes. Click the link below for the latest news where there may be programmes relevant to Conwy County:

https://naturalresources.wales/evidence-and-data/research-and-reports/reports-evidence-and-data-on-flooding/flood-and-coastal-erosion-risk-management-research/?lang=en

6.3 LLFA flood risk management assets

The LLFA own and maintain a number of assets throughout Conwy County which will include coastal defences, culverts, bridge structures, gullies, weirs and trash screens. Most of these

assets will lie along ordinary watercourses within smaller built-up areas where watercourses may have been culverted or diverted, or within rural areas. All these assets can have flood risk management functions as well as an effect on flood risk if they become blocked or fail. In most cases responsibility lies with the riparian landowner.

As part of its FWMA duties, the LLFA has a duty to maintain a register of structures or features, which are considered to have a significant effect on flood risk, including details on ownership and condition as a minimum. The Asset Register should include those features relevant to flood risk management function including feature type, description of principal materials, location, measurements (height, length, width, diameter) and condition grade. The Act places no duty on the LLFA to maintain any third-party features, only those for which the authority has responsibility as land/asset owner.

CCBC have provided an asset register for the purposes of this Stage 1 SFCA. The register provides information on 49 high priority assets, which lie along ordinary watercourses. Of these assets, 37 provide protection against fluvial flooding, 9 against fluvial/tidal and 3 pluvial. The register includes information such as feature type, location, asset owner and asset maintainer as summarised in Table 6-1.

However, the asset register should also outline how the County Council intends to manage these assets or features including their ongoing maintenance programme. Where assets or features are located in a high risk area or have been assessed to have the potential to effect flood risk, CCBC should prioritise and focus any maintenance or upgrades.

Asset type	Asset sub type	Asset name (*if known)	Asset maintainer	Asset owner	Protection type	Location description
Structure	Screen	Is Coed Inlet	Conwy CBC	Conwy CBC	Fluvial	Conwy
Structure	Outfall	Morfa Drive Outfall	Conwy CBC	Conwy CBC	Fluvial	Conwy
Structure	Screen	Bryn Rhys Screens	Third Party Owned/ Maintained	Third Party Owned/ Maintained	Fluvial	Glan Conwy
Structure	Screen	Eldon Drive Inlet	Conwy CBC	Conwy CBC	Fluvial	Abergele
Structure	Screen	Cae Person Channel and Screen	Conwy CBC	Conwy CBC	Fluvial	Llanrwst
Structure	Screen	Top Llan Road Screen	Conwy CBC	Conwy CBC	Fluvial	Glan Conwy
Structure	Screen	Pentrefelin Screen	Third Party Owned/ Maintained	Third Party Owned/ Maintained	Fluvial	Pentrefelin
Channel	Open Channel	Graiglwyd Road Drainage	Conwy CBC	Conwy CBC	Pluvial	Penmaenmawr
Structure	Screen	Bron Haul Gardens Inlet	Conwy CBC	Conwy CBC	Fluvial	Penmaenmawr
Structure	Screen	Bryn Helig Inlet	Conwy CBC	Conwy CBC	Fluvial	Penmaenmawr
Structure	Screen	Merton Park Junc Inlet	Conwy CBC	Conwy CBC	Fluvial	Penmaenmawr
Channel	Simple	Aber Road	Conwy CBC	Conwy CBC	Fluvial	Llanfairfechan

Asset type	Asset sub type	Asset name (*if known)	Asset maintainer	Asset owner	Protection type	Location description
	Culvert	Culvert				
Structure	Screen	Glan Conwy Flood Alleviation Screen	Conwy CBC	Conwy CBC	Fluvial	Glan Conwy
Structure	Screen	Park Crescent Gullies	Conwy CBC	Conwy CBC	Pluvial	Llanfairfechan
Structure	Screen	Penmaen Park Golly	Conwy CBC	Conwy CBC	Pluvial	Llanfairfechan
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial/tidal	Penmaenmawr
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial	Conwy
Structure	Outfall	Outfall	Conwy CBC	Conwy CBC	Fluvial/tidal	Conwy
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llandudno Junction
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llandudno Junction
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial/tidal	Llandudno
Structure	Screen	N/A	Conwy CBC	Conwy CBC	Fluvial	Glan Conwy
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial/tidal	Colwyn Bay
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial/tidal	Colwyn Bay
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial/tidal	Colwyn Bay
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial/tidal	Colwyn Bay
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llansannan
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llansannan
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanfair Talhaiarn
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanfair Talhaiarn
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial	Abergele
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanrwst
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanrwst

Asset type	Asset sub type	Asset name (*if known)	Asset maintainer	Asset owner	Protection type	Location description
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial	Eglwysbach
Structure	Screen	Unknown	Conwy CBC	Conwy CBC	Fluvial	Llanfairfechan
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanfairfechan
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanrwst
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanrwst
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanrwst
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial	Dolwyddelan
Structure	Screen	Unknown	Third Party Owned/ Maintained	Conwy CBC	Fluvial	Dolwyddelan
Structure	Screen	N/A	Conwy CBC	Conwy CBC	Fluvial	Betws-y-Coed
Channel	Simple Culvert	Inlet	Third Party Owned/ Maintained	Third Party Owned/ Maintained	Fluvial	Pwllycrochan Avenue
Structure	Screen	N/A	Third Party Owned/ Maintained	Third Party Owned/ Maintained	Fluvial	Cerrigydrudion
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial/tidal	Penmaenmawr
Structure	Screen	N/A	Conwy CBC	Conwy CBC	Fluvial	Rowen
Structure	Screen	Screen	Conwy CBC	Conwy CBC	Fluvial	Llanrwst
Structure	Screen	N/A	Conwy CBC	Conwy CBC	Fluvial	Mochdre
Structure	Screen	N/A	Conwy CBC	Conwy CBC	Fluvial	Colwyn Bay

Table 6-1 Critical Assets

6.4 Future flood defence

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.

Welsh Government's 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 FMfP 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.

It is however recognised that there is a need to develop resilience in town centres and for nationally significant infrastructure, where they face new or increased flood risks as a result of climate change. It is likely a multi-agency approach, with the support of the private

sector where appropriate, will be required to deliver such outcomes, whilst remembering that new flood defences will have to satisfy the qualifying criteria for Defended Zones.

Policy 8 of Future Wales – the National Plan 2040 demonstrates 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.

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.

6.4.1 Current pipeline of FCERM projects

Welsh Government has requested the SFCA be used to help identify a pipeline of potential FCERM projects that may support the setting of future FCERM investment opportunities, as summarised in **Error! Reference source not found.**. Transparency in these priorities is hoped to bring forth investment and partnership working opportunities, and generally facilitate collaborative working.

NRW and LLFA's have been approached to provide details of any significant FCERM plans within the County that are likely to be delivered in the next five years, at the time of writing. A pipeline of future projects is not available at the time of writing. Further work to establish a detailed pipeline of projects should be undertaken through a Stage 2 SFCA or as a separate piece of work if a Stage 2 SFCA is not required. Further detail on the identification of pipeline projects should be undertaken in consultation with NRW, Welsh Government and other RMAs.

Details of ongoing or recently completed projects are summarised in Table 6-2. Some of the ongoing 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.

It should be noted that this list of projects is not exhaustive and is subject to frequent change. Details of FCERM investment plans are regularly published by Welsh Government, NRW and RMAs, as stated in Section 6.2.

