

Land Use Planning and Flood Risk

FINAL

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This report describes work commissioned by National Infrastructure Commission for Wales, by an instruction dated 1st August 2023. The Client's representative for the contract was Stuart Ingram. Faye Tomalin of JBA Consulting lead this work for JBA Consulting.

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Abbreviations

AAD	Annual Average Damages
AMR	Annual Monitoring Report
DAM	Development Advice Map
DCWW	Dŵr Cymru Welsh Water
EA	Environment Agency
EFAS	Emergency Financial Assistance Scheme
FCERM	Flood and Coastal Erosion Risk Management
FMfP	Flood Map For Planning
FRAW	Flood Risk Assessment Wales
LDP	Local Development Plan
LPA	Local Planning Authority
MCH	Multi-Coloured Handbook
MCM	Multi-Coloured Manual
NICW	National Infrastructure Committee Wales
NRD	National Receptor Data
NRW	Natural Resources for Wales
PAC	Public Accounts Committee
POS	Public Open Space
PPW	Planning Policy Wales
RMA	Risk Management Authority
SAB	SuDS Approval Body
SFCA	Strategic Flood Consequences Assessment
SD4	Sustainable Development Indicator 4: Climate Change and Flood Risk
TAN-15	Technical Advice Note 15: Development and Flood Risk

Executive Summary

JBA Consulting have been commissioned by National Infrastructure Commission Wales (NICW) to undertake research into land-use planning and infrastructure to inform the wider *Managing Flood Impacts in Wales 2050* project. This report outlines the research process, together with the issues raised and recommended considerations to NICW.

The purpose of this workstream is to quantify the issue of flooding and land use planning and make recommendations to NICW on this issue.

To achieve the above aims, the following four questions have been defined:

1. Establish how much development has been consented in flood risk areas in Wales over the last 10 years, establishing the type of development and category of flood zone.
2. Establish the availability, use and barriers to collection of data to monitor the quantity of development in flood risk areas.
3. Determine the attitude towards permitting new development in areas of flood risk with stakeholders on a national and local scale.
4. Estimate the cost to the public purse for agencies to respond to flood emergency situations within new development, considering a range of scenarios and scales of development.

Monitoring and Quantification of Development on the Floodplain

The study found that there exists no reliable nationally consistent monitoring data for development consents in the floodplain.

Monitoring has previously been undertaken by Welsh Government via Sustainable Development Indicator 4: Flood Risk and Climate Change. However, the associated uncertainties with data collection and verification are extensive, resulting in no nationally robust quantification of development in flood risk areas.

Additionally, Local Planning Authorities (LPAs) collate planning monitoring metrics on an annual basis in line with their requirements under Section 76 of the Planning and Compulsory Purchase Act 2004. However, a range of inconsistencies arise across the Annual Monitoring Reports from LPAs which result from misalignment of policy cycles on a national and local level. This renders LPA to LPA comparisons difficult and contribute to the associated uncertainties with the subsequent data.

We therefore recommend an alternative approach to assessing development in flood risk areas in the form of the number of properties, as opposed to on the basis of planning consents. This is based on analysis of existing data products. This approach would use OS AddressBase products to identify the date of construction, National Receptor Database (NRD) to classify the type and building area of development, and flood maps to assess the level of flood risk to each individual property.

Determination of the Attitudes Towards New Development in Flood Risk Areas

Stakeholders have a general perception that there is too much new development consented in flood risk areas. However, many also acknowledged that there are limited places across Wales on which to build, and current strategic planning policies direct development towards existing growth areas, most of which are located in areas at flood risk. Many stakeholders also made key distinctions between new and redevelopment opportunities.

Public opinion can be a powerful force shaping attitudes towards development in flood risk areas. However, this study found generally negative perceptions towards land use planning and flood risk. This was often influenced by sensationalist headlines within the media.

Improved public understanding of resilience in relation to flood risk can increase community engagement, preparedness and responsibility taking in the management of flood risk. A shift in the public perception to resilience would assist in easing the transition towards learning to live with water.

Estimation of the Cost to the Public Purse of Responding to Flood Events on New Developments

The study has identified opportunities to determine an All-Wales cost for quantifying the cost to the economic purse following the events of Storms Dennis and Ciara in 2020. Whilst the literature and case studies utilised provide figures in relation to grant scheme funding, Local Authority emergency infrastructure repairs, and NRW infrastructure response, no publicly available information has been found to provide indicative figures for the emergency response effort. As such, no recommendations of updated percentage multipliers can be made from the data informing this report.

To provide a more robust quantification of the cost to the public purse of responding to flood events, further work would need to be undertaken to address the omissions and uncertainties around the methodology presented within this study.

Evidence shows that most development in flood risk areas, particularly residential development, is in areas of existing flood defences; typically, within major towns and cities. Where development does take place, whether in a defended area or not, development must be on previously developed land and comply with strict criteria for flood frequency and flood severity. Therefore, given existing development controls, new development is unlikely to significantly contribute to costs to the public purse. It is also noted that development can contribute to national and local economic growth and sustainability objectives. This is however conditional on the robust application of planning controls and best available science to consenting new development.

Recommendations to NICW:

R1: The current approaches to collecting planning performance statistics for flood risk is inconsistent and often lacks verification. The implementation of the new TAN-15 provides the ideal opportunity to establish a new nationally consistent planning performance flood metric which considers all sources of flooding. Alongside this, it may be beneficial to introduce changes to the planning application forms to simplify and provide consistency in data capture.

R2: To simplify the process and improve data quality and consistency, utilise existing OS AddressBase products to quantify new development within the flood risk areas.

R3: Align work to quantify new development in flood risk areas (R2) with similar work currently undertaken for National Wellbeing Indicator 32, and other climate change indicators, to provide greater consistency and efficiency in flood risk metrics.

R4: Opportunities should be sought for collaborative working, led by NRW in their strategic oversight role, to raise awareness and understanding of flood risk and resilience; with the aim of positively reshaping public perceptions and encouraging engagement with flood risk activities.

R5: Welsh Government should consider the benefits and value of determining an All Wales cost to the public purse of responding to flood events. It is suggested that relevant data to inform the calculation of an All Wales cost could be sought through the Section 19 flood investigation obligations held by Lead Local Flood Authorities.

1 Introduction

1.1 Terms of reference

JBA Consulting have been commissioned by National Infrastructure Commission Wales (NICW) to undertake research into land-use planning and infrastructure to inform the wider *Managing Flood Impacts in Wales 2050* project. This report outlines the research process, together with the issues raised and recommended considerations to NICW.

1.2 Understanding of Project and Specification

The National Infrastructure Commission for Wales (NICW) was established in 2018 as an independent, non-statutory, advisory body to Welsh Ministers. Its key purpose is to analyse, advise and make recommendations on Wales's longer term strategic economic and environmental infrastructure needs over a 50–80-year period.

As a country with all its major cities and many important towns located on the coast and around Main Rivers, and more than 60% of its population living and working in the coastal zone, Wales is set to face significant challenges in the face of the changing climate. The UK Climate Change Risk Assessment 2022 (UKCCRA) Summary for Wales highlights the risk of up to 28cm of sea level rise in Cardiff in the 2050s and up to 76cm in the 2080s. Future Wales: The National Plan 2040 identifies growth areas across Wales, almost all of which are constrained by tidal and fluvial flooding now or in the future.

NICW therefore wish to develop their own appreciation of the facts to understand the scale of the problem, why is it happening, and what can be done to amend / remediate the issue through the *Managing Flood Impacts in Wales 2050* project. The project aims to achieve the following:

- A shared vision for 2050 and beyond on how we wish to enhance resilience and adaptation planning to the risks from flooding in the context of climate change given the increased impacts that we are going to see.
- A plan so that homes, communities, businesses and infrastructure are more resilient and adaptive to flood events and associated climate risks and are able to recover more quickly.
- Increased stakeholder understanding of the likely impacts and where responsibilities sit in terms of response / action.
- An increase in the ability for people (including those with protected characteristics) to understand, feel prepared and able to respond to future flooding and climate risks.
- A suggested approach to strengthen collaboration and partnership working amongst organisations and agencies as well as involvement of, and increasing resilience of, communities.

The *Managing Flood Impacts in Wales 2050* project is split into 4 workstreams which will inform the wider NICW objectives. The four workstreams are as follows:

- Visioning
- Catchment / Spatial Planning Framework
- Resources - Workforce and Funding
- Land Use Planning and Flood Risk

This project forms Workstream 4: Land Use Planning and Flood Risk.

1.3 The Aim of the Workstream

The purpose of this workstream is to quantify the issue of flooding and land use planning and make recommendations to NICW on this issue.

This workstream involves qualitative and quantitative research to determine the scale of the issue and seeks to understand how much development has been constructed in flood risk areas in the last 10 years. It also examines attitudes to flood risk to explore the current picture when looking at increased flood risk over the next 50-80 years. The workstream also aims to estimate the likely cost to the public purse for responding to flood events in new developments and consider how this could be factored into the planning process.

To achieve the above aims, the following four questions have been defined:

1. Establish how much development has been consented in flood risk areas in Wales over the last 10 years, establishing the type of development and category of flood zone.
2. Establish the availability, use and barriers to collection of data to monitor the quantity of development in flood risk areas.
3. Determine the attitude towards permitting new development in flood risk areas with stakeholders on a national and local scale.
4. Estimate the cost to the public purse for agencies to respond to flood emergency situations within new development, considering a range of scenarios and scales of development.

1.4 Approach

This workstream has been informed by a desk-based review, stakeholder interviews, data analysis and the expertise of staff within JBA involved in Flood and Coastal Erosion Risk Management (FCERM). This report summarises the current parameters for development and flood risk, the findings from the desk-based review, stakeholder engagement and data analysis, and makes recommendations to NICW on the issue of flooding and land use planning.

2 The Current Picture

2.1 Development and Flood Risk in Wales

2.1.1 National Approach

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy and improve the social, economic, environmental, and cultural wellbeing of Wales as set out in the Wellbeing of Future Generations Act 2015.

Technical Advice Note 15 (TAN-15): Development and Flood Risk was introduced by the Welsh Government in 2004 and provides technical guidance relating to development planning and flood risk in Wales. TAN-15 reflects the core principles of the National Strategy for Flood and Coastal Risk Management in Wales to adopt a risk-based approach in respect of new development in areas at risk of flooding and coastal erosion.

TAN-15 provides a framework within which the flood risk arising from **fluvial** and **tidal** sources is addressed. An indicative sequence to negotiating the various elements of TAN-15 is provided below in Figure 2-1. Its initial requirement is to identify the flood zone and vulnerability classification relevant to the proposed development, based on an assessment of future conditions.

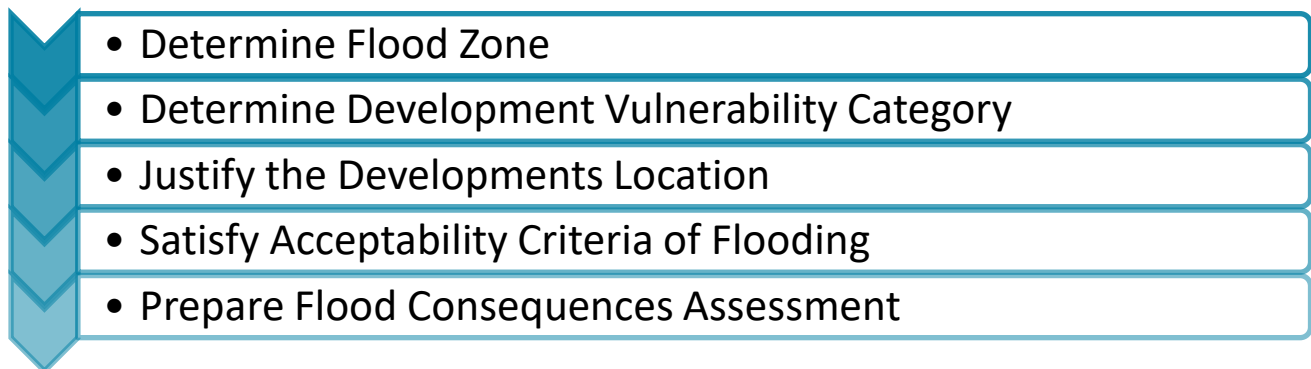


Figure 2-1 Navigating TAN-15 Requirements

TAN-15 is supported by the Development Advice Map (DAM) which is used to trigger different planning actions based on a precautionary assessment of fluvial and tidal flood risk. The DAM contains three zones which are outlined below in Figure 2-2. TAN-15 also assigns one of three flood risk vulnerability classifications to a development, which are outlined in Figure 2-3.

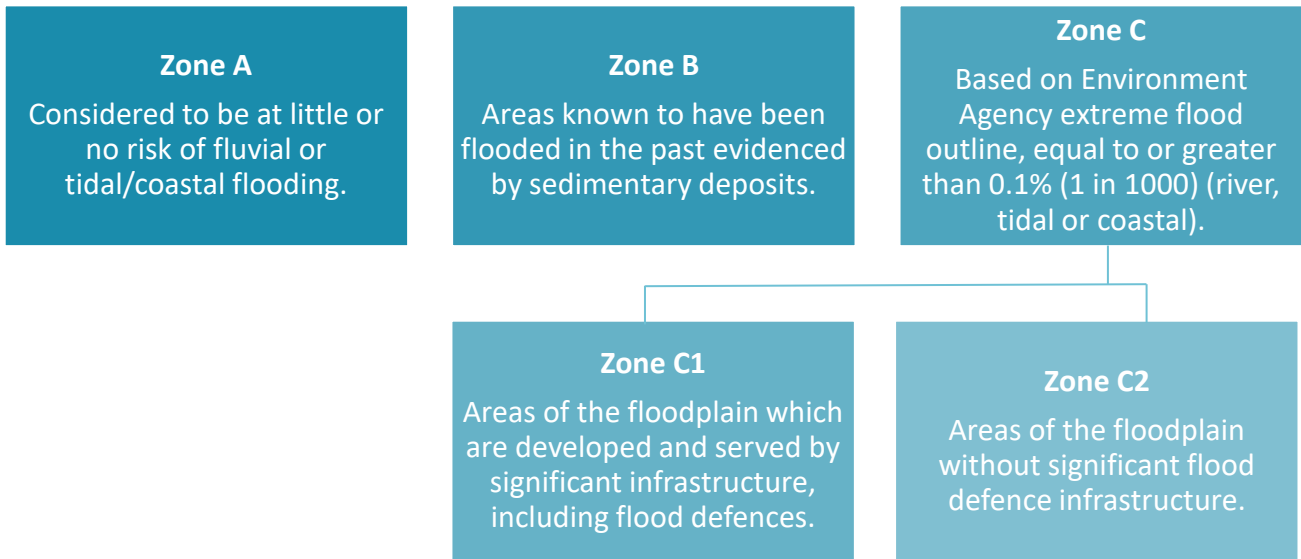


Figure 2-2 DAM Zones

Emergency Services

Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood.

Highly Vulnerable Development

All residential properties (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial development and waste disposal sites.

Less Vulnerable Development:

General industrial, employment, commercial and retail development, transport utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites.

Figure 2-3 Development Vulnerability Classifications

Application of TAN-15

New development should, where possible, be directed away from Zone C towards suitable land in Zone A, otherwise to Zone B where river or coastal flooding will be less of an issue. Development in Zone C must be assessed against the Justification Test and Acceptability of Consequences outlined in TAN-15. However, the Justification Test does not apply to Highly Vulnerable Development and Emergency Services in Zone C2, as such development

should not be permitted. All other new development should only be permitted in Zones C1 or C2 if the planning authority determines that it is justified in that location (based on considerations such as alignment to the Local Development Plan, sustainability, and development being on previously developed land).

Whether a development should proceed or not will depend upon whether the consequences of flooding can be managed to an acceptable level for the nature/type of development being proposed, including its effects on existing development. A full understanding of the potential risks and consequences is required to demonstrate that the criteria contained within TAN-15 (Section 7) have been satisfied. The three principal aspects to the Acceptability Criteria are contained in Figure 2-4.

Accordingly, the Local Planning Authority (LPA) will need to arrive at a judgement on the acceptability of the flooding consequences and should only permit development where the developer has demonstrated that the risks and consequences of flooding are manageable and meet the 'Acceptability Criteria'. The LPA decision is supported and advised by comments from Natural Resources Wales (NRW) in their role as a statutory consultee to the planning process.

Should a local planning authority be minded to approve residential development of 10 units or more within Zone C2 the authority must first refer the case to Welsh Government for potential ministerial call-in.

1. Flood frequency requirements. The frequency at which flooding is regarded to be acceptable. TAN-15 states that all development must be designed to be flood free during the 1% (1 in 100) river flood and 0.5% (1 in 200) flooding from the sea events, with an allowance for climate change over the lifetime of development.

2. Tolerable conditions. The flood conditions that are regarded to be acceptable during an extreme flood event with an allowance for climate change.

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% (1 in 1000) extreme flood event plus climate change over the lifetime of development.

Figure 2-4 Acceptability Criteria Principles

Updated TAN-15 and Flood Map for Planning

An update for TAN-15, entitled Development, Flooding, and Coastal Erosion, was initially released in October 2021, with implementation of the policy anticipated for December 2021. However, Welsh Government subsequently suspended its implementation, with a subsequent draft and consultation version of the revised policy document released in

January 2023. It is not currently known when the new TAN-15 will be published in its final form and implemented.

The update to TAN-15 shall be supported by the Flood Map for Planning (FMfP). The FMfP was released by NRW in October 2021, containing 3 flood zones, as outlined in Figure 2-5. Importantly, the FMfP includes consideration of climate change.