Project name	Location / extent	RMA	Timescales (at the time of writing)
Llansannan Flood Alleviation Scheme	Llansannan	LLFA	Expected completion date December 2022.
Nant y Felin, Llanfairfechan Flood Alleviation Works	Llanfairfechan	LLFA	Progress Report July 2022 - Review of scope & project out for tender Summer 2022.
Eglwysbach Flood Alleviation Scheme	Eglwysbach	LLFA	Progress Report July 2022 - Outline Business Case in development.
Graiglwyd Road, Penmaenmawr	Penmaenmawr	LLFA	Progress Report July 2022 - Outline

Project name	Location / extent	RMA	Timescales (at the time of writing)
			Business Case in development.
Bryn Helyg, Penmaenmawr - FBC	Penmaenmawr	LLFA	Business Justification Case submitted to Welsh Government for review in 2021/22 financial year.
Eldon Drive Flood Alleviation Scheme	Abergele	LLFA	Completed September 2022.
School Bank Road, Llanrwst	Llanrwst	LLFA	Progress Report July 2022 - Outline Business Case in development.
Upper catchment study, Llanrwst	Llanrwst	LLFA	Progress Report July 2022 – Preliminary stage.
Llanfairfechan Coastal Defence Improvements			Progress Report July 2022 - Detailed design stage.
Llandudno (north and west shore) Coastal Defence Improvements	Llandudno	LLFA	Progress Report July 2022 - Outline Business Case in development.
Penrhyn Bay Coastal Defence and Public Realm Improvements	Penrhyn	LLFA	Progress Report July 2022 – Construction commenced 2022.
Colwyn Bay Waterfront Ph2b	Colwyn Bay	LLFA	Progress Report July 2022 - Construction commenced 2022.
Llanddulas to Kinmel Bay Coastal Defence Improvements	Llanddulas to Kinmel Bay	LLFA	Progress Report July 2022 - Detailed design stage.
Aber Road Culvert SSG – Phase 2	Llanfairfechan	LLFA	Progress Report July 2022 – Tender documents at final review stage before being put out to tender.
Park Crescent, Llanfairfechan	Llanfairfechan	LLFA	Progress Report July 2022 – Complete.
Station Road, Deganwy	Deganwy	LLFA	Progress Report July 2022 – Preliminary Stage.
Morfa Drive, Conwy	Conwy	LLFA	Progress Report July 2022 – Preliminary Stage.
Old Colwyn Coastal	Old Colwyn	LLFA	Progress Report July

Project name	Location / extent	RMA	Timescales (at the time of writing)
Defence and Promenade Improvements			2022 - Construction in progress.
Highway Improvement Measures – B5106 Dolgarrog to Llanrwst – Resilient Roads	Llanrwst	LLFA	Currently at preliminary stage: WelTAG Stage 1 working draft submitted to CCBC for review April 2022.

Table 6-2 Identified FCERM projects

6.5 Water company assets

The sewerage infrastructure across Conwy County is likely to be based on Victorian sewers from which there is a risk of localised flooding associated with the existing drainage capacity and sewer system. The drainage system may be under capacity and / or subject to blockages resulting in localised flooding of roads and/or property. DCWW is responsible for the management of the adopted sewerage system. This includes surface water and foul sewerage.

There may however be some private surface water sewers in the county as only those connected to the public sewer network that were transferred to the water companies under the Private Sewer Transfer in 2011 are likely to have been constructed since this transfer date. Surface water sewers discharging to watercourses were not part of this transfer and would therefore not be under the ownership of DCWW, unless adopted under a Section 104 adoption agreement.

Water company assets include Wastewater Treatment Works, Combined Sewer Overflows, pumping stations, detention tanks, sewer networks and manholes.

6.6 NRW Flood Storage Areas

NRW's Flood Storage Areas (FSA) dataset shows areas that act as a balancing reservoir, storage basin or balancing pond. Their purpose is to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel. It may also delay the timing of a flood peak so that its volume is discharged over a longer time interval. There are five Flood Storage Areas within CCBC, which are located along the River Wydden in the north west of the County. This dataset is shown on the SFCA Maps in Appendix A.

6.7 Working with Natural Processes and Natural Flood Management

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

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 focuses 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 Conwy County. This section provides an overview of different WwNP / NFM measures that can be implemented and provides a review of the WwNP mapping to understand the potential for using these techniques in Conwy County.

A wide range of techniques can be used that aim to reduce flooding by working with natural features and processes in order to store or slow down floodwaters before they can damage flood risk receptors (e.g. people, property, infrastructure, etc.). WwNP involves taking action to manage flood and coastal erosion risk by protecting, restoring and emulating the natural regulating functions of catchments, rivers, floodplains and coasts. Techniques and measures, that may be applicable to Conwy County, include:

- Peatland and moorland restoration in upland catchments
- Re-meandering streams
- Targeted woodland planting
- Reconnection and restoration of functional floodplains
- Restoration of rivers and removal of redundant structures
- Installation or retainment of large woody material in river channels
- Improvements in management of soil and land use
- Creation of rural and urban SuDS
- Restoration and management of sand dunes, saltmarshes and mudflats on the coast
- Managed realignment of the coastline
- Beach nourishment

Welsh Government actively encourages the implementation of WwNP measures within catchments and coastal areas in order to assist in the delivery of the requirements of various directives relating to broader environmental protection and national policies.

6.7.1 WwNP in Conwy County

Section 8.3 of the Conwy LFRMS discusses WwNP in the context of Flood and Coastal Erosion Risk Management whereby WwNP means slowing down the flow of water (e.g. by re-establishing floodplains that hold floodwaters) or speeding up the flow of water (e.g. by removing unnatural obstructions), to prevent floodwaters from causing harm. Such techniques protect, restore or emulate natural processes which regulate flooding and erosion. Natural processes operate across a continuum from mitigated engineering to full naturalisation.

An example from Llanrwst in the Conwy valley is provided in the LFRMS. In Llanrwst, the White Barn (south) embankment was lowered to help reduce flood levels to enable flood water to overtop the structure in a controlled manner and allow the reconnection and utilisation of the floodplain. The scheme also created a wetland by excavating borrow pits for material for the embankment around Trefriw.

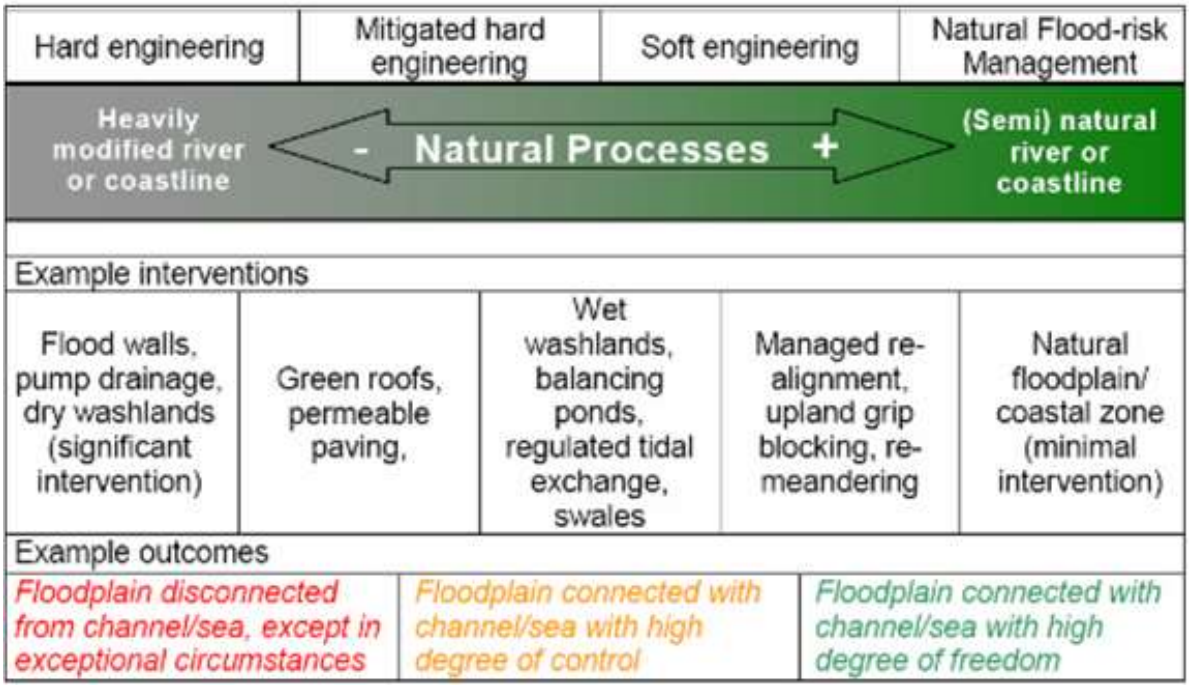

Figure 6-2 NRW's conceptual model of WwNP[26]

6.7.2 NRW Maps of Natural Flood Management[27]

Natural flood management is a means of working with natural processes by implementing nature-based interventions to help reduce the risk of flooding. The maps 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'. This joint project was delivered under the Flood and Coastal Erosion Risk Management Research and Development programme managed by the Environment Agency.