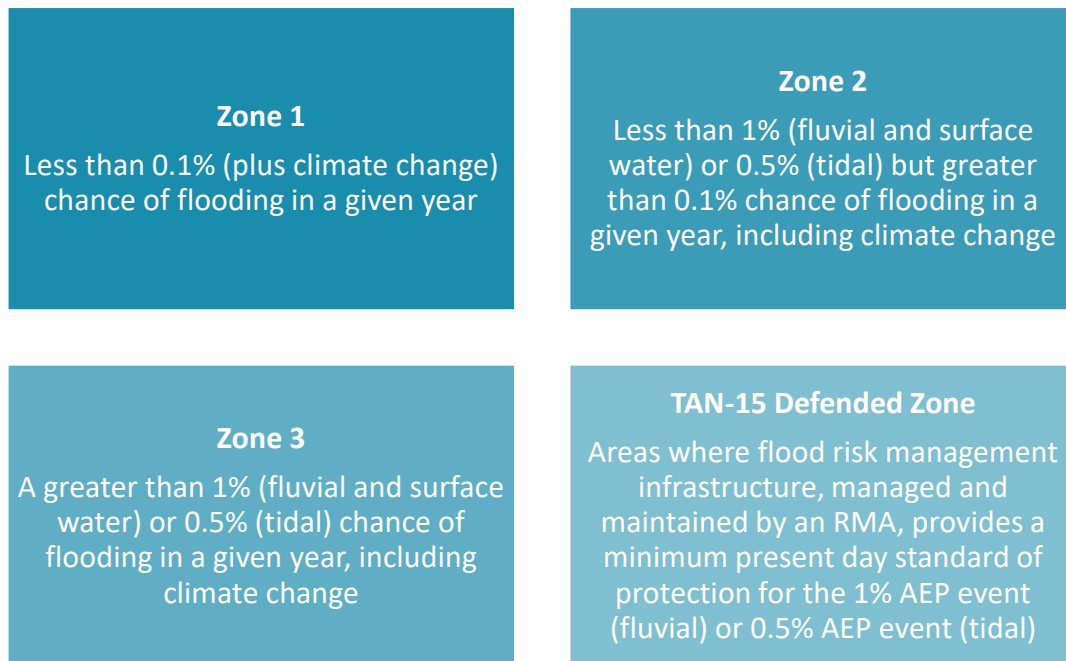


Figure 2-5 FMfP Flood Zone Definitions

As a consequence of the above, , at the request of Welsh Government, the DAM has not been updated by NRW since January 2020 due to the intention to implement a revised TAN-15 in December 2021 and to allow for resources to be utilised to prepare the updated FMfP as the best publicly available source of flood risk data across Wales. The FMfP is currently being utilised concurrently with the DAM to inform planning advice as best available information on flood risk, an approach supported by Welsh Government.

Key changes to the revised TAN-15 include the addition of the requirement to consider the risk of flooding from **surface water and small watercourses**, in addition to fluvial and tidal sources.

The latest draft policy document also draws a distinction in development type, including: new development; redevelopment; changes of use or conversions; and extensions. Where a proposal is not for **new** development, other categories may be considered differently.

Climate Change

Both the current version of TAN-15 and the draft updated version require new development to consider the predicted effects of climate change. The latest Welsh Government

guidance¹ for flood consequences assessments are informed by the latest available climate change projections and different scenarios of increased global mean surface temperatures caused by greenhouse gas emissions. The guidance reflects the higher central allowance and upper end allowance of RCP18.5, suggesting an increase in global mean surface temperature of around 4.3 degrees by 2100.

Depending on the nature of development there is variation in the assumed lifetime of development; typically 100 years for residential and 75 years for non-residential development.

Surface Water and Ordinary Watercourse Risk

Built development can increase the surface area of impermeable ground, which increases rapid surface run-off. Run-off from developments can, if not properly controlled, result in flooding at other locations and significantly alter the frequency and extent of floods further down the catchment.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirement for all new developments to incorporate the four pillars of SuDS design, shown in Figure 2-6. SuDS aim to mimic the natural processes of Greenfield surface water drainage by allowing water to flow along natural flow routes and aim to reduce runoff rates and volumes during storm events, whilst providing water treatment benefits.

SuDS perform an important role in managing run-off from a site and must be implemented in most new developments. The responsibility within the Local Authority for ensuring SuDS are integrated into new developments sites lies with the SuDS Approval Body (SAB). The approval of SuDS for a new development by the SAB is independent of the planning process. The Statutory Standards for SuDS in Wales outlines various approved methods of managing surface water. The Highways Authority, NRW and Dŵr Cymru Welsh Water (DCWW) are RMAs which are statutory consultees to the SAB process.

¹ Welsh Government Climate Change Guidance: https://www.gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments_0.pdf

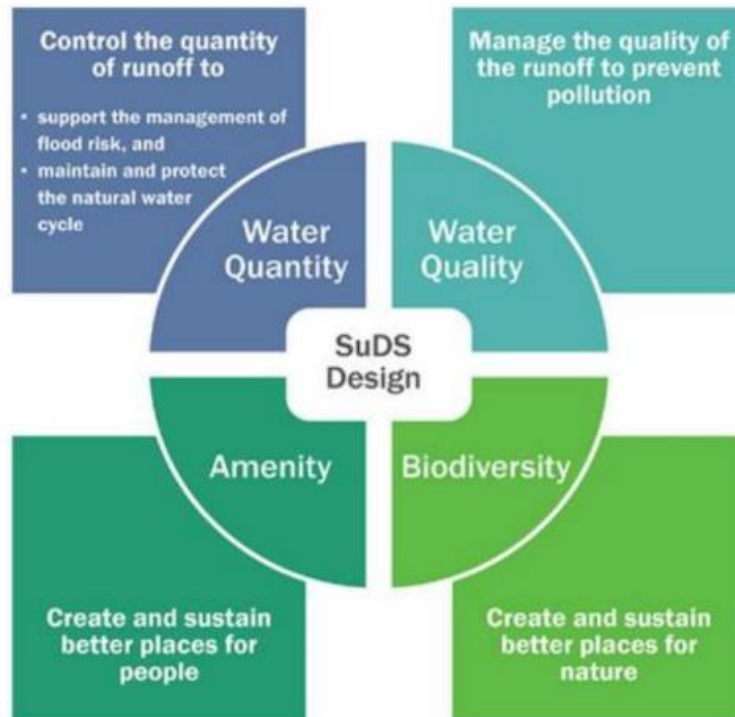


Figure 2-6 The 4 Pillars of SuDS Design

Risk of Flooding from Groundwater, Reservoirs and Sewers

All sources of flood risk should be considered across new development sites. However, under current planning policy, the risk of flooding from groundwater, reservoirs and sewers is not explicitly covered. Figure 2-7 contains an extract of the National Strategy for Flood and Coastal Erosion Risk Management in Wales² detailing the basic responsibilities of key stakeholders across Wales in terms of flood risk management.

² National Strategy for FCERM in Wales: <https://www.gov.wales/sites/default/files/publications/2020-11/the-national-strategy-for-flood-and-coastal-erosion-risk-management-in-wales.pdf>

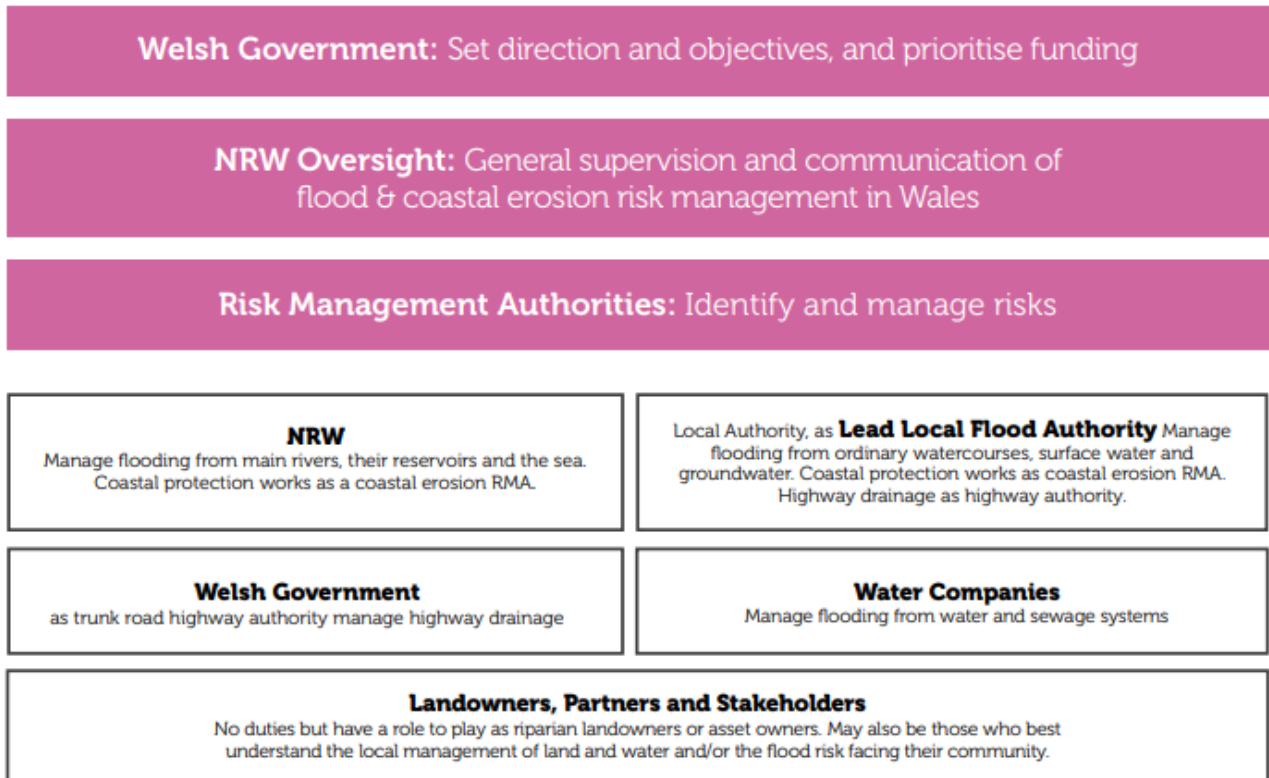


Figure 2-7 Extract from National Strategy for FCERM in Wales

2.1.2 Local Approach

Local planning policies are set out in the Local Development Plan (LDP) for each of the 25 Local Planning Authorities across Wales. The LDP sets out how land should be used and where development should take place over a given period of time through plan policies and objectives. A development plan makes sure that development happens in a sustainable manner and in the public interest. LDPs will focus on issues, policies, and proposals in each authority area across Wales.

LDPs can allocate a number of sites for development across the LPA area. This is supported through the Call for Candidate Sites process which is an important step in the LPA's evidence gathering process for drafting the LDP. Each candidate site should provide detailed evidence upfront and early in the plan making process to demonstrate its sustainability, along with other factors.

The LDP should be supported by a Strategic Flood Consequences Assessment (SFCA) which evaluates and considers flood risk from all sources of flooding across the Local Authority area, including the role and integrity of defences. SFCAs aim to provide a straightforward risk-based approach to development management and provide guidance on the potential risk of flooding associated with future planning applications and site allocations with the LDP.

2.2 Monitoring of Development in the Flood Risk Areas

2.2.1 Welsh Government Data Collection

As part of the preparation for the Planning (Wales) Act 2015, a series of indicators within a Planning Performance Framework³ were introduced, designed to measure service standards in a comparable way, with an aim to realign the planning system to deliver a quality outcome for its users. The indicators also aimed to foster collaborative and joint working and the sharing of best practice.

The Performance Framework is composed of three elements:

- A Performance Framework/Table, listing the indicators and targets agreed with Local Planning Authorities and each Authorities performance against them;
- An Annual Performance Report, prepared by Local Planning Authorities, summarising their performance over the previous financial year, and identifying areas of best practice and actions to be taken to drive improvement where required; and
- A cumulative All Wales Planning Annual Performance Report, prepared by Welsh Government, giving a strategic picture of common issues and factors in the delivery of local services and setting out areas for future work in delivering and sharing good practice.

Sustainable development plays a key role within the Planning Performance Framework, driven by The Well-being of Future Generations (Wales) Act 2015 which mandates public bodies, including Welsh Ministers, to engage in sustainable development. The Act defines sustainable development as:

"Sustainable development" means the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals.

Adhering to this principle requires entities to act in a manner that ensures meeting present needs without jeopardising the ability of future generations to fulfil their own requirements.

The planning system plays a pivotal role in implementing sustainable development in Wales, providing the legislative and policy framework for the use, management, and development of land in the public interest. It serves as a crucial tool for executing the National Strategy, "Prosperity for All."

A revised edition of Planning Policy Wales, released in December 2018, integrated placemaking into national planning policy, emphasising the creation of sustainable places as the primary objective of the planning system.

³ <https://www.gov.wales/planning-services-performance>

The Welsh Government has set seven primary indicators designed to assess the planning system's role in advancing strategic sustainable development within Wales. This metric is reviewed every 2 - 3 years and updated accordingly when new data is presented⁴.

The seven metrics are:

- SD1: Economic Renewal - Economic Development
- SD2 A Low Carbon Economy - Renewable Energy
- SD3 Access to Better Homes - New Homes (including affordable housing)
- **SD4 Resilience to Climate Change - Flood Risk**
- SD5 Efficient Land Use - Previously Developed Land
- SD6 Open Space - Open Space Lost/Gained
- SD7 Community Infrastructure - Contributions secured for community facilities

The metric for addressing and adapting to climate change impacts, particularly focusing on resilience against flood risks is Sustainable Indicator 4 (SD4) Resilience to Climate Change – Flood Risk.

This metric quantifies: *Planning permission granted and refused for development in C1 and C2 floodplain areas during the year.*

2.2.2 Welsh Government National Wellbeing Indicators

The Well-being of Future Generations (Wales) Act 2015 required Welsh ministers to set national indicators⁵ to assess progress towards the seven well-being goals set out within the Act. The seven wellbeing goals are as follows:

- A prosperous Wales
- A resilient Wales
- A healthier Wales
- A more equal Wales
- A Wales of more cohesive communities
- A Wales of vibrant culture and thriving Welsh language
- A globally responsible Wales

The national indicators must be a value or characteristic which can be measured quantitatively or qualitatively against a particular outcome, measured over such a period the Welsh Ministers consider appropriate, and be measurable in relation to Wales. 50 national indicators were laid before the Senedd in 2021, replacing indicators originally set in 2016.

National Indicator 32 relates to flood risk across Wales:

⁴ Planning Service Performance Reports containing sustainable development indicators: <https://www.gov.wales/planning-services-performance-reports#Annualreports>

⁵ <https://www.gov.wales/well-being-future-generations-national-indicators-2021-html#content>

Number of properties (homes and businesses) at medium or high risk of flooding from rivers and the sea

Data to ascertain National Indicator 32 is provided by NRW on a 2-3 year basis. The data utilises the best available public data on flood risk across Wales (the FRAW dataset), along with the National Receptor Database to identify properties within high and medium risk areas of flooding from rivers and sea. The dataset identifies all properties and does not distinguish between new developments. Currently, data is provided for 2021 only⁶. Whilst data analyses to inform the indicator have been previously undertaken, a change in approach to the methodology to determine the data supporting the indicator could not be compared to previous figures.

Under the Act, Welsh ministers must set National Milestones which would assist in measuring progress towards the achievement of the well-being goals. No milestones have been set in relation to flood risk.

2.2.3 Local Planning Authority Data Collection

Under the Planning Policy Framework Local Planning Authorities are required to prepare an Annual Performance Report summarising their performance over the previous financial year, identifying areas of best practice and actions to drive improvements, where required.

The LPA requirement to prepare an Annual Performance Report aligns with their statutory obligation under Section 76 of the Planning and Compulsory Purchase Act 2004 to produce an Annual Monitoring Report (AMR). The main aim of the AMR is to assess the extent to which strategies and policies within the Local Development Plan are being achieved.

AMRs therefore have two primary roles:

- To consider whether the policies identified in the monitoring process are being implemented successfully; and
- To consider the plan as a whole against all of the information gathered to determine whether a complete or partial review of the plan is necessary.

2.3 Attitudes Towards Development in the Flood Risk Areas

There are a series of national documents which provide policy and guidance on development in the flood risk areas. In order to assess the attitudes towards development in the flood risk areas from this perspective, the following documents have been reviewed:

- Planning Policy Wales (Edition 12, 2024), supported by TAN 15: Development and Flood Risk (2004)
- Future Wales: The National Plan 2040

⁶ National Indicator 32 dataset:

<https://app.powerbi.com/view?r=eyJrljoiYjc5ZjRhY2YtOGFmYi00ZjM5LWE2ZWltZjk1NWUzZDY0NGI3liwidCI6ImEyY2MzNmM1LTkyODAtNGFINy04ODg3LWQwNmRhYjg5MjE2YiJ9>

- National Strategy for Flood and Coastal Erosion Risk Management in Wales (October 2020)
- Environment (Wales) Act 2016: Flood Risk Management and Land Drainage
- Wellbeing of Future Generation (Wales) Act 2015

The above documents address a wide range of issues including the placemaking of sustainable settlements, the location of new development, the commitment to the reuse of land, and promoting sustainability through good design. In terms of flood risk management, consistent themes for supporting new development run through each of the policy documents. These are summarised in Figure 2-8 Policy Themes for Land Use Planning and Flood Risk.

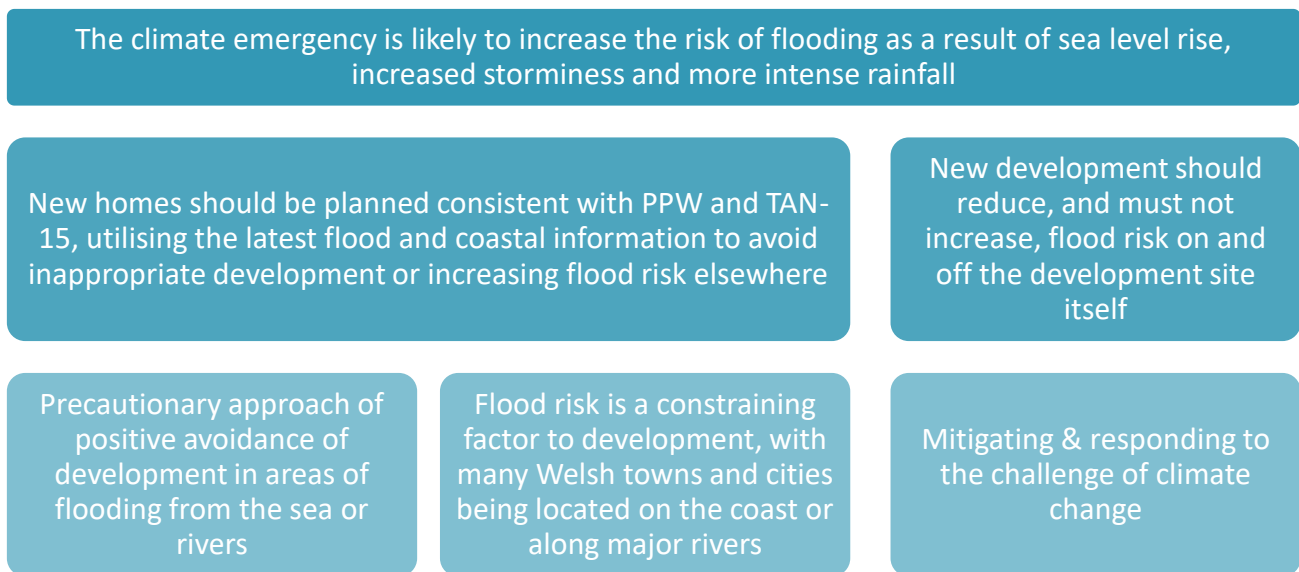


Figure 2-8 Policy Themes for Land Use Planning and Flood Risk

2.4 Quantification of the Economic Impact of Flooding

Across England and Wales, the Multi-Coloured Manual (MCM), 2013⁷ provides methods and data which can be used to assess the economic costs of flood and erosion events and the benefits of subsequent FCERM schemes. Chapter 6 of the Multi-Coloured Manual (MCM), "Local Authority, emergency services and recovery costs" details the type of costs to the public purse in emergency situations and how to evaluate them.

The Multi-Coloured Handbook (MCH)⁸ is intended to be a stand-alone "Step-by-Step" guide to assessing the benefits of flood and coastal erosion risk management, which includes annual updates to the MCM.

Evaluating associated costs to the public purse is suggested to be taken as a percentage of the capped Annual Average Damages (AAD) to both residential and non-residential

⁷ Flood Hazard Research Centre (2013) Flood and Coastal Erosion Risk Management: A Manual for Economic Appraisal.

⁸ Flood Hazard Research Centre (2023) Flood and Coastal Erosion Risk Management: A Handbook for Economic Appraisal.

property. Annual Average Damages are defined as the theoretical average economic damages caused by flooding when considered over a long period of time.

The suggested percentage is proposed to be between 5.6% and 10.7%. This is based on the percentage of total economic property losses during significant flood events during the Summer of 2007 and the Autumn of 2000, respectively.

The Autumn 2000 floods reflect dispersed communities, whereas the summer 2007 floods reflect more densely populated communities. A lower factor is therefore suggested in urban areas to reflect the economy of scale in emergency services provision.

In addition to this, the MCM states that there are circumstances where the standard data, (i.e. the percentages provided above) are not appropriate or the data is not considered accurate enough for project appraisal purposes. In this case, it is necessary to collect data from the authorities relevant to the area in question. To facilitate this, the MCM provides a 'Standard checklist for emergency service survey' which covers costs such as staff, vehicles, and equipment.

3 Study Approach





This section sets out the approach and associated stakeholder engagement undertaken for meeting the aims of this workstream.

Each subsection sets how this study approaches the aims of the workstream, considers the most appropriate methodology required for determining a robust outcome, and subsequent recommendations.

3.1 Quantification of New Development in Flood Risk Areas

This report aims to quantify how much development has been consented in flood risk areas. Development consented has therefore been defined as new development consented through the planning process.

In order to ascertain the quantity of development in flood risk areas, a number of methodologies have been appraised to determine the best approach for informing this study. These are:

-  Obtain planning application boundaries across Wales to undertake spatial analysis to determine those located within Flood Risk Zones as defined by the DAM and FMfP.
-  Utilise the NRW Dashboard for monitoring planning application responses.
-  Utilise annual monitoring data collected by Welsh Government and LPAs.
-  Utilise the OS AddressBase products and National Receptor Database to determine the residential and commercial properties built in areas of flood risk by using construction date information .

The nature of the analysis proposed for each method, and the opportunities and constraints associated with them, are set out in Table 3-1.

The method appraisal concludes there is no nationally consistent robust dataset in which to provide a definitive answer on the extent of new development in flood risk areas. Additional constraints to access data within the scope and timeframe of this study adds to the complexities and uncertainties in quantifying new development in flood risk areas. Consequently, whilst this study presents indicative data for new development in flood risk areas, it should be used with caution and with consideration of the associated uncertainties.

The result of the analysis is contained in Section 4.

Table 3-1 Methodology Appraisal

	Individual Planning Applications	NRW Dashboard	Planning Annual Monitoring Data	OS AddressBase Data
Overview	<p>Obtain the red line boundaries for all planning applications in all LPAs for period from January 2013 to October 2023.</p> <p>Undertake spatial analysis to determine applications located within tidal and fluvial flood zones as defined by DAM (2020) and FMfP (Nov 2023).</p> <p>Assessment of application type, and extent of flood zone within the red line boundary.</p>	<p>NRW collate a Microsoft PowerBI dashboard to track applications on which they are consulted. The dashboard collates data on development type, flood zone and date of application, whilst providing ease of data search and analysis</p>	<p>Use of the Welsh Government collated SD4 from 2014-2019 to determine planning consents in flood risk areas.</p> <p>Data to be supported by utilising AMRs from LPAs to analyse flood risk metrics on a national scale.</p>	<p>Analysis to be undertaken on the Basic Land and Property Unit (BLPU) attribute and the Start Date attribute to determine when each property within the register was entered, indicating build date.</p> <p>AddressBase Premium likely required to provide the BLPU and Start Date attribute. With the NRD providing property type based on MCM categorisation of property (residential and commercial).</p> <p>Databases can be linked using the UPRN of each property.</p>
Data Collection & Availability	<p>Data request issued to all LPAs through Planning Officer Society Wales.</p>	<p>Requests for access to the dashboard to NRW were initially unsuccessful, with data requests discontinued due to method appraisal</p>	<p>SD4 available from 2014-2019.</p> <p>AMRs available from 22 LPAs.</p>	<p>Access to NRD 2023 through NRW Re-use Licence.</p> <p>Access to AddressBase Premium (June 2023) via Welsh Government PSGA licence and Data Map Wales.</p>

	Individual Planning Applications	NRW Dashboard	Planning Annual Monitoring Data	OS AddressBase Data
Definition of 'new development'	10 year period from 2013 - 2023, in line with the aim of the workstream	Approximately 5 year period from 2018-2023, based on data collection in relevant format by NRW	5 year period from 2014-2019, based on WG data. Variable timeframe based on AMRs availability.	Opportunity to define period from 2004 - 2023, from the inception date of TAN-15
Definition of flood risk areas	Based on areas of DAM Zones C1 and C2, or FMfP Zones 2 and 3 based on latest available data	Based on areas of DAM Zones C1 and C2, or FMfP Zones 2 and 3 as defined at the time of the application	Based on areas of DAM Zones C1 and C2	Based on areas of DAM Zones C1 and C2, or FMfP Zones 2 and 3 based on latest available data
Opportunities	Allows for analysis of development type, including change of use, multiple applications on same site and extent of site within the flood zone to determine where areas of a site are given over to flood storage, or the flood zone is attributed to a watercourse corridor.	Ability to review, search and analyse data easily through the tools available in PowerBI. Consistent approach to data collection based on PowerBI attributes	Allows for national scale assessment of those applications granted approval within flood risk areas	Allows for analysis over distinct time period based on the date of the property being built on a national scale. Allows for quick and effective spatial analysis of the data across the flood zones. Can provide data on flood zone type and property type.

	Individual Planning Applications	NRW Dashboard	Planning Annual Monitoring Data	OS AddressBase Data
Constraints	<p>Data quality is poor with wide variation in attributes of data collated by LPAs. Inconsistencies in the data results in various attributes and data conflicts on which to commence the analysis. Multiple applications for the same site.</p> <p>Planning approval does not mean development takes place.</p> <p>Extent of development within flood risk zones may vary widely (eg. areas of public open space allowed to flood).</p>	<p>Does not track application outcomes and therefore unknown if planning consent has been granted.</p> <p>Results in over-estimation of development consents.</p> <p>Limited spatial data; no red line boundaries to confirm intersection of development with flood risk.</p>	<p>Conflicting and different flood risk metrics across each LPA AMR.</p> <p>Lack of QA, peer review or verification of results.</p> <p>Specific details of the application are not always known. Therefore, extent of the flood zone within the application boundary is not reflected in the analysis.</p>	<p>It was not possible to source the necessary data within the timescales of the project. Data obtained via DataMap Wales was incomplete. Specialist advice may be required to complete the analysis, although the approach has been confirmed with GeoPlace who are responsible for collating, managing and maintaining the primary UK authoritative geospatial address and street data.</p>
Method Viability	<p>Variation in data results in inconsistencies to proposed approach and inability to capture data on a national approach or in a consistent way.</p>	<p>With no knowledge of whether an application has been approved or refused, use of the NRW dashboard results in an overestimation of development consented in flood risk areas.</p>	<p>The data obtained varies in consistency and does not allow for a national overview of planning consenting. However, the data does provide an indication of the development in flood risk areas. The results should be used with caution, noting the uncertainties associated with the data used.</p>	<p>Analysis of the data, if available would provide a robust assessment of new development in flood risk areas on a national scale. However, for this study, access to the data has been challenging within the study timeframes.</p> <p>A similar methodology has been utilised in the provision of data for National Indicator 32 of the Wales Wellbeing Goals,</p>

	Individual Planning Applications	NRW Dashboard	Planning Annual Monitoring Data	OS AddressBase Data
				demonstrating effectiveness of the approach.
Appraisal Conclusion	Not appropriate for this study	Not appropriate for this study	Data to be provided with caution	Not available for use in this study

3.2 Monitoring of New Development in the Flood Risk Areas

As detailed in Section 2.2, both Welsh Government and LPAs collate data on development consents within the flood risk areas via the All Wales Planning Annual Performance Report, and Annual Monitoring Reports, respectively.

In order to ascertain the metrics recorded across the AMRs, and to support the methodology outlined in Section 3.1 to quantify the extent of development within flood risk areas, the following data has been obtained:

- Publicly available All Wales Planning Annual Performance Reports from 2014-2019
- The raw data behind the All Wales Planning Annual Performance Reports from 2014-2019
- All publicly available Annual Monitoring Reports from 22 LPAs across Wales.
 - Two LPAs had an AMR report for 2022/2023 only, with an indication that previous versions were no longer publicly available.
 - One LPA had limited information available on their AMR online.

Targeted interviews were held with Planning Officer Society Wales, the WLGA, and Welsh Government Flood Branch and Planning Policy teams to gain further understanding on the use of the monitoring data, and the barriers (past and future) to data collection. Interview questions are contained in Figure 3-1 Interview Questions and Stakeholders.

We have assessed the existing evidence base behind SD4 and the AMR metrics to identify lessons learnt and the potential for improvements in the collection and analysis of this monitoring data.

From your understanding, how is the planning process monitored for considering consents granted for development in the flood risk areas?

In your opinion, has monitoring been undertaken in a robust and efficient way?
If not, what are the barriers for data collection and how can data collection be improved?

How is the data collected through the All Wales Annual Planning Performance Report, or the LPA Annual Monitoring Reports used?

Is this data used effectively to drive change in the planning process and can you provide any examples of where this happened across Wales?



Figure 3-1 Interview Questions and Stakeholders

3.3 Attitudes Towards Development in the Flood Risk Areas

It is recognised that attitudes towards development in flood risk areas will vary between stakeholders on a political, public and professional level. Consequently, in order to provide a representative view of the perception of new development we have undertaken a range of stakeholder engagement activities.

The Wales political attitude, outlined in various policies and plans covering Wales on a national scale is set out in Section 2.3. These policies and plans outline the general requirements of a forward-looking Wales and a shift towards increasing sustainability and resilience to climate change and flood risk.

In order to ascertain an understanding of the perception of development in flood risk areas, targeted interviews were held with a variety of stakeholders to provide a view across a spectrum of those involved with decision-making and implementation of planning policy in Wales. The interviews aimed to gain an understanding on:

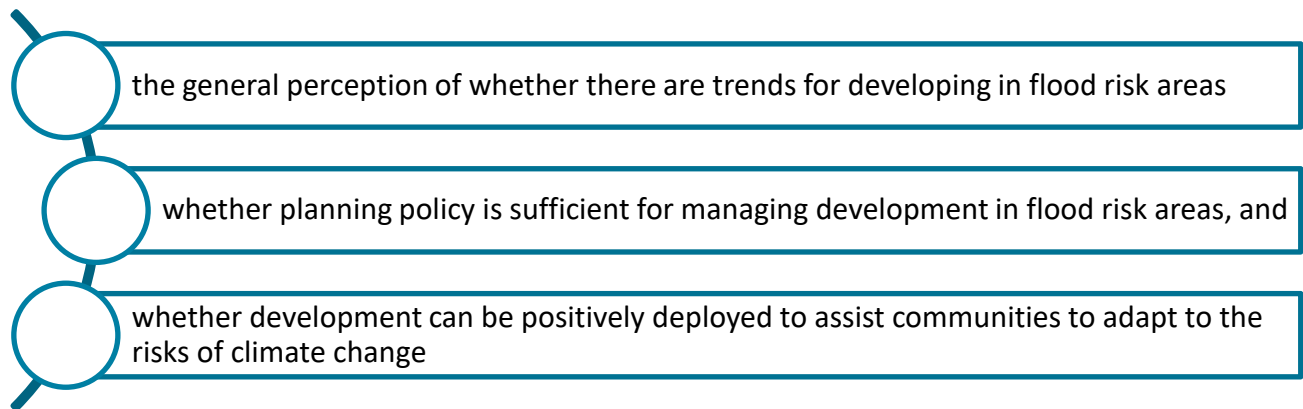


Figure 3-2 Aims of Stakeholder Interviews

The interview questions and stakeholders interviewed are contained in Figure 3-3. The stakeholders listed are those that responded to requests for interviews, with invitations for contributions also provided to a number of other stakeholders.

From your perspective, do you think too much development takes place within flood risk areas in Wales?

In your opinion, should we allow building in flood risk areas, and are there justifiable reasons for doing so?

Is there a difference in your views between new development and re-development?

Planning Policy Wales (PPW) and TAN-15: Development and Flood Risk, set out the framework and rules for development in locations susceptible to flooding. Whilst recognising that such policies are always evolving, with significant changes for TAN-15 in the pipeline, do you have confidence in the current and proposed approaches to managing development and flood risk.

Can appropriate development assist communities to adapt the risks for climate change? If so, could you give any examples?



Figure 3-3 Interview Questions and Stakeholders

To provide a wider view of attitudes towards developing in flood risk areas, we attended 3 workshops conducted by Arup as part of Workstream 1 of the wider *Managing Flood Impacts in Wales 2050* project. The aim of the workshops was to invite a conversation about how to build a future Wales resilient to flood risk, supported by a range of stakeholders across the political, public and professional spectrum. The stakeholders engaged at the workshops are outlined in Figure 3-4.

Attendance at the workshops enabled a wide range of views and opinions to be heard on the subject of development in flood risk areas, and some, limited, opportunities arose for more in-depth conversations with individuals to ascertain a range of views on this area.

The workshop was followed by the issue of a survey to all prospective attendees of the workshop. Survey questions in relation to development in flood risk areas are outlined in Figure 3-5. The survey received a limited number of responses (15), with the background of stakeholder response unknown. However, it is recognised that the data received as a result

of the survey remains useful to support some of the assumptions and recommendations formed in this report.

Risk Management Authorities	Political Members	Local Government Groups	Public and Community
<ul style="list-style-type: none"> Natural Resources Wales Dŵr Cymru Welsh Water Lead Local Flood Authorities 	<ul style="list-style-type: none"> Members of the Senedd Local Councillors Community Councillors Town Councillors 	<ul style="list-style-type: none"> Local Authority (eg Environment, Countryside and Ecology teams) North Wales Councils Regional and Emergency Planning Services North Wales Resilience Forums Welsh Local Government Authority 	<ul style="list-style-type: none"> Local Residents Education Professionals Social Landlords Volunteer Groups Environment Groups (e.g Wildlife Trust, NFU Cymru, Conservationists and Climate Specialists) Coastguard

Figure 3-4 Workshop Stakeholders



Figure 3-5 Survey Questions and Response Options

To gain a further understanding of the public perception of development in flood risk areas, a desk-based literature review has been undertaken across a range of media types (e.g. scholarly articles, news articles, and television). This has been translated into a number of

case studies demonstrating how development and flood risk is presented to the public from both technical and non-technical perspectives.

3.4 Quantification of Economic Impact of Flooding on New Developments

To understand the cost to the public purse to respond to flood emergency situations within new developments, a literature review has been undertaken to determine the extent of the existing evidence base. The review focuses largely on the MCM and MCH. A review has also been undertaken on the costs to public purse of Storms Dennis and Ciara (February 2020) to understand if existing formulas and methodologies can be updated to consider more recent events.

Since 2004, all new development has been subject to TAN-15 which provides technical guidance relating to development planning and flood risk in Wales. A detailed review of TAN-15 has been undertaken to understand if existing formulas and methodologies remain applicable to new development.

In order to provide more detailed estimates of the costs of Storms Dennis and Ciara to public purse, we have attempted to engage with the Wales Resilience Partnership Team and Local Resilience Forums which were known to be impacted by these storm events. This engagement included issuing a questionnaire on emergency response adapted from the standard template contained within Chapter 6 of the MCH. A copy of this questionnaire is contained in Appendix A. Unfortunately, no responses were received to the questionnaires within the timescales of the study.

4 Findings

4.1 Monitoring of Development in Flood Risk Areas

4.1.1 What is Monitored?

The National Approach

As detailed in Section 2.2, Welsh Government's Planning Performance Framework contains an All Wales Planning Annual Performance Report which measures service standards in a comparable way. Flood risk and land use planning is monitored through the use of SD4 Resilience to Climate Change – Flood Risk.

This metric quantifies: *Planning permission granted and refused for development in C1 and C2 floodplain areas during the year.*

This metric was put in place for addressing and adapting to climate change impacts against flood risks and identifies the number of planning permissions granted and refused in Flood Zone C1 and C2, which is represented within the Development Advice Map (DAM). However, the DAM's last update was January 2020, which means that it does not presently reflect the best available mapping on flood risk across Wales. At the time of this report no further updates are planned to the DAM.

Since the introduction of the Planning Performance Framework, planning performance has been monitored over the financial year periods since the 2014-15 financial year. Performance reports are publicly available for the subsequent 4 years, resulting in a **5 year period of 2014 to 2019** being monitored and reported on. Collation of SD4, and all planning performance metrics, ceased in 2020 as a consequence of the Covid-19 pandemic, resulting in no further reports being published. The time period of 2014-2019 therefore represents the complete dataset for the SD4 monitoring metric.