The maps identify potential areas for the following measures:

- floodplain reconnection
- runoff attenuation features and gully blocking
- woodland planting covering floodplain planting, riparian planting and wider catchment woodland

It is recommended that the maps are used alongside the Working with Natural Processes Evidence Directory to help users think about the types of measures that could be used and where they may be most effective within a catchment. The maps are shown on the SFCA Maps in Appendix A.

The maps do not cover all measures for working with natural processes and users may wish to refer to other sources of relevant information when identifying areas of opportunity.

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26 https://www.conwy.gov.uk/en/Resident/Crime-and-emergencies/Preparing-for-Emergencies/Flooding/documents/Conwy-Local-Flood-Risk-Management.pdf

27 http://naturalresources.wales/flooding/managing-flood-risk/maps-for-natural-flood-management/?lang=en

A technical guide containing further technical background on the maps as well as additional information on Working with Natural Processes as part of the same study is also publicly available[28].

6.8 Green Infrastructure assessments

Open space, or Green Infrastructure (GI), should be designed and managed as a multifunctional resource capable of delivering a wide range of environmental and quality of life benefits for local communities and should be provided as an integral part of all new development, alongside other infrastructure such as utilities and transport networks.

Open space can provide many social, economic and environmental benefits close to where people live and work including:

- Places for outdoor relaxation and play;
- Space and habitat for wildlife with access to nature for people;
- Environmental education;
- Local food production - in allotments, gardens and through agriculture;
- Improved health and well-being – lowering stress levels and providing opportunities for exercise;
- Climate change adaptation - for example flood alleviation and cooling urban heat islands.

Open space can perform many functions, including flood risk mitigation. LDPs should account for increased flood risk, resulting from climate change, through the planning of GI. GI can have an important role to play in reducing the likelihood of flooding by providing space for flood storage, reducing runoff and increasing infiltration, whilst also providing other benefits as stated above.

Alongside GI should be the implementation of SuDS (see Section 8.7), specifically within sites that may present development opportunities. The suitability of GI and SuDS can be informed by this SFCA through utilisation of open space for water in the areas of greatest flood risk, which would be key to helping deliver sustainable development.

Examples include:

- Restoration of the natural character of floodplains;
- Keeping and preserving of areas of existing natural floodplain;
- Introduction of new areas and enhancing existing areas of greenspace whilst incorporating sustainable drainage within new development; and
- Reduction of downstream flood risk.

CCBC produced a SPG note on design in 2015, which discusses the importance of establishing a multifunctional green infrastructure in new developments at all scales to improve connectivity to open spaces beyond the site boundary. This note does state that in these cases, the open space should be designed with the management of flood risk in mind. This could also be linked in to certain WwNP measures discussed in Section 6.7.

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28 Mapping the potential for Working with Natural Processes – technical report https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/677592/Working_with_natural_processes_mapping_technical_report.pdf

7 Emergency Planning

This SFCA contains useful data to allow emergency planning processes to be tailored to the needs of the area and be specific to the flood risks faced. The SFCA Maps in Appendix A and accompanying GIS layers should be made available to emergency planners to help prepare for any flood event and throughout the planning process.

The provisions for emergency planning for local authorities in Wales are set out by the Civil Contingencies Act, 2004. North Wales Councils Regional Planning Service (NWC-REPS) is the emergency planning provider to all North Wales Local Authorities, namely, Isle of Anglesey County Council, Conwy County Borough Council, Denbighshire County Council, Flintshire County Council, Gwynedd Council and Wrexham County Borough Council. The service is hosted by Flintshire County Council and is funded on a collaborative basis.

NWC-REPS role is to ensure that the Councils are fully compliant with the Civil Contingencies Act 2004, Pipeline Safety Regulations 1996, Control of Major Accident Hazard Regulations 2015 and the Radiation (Emergency Preparedness and Public Information) Regulations 2019. This involves identifying threats and hazards, producing Emergency Response Plans, delivery of training to Local Authority staff and testing arrangements once in place. NWC-REPS work collaboratively with partner agencies through North Wales Local Resilience Forum to represent all Local Authorities in North Wales. By undertaking these activities, NWC-REPS are also contributing to the resilience and safety of communities in North Wales.

7.1 Wales Resilience Forum

The Wales Resilience Forum is the highest level of emergency planning in Wales with four regional Local Resilience Forums (LRF) in place for the four Welsh Police Areas (see Section 7.2). The Wales Resilience Partnership Team supports the Wales Resilience Forum through sub-groups to develop resilience across Wales in such areas as risk assessment and mass fatalities.

The Joint Emergency Services Group brings together all the emergency services in Wales, including NHS Wales, Welsh Government and armed forces at the most senior level. They consider their contribution to civil contingencies and counterterrorism in Wales. They also address wider cross-service issues of joint interest.

7.2 Local Resilience Forums

The administrative area of Conwy is in the North Wales LRF[29] (NWLRF) which consists of emergency services, other principal councils and health organisations, including:

- North Wales Fire and Rescue
- North Wales Police
- Welsh Ambulance Service
- North Wales Local Authorities
- Betsi Cadwaladr University Health Board

Several Welsh Government agencies are also part of the LRF, including NRW, Public Health Wales, British Transport Police, Maritime and Coastguard Agency, The Met Office, the Health and Safety Executive, utility companies and the military.

The aim of the LRF is to legally deliver the duties stated in the Civil Contingencies Act 2004 within a multi-agency environment. The NWLRF works to prepare and respond to emergencies in North Wales.

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29 https://www.gwynedd.llyw.cymru/en/Residents/Emergencies/Emergecy-documents/North-Wales-Community-Risk-Register.pdf?_ga=2.237690115.287948601.1653466681-420525351.1637160856

In relation to flooding and severe weather, the NWLRF is:

- Monitoring forecasts and providing timely warnings to those at risk
- Planning strategically to protect risk areas and to maintain sea defences
- Working to help minimise disruption to critical services
- Designing and planning services to be resilient
- Working with partners to raise awareness of flood risk and steps the public can take to prepare themselves for flooding.

7.2.1 North Wales Community Risk Register

The LRF produces the Community Risk Register (CRR) which lists possible risks, the probability of occurring and potential impact. The CRR provides information on the biggest emergencies that may have a significant impact on the communities of North Wales, together with an assessment of how likely they are to happen and the impacts if they do include impacts to people, houses, the environment and local businesses. Each identified risk is then analysed and given a rating according to how likely the risk is to lead to an emergency and their potential impact on safety and security, health, economy, environment and society.

7.3 Emergency Plans

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.

7.4 Access and egress

TAN 15 requires safe access and egress to be available to from new 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 Table 3-5. For any development where there is a flood risk to the development or the associated highways a flood response plan should be compiled to inform site occupants of safe access and egress routes to and from the site. Safe routes should be available at all times to all site users and the emergency services.

7.5 Flood warnings and alerts

NRW operates a Flood Warning Service[30] 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.