When determining how information on flood risk and land use planning is monitored, it was advised by Welsh Government that the use of SD4 as an indicator of policy performance and a robust measure of development in flood risk areas should be used with caution, as a result of uncertainties associated with the data, including:

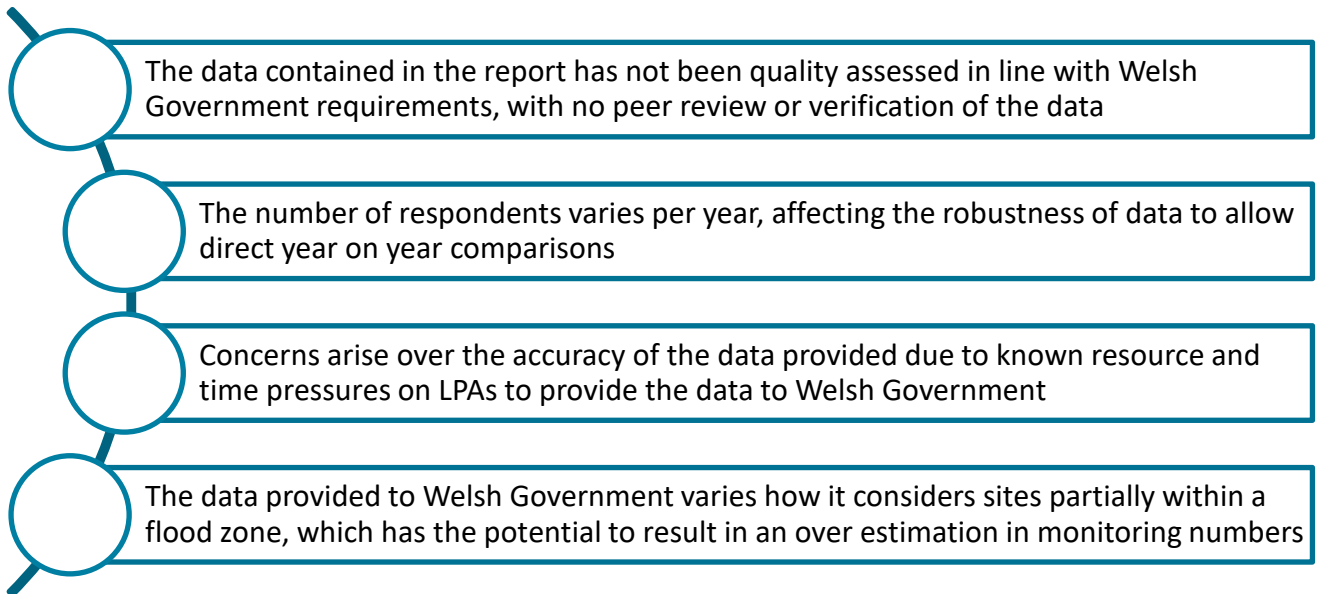


Figure 4-1 Uncertainties Associated with SD4

Within the published All Wales Planning Annual Performance Reports, the SD4 data presented differs between the 2014/15 and 2015/16 reports to the remaining 3 available reports. Initially, the data presented within the All Wales Planning Annual Performance reports distinguishes between development granted consent in flood risk areas which met all the TAN-15 tests, and those that did not. Later reports provided no breakdown in permissions between those that met all the tests of TAN-15 and those that did not. This represents a known change in approach to data collection for SD4 from Welsh Government to simplify data collection.

In all instances, data is collected on the number of residential units, and the area of non-residential units (Ha) which were granted planning permission, and the equivalent refused permission, where permission is refused on flood risk grounds. New development included change of use applications and not just new build development. Guidance notes for data collection advise that to avoid double counting, outline and reserved matters applications should be recorded at the earliest point at which the extent of development is known.

It should also be noted that the data collected collates the total number of units, and the gross area of land within flood risk areas as opposed to the number of individual planning decisions. As a result, large development sites may render year on year direct comparisons difficult.

The Local Approach

Each LPA in Wales has its own metric to monitor development consents within Zones C1 and C2. These metrics are detailed in their Annual Monitoring Reports and are worded in line with each authority's LDP objectives and policies. Each metric is defined by an Indicator defining what metric is being measured, and a target against which the indicator is measured.

Figure 4-2 presents an overview of the indicators and targets from the 23 LPA AMRs which are publicly available. Some authorities monitor the amount of development permitted in C1 and C2 flood zones areas not meeting all TAN-15 tests, whilst others are monitoring "highly vulnerable development" within C1 and C2 areas not meeting all TAN-15 tests.

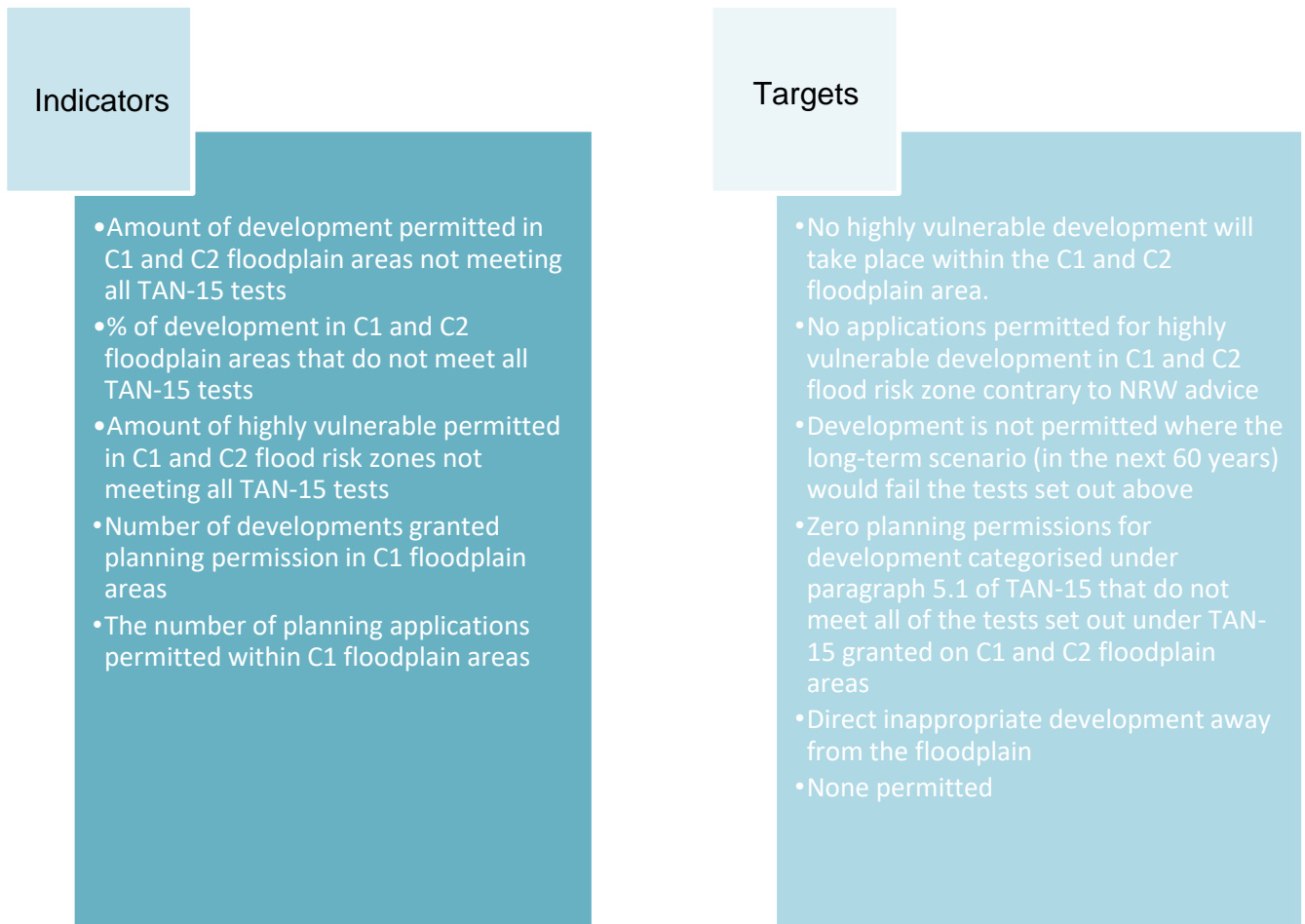


Figure 4-2 AMR Indicators and Targets Across LPAs

The monitoring targets across the authorities of Wales also lack consistency. For example, some monitoring targets require that all developments are to meet the justification tests set out by TAN 15. Other targets are less detailed and point out that inappropriate development should be directed away from the floodplain. One target is simply set out as "none permitted".

Whilst the general trend for the AMRs is to record development in flood risk areas, the definition of 'development' across the metrics differs. Some metrics define recordings against 'the amount of development permitted', whilst others state 'Percentage of development', with some stating 'number of planning applications'. This change in wording across the metrics contributes to the uncertainty in direct LPA to LPA comparisons across the metrics, or the creation of a national picture.

Additionally, the number of AMR reports publicly available varies greatly between the LPAs. Data ranges for availability vary from 2 years of records to 10 years of records. However, the timeframes for each data range also varies. This is likely as a result of LDP cycles and monitoring periods, with a possible impact on monitoring metrics within the AMRs being represented.

Although the metrics of each Welsh Authority have similar objectives to the Welsh Government's SD4, they are not consistent, and differ across the LPAs. This lack of consistency or coordination among the authorities of Wales limits the value of the data both locally and nationally.

4.1.2 Barriers for Data Collection

A summary of the barriers to data collection is contained in Figure 4-3

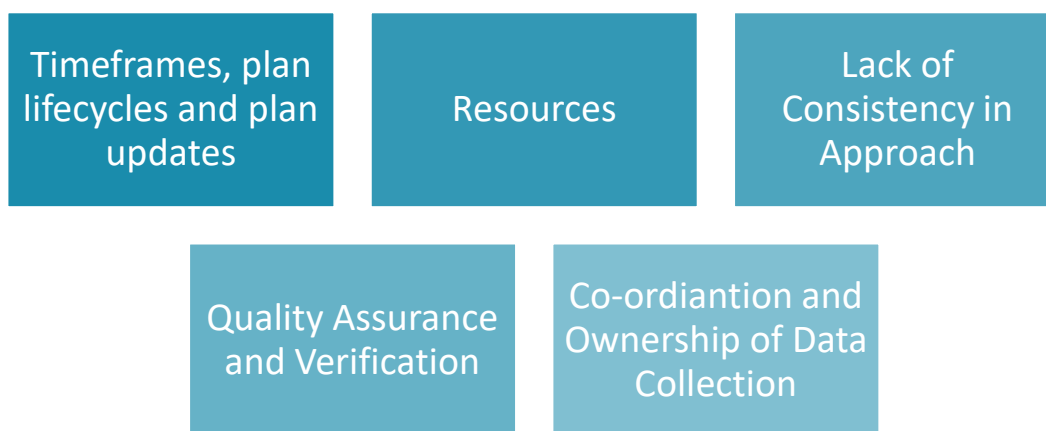


Figure 4-3 Barriers to monitoring planning consents in flood risk areas.

Resources

Collection of SD4 data stopped during 2020, along with all other metrics within the All Wales Annual Planning Performance Report, as a result of the global coronavirus Covid-19 pandemic. Data monitoring was halted during the Covid-19 period due to resource shortages, prompting officers to relocate to different areas. This shift allowed the planning process to persist with a primary emphasis on delivering planning decisions. It was acknowledged that, given the constraints in capacity within LPAs and WG, resuming monitoring was not prioritised. While recognising the significance of data monitoring, it was deemed less crucial than the determination phase in the planning process, particularly in light of the challenges posed by the pandemic. There is also a consciousness around the number of data requests issued by Welsh Government, including to LPAs and the drain that this can have on valuable staff time. Whilst there is a desire by Welsh Government to resume monitoring, lack of resources continues to be a barrier to restarting this data collection.

Lack of consistency in approach

Research into the current monitoring undertaken across Wales demonstrates a lack in consistency of approach to data collection. LPA data collection is driven by LDP cycles, objectives and policies, whilst Welsh Government's SD4 is driven by the Well-being for Future Generations (Wales) Act, and the need for sustainable development. However, both monitoring mechanisms have a shared basis of being driven by a common planning policy, with a desire to drive development away from areas of flood risk.

Conversations with key stakeholders suggest that a joined up, national approach to data collection is feasible, being a variation on the data collection already carried out on an annual basis by each LPA as a statutory requirement under Section 76 of the Planning and Compulsory Purchase Act 2004. A co-ordinated approach to monitoring metrics, led by Welsh Government would provide consistency in data collection and metrics considered.

The limited value of the data currently collected is a drag on effective data gathering. Conversely, if the right data can be consistently collected and its value demonstrated this can be an incentive for improvement.

Planning Policy Wales and TAN-15 do not currently set out any monitoring requirements. Stakeholders reported some reluctance for additional mandatory monitoring from Welsh Government due to the resource pressures already experienced by LPAs. However, given the LPA statutory requirement to monitor planning performance regardless, there may be opportunities for smarter and more coordinated data gathering to inform the Planning Performance Framework.

A nationally consistent, robust dataset would enable statistical reviews of planning policy performance, not just in relation to flood risk matters, but across the spectrum of planning matters and better inform the public debate around development and flood risk.

Quality Assurance and Review of Data

On receipt of data from Welsh Government in order to inform this study, the uncertainties associated with the data were identified (as detailed in Section 4.1.1). Key to this uncertainty is the lack of quality assurance in the data gathering process. This is apparent across both SD4, and AMR metrics. Whilst SD4 is collected alongside guidance notes intended to ensure no double counting of applications, and how to count consents, it is unknown as to how robustly this is applied to data provided to Welsh Government from LPAs. Additionally, in discussions with LPA representatives, little was known about QA of the data input in the AMRs. Often, data is sourced from the planning application form, which can hold little data on the relevant attributes required for robust data analysis, allowing for discrepancies and uncertainties. For example, a planning application asks if a site is in a flood zone, the box is therefore ticked, but actually only an area of public open space is at risk of flooding and none of the proposed dwellings.

Timeframes and Product Lifecycles

When reviewing the monitoring data available from LPAs, it is evident that the availability of data and duration of data gathering varies greatly. This is likely due to the link between

AMR monitoring metrics and LDP policy objectives, with LDP cycles of 15 years and expiries of LDPs varying across Wales. The variability in data availability results in concerns when trying to assess trends in planning performance over a continuous period.

Additionally, all of the metrics considered cover flood risk and development in relation to the DAM only. The DAM was last updated in January 2020, and was subsequently replaced by the FMfP in September 2021. No monitoring is currently undertaken in relation to the FMfP. Again, this is likely as a consequence of LDP cycles, and AMR monitoring metrics not being updated until a revised LDP has been adopted, with many LPAs currently going through the LDP update process. Consequently, AMRs are monitoring consents with outdated definitions of flood zones as the FMfP constitutes the most up to date representation of flood risk across Wales, and includes for the consideration of climate change impacts.

It is unknown whether SD4 would have been updated to reflect the changes to the DAM as collection of SD4 ceased in 2020.

Definition of Flood Risk

A key omission to monitoring data is distinguishing between tidal and fluvial risk in all monitoring metrics. Whilst some metrics across SD4 and the AMRs will distinguish between residential and non-residential development (or highly vulnerable vs less vulnerable), no evidence has been found to indicate that distinction between flood source is made.

It is also noted that all monitoring data is based on the content of Planning Policy Wales and TAN-15. As TAN-15 does not currently cover the risk of flooding from surface water, no monitoring currently takes place to determine the extent of development within surface water flood risk zones.

4.1.3 Who is using the Data?

The extent to which the monitoring data detailed is used by various stakeholders is unclear.

The Welsh Government Planning Policy Framework aimed to introduce a system for measuring service standards comparably, to realign the planning system and promote collaborative working and sharing of best practice. However, with monitoring ceasing as a result of the Covid-19 pandemic and resource pressures, it is unclear as to the extent the data was being analysed and used to meet these aims. However, the 2018-19 All Wales Planning Annual Performance Report suggests that the forthcoming update to TAN-15 is:

"partly in response to the high number of homes permitted in flood risk areas since 2015".

Within the AMRs, LPAs are required to justify where policy objectives and indicators are not met. When assessing this data, LPAs are required to respond with appropriate actions, such as determining whether additional training is required for planning officers and committees, or whether the decisions made were justified and applicable across the LPA area. The LPA is required to report on these findings and subsequent actions. It is unclear as to whether the key findings from their reports are shared amongst LPAs to encourage and share best practice.

When engaging with key stakeholders, all agreed in the value of monitoring land use planning in relation to flood risk. However, key to this, was the need for consistent monitoring to establish a national picture and an overview of how planning policy is held up in terms of flood risk.

All stakeholders highlighted the opportunities to use of the data should a consistent approach be taken. In monitoring land use planning and flood risk, an evidence base can be built on which to monitor the success of existing national planning policy and strategies, including Future Wales: The National Plan, and TAN-15. A robust data-led evidence base would have the potential to inform, and support, proposed future changes to planning policy in the longer term.

4.1.4 Quantifying Development in Flood Risk Areas

National Indicator 32

Welsh Government National Indicator 32 is defined as:

Number of properties (homes and businesses) at medium or high risk of flooding from rivers and the sea

Published as an indicator of the number of properties in the floodplain in 2019 (checked and verified by NRW in 2021), National Indicator 32 suggests that:

9,792 properties are at tidal risk of flooding, whilst a further 20,518 properties are at risk of fluvial flooding across Wales.

No data is provided for properties at risk of surface water flooding. These figures relate to existing properties only. Whilst a yearly update might identify the number of new properties within flood risk areas, and therefore provide an indication to the number of planning consents for development in flood risk areas, the dataset is too new to provide this data at present. Furthermore, our definition of flood risk areas is always being improved, such that changes might be due to development or due to changes in flood maps.

The update frequency for National Indicator 32 is on a 2-3 year basis. As a result, whilst this may in future provide a means of determining the extent of development permitted in the flood risk areas, the dataset is not currently a suitable means of doing so.

However, the collation of National Indicator 32, does suggest that the proposed methodology set out in Section 3.1 to inform this study would be viable. The use of OS AddressBase products supported by the NRD and flood maps, would provide a robust means of determining the number of new developments in the flood zone over a set time period, and into the future. AddressBase Premium is updated on a six weekly basis, providing the most up-to-date dataset on properties across Wales, whilst the FMfP is updated on a six monthly basis by NRW.

Monitoring Data

As detailed above, there are currently a number of barriers to data collection across Wales which would provide a robust, local and national picture of the extent of development in

flood risk areas. Notwithstanding the shortcomings of data availability, the LPA AMR reports and Welsh Government SD4 data has been reviewed in order to determine an estimate of the extent of development in flood zones.

Throughout the AMRs, the metric for monitoring development within Zones C1 and C2 of the DAM vary extensively, with some defining the DAM Zone within the metric, and others just simply stating 'flood zone'. Examples of AMR metrics are contained in Figure 4-2.

A review of the publicly available AMRs provides figures for consented development within Zones C1 and C2 of the DAM, as shown in Figure 4-4. The following should be noted with respect to the data shown:

- Where development is stated as 'Zone C1 or C2', the monitoring metric did not explicitly state in which zone development was consented, and it has therefore been assumed to be either.
- The number of AMR reports publicly available varies greatly between the LPAs. Data ranges for availability vary from 2 years of records to 10 years of records. However, the timeframes for each data range also varies.
- Whilst a figure has been provided for each year, the number of LPAs contributing to figures for that year varies greatly and the number provided is insufficient to provide a national picture of development in flood risk areas.
- Noting the uncertainties and inconsistencies around the data, the figures should be used with caution.

The data analysed from the Local Development Plans across Wales shows that from 2011 to 2023:

- 828 developments were permitted in Flood Zone C1 (areas benefiting from defences),
- 575 developments were permitted in a Flood Zone C2 (undefended areas); and
- 171 developments were permitted in either Flood Zone C1 or C2

In some cases, the AMRs identified the type of development that took place. Figure 4-5 shows the range of development types using the exact wording taken from the LDPs, demonstrating the variability across the dataset. The majority of the development types are not categorised within the Local Development Plans, so have been set as "Not stated". Planning permission may be for a tower block or advertising sign, with obvious variations in significance. This variability, and the lack of development type definition, makes the provision of a robust national picture difficult. Justification of a development within a flood risk area is based on development type and its vulnerability. Where not stated, the uncertainties associated with the data become too great to apply any meaningful analysis or context.