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.

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

More information on how to register for flood alerts and warnings is available via:

https://naturalresources.wales/flooding/sign-up-to-receive-flood-warnings

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.

The SFCA Maps in Appendix A show NRW's Flood Warning Areas (FWA) and Flood Alert Areas (FAA).

7.5.1 NRW Flood Warning Areas

Part of the FRAW map, Flood Warning Areas (FWA) are geographical areas where NRW expects flooding to occur and where NRW provides a Flood Warning Service, as discussed above.

FWAs generally contain properties that are expected to flood from rivers or the sea. Specifically, FWAs define locations within the Flood Warning Service Limit that represent a discrete community at risk of flooding. A discrete community is a recognised and named geographical community, which can be an urban area, a significant suburb of a large city or a village or a hamlet.

The purpose of Flood Warnings is to alert people that flooding is expected, and they should take action to protect themselves and their property. There are 22 Flood Warning Areas in Conwy County, which are located in areas at high risk of fluvial or tidal flooding. These include Flood Warnings at Llanrwst and Trefiw alongside the River Conwy and coastal locations including Abergele and Llandudno.

7.5.2 NRW Flood Alert Areas

Also part of the FRAW map, Flood Alert Areas (FAA) are geographical areas where it is possible for flooding to occur from rivers or the sea, therefore different to FWAs, where flooding is expected to occur. There are 5 Flood Alert Areas within Conwy County. These include areas along the North Wales coastline including Llandudno, Kinmel Bay and Towyn and areas around the main Rivers including the River Conwy from Llanrwst to Conwy

A single FAA may cover the floodplain within the Flood Warning Service Limit of multiple catchments of similar characteristics containing a number of FWAs. A FAA may also match that of a corresponding FAA and warn for the possibility of flooding in that area. In some coastal locations a Flood Alert may be issued for spray or overtopping and be defined by a stretch of coastline. Practical and administrative factors may also influence the exact extent of a FAA.

8 Flood Risk Mitigation for Development

TAN 15 outlines the complementary role that planning and building regulations have in flood risk management, and the requirement for the use of flood mitigation and damage resistant measures to ensure the consequences of flooding can be deemed acceptable. Any new development in Zones 2 and 3 and the TAN 15 Defended Zones must have resilience to flooding built-in at the site and property level. Where possible, development should still be directed to Flood Zone 1 (where there is a lower risk of flooding). Measures that could be used to help mitigate flood risk at development sites are outlined in this chapter. The appropriateness of measures will differ and be based on local conditions.

8.1 LDP Candidate and strategic sites

The information and guidance provided in this chapter (supported by the SFCA mapping in Appendix A) can be used by CCBC to inform the allocation of sites in the new LDP, and provide the basis from which to fully apply the Justification and Acceptability Tests in Sections 10 and 11 of TAN 15 (see Sections 3.4.5 and 3.4.6 of this report respectively).

The LPA provided a GIS layer of candidate sites with potential to be included as site allocations in the new LDP. 60 candidate sites have been provided including five strategically important sites. It is intended that the five strategic sites will provide the bulk of allocated land in the new LDP. The strategic sites are located in the locations listed below and are proposed for the land uses stated:

- Llanfairfechan
  - Primary school
  - ~200 houses
- Llanrhos
  - ~200 houses
- Old Colwyn
  - ~300 houses
- Abergele South East
  - Employment
  - Retail
  - Primary school
- Llanrwst
  - ~200 houses

The sites were visually screened to assess those that may be adversely affected by the new Flood Map for Planning of TAN 15 in comparison to the Development Advice Map. There is no additional risk to the five strategic sites from the Flood Map for Planning. There is however a reduction in risk to the Abergele South East site.

Table 8-1 lists eight candidate sites that are shown to be at additional flood risk based on the Flood Map for Planning. Table 8-2 lists 10 candidate sites shown to be at reduced risk. all other candidate sites are within Flood Zone 1 for fluvial and tidal flood risk. 39 candidate sites are at risk from surface water and small watercourses.

Any further analysis and investigation into flood risk at these sites should be carried out as part of a Stage 2 SFCA.

Site	Change in risk
Land off Nebo Road, Llanrwst	Additional fluvial risk
Land adjacent Mochdre Commerce Parc, Ty Gwyn Road, Dolwyd	Additional tidal risk
Heath & Ysgol Pant y Rhedyn, Llanfairfechan	Additional fluvial and tidal risk
Land at Glan Conwy Corner	Additional tidal risk
Land North of Sychnant Pass Road (Site 2), Conwy	Additional fluvial risk
Land to the South and East of Dolgau, Dolwyn Road, Old Colwyn	Additional fluvial risk
Land bordering Eldon Drive, Abergele	Additional fluvial risk
Bryn Rhodyn Farm, Old Colwyn	Additional fluvial risk

Table 8-1 Candidate sites at increased risk from Flood Map for Planning

Site	Change in risk
The Old Garden Centre, Dolwyd Nurseries, Dolwyd, Mochdre	Reduced tidal risk
Land adjacent Premier Inn, Conway Road, Llandudno Junction	Reduced tidal risk
Finger of Land, Mochdre	Reduced fluvial and tidal risk
Land off Llanfair Road, Abergele	Reduced fluvial risk
Land off Llanfair Road, Abergele (Site 2)	Reduced fluvial risk
Land by Ysgol y Creuddyn, Penrhyn Bay	Reduced tidal risk
Land at Tandderwen and off Tan Y Fron Road, Abergele	Reduced fluvial risk
Bryn Hyfryd-Ffordd Tan yr Ysgol, Llanrwst	Reduced fluvial risk
Roundbout field, Abergele	Reduced tidal risk
Land North of Kinmel Manor, Abergele	Reduced tidal risk

Table 8-2 Candidate sites at reduced risk from Flood Map for Planning

8.2 Accounting for Climate Change

Climate change will increase flood risk over the lifetime of a development. The effects are well documented and include rising sea levels and more frequent periods of heavy rainfall increasing the risk of flooding. The new Flood Map for Planning therefore accounts for climate change so it can be considered at the first stage of planning for new development.

Note: Peak river flow and sea level rise are based on the central climate change allowance. Although the central allowance is not included in NRW's most up to date allowances for sea

level rise, it was available at the time of the production of the new TAN 15 and Flood Map for Planning.

The new TAN 15 outlines ways in which the planning system can support communities and people to avoid being affected by flooding, and to develop more resilience where it cannot be avoided.

Para 7.15 of TAN 15 states:

'Using the most up-to-date national climate change projections, planning authorities should ensure new dwellings will be safe places to live now and in the future. 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'.

8.2.1 Welsh Government Climate Change Allowances

Welsh Government published new climate change allowances for sea level rise and peak river flows in September 2021 with the last update having occurred in December 2021. These allowances should be used in FCAs submitted in support of relevant planning applications, and to inform development plan allocations.

Providing an allowance for the potential impacts of climate change when assessing future flood risk, allows for development proposals to incorporate design measures that help to manage risk and improve resilience.

The allowances are based on the latest available information on climate change projections and different scenarios of increased global mean surface temperatures. Welsh Government has produced a guidance document[31] to accompany the new allowances which replaces guidance issued on 23 August 2016 (reference CL-03-16).

The guidance states:

'Revised sea level rise allowances are based on the most up to date assessment of how climate may change in the UK over the 21st Century as presented by UK Climate Projections (UKCP18). A new section on peak rainfall intensity has been included to reflect the risk from increased rainfall on smaller catchments and on land and urban drainage systems. There has been no change to the guidance for wave height, or for peak river flow which is based on an assessment of UKCP09 data undertaken by the Environment Agency between 2013 and 2015. An update to these allowances will be made in future following analysis of the impacts of revised UKCP18 climate projections. For peak river flow and peak rainfall intensity, allowances are provided for different epochs (periods) of time over the next century. UKCP18 presents sea level rise allowances as regionalised data, with the impact of climate change dependent on location. This guidance has been updated to indicate projected increases in sea level rise for each local authority administrative area. These regional allowances replace the single allowance for Wales previously provided'.

Peak river flow allowances

Table 8-3 indicates the anticipated increase in peak river flows for the river basin districts that cover Conwy County, namely Western Wales and River Dee RBDs. Note, this data will be updated once revised data is made available through UKCP18.

The allowances are based on percentage increases of change from a 1961-1990 baseline and are provided for the:

- 10th percentile (lower end estimate)
- 50th percentile (change factor / central estimate)
- 90th percentile (upper end estimate)

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31 Flood Consequences Assessment: Climate change allowances. Welsh Government Planning Policy Branch. September 2021

RBD	Allowance Category	Total Potential change anticipated by the...		
		2020s	2050s	2080s
Western Wales	Upper end	+25%	+40%	+75%
	Change factor / central	+15%	+25%	+30%
	Lower end	+5%	+10%	+15%
Dee	Upper end	+20%	+30%	+45%
	Change factor / central	+10%	+15%	+20%
	Lower end	+5%	+5%	+5%

Table 8-3 Peak river flow allowances for Western Wales and River Dee RBDs

The guidance recommends that the central estimate / change factor for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of a FCA and to inform site design levels.

Sea Level Rise Allowances

There is greater confidence in the revised projections of global mean sea level rise presented by UKCP18, which reflects regional variation across Wales. Table 8-4 sets out estimates of cumulative sea level rise for Conwy up to 2100 and 2120 to reflect the assumed 100-year lifetime for residential development. The allowances are derived using the UKCP18 2100 dataset.

The allowances shown in Table 8-4 are intended as a guide. The 2100 figure for the 70th percentile is considered appropriate for development with a 75-year lifetime. The guidance states:

'*Location specific allowances, projections for different timescales and projections beyond 2120 should be obtained directly from the UKCP18 User Interface32. As a minimum, development proposals should be assessed against the 70th percentile to inform design levels. An assessment should also be made against the 95th percentile to inform mitigation measures, access and egress routes and emergency evacuation plans. The allowance used should be appropriate to the lifetime of development'*.

Allowance (percentile)	Mean sea level rise (metres) by 2100	Mean sea level rise (metres) by 2120
70th	0.75	0.89
95th	1.01	1.21

Table 8-4 Estimated mean sea level rise (in metres) for Conwy by 2100 and 2120

When considering proposals for development with a lifetime beyond 100 years (i.e. 2120) an appropriate assessment is required for the whole of the development lifetime. Allowances up to 2125 should be calculated using the average incremental increase from the previous five years of the dataset (2095-2099 at the time of writing), multiplied by 25. Allowances beyond 2125 can be obtained from the UKCP18 User Interface online.

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32 https://ukclimateprojections-ui.metoffice.gov.uk/ui/home

Peak rainfall intensity

Allowances for peak rainfall intensity apply across the whole of Wales though are only appropriate to small catchments (less than 5km^2). In relation to Table 8-5, the guidance states:

'Both the central and upper estimates should be assessed to understand the range of impact. As a minimum, development proposals should be assessed against the central estimate to inform design levels. Where the assessment indicates a significant flood risk for the upper estimate (e.g. depths, velocity), the flood consequences assessment will need to indicate the mitigation measures required to protect people and property. For river catchments over 5km^2, the peak flow ranges in Table 8-3 *should be used. Rainfall allowances should also be applied when considering surface water flooding and drainage assessments. Drainage systems should be designed to ensure there is no increase in site runoff when assessed against the upper estimate'.*

Allowance (across Wales)	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper estimate	+10%	+20%	+40%
Central estimate	+5%	+10%	+20%

Table 8-5 Peak rainfall intensity allowances

8.3 Justification and acceptability testing

There are several outcomes which could come out of the Justification and Acceptability Testing process (see Sections 3.4.6 and 3.4.7 respectively).

8.3.1 Rejection of site

A site which fails to pass the Justification and Acceptability Testing would be rejected.

In terms of surface water flood risk, the Justification Test is not applicable though certain Acceptability Criteria must be met, or the site could be rejected (see Figure 1 of TAN 15[2]). Section 8 of TAN 15 provides details on surface water and ordinary watercourses, summarised in Section 8.7 of this report.

8.3.2 Consideration of site layout and design

Site layout and site design is important at the site planning stage where flood risk exists. The site area would have to be large enough to enable any alteration of the developable area of the site to apply a sequential, risk-based approach to try to locate more vulnerable development uses away from flood zones to higher ground, while more flood-compatible development (e.g. vehicular parking, recreational space) is located in higher risk areas. However, vehicular parking in floodplains should consider the nature of parking, flood depths and hazard including evacuation procedures and flood warning. The nature of risk to water quality also needs to be considered and mitigated to ensure that accumulated hydrocarbons and other vehicle related pollutants are not released to the aquatic environment

Surface water risk and opportunities for SuDS should also be assessed during the planning stage. 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.

Depending on local circumstances and development vulnerability, if it is not possible to adjust the site boundary to remove the site footprint from high risk Flood Zone 3 to a lower risk zone then development may not be permitted, depending on whether the Justification and Acceptability criteria can be met for development in a flood zone.

8.3.3 Raised floor levels

When designing the layout for a development, consideration should be given to the potential effects of flood risk and great care should be taken so that development is safe and there are no adverse effects on 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 risk of flooding (from any source) to properties within a development boundary, 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.

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 a development proposed within an area at risk of flooding should be set based on these requirements.

The design flood level should be the level taking account of the highest risk source, which could include the risk that remains should flood defences be breached or fail, or where any culvert or structure may be blocked, as well as any undefended risk.

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.

Single storey buildings such as ground floor flats or bungalows are especially vulnerable to the rapid rise of water (such as that experienced during a breach). 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 days. Similarly, the use of basements in areas at risk of flooding should be avoided.

8.3.4 Modification of ground levels

Modifying ground levels to raise the land above the required flood level is an effective way of reducing flood risk to a particular site in circumstances where the land does not act as conveyance for floodwaters. 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 surface water moves around the site, introducing flood risk to areas that were not at flood risk previously. Where ground levels are modified, mitigation measures should be considered to stop the introduction of new flood risk or offsite effects.

In most areas of fluvial flood risk, raising land above the floodplain would reduce conveyance or flood storage in the floodplain and could adversely impact flood risk downstream or on neighbouring land. Compensatory flood storage should therefore 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 boundary of the planning application.

8.3.5 Buffer strips

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. 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.

It is recommended that an undeveloped buffer strip alongside main rivers and ordinary watercourses is for maintenance purposes and that developers would explore opportunities for riverside restoration as part of any development.

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

- on or near a main river
- on or near a flood defence structure
- on or near a sea defence
- in a floodplain

Further guidance on obtaining a flood risk activity permit and activities requiring a flood risk activity permit are available from the NRW website[33]. Buffer strips are also likely to apply in relation to land drainage consenting for ordinary watercourses and LLFAs may have similar requirements.

8.3.6 Access and egress

TAN 15 requires safe access and egress is available to and from a development in all flood return periods. This should consider all sources of flood risk including surface water. As a minimum, safe access and egress routes should comply with the tolerable conditions of TAN 15 Figure 7. For any development at flood risk or where associated highways and pedestrian routes are at risk, a flood response plan should be compiled to inform site occupants of a safe access and egress route to and from the site (see Section 7).

8.4 Requirements for a Flood Consequence Assessment

8.4.1 What is site-specific FCA?

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.

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, considering 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.

8.4.2 When are site-specific FCA's required?

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;
- At the request of the LPA, NRW, or LLFA where there are reasonable flood risk concerns to proposed development not otherwise covered by the triggers above.