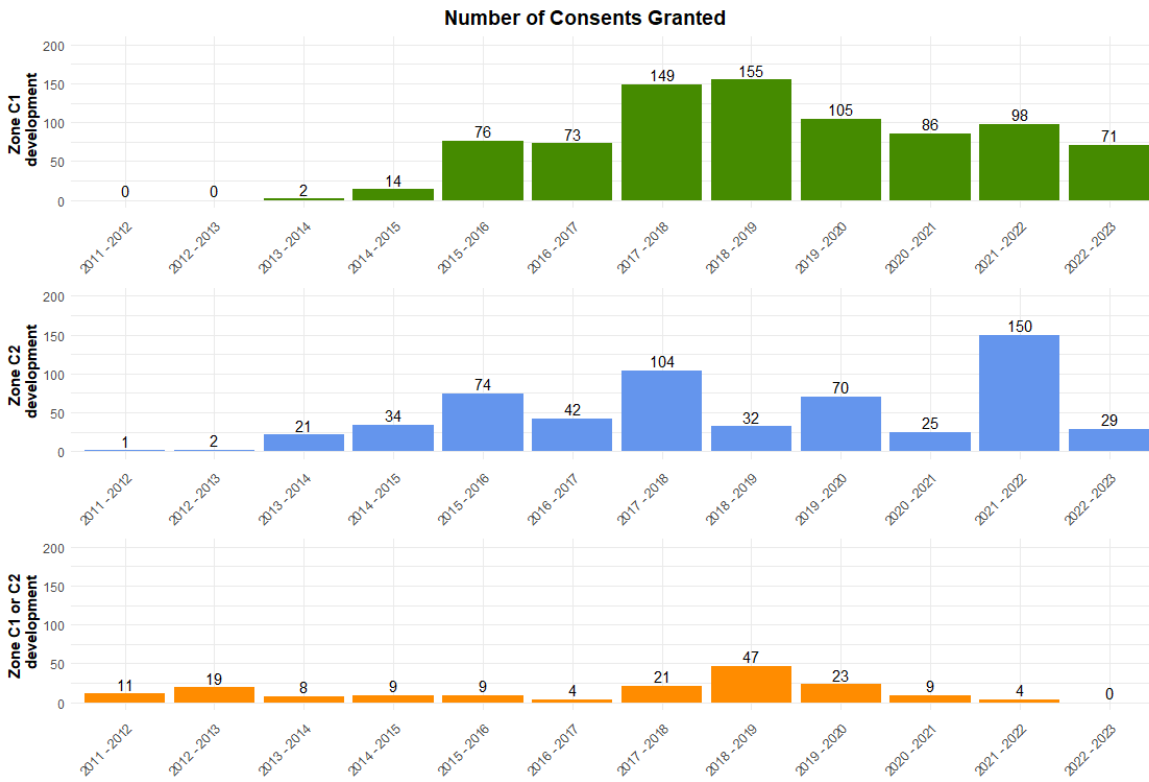


Figure 4-4 Applications Consented in C1 and C2 Flood Zones from 2011 to 2023. (Data obtained from individual Local Development Plans)

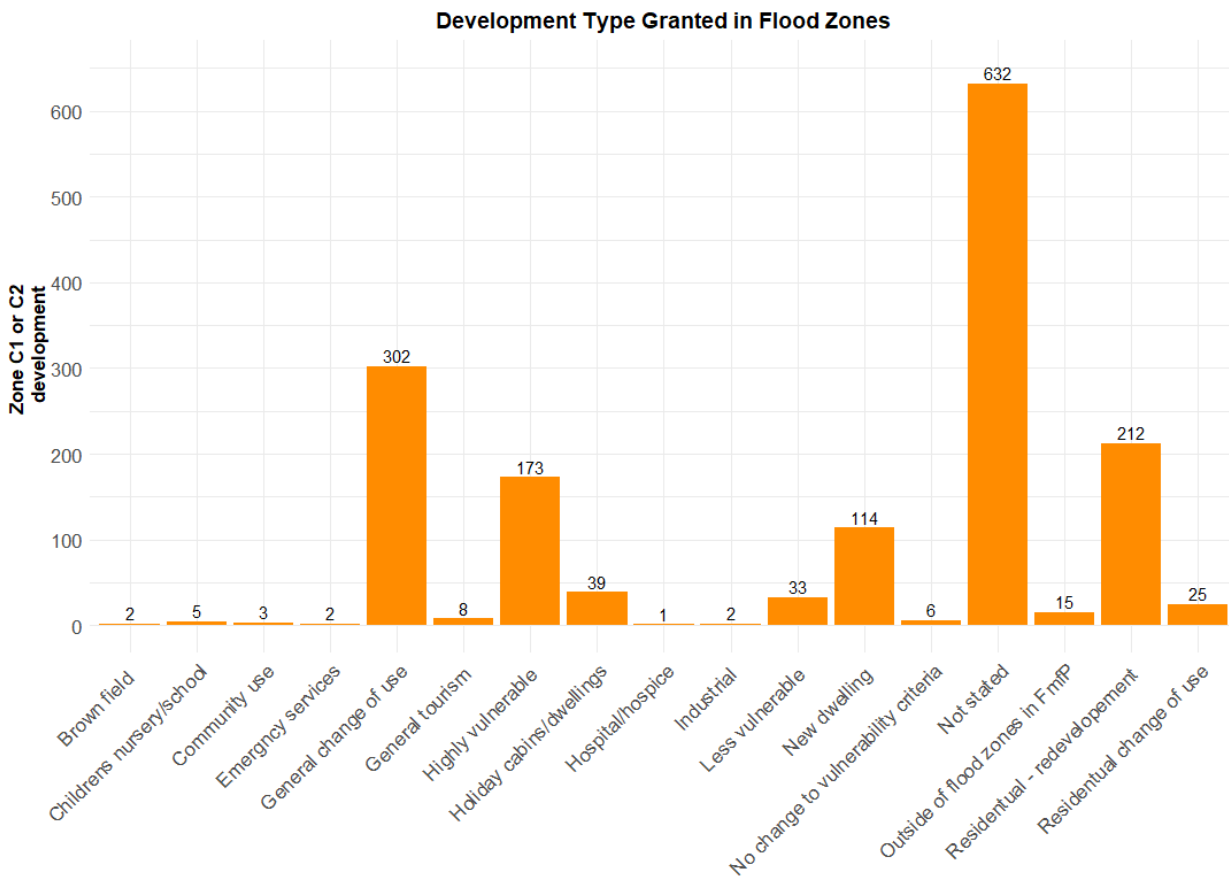


Figure 4-5 Development Categorisation

Additionally, the data obtained from the AMRs cannot easily be used to support or compare against the Welsh Government SD4 monitoring metric as a result of the specific nature of the data collected. The AMRs report on the number of planning consents, whilst SD4 reports on the number of units (for residential) or gross land area (for non-residential) permitted. Consequently, the SD4 numbers are far greater than those represented in the AMRs due to the number of planning applications submitted for more than one dwelling.

Nevertheless, the SD4 dataset can provide valuable insight into the extent of development in flood risk areas. The guidance notes released alongside the data collection form for the SD4 dataset provides guidance on using SD4 to only count the number on units, or gross land area, within the flood zone, as opposed to the entirety of the development boundary. This aims to avoid counting properties where across a red line planning application boundary the flood zone encroaches, but where all built development is outside the flood zone, with the potential to provide more accuracy within the dataset. However, the extent to which this has been considered in data collation by the LPAs is unknown, and the accuracy of the data has not been determined due to no quality assurance or verification of the datasets informing SD4. The uncertainties associated with SD4 have been highlighted above (Section 4.1.1) and are therefore not restated here.

Welsh Government have provided the raw data behind the publicly available All Wales Annual Planning Performance Reports, which contains an extra year of data for financial year 2013-14 compared to the published reports which cover a time period of 2014-15 to 2018-19. This data has been presented below.

SD4 is broken down into residential development and non-residential development, and also distinguishes between the flood zone, C1 or C2. The raw data provided covers those units granted consent whilst **not** meeting all of the tests set out in TAN-15. Figure 4-6, and Figure 4-7 show the breakdown of units/area of development granted from over the 2013-14 to 2018-19 time period. The total number of units/area consented within the flood zones across the time period is as follows:

- 2137 residential units within Zone C1 (defended areas)
- 491 residential units within Zone C2 (undefended areas)
- 1478.73 Ha of non-residential development within Zone C1 (defended areas)
- 1518.13 Ha of non-residential development within Zone C2 (undefended areas)

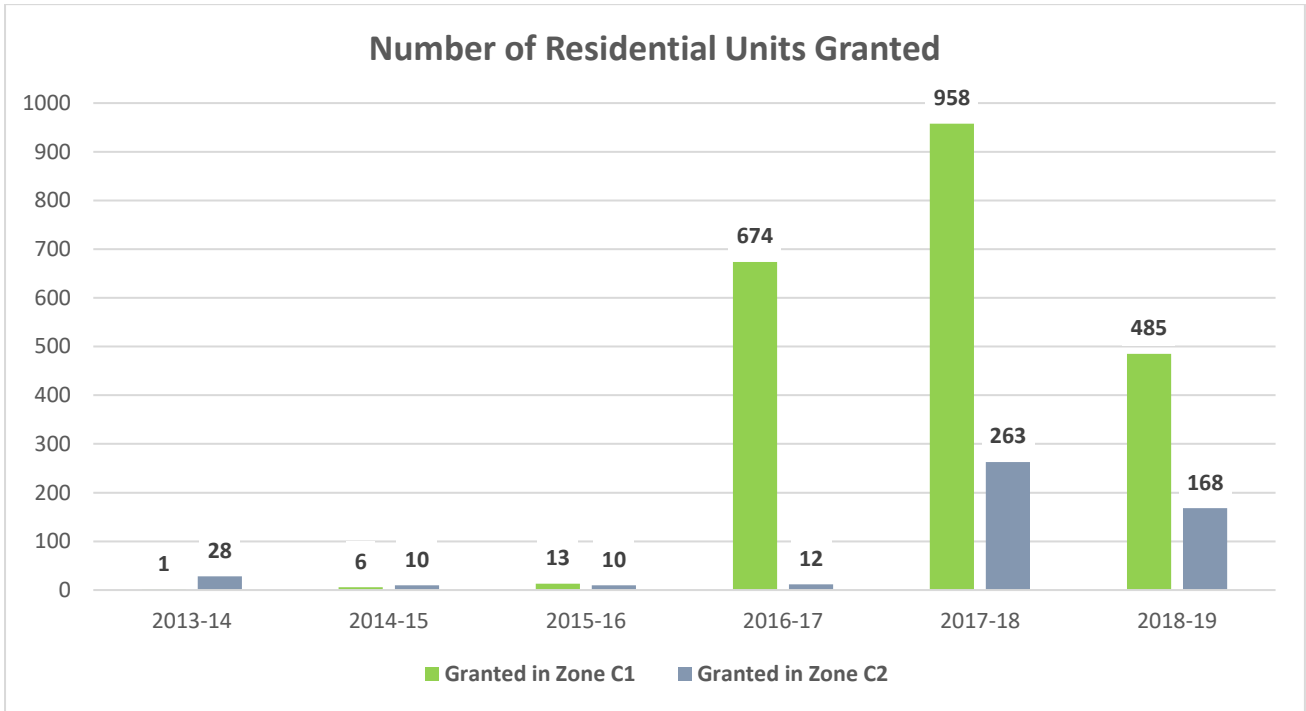


Figure 4-6 SD4 Residential Development in the Flood Zone

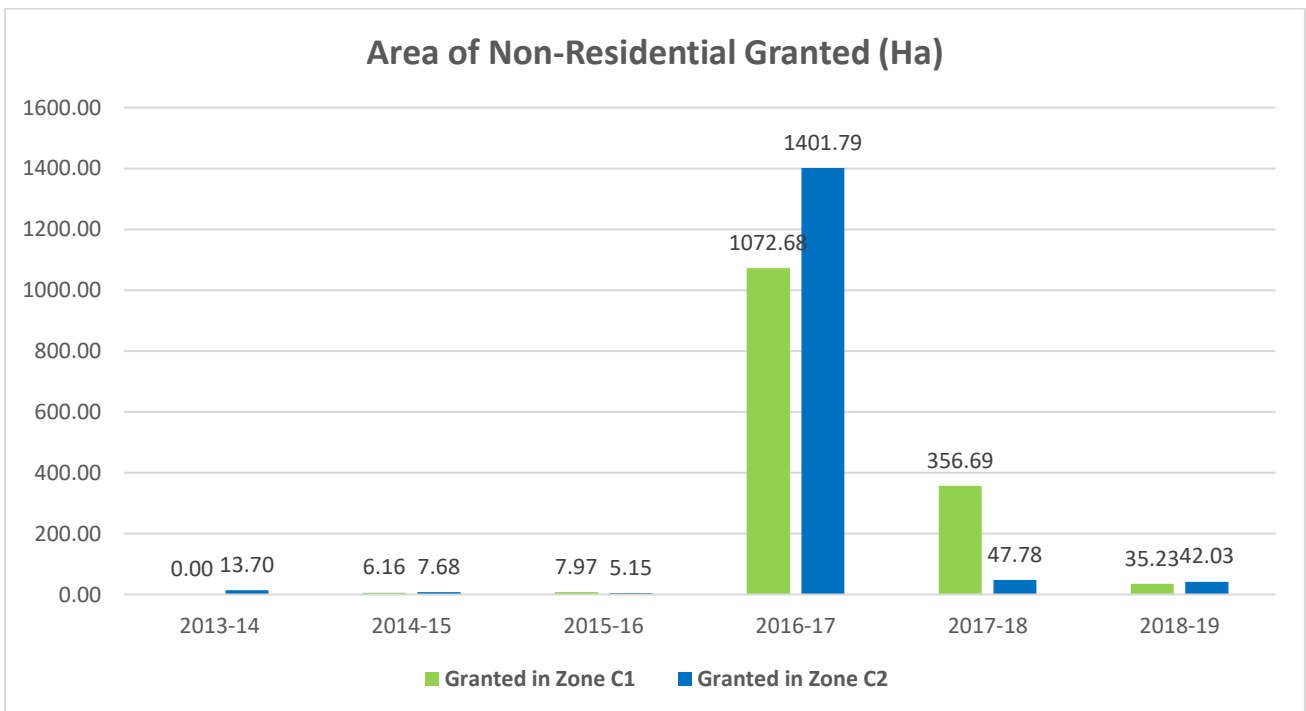


Figure 4-7 Non-Residential Development in the Flood Zone

Clear from the graphs presented in Figure 4-6 and Figure 4-7 is the increase in consented development between 2015-16 and 2016-17, for both residential and non-residential development. This increase in approvals noted correlates with the change in data provided within the All Wales Planning Annual Performance Report, detailed in Section 4.1.1, representing the change in approach to collation of SD4 to simplify data collection. The survey release notes indicate that the change in data collection removed reference to the TAN-15 tests and whether planning permission was granted in line with the requirements set out in TAN-15.

It is therefore considered likely that due to the simplification of data collection, a greater number of LPAs returned data to Welsh Government to inform the SD4 indicator. This is supported when reviewing the raw data. It is evident that the larger numbers shown for 2016-17 onwards corresponds with a greater return rate from LPAs with known extensive flood zones across the Local Authority area. It should also be noted that numbers provided represent units approved, and not applications or units built. Whilst the nature of the applications are not known or provided in the raw data, the Welsh Government report for 2016-17 attributes the high number of approvals in that period to the conversion of one building to 441 student flats. It is not, however, known whether this planning application met all of the tests required set out in TAN-15.

Consequently, the numbers provided should be used with caution to judge the significance of development in flood risk areas. The number of applications proposing development in flood risk areas is unknown, along with the number of units associated with each application. It is therefore unknown as to how the number of units associated with a single application may impact the results shown in Figure 4-6.

It is also noted that the raw data provided differs to that contained within the published All Wales Planning Annual Performance Reports for some years. Almost all years contain minor discrepancies (in the region of 1-2 units) in the number of approved residential units in flood risk areas shown in the report when compared to the raw data. However, the 2016-17 report contains greatly different numbers when compared to the raw data, and we have been unable to identify an explanation for this discrepancy.

The 2016-17 report graph, extracted directly from the Welsh Government report, is contained in Figure 4-8. The figure demonstrates that:

- 1416 residential units were granted permission in the floodplain in 2014-15
- 255 residential units were granted permission in the floodplain in 2015-16
- 1972 residential units were granted permission in the floodplain in 2016-17

By comparison, the raw data and corresponding reports indicate that 1412 residential units were granted permission in 2014-15, with a further 248 permitted in 2015-16. For 2016-17, the explanatory text associated with the figure notes that 1754 residential units were permitted in Zone C1, with 674 of these not complying with the tests set out in TAN-15. This is supported by the raw data. However, the report states that 217 units were granted within Zone C2. The raw data provided suggests that this is closer to 12 units.

One explanation for this C2 discrepancy is that the raw data provided covers units/area granted within the flood zones that **do not** comply with the tests set out in TAN-15 only. It is unclear as to where the data determining units/area granted which **do** comply with TAN-15 is sourced. With this, the 2016-17 report would suggest that 205 residential units were approved in Zone C2, complying with the tests as set out in TAN-15. This is in line with the data as set out in the 2014-15 and 2015-16 reports.

However, TAN-15 (Section 6.2) clearly sets out that Highly Vulnerable (residential) development shall not be permitted in Zone C2. It therefore stands, that no residential development can be permitted within Zone C2 that is deemed to fully comply with the tests as currently set out in TAN-15. This results in greater uncertainty associated with the raw data figures as set out in Figure 4-8 (extracted directly from the Welsh Government All Wales Annual Planning Performance Report 2016-17) as it is unclear as to what Welsh Government have considered as residential development in Zone C2 meeting all TAN-15 tests, or whether the data provided is fully representative of the extent of residential development permitted within Zone C2.

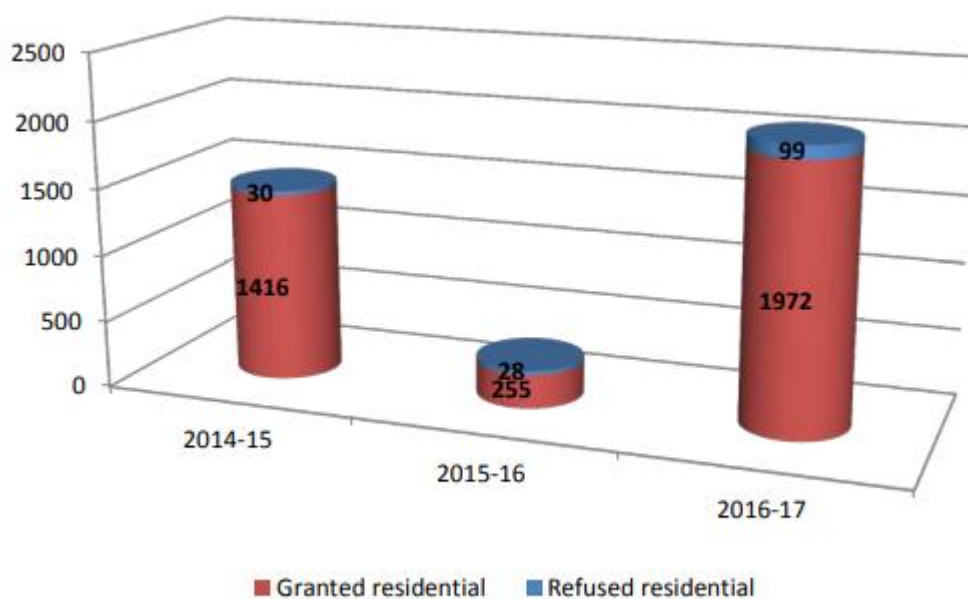


Figure 4-8 Extract from the Welsh Government All Wales Annual Planning Performance Report 2016-17 presenting the SD4 dataset

Whilst the data within the Welsh Government reports should be used with caution, it would be beneficial to add context to the figures provided. SD3 of the sustainable development indicators, provides:

SD3: The number of dwellings granted planning permission during the year.

Figure 4-9 therefore shows the percentage of residential dwellings that have been granted permission in the flood zone, against a base of the total number of residential dwellings granted in a year, denoted by SD3. Many of the uncertainties associated with SD4 apply

similarly to SD3. The SD4 raw data has been used, and therefore flood zone development constitutes those granted but **not** meeting all of the tests set out in TAN-15. The same uncertainties therefore remain on the number of residential C2 approvals.

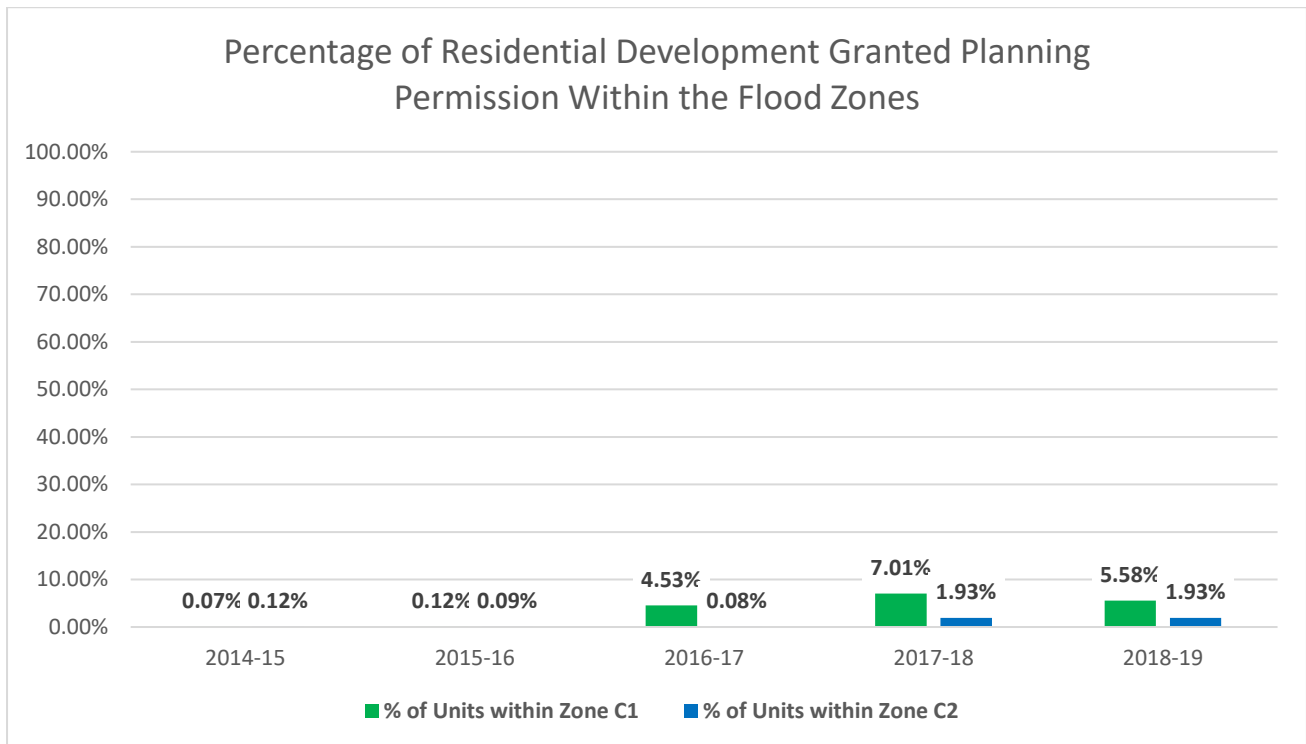


Figure 4-9 Percentage of Residential Approvals Not Meeting All TAN-15 tests Within the Floodplain

Whilst it is known that the collection of SD4 changed to inform 2016-17 results, there is no known change in the collection of SD3.

Before the data collection change, residential development permitted in areas of flood risk constituted less than 0.2% of all approvals. Post-data collection change, permissions in the flood zone remained relatively low with less than 7% of all approvals being within the flood zone. Across the 2015-16 to 2018-19 period, as one would expect, far fewer units were granted in C2 than in C1.

There is no known comparator to provide further context on the non-residential figures outlined above.

Summary

Despite the uncertainties associated with both the AMRs and SD4, it is evident that development in flood risk areas is consented through the planning process, with the data behind SD4 outlining consents contrary to the tests outlined in TAN-15.

The extensiveness of this development is debated, with various views on how much development constitutes 'too much'. Attitudes towards developing in flood risk areas are explored further in Section 4.2.

Whilst the data presented above should be used with caution, it presents the following figures for development consented in areas at risk of flooding from tidal and fluvial sources. No data is available to determine the level of development in areas at risk of flooding from other sources.

In accordance with the AMRs available from Local Authorities, over a period from 2011 to 2023, **a total of 1574 developments were consented** in areas at risk of flooding from tidal and fluvial sources.

In accordance with SD4, from 2013/14 to 2018/19, **a total of 2628 residential units and 2996.86 Ha of non-residential development were consented** in areas at risk of tidal and fluvial flooding. This constitutes **4.61% of all residential units consented** in the same time period.

4.2 Attitudes Towards Developing in Flood Risk Areas

4.2.1 Stakeholder attitudes towards development in Flood Risk Areas

Following targeted interviews with a range of stakeholders across the spectrum of flood risk management and planning policy and reviewing the responses to the workshop attendee survey questions, key themes in the attitude towards development in flood risk areas have been identified.

Extent of Development in Flood Risk Areas

Generally, respondents believed that too much development is currently taking place in areas of flood risk. Figure 4-10 provides the themes of conversations around the extent of development in flood risk areas.

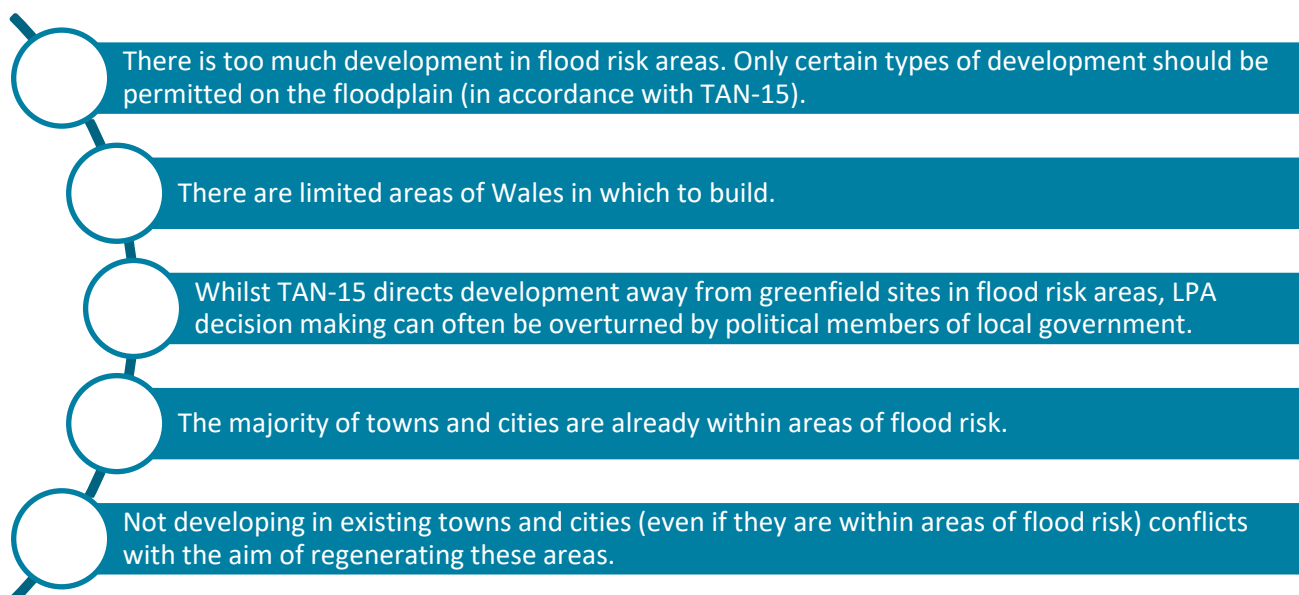


Figure 4-10 Stakeholder Comments on the Current Extent of Development in Flood Risk Areas

Justification of Development in Flood Risk Areas

In response to whether developing in Flood Risk Areas can be justified, stakeholders were divided. Figure 4-11 provides an overview of the responses to development justification.

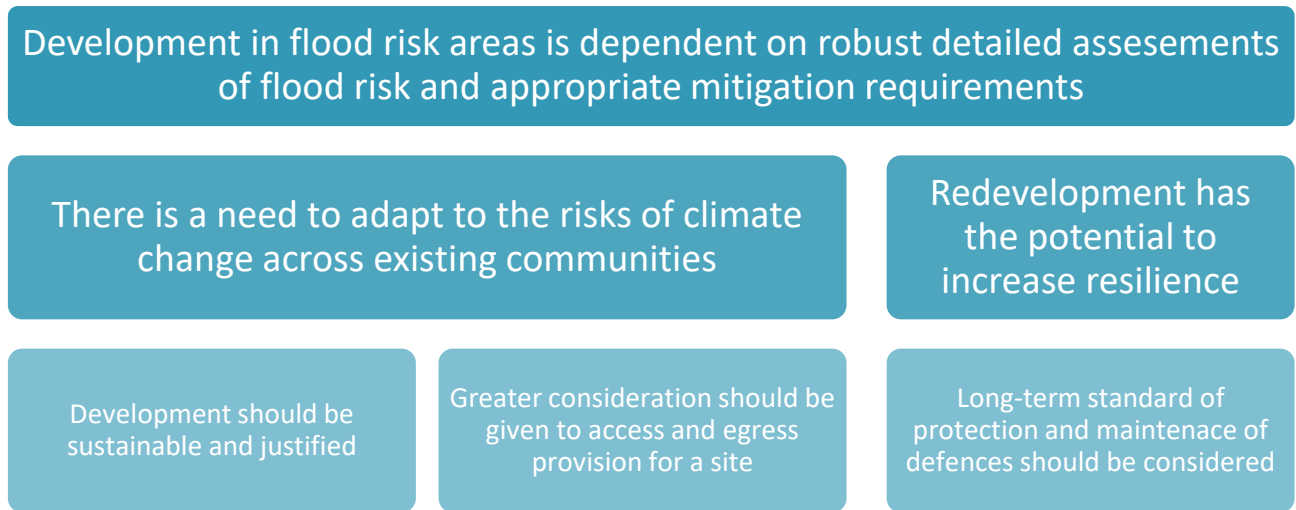


Figure 4-11 Key Themes for Justifying Development in Flood Risk Areas

For some, of key importance was the difference between development and redevelopment. It was commented that the priorities of Welsh Government are to protect existing communities from flood risk, as opposed to new developments.

For those generally in favour of redevelopment in flood risk areas, there was recognition of a need to adapt and improve the resilience of our communities in the face of increasing flood risk. Some talked about needing smarter and more resilient development, rather than total avoidance. All consultees recognised the complexities of the issues facing sustainable development and resilient communities.

Many consultees questioned whether it should ever be acceptable to develop greenfield sites within flood risk areas.

A further theme identified was the need for the consideration of access, egress and general flood preparedness for new development. Some were in favour of the tolerable flood depths as set out in TAN-15, whilst others were greatly opposed to any level of risk due to the consequences on emergency services (and others) in responding to flood events, particularly in the extreme event. Concerns were also raised that current requirements for Flood Response Plans were weak; rarely adequately prepared, reviewed, updated or maintained for the long term. No stakeholder questioned was able to identify who had responsibility for commenting and approving details on access and egress, beyond the LPA.

Confidence in the Current and Proposed Approaches to Managing Development and Flood Risk

Survey responses provided a clear split when commenting on whether current planning policy is sufficient for managing development and flood risk. Figure 4-12 highlights key discussion points across stakeholder interviews.

Conversations with stakeholders provided support to the robustness of current planning policy. However, generally, stakeholders wanted more evidence on the success of TAN-15 and the extent of development in flood risk areas to determine to whether it would be right to have confidence in the planning system to regulate development in flood risk areas effectively. Some stakeholders also raised concerns on the relationship between the LPA and consultees on whether these were sufficient for development objections to be heard, particularly on consultation for surface water matters where the Lead Local Flood Authority is not a statutory consultee to the planning process.

A significant theme to discussions was the forthcoming changes to TAN-15, which has been postponed and delayed by Welsh Government since 2021. All stakeholders recognised that these delays and associated uncertainties destabilises the planning process, with many unclear on what the impacts of the updated policy will be in practice. Generally, there is a split between those steering the policy, and those implementing policy in practice. Concerns were raised over the number of conflicting voices contributing to changes in the policy, adding uncertainties to the process and the potential for weaknesses in future policy as a result. It is recognised that not everyone will be completely satisfied with the revised policy, in whatever form it is published. However, views from stakeholders preparing and updating planning policy, felt that the fundamental principles of the forthcoming TAN-15, as per the consultation drafts, will be broadly in line with existing policy. Additional points of detail and nuances around development types will update policy in line with a need to adapt to climate change and living with water. An update to policy is generally welcomed by all stakeholders, with the need for clear guidance to facilitate sustainable development.

Some stakeholders note that the application of TAN-15 is very site-specific. They felt that a more holistic approach to land use planning and flood risk was needed to reflect the scale (catchments, shorelines) and nature of the problem.

Conflicts were identified between national/regional planning policies and the drive to support growth and regeneration of historic centres can conflict with the desire to focus development outside of flood risk areas. It was also commented upon that we need to allow for places to change and adapt in the face of climate change.

Some stakeholders noted the various policy document cycles do not align, consequently impacting on associated measures for flood risk management and land use planning. For example, there is no nationally consistent date for updates to LDPs in line with updates to PPW. Many LDP updates shall be completed prior to the implementation of the forthcoming TAN-15.

Two stakeholders also identified the absence of the consideration to surface water flooding within current planning policy and TAN-15 and queried the merits of the implementation of Schedule 3 of the FWMA 2010 in managing this risk outside of the planning process. It was commented that further alignment between the planning process and the requirements of Schedule 3 would be beneficial. It is noteworthy that Welsh Government have recently

issued a review into the implementation of Schedule 3 in Wales⁹, with a number of associated recommendations.

Adapting to the Risk of Climate Change

Almost all stakeholders were in favour of the potential for new development to assist others in adapting to the risk of climate change and flood risk. Stakeholders acknowledged the potential for development driving adaptation and innovation in managing flood risk across development sites and mitigating the risk to third parties. This might be by reducing the intensity or vulnerability of development in an area, or by using development to reduce flood risk elsewhere.

To promote approaches that reduce flood risk elsewhere requires the buy in from landowners and developers, acknowledging the associated costs and timeframes for developers to prepare, design, and construct flood mitigation measures. Developer concerns would include the land take for providing the measures, particularly following existing amendments to development and land use planning where additional land is given over to manage surface water drainage systems. Wider concerns were also voiced over the potential for ongoing costs and maintenance of these mitigation measures, if required, and who would ultimately be responsible for these assets.

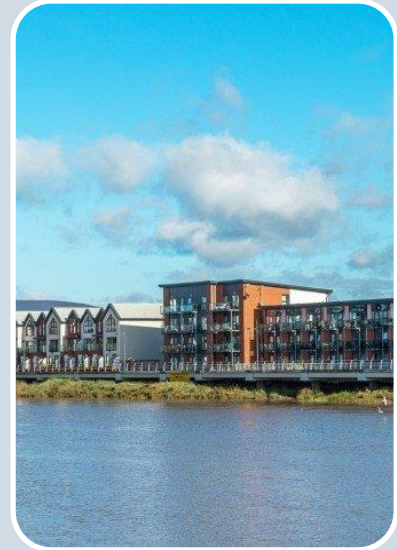
When considering the potential for the use of new developments to adapt to the risks of climate change, stakeholders advised of the need for strategic approaches, seeking further opportunities for joined up thinking to maximise the wider opportunities that better flood risk management measures can provide.

The case study presented below of City Vizion, Newport, utilises passive flood mitigation measures (ground raising) to mitigate against the risk of flooding to both the development site, and existing development behind, whilst also delivering significant placemaking benefits.

Stakeholders identified the benefits of early pre-application consultation on development sites within flood risk areas to identify opportunities for improving the resilience of others, and to incorporate the impacts of climate change into masterplanning at the earliest opportunities. However, the challenges associated with pre-application consultation with LPAs and wider consultees, including NRW, was evident amongst the stakeholders consulted.

⁹ <https://www.gov.wales/sites/default/files/publications/2023-07/sustainable-drainage-systems-suds-schedule-3-post-implementation-review.pdf>

Case Study 1: City Vizion, Newport



Growth and regeneration are key requirements to aid recovery from the challenging impacts of the economic downturn of the early 2000s across Newport. The LDP encourages economic growth and regeneration across a City which has a high risk of tidal flooding. The LDP highlights that sustainability is at the heart of land use planning, and it is crucial that the right development is sited in the right location.

The City Vizion project comprised a mixed-use development to include residential units, a riverside walk, flood mitigation measures, commercial development, and new public areas on the banks of the River Usk in the centre of Newport.

The development also included the provision of key active travel linkages to the River Usk footbridge, through to city centre amenities. Consequently, the developer-led proposals provided much needed regeneration and placemaking opportunities to improve a brownfield city centre strategic site.

To facilitate development, and in line with the requirements of planning policy, the project required ground raising to mitigate against the impact of flooding for the lifetime of development.

In raising ground levels along the banks for the River Usk, flood flows are predominantly retained in bank, resulting in increased resilience to flooding to the existing development behind the City Vizion site.

As passive mitigation measures (ground raising), long-term maintenance of the measures is limited and shall be structurally sound during flood events.