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

- 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.
- 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 Justification Test does not apply and the LLFA or NRW will be able to provide guidance on requirements for a proportionate FCA.

8.4.3 Requirements of a site-specific FCA

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

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

FCA's for development sites should follow the approach set out in Figure 9 of TAN 15 and guidance provided by NRW[34]. 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.

8.5 Surface water risk management

For sites at risk from surface water or small watercourses, the following should be considered, based on Section 8 of TAN 15:

- Where flood depths are significant or floodwater is fast flowing, new development should be avoided. Where flood depths are shallow, it may be possible to mitigate risk to an acceptable level, though onsite mitigation must not increase risk elsewhere and must not entail development on top of ordinary watercourses and culverting should be avoided.
- Where a site is developed in areas at risk, or near areas at risk, there is potential for a change in the expected flow of water during a flood. A comprehensive assessment of how new development will affect surface water and ordinary watercourse flows and subsequent flood risks must be carried out.
- An FCA is required for any development in Flood Zones 2 or 3 of the Surface Water and Small Watercourses map. An FCA may want to consider detailed surface water modelling, particularly for larger sites which have greater potential to influence risk elsewhere.
- The size of development and the possibility of increased surface water flood risk caused by development on current Greenfield land (where applicable), and cumulative impacts of this within specific areas.
- Management and reuse of surface water onsite, assuming the site is large enough to facilitate this and achieve effective mitigation. Effective surface water management should ensure risks on and off site are controlled.
- For large sites, surface water flood prone areas could be left as or converted to open greenspace, incorporating social, environmental and ecological benefits.
- Measures of source control should be required for all new development sites.
- Developers should be required to set part of their site aside for surface water management, to contribute to flood risk management in the wider area and supplement green infrastructure networks.

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

- Developers should be required to maximise permeable surfaces.
- Flow routes on new development where the sewerage system surcharges as a consequence of exceedance of the 1 in 30 AEP design event should be retained.
- SuDS must be implemented in most new developments. New developments of more than one dwelling or where the area covered by construction work equals or exceeds 100m² require approval from the SuDS Approval Body (SAB) before construction can commence. Appropriate SuDS may offer opportunities to control runoff to Greenfield rates or better. Restrictions on surface water runoff from new development should be incorporated into the development planning stage. For brownfield sites, where current infrastructure may be staying in place, then runoff should attempt to mimic that of Greenfield rates. Developers should refer to the Statutory National Standards for SuDS[35] which outline various approved methods of managing surface water. Developers will need to design and construct SuDS in accordance with these Standards in order to secure SAB approval. Section 8.7 of this report provides further information on SuDS.

8.6 Safeguarded land for flood storage

Where possible, the LPA may look to allocate land for flood storage functions. Such land can be explored through the site allocation process whereby an assessment is made, using the SFCA Maps in Appendix A, of the flood risk at sites that may present development opportunities and what benefit could be gained by leaving the site, or part of the site, undeveloped. In some instances, the storage of floodwater can help to alleviate flooding elsewhere, such as downstream developments. Where there is a large area of a site at risk that is considered large enough to impact development yields, it may be appropriate to safeguard this land for the storage of floodwater.

Applicable sites may include any current greenfield sites:

- That are considered to be large enough to store floodwater to achieve effective mitigation,
- With large areas of their footprint in Flood Zones 2 or 3 of the Surface Water and Small Watercourses map,
- With large areas of their footprints within Flood Zones 2 or 3 of the FMfP Rivers or Sea, and
- That are large enough and within a suitable distance to receive floodwater from a nearby development site, where storage is not feasible, using appropriate SuDS techniques which may involve pumping, piping or swales / drains.

Brownfield sites could also be considered though this would entail site clearance of existing buildings and conversion to greenspace.

By using a sequential approach to site layout, the LPA and developers should be able to avoid the areas at risk and leave clear for potential flood storage.

8.7 Sustainable Drainage Systems (SuDS)

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and consequently a potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure. Managing surface water discharges from new development is therefore crucial in managing and reducing flood risk to new and existing development downstream. Carefully planned development can also play a role in reducing the number of properties that are directly at risk from surface water flooding.

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35 National SuDS standards are published at: www.gov.wales/national-standards-sustainable-drainage-systems-suds

As discussed in Section 3.2.4, Schedule 3 of the FWMA states the requirement for surface water drainage for new developments to comply with Statutory National Standards for SuDS.

SuDS adoption and management arrangements, including a funding mechanism for maintenance of SuDS infrastructure and all drainage elements, must be agreed by the SAB as part of the SuDS approval stage. This will ensure that SuDS infrastructure is properly maintained and functions effectively for its design life.

Maintenance arrangements must clearly identify who will be responsible for maintaining SuDS and funding for maintenance should be fair for householders and premises occupiers; and, set out a minimum standard to which the sustainable drainage systems must be maintained. Any SuDS serving multiple properties will be subject to adoption by the SAB.

There is a priority hierarchy for the destination of runoff when considering design criteria for SuDS, this includes the following possible destinations in order of preference (note that options 4 and 5 should only be used in exceptional circumstances):

1 Runoff is collected for use
2 Runoff is infiltrated into the ground
3 Runoff is discharged to a surface waterbody
4 Runoff is discharged to a surface water sewer, highway drain, or another drainage system
5 Runoff is discharged to a combined sewer

Effects on water quality should also be investigated when considering runoff destination in terms of the potential hazards arising from development and the sensitivity of the runoff destination. Developers should also establish that proposed outfalls are hydraulically capable of accepting the runoff from SuDS through consultation with the LLFA, NRW and DCWW, as appropriate.

Many different SuDS techniques can be implemented. As a result, there is no one standard correct drainage solution for a site. In most cases, a combination of techniques, using the Management Train principle (

Figure 8-1) will be required, where source control is the primary aim.

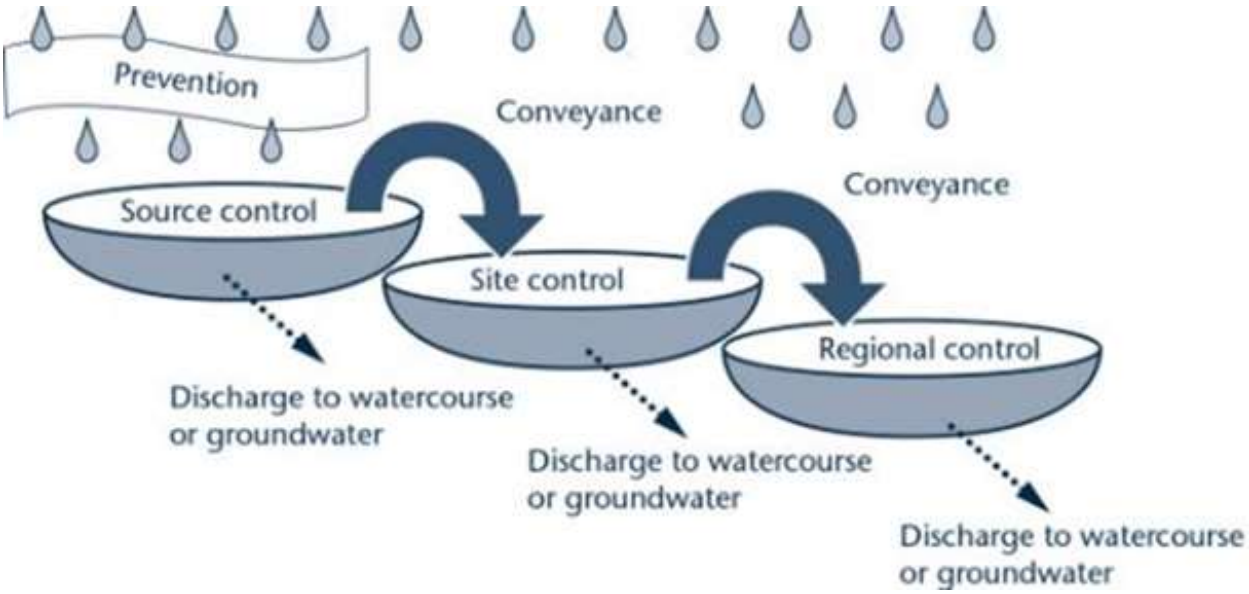

Figure 8-1 SuDS Management Train Principle[36]

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36 CIRIA (2008) Sustainable Drainage Systems: promoting good practice – a CIRIA initiative

The effectiveness of a flow management scheme within a single site is heavily limited by land use and site characteristics including (but not limited to) topography; geology and soil (permeability); and available area. Potential ground contamination associated with urban and former industrial sites should be investigated with concern being placed on the depth of the local water table and potential contamination risks that will affect water quality. The design, construction and ongoing maintenance regime of any SuDS scheme must be carefully defined as part of a site-specific FCA including a SuDS Drainage Statement to be approved by the SAB.