Note the cantilever walkway is not the flood defence, that is provided passively by the raised ground levels behind.

4.2.2 Public perception towards development in flood risk areas

Public opinion can be a powerful force shaping attitudes towards development in flood risk areas. Public perception can be influenced by a number of sources, highlighted in Figure 4-12:



Figure 4-12 Influences of Perception of Flood Risk

Direct Experience of Flooding and Climate Change

Discussions at stakeholder workshops suggested that previous experience of flood events can influence public perception in two ways:

- Resulting in an increase in community awareness, resilience and adaptation to their response to the risk of flooding,
- An increased reliance on engineered flood defences, resulting in lower personal preparedness.

Local communities and residents often feel the immediate consequences of development on their wellbeing, with known impacts on mental health well documented. Residents and communities will often look for reasons for flooding, particularly where flooding is perceived to be an unknown risk or becoming more frequent to areas with a known risk. Often, this results in concerns over new developments nearby which are considered to have either:

- Increased flood risk downstream by moving floodwaters towards existing properties as a result of the flood defences serving new development sites, or
- resulted in an increase of surface water runoff from new developments which arises from an increase in impermeable area.

With increasing awareness of climate change, and more people talking about, and organisations declaring, a climate emergency, the increased risks of flooding as a result of climate change are well known. Residents and the wider public can feel a lack of trust in political and institutional entities, creating a negative response towards development in areas of flood risk.

Communication of Flood Risk

In undertaking this study, it became evident that non-technical experts outside of the flood risk management and planning sectors have little to no understanding of the ways in which land use planning and flood risk is regulated across Wales. This raises questions as to the effectiveness of how flood risk management issues are currently communicated to the wider public.

Examples of questions raised by stakeholders during the study process have included:

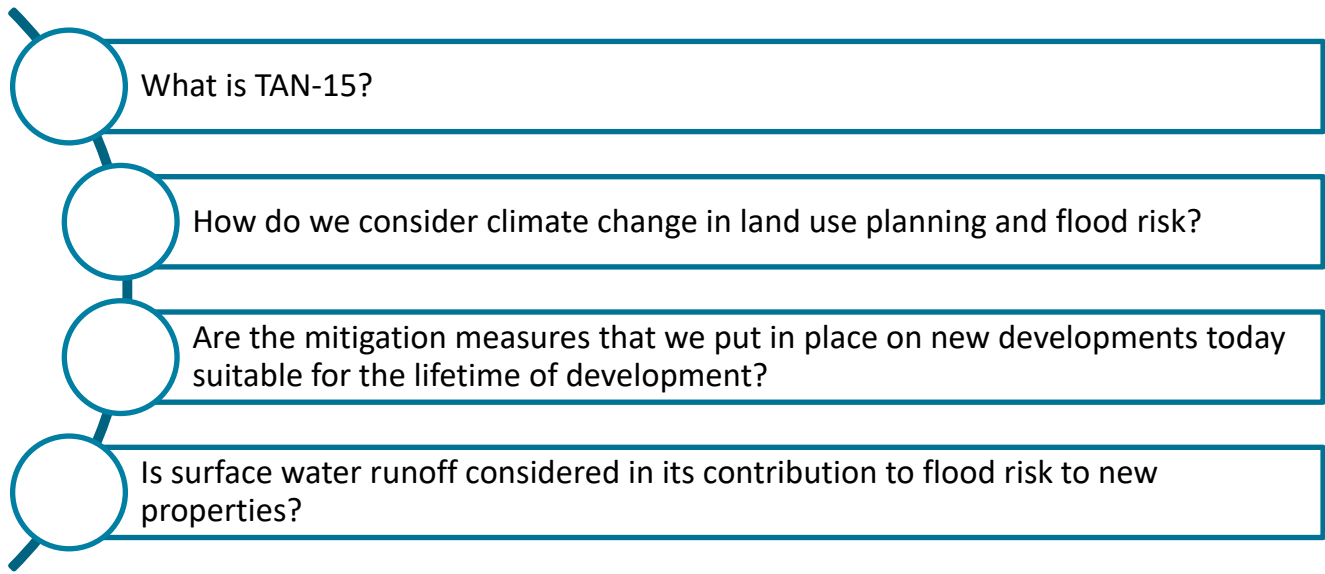


Figure 4-13 Questions around Land Use Planning and Flood Risk from Non-Technical Stakeholders

At present, it is unlikely that flood risk associated with a new development site is reliably communicated to future occupiers. Whilst TAN-15 acceptability criteria states that occupiers should be aware of the flood risk to a development site, it is unclear as to the extent to which this happens in practice. When engaging with stakeholders, it was suggested that house builders are unlikely to actively share information on flood risk, with the perception that if a development has moved through the planning process successfully, flood risk has been effectively managed and to raise the issue with prospective buyers may result in a downturn in sales. However, it was acknowledged that if parts of a new development site are given over to flooding, then this risk and function of areas of public open space should be explained to future occupiers, not least to prevent alarm should intended flooding occur.

This communication of flood risk across non-residential sites may be more extensive due to the end user of the site likely to be more actively engaged in the planning process and consequently more aware of the regulation of land use planning and flood risk.

The extent to which Acceptability Criteria is fully applied and enforced in perpetuity is therefore questioned, and the merits of this as a function within the planning process in terms of ensuring that flood risk is communicated is limited.

As raised elsewhere in this report, TAN-15 covers fluvial and tidal flood risk only. Management of surface water is regulated under Schedule 3 of the FWMA 2010, regulated by the SAB, at the Local Authority. Guidance and associated material for the Statutory Standards for SuDS in Wales clearly promotes the need to communicate the risks of surface water flooding and the function of SuDS assets across new developments. The application form for full SAB approval contains a table of standard detail to be submitted with full applications. An extract of Table A of the application form is contained in Figure 4-14 below.

<p>Information and communications plan (where appropriate) – (See also specific Ciria SuDS Manual C753 Chapter 34)</p> <p>REASON: To provide a structured approach to engagement with the local community and set out the engagement stages, how they are delivered, the resources available to deliver them, and the timescale within which an outcome needs to be delivered. The plan shall include:</p> <ul style="list-style-type: none"> • communication with and education of existing residents; • communication with and education of new residents; • site and SuDS component specific information boards; and • local community education and education strategies (eg through schools).
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Figure 4-14 Table A Requirements for Full SAB Applications

Generally, an Information and Communication Plan should be submitted with SAB applications which demonstrates how the local community is engaged in respect to SuDS. However, the extent to which these plans are received and enforced as part of the SAB process is unclear. In conversation with stakeholders it became evident that the requirement for these plans was not widely known, and it was therefore considered unlikely that many of the plans were in use or being prepared for new development sites across Wales. SAB applications are not in the public domain with no monitoring data available to inform this study. The Welsh Government SuDS Review, published in July 2023, made no mention of Information and Communication Plans. It is therefore considered that whilst there is a wish to promote engagement around surface water flood risk, the inclusion of Information and Communication Plans within the SAB process has not been widely adopted.

Perception of Resilience

Across the Flood Risk Management sector, it is generally accepted that the conversation needs to move from simply stopping flooding to building flood resilience and adapting to climate change. Throughout the National Strategy for Flood and Coastal Erosion Risk Management in Wales, resilience is referred to in the context of improving the resilience of people and communities, businesses and transport infrastructure. Within the Strategy, 'resilience' is also used in the context of providing education, resources and support for managing the impacts of flooding, to respond and recover from flooding effectively. This correlates with an industry shift towards the need to 'Live With Water', adapting to the effects of climate change, managing flood risk with nature based solutions to enhance the

environmental resilience of Wales, along with making difficult decisions on coastal adaptation in the face of climate change and flood risk.

However, public perceptions of resilience appear to lag behind, with this sentiment echoed through the stakeholder interviews conducted. It is thought that public perception of resilience is to 'shut the water out' by building walls, bunds, storage areas and ground raising. Consequently, this presents challenges for development where space is made for water and aspects of flood resilience, and not just resistance, are included in the development.

To give over areas of development sites, such as areas of public open space (POS), to flood during larger design events has the potential to raise alarm to occupiers of the site if the risks and function of flooded areas are not effectively communicated. Case Study 2 highlights how development has been planned to allow for adaptation to the risks of flooding, allowing for areas of POS to flood during high tide events. However, media headlines presented a very different and critical picture.

Case Study 2¹⁰: The Waterfront, Barry Docks - March 2023

High tide leaves huge Barry Docks development partly under water

Worrying pictures showed very high water levels at the sprawling estate on Saturday morning

NEWS By **Ryan O'Neill** Senior reporter
17:09, 25 MAR 2023 | UPDATED 14:50, 26 MAR 2023



Picture on Saturday at 9am showed part of the huge Barry waterfront housing development under water (Image: Beautiful Barry)

The headline and associated image suggest that the development site has flooded during construction.

The article reports that local residents are concerned about water levels across the docks, relating this directly to naturally high spring tides.

Engagement with stakeholders and research into the associated planning approval provided additional information to provide further context to this flood event.

It is thought that the dwellings across the site did not, in reality, flood as a result of the high tide. However, the perception and angle of the article photograph makes it appear as though flood water entered the properties.

The planning application for the site is accompanied by a Flood Consequences Assessment demonstrating that the site complies with the tests as set out in TAN-15.

The FCA was prepared in 2009, setting out the modelled design water levels across Barry Docks for the lifetime of the development (100 years of climate change).

Across the development proposed dwellings are predicted to be flood free in all design events, whilst areas of public open space are permitted to flood during high tide events.

In reality, the development reflects a design which addresses a need for housing and regeneration of a post-industrial area whilst incorporating the amenity value of waterside development, historic structures and future climatic conditions.

The development provides an opportunity for revitalising a historic location and brownfield site, contributing to housing needs in a sustainable way.

The media coverage of this event is likely to contribute to negative public perceptions of development in flood risk areas, as opposed to taking the opportunity for education and awareness raising.

10 (Wales Online: <https://www.walesonline.co.uk/news/wales-news/high-tide-leaves-huge-barry-26559737>)

Flood Risk in the Media

Public perception of land use planning and flood risk can also be influenced by the presentation of flood risk in the media. This may come from a number of sources, such as news articles, post-flood event news programmes, television portrayals of flood risk and others. This study has been undertaken across the winter of 2023/24, in which there have been 10 named storms across the UK by February 2024. Consequently, UK media coverage of flood risk has been extensive, and this has been used to support the study.

The media is very likely to provide a subjective coverage of news, and often has the ability to influence public perception. Figure 4-15 demonstrates how flood risk associated with new developments has been portrayed in news articles across the UK and Wales and is presented below.

In light of the 10 named storms across the UK so far across the 2023/24 winter, numerous national headlines have referenced flood risk and new developments, associated with soundbites from credible sources. Whilst specifically referencing English-based developments, these UK-wide news sources have impact on public perceptions across the UK. A January 2024 Sky News¹¹ headline, shown in Figure 4-15, specifically associates new housing developments without defences resulting in an increase in flood risk.

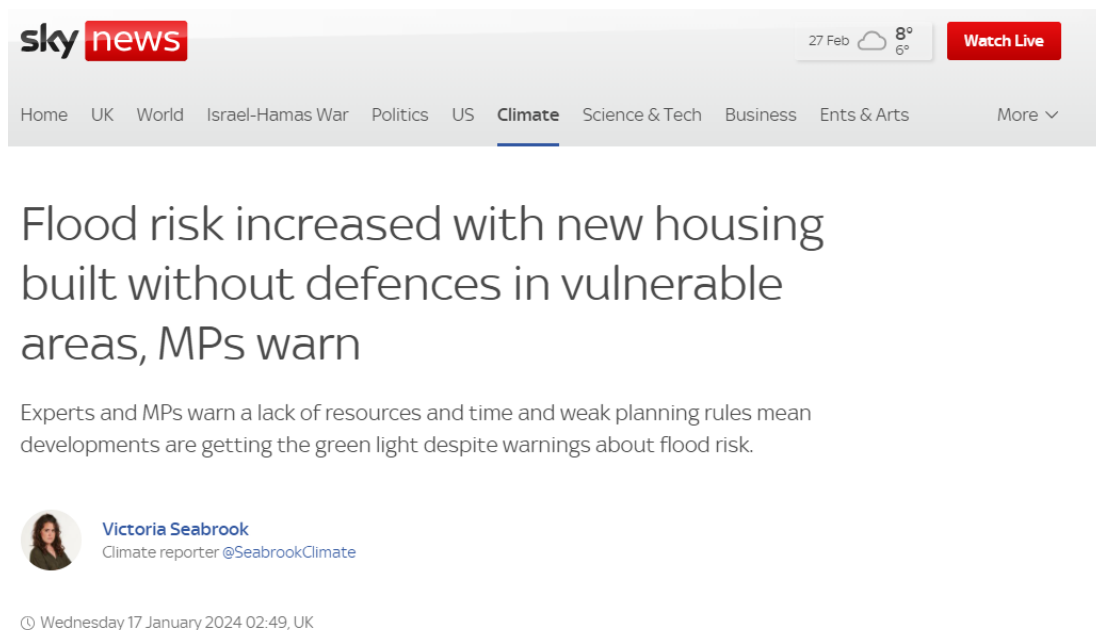


Figure 4-15 Sky News Headlines

The above article references quotes and statements from MPs:

"New homes are being built on flood plains in England without defences to protect them and in spite of warnings about the risk"

11 <https://news.sky.com/story/flood-risk-increased-with-new-housing-built-without-defences-in-vulnerable-areas-mps-warn-13049616>

However, the article combines these with references to the Public Accounts Committee (PAC) report on "flood-proofing England" which states an additional 203,000 properties are at risk of flooding due to existing flood defences not being maintained, and references to the number of properties flooded during Storm Henk, whilst not specifically providing data in relation to the number of properties on new development sites which have flooded, or are at an increased risk due to flood defence maintenance concerns. The article continues to state:

Over half of local planning authorities rarely or never check whether a new development complies with flood risk measures, according to a survey by the environment department (Defra).

And:

The Environment Agency (EA) had told the committee that "a number of... quite large" planning applications had been approved by the planning inspectorate, despite EA warnings "there was no robust plan to build the necessary flood defences".

Specific statements around the robustness of planning policy and its implementation can impact on public trust in the relevant processes being followed to manage risk and develop sustainably. Consequently, negative UK-wide coverage is likely to result in public perceptions of extensive development in flood risk areas, and a lack of support from the appropriate authorities in managing flood risk. Mainstream media articles, and quotes from 'trustworthy' sources such as Defra, the EA, MPs and 'industry experts' serve to provide trust in the accuracy of the article and aid in influencing public perception of land use planning and flood risk.

When engaging with stakeholders, the general consensus is that the media "*loves a bad news story*" and therefore will represent flood risk in as sensationalist a light as possible. Stakeholders suggested that media coverage also aims to "*put the blame on the housebuilder or the Local Authority*" for any perceived issues across new development sites, including flood risk. However, no engagement has been undertaken with journalists to determine their viewpoint on headlines and articles sourced. Those stakeholders engaged from the Flood Risk Management sector, suggested that as we move towards more resilient developments and adapting to the risks of flooding in light of climate change, opportunities could be taken to provide informative news stories which have the possibility to sway public perceptions, including those officials (eg councillors and AMs) outside of the flood risk sector, and educate on approaches to flood risk management.

With increasing awareness of climate change and as the risk of flooding becomes more prevalent across the UK, the media is taking the opportunity to utilise flooding as a backdrop of television dramas, such as 'After the Flood' (ITV, January 2024). Again, whilst not specifically based within a Welsh community, this UK-wide programme would impact and influence on public perceptions across Wales.

'After the Flood' is a Yorkshire based crime drama set in the context of the aftermath to a fluvial flood event in a flood-prone community. A key side story to the drama is the perceived impact of new, upstream development contributing increased surface water

runoff to the watercourse, resulting in increased flows in the watercourse and some of the worst flooding the town had experienced. Certain characters within the show explore how SuDS techniques can be used to manage surface water across new developments, not just to serve hydraulic purposes but also to provide amenity and water quality benefits.

Programmes such as 'After the Flood' provide examples of how UK-wide media can inform and educate the public to innovations in flood risk management. Whilst SuDS are no longer considered new within the industry, the barriers to their implementation across the UK are well known; subsequently awareness outside of the industry is low. Whilst 'After the Flood' did highlight the constraints associated with SuDS implementation in England, it also established the differences in English and Welsh policies, and the mandatory requirement for SuDS to manage flood risk on new developments across Wales, painting Welsh developments in a positive light in the context of this programme. However, how well this portrayal of surface water management was picked up by the general public is unknown and difficult to measure in the context of this study.

4.3 Quantification of the Economic Impact of Flooding to New Developments

The Multi-Coloured Manual (MCM) details the type of costs to the public purse in emergency situations and how to evaluate them. Costs to the public purse in relation to flood response are defined as follows:

- Costs arising in Local Authorities to repair infrastructure such as roads and bridges,
- Costs arising in Local Authorities to safeguard life and property,
- Costs arising from Risk Management Authorities (e.g. NRW) in emergency response and repair actions; and
- Costs arising from Risk Management Authorities to undertake post-storm reviews (e.g. asset condition surveys, flood response reports)

Chapter 6 of the Multi-Coloured Manual (MCM) recommends that emergency response costs are estimated as a percentage of the capped Annual Average Damages (AAD). The recommended percentage is between 5.6% and 10.7%, which is based on the percentage of total economic property losses during the Summer 2007 floods and the Autumn 2000 floods respectively. The sources of these uplifts have been further investigated in the sections below.

It is noted that the methodology outlined within the MCM is predominantly based on historic flood events across England and Wales and covers the whole flood event. Consequently, a Wales specific approach, or an assessment of costs to the public purse specifically to flooding on new development sites is not available to inform the study.

4.3.1 Autumn 2000 Floods

The autumn of 2000 was the wettest on record across England and Wales for over 270 years. The recurrent heavy rainfall caused prolonged, extensive, and in places repeated

flooding. Flooding was reported to over 10,000 properties in over 700 locations¹². This event has been reviewed extensively by a number of organisations to provide ‘lessons learnt’ and understand the economic impacts of the flooding which has been broken down into several factors within the MCM.

The Bellwin Scheme

The Bellwin Scheme is a scheme incorporated in the Local Government and Housing Act (1989) which aims to

‘reimburse Local Authorities for costs incurred on, or in connection with, the taking of immediate action to safeguard life or property, or to prevent suffering or severe inconvenience, in their area or among its inhabitants.’¹³

The scheme aim is to cover the emergency response phase of an event, and not costs accrued during the recovery phase.

To cover the Autumn 2000 flood response phase, Local Authorities in England claimed for £28.8 million under the Bellwin Scheme. Meanwhile, in Wales, a total of £7.6 million was claimed under the Emergency Financial Assistance Scheme (EFAS), the Welsh Government equivalent of the Bellwin Scheme.

Thirty-one authorities were unable to claim under the Bellwin Scheme as their claims were below the claim threshold of £200,000. Assuming the average emergency cost for each council of half the threshold, emergency costs for these councils may have amounted to an additional £3.1 million.