A clear and comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system) is essential for successful SuDS implementation.

8.7.1 Implementing SuDS within Wales and SuDS Approving Bodies (SAB)

Schedule 3 of the FWMA states the requirement for surface water drainage for new developments to comply with Statutory National Standards for SuDS.

Schedule 3 also places a duty on local authorities as SABs to approve, adopt and maintain systems compliant with Section 17 of the Schedule.

In light of Schedule 3, Welsh Government launched a consultation on draft regulations for the implementation of SuDS on new developments in November 2017. As of January 2019, all new developments of more than 1 house or where the construction area is of 100m^2 or more, require sustainable drainage to manage onsite surface water. As discussed, SuDS must be designed and built in accordance with the Statutory Standards for SuDS published by Welsh Ministers in 2018.

Such SuDS schemes must be approved by the Council, acting in its SAB role, before construction work can commence. The SAB has a duty to adopt compliant systems so long as it is built and functions in accordance with the approved proposals, including any SAB conditions of approval.

The SAB is established to:

- Evaluate and approve drainage applications for new developments where construction work has drainage implications, and
- Adopt and maintain sustainable surface water drainage systems according to Section 17 of Schedule 3 (FWMA).

The SAB also has powers of inspection and enforcement and uses discretionary powers to offer non-statutory pre-application advice.

A developer, agent or individual seeking planning permission for a development that is of more than 1 house or of 100 m^2 or more of construction area, must seek SAB approval alongside planning approval. Construction cannot commence until both SAB and planning permissions are granted. Existing sites and developments with planning permission granted or deemed to be granted (whether or not subject to any conditions as to a reserved matter) or for which a valid application has been received but not determined by 7 January 2019, will not be required to apply for SAB approval. However, SAB approval will still be required if the planning permission was granted subject to a condition as to a reserved matter and an application for approval of the reserved matter was not made before 7 January 2020.

How to seek SAB approval and pre-application advice

a) Application for pre-application advice

The SAB offers a pre-application advice service to discuss in detail your site's drainage requirements and what needs to be submitted with your application. Whilst at the start, this service was free to encourage early engagement, pre-application fees may now be charged. Initially, the SAB should be contacted online via:

sab@conwy.gov.uk

to request a short meeting or telephone discussion in relation to general SAB approval requirements for the development. Any subsequent site-specific pre-application advice requires formal submission of details via the 'Application Form for Pre-Application Advice', upon receipt of which a unique case reference number will be issued enabling SAB officers to engage in further formal pre-application discussions. Note there is no statutory timescale relating to the pre-application process.

b) Application for full approval of SuDS

Applications must be submitted using the Application Form for Full Application Approval of SuDS. Once a full SAB application is received it will be determined solely on the information provided and only in exceptional circumstances will the SAB contact the applicant during its assessment, therefore it is essential that any technical uncertainties or issues are dealt with by all parties as part of the pre-application advice process discussed above. The form must be fully completed and accompanied by all necessary technical supporting information as indicated in the guidance or as otherwise directed during pre-application discussions.

On confirmation that the application form is complete and valid, the SAB will provide details of how to make payment of the prescribed application fee and provide a unique application reference. This must be quoted on all future correspondence. A valid application will not be processed until the application fee is received and cleared in full. Note the SAB has seven weeks upon validation to determine the application.

Further details are provided online: Conwy SAB

8.7.2 Local Standards

In addition to the national standards, the LPA and LLFA may set local requirements for planning permission that include more rigorous obligations. More stringent requirements should be considered where current Greenfield sites lie upstream of high risk areas. This could include improvements on Greenfield runoff rates. CCBC does not currently have its own guidance for SuDS therefore the national standards should apply in Conwy County.

The CIRIA SuDS Manual 2015[37] should also be consulted by the LPA and developers. The SuDS manual (C753) is highly regarded and was updated in 2015 to incorporate further research, industry practice, technical advice and adaptable processes to assist in the planning, design, construction, management and maintenance of good SuDS.

Drainage for new developments

Developers must always adhere to the following core SuDS principles:

- Water to be reused or managed on or as close to the surface and source of the runoff as possible,
- Pollution is prevented at source, and not reliant on the drainage system to treat it,
- Protection of people from increased flood risk, and the environment from ecological changes in flow rates, patterns and sediment movement caused by the development,

Use of the SuDS Management Train (see

- Figure 8-1) sequentially across a site rather than a single "end of pipe" feature, such as a pond, to serve the whole development,
- SuDS should perform safely, reliably and effectively over the design lifetime of the development. The type of SuDS implemented must account for the requirements for reasonable levels of maintenance,
- Avoidance of the need for pumping where possible, and

37 https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

- SuDS should remain affordable, taking into account both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system.

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure. Managing surface water discharges from new development is crucial in managing and reducing flood risk to new and existing development.

Carefully planned development can also play a role in reducing the number of properties that are directly at risk from surface water flooding. The Planning System has a key role to play in setting standards for sustainable drainage from new developments and ensuring that developments are designed to take account of the risk from surface water flooding. Sustainable drainage plays an important role in reducing flows in the sewer network and in meeting environmental targets, alongside investment in maintenance by the water companies on their assets. Water companies plan their investment on a five year rolling cycle, in consultation with key partners, including NRW.

The LPA and LLFA expect the content for a SuDS Drainage Statement for a typical housing development should include:

- Description and plan showing the characteristics of the site including – topography, ground conditions, natural directions and paths for water movement,
- Options analysis of discharge routes offsite (infiltration, watercourse, surface water sewer) with information on any agreements / confirmed information,
- Options analysis of drainage solutions demonstrating consideration of SuDS principles in development layout, specifically keeping water on or near the surface from collection to conveyance to storage, the use of sub-catchments and SuDS in sequence from management at source to larger features in open space and integration with the landscape. If agreement on discharge route cannot be established, alternatives must be explored,
- Outline figures to support drainage options,
- Principles of management of return periods both within and external to the drainage system up to 1 in 100 AEP event plus climate change,
- Proposed management arrangements for all drainage infrastructure including who is responsible, what maintenance activities and how resourced,
- Concept plan and critical sections to demonstrate feasibility of solutions.

The most successful SuDS schemes are delivered through a collaboration between the Drainage Engineer and the design team for example, the architect, landscape architect and Highway Engineer.

Overland flow paths

Underground drainage systems have a finite capacity and regard should always be given to larger events where the capacity of the network will be exceeded. Hence there is a need to design new developments with exceedance in mind. This should be considered alongside any surface water flows likely to enter a development site from the surrounding area.

Master planning should ensure that existing overland flow paths are retained within the development. As a minimum, the developer should investigate, as part of a FCA, the likely extents, depths and associated hazards of surface water flooding on a development site, as shown by the Surface Water and Small Watercourses dataset of the FMfP. Green infrastructure should be used wherever possible to accommodate such flow paths.

The effectiveness of a flow management scheme within a single site is heavily limited by site constraints including (but not limited to) topography; geology and soil (permeability); development density; existing drainage networks both onsite and in the surrounding area; adoption issues; and available area. The design, construction and ongoing maintenance

regime of such a scheme must be carefully defined at an early stage and a clear and comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system) is essential.

8.8 Property Flood Resilience (PFR)

Flood resilience and resistance measures are designed to mitigate flood risk and reduce damage and adverse consequences to existing property. Resistance and resilience measures may aim to help residents and businesses recover more quickly following a flood event.

It should be noted that it is not possible to completely prevent flooding to all communities and business. PFR measures should not cause an increase in flood risk to other properties or other parts of the local community. They will help mitigate against flood risk but, as with any flood alleviation scheme, flood risk cannot be removed completely. Emergency plans should, therefore, be in place that describe the installation of measures and residual risks.

A Code of Practice for Property Flood Resilience[38] (January 2021) is available from Ciria online.

Definitions

Flood resilience measures aim to reduce the damage caused by floodwater entering a property. Flood resilience measures are based on an understanding that internal flooding may occur again and when considering this eventuality, homes and businesses are encouraged to plan for flooding with an aim of rapid recovery and the return of the property to a habitable state.

For example, tiled floors are easier to clean than carpets, raised electricity sockets and high-level wall fixings for TVs / computers may mean that that power supply remains unaffected. Raising kitchen or storage units may also prevent damage that may not require replacement after a flood.

Flood resistance measures aim to reduce the amount of floodwater entering the property. Obvious inflow routes, such as through doors and airbricks may be managed, for example, by installing bespoke flood doors, door flood barriers and automatic closing airbricks. However, the property's condition and construction are also key to understanding how floodwater may enter and move between buildings. For example, floodwater can also flow between properties through connecting cavity walls, cellars, beneath suspended floors and through internal walls. Flood resistance measures alone may not keep floodwater out. Building condition is a critical component of any flood mitigation survey.

Property Mitigation Surveys

To define the scale and type of resistance or resilience measures required, a survey is required to pick up property threshold levels, air brick levels, doorways, historic flood levels and a number of ground spot levels required to better understand the flood mechanisms for floodwater arriving at the property (e.g. along road, pavements, etc.). The depth of flooding experienced at a property helps guide the selection of resistance measures. Surveys will need to include consideration of issues such as:

- Detailed property information
- An assessment of flood risk, including property (cross) threshold levels
- Routes of water ingress (fluvial, tidal, ground and surface water flooding)
- An assessment of the impact of floodwaters
- A schedule of measures to reduce risk (resistance and resilience)
- Details of recommendations (including indicative costs)

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38 https://www.ciria.org/ItemDetail?iProductCode=C790F&Category=FREEPUBS

- Advice on future maintenance of measures
- Advice on flood preparedness

All sources of flooding need to be considered, including a comprehensive survey of openings (doors, windows and air bricks), as well as potential seepage routes through walls and floors, ingress through service cables, pipes, drains and identification of possible weaknesses in any deteriorating brickwork or mortar.

9 Conclusions and Recommendations

9.1 Conclusions

This SFCA provides a single repository planning tool relating to flood risk and development in the County of Conwy. Key flood risk stakeholders namely NRW and DCWW were consulted to collate all available and relevant flood risk information on all sources into one comprehensive assessment. Together with this report, this SFCA also provides a suite of interactive GeoPDF flood risk maps (Appendix A).

The flood risk information, assessment, guidance and recommendations of the SFCA will provide strategic planners and development managers with the evidence base required to apply the justification and acceptability tests of TAN 15 to help assess what type and scale of development should be allocated, where it should be located, and demonstrate a risk-based approach has been applied.

This SFCA should provide the necessary links between spatial development, wider flood risk management policies, local strategies / plans and on the ground works by combining all available flood risk information together into one single repository for both the LPA, LLFA and developers. This is a strategic study based on the most recent and available information at the time. Not all flood risks and combinations of risks are accounted for, and there could be a further, more detailed assessment of specific areas or sites, where required.

9.2 Recommendations for further work

The SFCA can be developed into a useful planning tool and evidence base to inform decision making for the LDP. Sitting alongside the LFRMS, PFRA, CFMPs, FRMPs and SMP2, it can be used to provide a much broader assessment tool for integrated, strategic and local flood risk management and delivery.

There are a number of plans and assessments listed in Table 9-1 that would be of benefit to CCBC in developing its flood risk evidence base to support the delivery of the LDP or to help fill critical gaps in flood risk information.

Type	Study	Reason	Timeframe
Understanding of local flood risk	Stage 2 SFCA	To further investigate risk in high risk areas, communities or to specific potential development sites or allocations.	Short term
	SWMP	CCBC has not developed a SWMP for the County of Conwy, nor for any areas or communities within the County. It is recommended that the LLFA uses information from this SFCA to ascertain whether certain locations at high surface water flood risk may benefit from a SWMP, such as Llanfairfechan, Llandudno and Abergele for example.	Short term
	Flood Risk Management Plan	It is recommended that the LLFA looks to produce an updated Flood Risk Management Plan for the North Wales Coast Flood Risk Area identified in NRW's Western Wales PFRA.	Short term
Data collection	Flood incident data	CCBC has a duty to investigate and record details of significant flood events within their area. General data collected for each incident, should	Ongoing

Type	Study	Reason	Timeframe
		include date, location, weather, flood source (if apparent without an investigation), impacts (properties flooded or number of people affected) and response by any RMA.	
	Asset Register	CCBC should formulate, update and maintain a register of structures and features, which are considered to have an effect on flood risk.	Short term
Risk Assessment	Asset Register Risk Assessment	CCBC should carry out a strategic flood risk assessment of structures and features, which are considered to have an effect on flood risk.	Short term
Designating Authorities	Designation of Assets	CCBC have permissive powers to designate assets which are considered to affect flood risk and are not owned by the LLFA or NRW.	Short term/ongoing
Partnership	Welsh Water	CCBC should continue to work with Welsh Water on sewer and surface water infrastructure projects.	Ongoing
	Natural Resources Wales	CCBC should continue to work with NRW on fluvial flood risk management projects. CCBC should also identify potential opportunities for joint schemes to tackle flooding from all sources.	Ongoing
	Joint Emergency Planning Unit	CCBC should continue to work with the members of the North Wales Resilience Forum (NWRF) to ensure appropriate preparedness to enable a multi-agency response to flooding.	Ongoing

Table 9-1 Recommended additional work

Appendix

A Interactive GeoPDF Map Datasets

Dataset	
General Data	CCBC boundary (including Snowdonia National Park boundary)
	Main Rivers and ordinary watercourses
Flood Map for Planning	Flood Zone 3 (Rivers)
	Flood Zone 2 (Rivers)
	Flood Zone 3 (Sea)
	Flood Zone 2 (Sea)
	Flood Zone 3 (Rivers and Sea)
	Flood Zone 2 (Rivers and Sea)
	Flood Zone 3 (Surface Water and Small Watercourses)
	Flood Zone 2 (Surface Water and Small Watercourses)
	TAN 15 Defended Zone
	Flood Defence Locations
	Recorded Flood Extents
	Reservoir Flood Risk
NRW	Shoreline Management Plan (SMP2)
Flood Risk Assessment Wales (FRAW)	Flood Warning Areas
	Flood Alert Areas
Development Advice Map (DAM)	Zone C2
	Zone C1
	Zone B
Groundwater	JBA 5m Groundwater Flood Map
Working with Natural Processes	Floodplain Reconnection
	Tree Planting Riparian
	Tree Planting Floodplain
	Tree Planting Wider Catchment
	Runoff Attenuation 1% AEP
	Runoff Attenuation 3.3% AEP

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