The claims submitted covered a range of costs for Local Authorities. In order to determine the percentage costs of these claims on emergency response, the North Yorkshire County Council claim was examined in more detail by Penning-Roswell et al (2002)¹⁴ to inform the MCM. The authority area experienced a number of simultaneous large scale events which were all incorporated into the Bellwin scheme claim, including the 1999 Malton/ Norton flood event, the Foot and Mouth epidemic, a fuel delivery crisis, and the Great Heck train disaster. A breakdown of the claim costs to examine the flood event in isolation, along with costs associated with emergency response to the flood event only, concluded that 42.5% of the Bellwin Scheme costs were allowed to be attributed to emergency response. As such, the methodology in the MCM applies a 42% scaling factor to the reported Bellwin Scheme costs for the Autumn 2000 flood event.

¹² Environment Agency (2001) Lessons learned: Autumn 2000 floods.

<https://assets.publishing.service.gov.uk/media/5a7cb5d8ed915d63cc65c61a/geho0301bm-xo-e-e.pdf>

¹³ Department for Levelling Up, Housing & Communities (2023) Bellwin scheme of emergency financial assistance to local authorities: guidance notes for claims. <https://www.gov.uk/government/publications/bellwin-scheme-guidance-notes-for-claims/bellwin-scheme-of-emergency-financial-assistance-to-local-authorities-guidance-notes-for-claims>

¹⁴ Penning-Roswell, E.C., Chatterton, J., Wilson, T. and Potter, E. (2002) Autumn 2000 Floods in England and Wales: Assessment of National Economic and Financial Losses, Flood Hazard Research Centre, Middlesex University, London.

Severe Weather Payments

Despite the Bellwin scheme, a shortfall in funding was noted across the UK. As such, a number of severe weather payments were made to Highways Authorities for flood damage caused to roads and bridges. This totalled £41.9 million in England and £17 million in Wales.

However, these costs will include some extent of betterment to existing road infrastructure rather than just emergency works. Consequently, the MCM applies a 50% scaling factor of the severe weather payments to represent the emergency works only.

Environment Agency Costs

In addition to the above, additional emergency response costs were reported by the Environment Agency (which includes Wales at the time of the flood event) to cover actions in the immediate aftermath of the Autumn 2000 flood event. Costs reported by the Environment Agency included:

- £10.292 million in emergency repairs for England,
- £8.442 million in emergency response for England,
- £2.368 million additional expenditure for post storm reviews such as LiDAR, condition surveys, and flood report lessons learned,
- £0.78 million in combined emergency repairs and response for Wales.

As with the Severe Weather Payments, the MCM deemed that costs encountered by the Environment Agency were likely to include some level of betterment. Consequently, the MCM applies a 50% scaling factor to represent the emergency works only.

Cost to the Public Purse

The MCM expresses the total emergency costs to the public purse as a percentage of the total economic property losses, resulting in **10.7%**, as shown in Table 4-1

Table 4-1 Emergency costs applicable to project appraisals as a result of Autumn 2000 floods (Table 6.33 of the MCM)

Cost	Amount (£ mil)	Allowed amount (%)	Allowed amount (£ mil)
Total Bellwin			
England	28.3	42.5	12
Wales	7.6	42.5	3.2
Costs below thresholds	3.1	42.5	1.3
Severe weather payments			
England	41.9	50	21.0
Wales	17.1	50	8.6
Environment Agency costs*			

Emergency repairs	11.1	50	5.5
Emergency response	9.2	100	9.2
Total	118.3		60.8
As % of economic property losses of £570 million			10.7%

4.3.2 Summer 2007 Floods

Following a dry early spring in 2007, three major storms in June and July resulted in soils across England and Wales being at their wettest for the time of year for at least 50 years¹⁵. Over 55,000 homes and 6,000 businesses were flooded and related insurance claims approached £3 billion by the end of 2007. As such, the economic costs associated with the Summer 2007 floods were investigated by a number of organisations in greater detail.

A similar process to the Autumn 2000 floods was conducted by the UK Hazard Research Centre to inform the MCM for the Summer 2007 floods, focusing on local government infrastructure and non-emergency services, expenditure by emergency services, and expenditure by the Environment Agency (which covered Wales at the time of the flood event). The total emergency costs were noted to be £223 million. This included £85 million to road repairs; as with the Autumn 2000 floods, a 50% allowable amount was applied to this value to account for the betterment to the roads.

The Bellwin Scheme

Overall, 82 Local Authorities registered for the Bellwin scheme, of which, 42 received funds totalling £19 million. As per the Autumn 2000 floods, a scaling factor of 42.5% was applied to the Bellwin Scheme costs to account for emergency response.

EU Restoration Fund

Alongside the Bellwin scheme, a number of Local Authorities claimed under the EU Restoration Fund (EURF), which provides financial assistance to recover from a range of disasters¹⁶, totalling £30.6 million. The breakdown of these grants is shown in Table 4-2 below.

¹⁵ Marsh, T.J. and Hannaford, J. (2007) The summer 2007 floods in England and Wales- a hydrological appraisal. Centre for Ecology & Hydrology. https://www.ceh.ac.uk/sites/default/files/ceh_floodingappraisal.pdf

¹⁶ United Nations Office for the Coordination of Humanitarian Affairs (OCHA) EU Solidarity Fund: Commission proposes aid worth EUR 162 million for UK region struck by floods. <https://reliefweb.int/report/united-kingdom-great-britain-and-northern-ireland/eu-solidarity-fund-commission-proposes-aid>

Table 4-2 Grants and support provided to English Local Authorities (Table 6.32 of the MCM)

	EURF (£ million)	Payments under Bellwin (£ million)
Local authorities	30.2	17
Police	0.3	1
Fire and Rescue	0.1	0.8
Total	30.6	18.8

Environment Agency Costs

Several emergency costs were reported by the Environment Agency, including:

- £4.43 million in emergency response,
- £15 million in emergency and urgent repairs to damaged flood risk infrastructure.

As with the Autumn 2000 floods, a scaling factor of 50% was applied to emergency repair costs only to allow for betterment of infrastructure.

Costs to the Public Purse

The MCM expresses the total emergency costs to the public purse as a percentage of the total economic property losses, resulting in **5.57%**, as shown in Table 4-3.

Table 4-3 Emergency costs applicable to project appraisals as a result of summer 2007 floods (Table 6.34 of the MCM)

Cost	Amount (£ mil)	Allowed amount (%)	Allowed amount (£ mil)
Total Bellwin			
Bellwin	30.2	42.5	12.84
Roads	175.0	50	87.5
Environment Agency			
Emergency repairs	14.8	50	7.4
Emergency response	2.2	100	2.2
Total	222.2		109.94
As % of economic property losses of £1,942 million			5.57

4.3.3 Storms Dennis and Ciara 2020

To apply the methodology to a more recent storm event specific to Wales, costs of Storms Ciara and Dennis have been reviewed. Storm Ciara impacted catchments in North Wales

most severely with intense rainfall and strong winds on the 7th February 2020. The following weekend (15-16 February 2020), Storm Dennis resulted in intense rainfall across South Wales, with significant impacts on river flows and levels and flooding to a total of 2,765 properties¹⁷. Some reports estimate that over £9.3million was spent by Risk Management Authority in response activities.

In order to estimate approximate costs to the public purse during Storms Dennis and Ciara, a review of Rhondda Cynon Taf Borough Council, Merthyr Tydfil County Borough Council and NRW expenditure has been undertaken from various published flood response reports from the respective authorities. As per Section 3.4 of this report, LRFs across Wales were contacted to contribute to this case study, however there was no response at the time of publication.

Rhondda Cynon Taf

Rhondda Cynon Taf Borough Council (RCTBC) published a review of the authority's response to Storm Dennis¹⁸. This review established an estimated Local Authority spend of:

- An estimated £91 million spent on repairing and replacing damaged infrastructure (including the former tip in Tylorstown)
- £550, 000 of works to the Councils rural highway network, with over 5 miles of highway repairs (e.g. carriageway replacement and drainage works)

Due to the significant financial implications to the authority, the council triggered an application to Welsh Government's Emergency Financial Assistance Scheme (EFAS). The EFAS in Wales acts similarly to the Bellwin scheme in England as described for the 2000 and 2007 floods. The total cost applied for was £3.762 million of which the EFAS repaid £1.697 million.

The overall economic damage of Storm Dennis was noted to be difficult to calculate given the scale of the flood impact on properties and infrastructure. However, the Association of British Insurers estimated that the average household flood claim was £32,000. Therefore, given an estimated 1,070 households were flooded in Rhondda Cynon Taf during Storm Dennis, the flood damage to household property alone was estimated to be in excess of £34 million.

To support impacted residents and business, the council established a Community Flood Recovery Grant Hardship Payment, which made £500 available to each home and £1,000 to small and medium sized enterprises affected to help deal with the initial impact of internal flooding. This, along with other grant funding resulted in the following associated costs to the authority:

- £401,500 to support the 803 residential households receiving the Community Flood Recovery Grant Hardship Payment

¹⁷ Natural Resources Wales (2020) February 2020 Floods in Wales: Flood Event Data Summary.

<https://cdn.cyfoethnaturiol.cymru/media/692376/february-2020-floods-in-wales-flood-event-data-summary-high-resolution-eng.pdf>

¹⁸ Rhondda Cynon Taf County Borough Council (2020) Review of the council's response to Storm Dennis.

<https://rctcbc.moderngov.co.uk/documents/s23954/Report.pdf?LLL=0>

- £326,000 to support 326 uniform grants
- £565,000 to support administration and payment of the Flood Hardship Grant to affected residents, on behalf of Welsh Government
- £226,000 to support business relief support payments to 226 businesses

Merthyr Tydfil

Merthyr Tydfil County Borough Council (MTCBC) also published a review of the authority's response to Storm Dennis¹⁹. The review established a Local Authority spend of:

- £8.6million on flood repair schemes to damaged infrastructure
- £0.25million in flood recovery activities²⁰

MTCBC established a similar grant to that across RCTBC, resulting in expenditure of:

- £100,000 to support 200 residential households receiving the hardship grant.

NRW

NRW published their report on the recovery response to Storms Ciara and Dennis in October 2020²¹. Overall, NRW emergency repairs totalled £2.7 million, with estimated expenditure as follows:

- £1.9 million in outstanding repair work to over 100 flood defences and structures, consisting of:
 - £1.5 million in capital spend on 19 projects
 - £0.4 million of revenue work on 75 projects
 - Unidentified costs on 11 projects that had not been scoped and costed at the time of the report (likely to be revenue funded)
- £7,000 in asset inspection, followed by £0.8million in repair and replacement activities

Costs to the Public Purse

From the above literature review of Storm Dennis and Ciara, a similar methodology could be applied as with the Autumn 2000 and Summer 2007 floods to provide a more recent assessment of associated costs, in a Wales setting.

The 2000 and 2007 methodology develops a percentage multiplier of total damages to attribute costs to the emergency response, comprised largely of the following parameters:

- NRW emergency response,
- NRW/ EA emergency repairs,
- Local Authority emergency repairs/ EFAS,

19 Merthyr Tydfil County Borough Council (2020) Storm Dennis Recovery. <https://www.merthyr.gov.uk/resident/crime-safety-and-emergencies/emergency-planning/stormrecovery/storm-dennis-recovery-information/>

20 Audit Wales (2020) Merthyr Tydfil County Borough Council. <https://www.audit.wales/infographics/local-council/merthyr-tydfil-county-borough-council>

21 Natural Resources Wales (2020) February 2020 Floods in Wales: Recovery report to end of June 2020.

<https://naturalresourceswales.gov.uk/media/692382/february-2020-floods-in-wales-recovery-report-to-end-of-june-2020-eng.pdf>

- Roads
- Additional grants.

Whilst the literature and case studies utilised provide figures in relation to grant scheme funding, Local Authority emergency infrastructure repairs, and NRW infrastructure response, no publicly available information has been found to provide indicative figures for the emergency response effort, and no feedback has been received on the engagement attempts to source this information from those known to have been affected by Storms Dennis and Ciara.

Furthermore, as with the 2000 and 2007 floods, the costs within public reports are generalised to cover a range of emergency response efforts. It is therefore uncertain as to what is included within the emergency costs to public purse.

As such, no recommendations of updated percentage multipliers can be made from the data informing this report.

4.3.4 Uncertainties Associated with Defining Costs to the Public Purse

The methodology and report²² underpinning the percentage uplifts for economic property losses notes a number of uncertainties in relation to how costs to the public purse are applied:

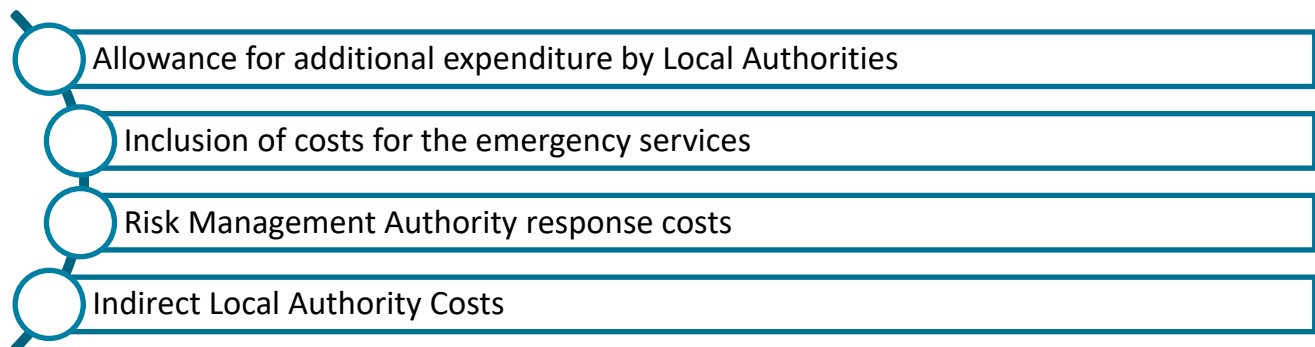


Figure 4-16 Uncertainties associated with how costs to the public purse are applied

Additional Expenditure by Local Authorities

As part of the review into the costs associated with the Summer 2007 floods, research was undertaken to determine the additional expenditure by the 16 Local Authorities with the highest costs for responding to the event, as outlined in Table 4-4 below. Costs were categorised as follows:

- Damage to roads and highways, in particular rural roads which were more exposed to flooding and less maintained than the major highways.
- General Expenditure, including damage to sports and leisure facilities, reduced revenue from council tax, car parks and sports facilities.

²² Environment Agency (2010) The costs of the summer 2007 floods in England.

https://assets.publishing.service.gov.uk/media/602e9870e90e07660dec0b0a/The_Costs_of_the_Summer_2007_Floods_in_England_technical_report.pdf

- Schools which covered the buildings themselves as well as temporary classroom accommodation.
- Social services.
- Housing, in particular repairs to council houses and temporary accommodation for displaced council tenants.
- Waste.

Table 4-4 Additional expenditure by 16 Local Authorities with the highest costs associated with the Summer 2007 floods.

	£ million	% of total
Highways	73.4	37
General Expenditure	41.8	22
Schools	37.6	19
Social Services	3.7	2
Housing	27	14
Waste	0.9	<1
Recovery	11.0	6

Whilst some of these additional costs were funded through the Bellwin Scheme and the EURF, the additional funds were generally met through:

- £9 million through Department for Schools and Families Grants for schools, and
- £40.9 million through the Department for Travel payments for roads.
- £123 million met out of financial reserves and borrowing.

Not all of these costs were included when deriving the percentage uplifts, raising questions as to the definition of emergency response costs to public purse and how these additional costs has been applied to the methodology outlined in the MCM.

Inclusion of Costs to the Emergency Services

The Summer 2007 floods were noted to place additional burden on emergency services for staff overtime, emergency supplies and provisions. In particular, Gloucestershire and South Yorkshire police noted a total audited extra spend of £2.57 million. Furthermore, nine Fire and Rescue Authorities reported above normal operating costs, totalling £1.17 million. Taken together, the additional costs for emergency services amounted to £3.74 million.

Alongside this, 1,000 personnel from the Royal Navy, Royal Marines, Army, and Royal Air Force were involved in assistance during the floods and immediate post-flood recovery, mostly in Gloucestershire. Although their costs could have been recharged under the Military Assistance to the Civil Community Scheme, no such costs were reported as the use of military resources were found to provide training opportunities and did not impact on either pre-deployment preparation or support to current operations.

This raises the uncertainty of the additionality of emergency response costs to the public purse from the flood event only, compared to regular operation of emergency services.

Environment Agency Costs

The Environment Agency costs for emergency response to the Summer 2007 floods were £4.43 million. This largely covered extra personnel including 1,200 flood risk management staff and 1,000 other EA staff to manage the event. Responsibilities included handling Floodline (flood warning and information service), media interviews and the National Customer Contact Centre.

There is uncertainty over the additionality of these costs and the extent that these should be covered in the determination of emergency response. Similarly to the Emergency Services, the responsibility of the EA remains despite a flood event. Furthermore, a certain proportion of costs will be covered under budgeted emergency response funds for the Risk Management Authority.

Indirect Local Authority Costs

The review into the Summer 2007 floods also notes the additional disruption to public services as a consequence of flooding.

One example is the considerable disruption to school services from flood events, with the report presenting the following figures in relation to education losses in Humberside and Yorkshire:

- 467 schools were affected across the region resulting in 170,000 pupils unable to attend school, the equivalent of 400,000 pupil days.
- The Hull Education Authority estimates an average expenditure per pupil day of £24.50.
- The loss in school pupil days is therefore estimated to have resulted in £9 million of lost expenditure.
- Closure of education settings also results in parents being absent from work for childcare purposes. Based on average wage rates, a cost of £2.4 million was estimate in Hull for lost working hours

The above costs were not included in the calculated costs percentages, therefore raising uncertainties in defining costs to the public purse in relation to emergency response and immediate impacts.

Opportunities for Improved Data Collection

As outlined above, there are a number of uncertainties associated with defining emergency costs to the public purse. In light of Storms Dennis and Ciara, a number of Risk Management Authorities published their responses to the event, including associated expenditure.

A key omission to the published emergency costs associated with Storms Dennis and Ciara were those in relation to emergency response. Emergency response is co-ordinated through the Wales Resilience Forum and Local Resilience Forums who work together to

strengthen preparedness, build collective capability and enhance resilience. Consequently, it is likely that these Resilience Forums would be best suited to provide a co-ordinated approach to estimate the costs associated with emergency response to flood events.

Under Section 19 of the Flood and Water Management Act 2010, the Lead Local Flood Authority has a statutory duty to investigate and publish reports on flood events that occur within its area to the extent it considered necessary or appropriate. Both RCTBC and MTCBC published Section 19 Reports following Storm Dennis in 2020. However, these reports were not supported by the cost evidence base they had previously published (referenced in Section 4.3.3).

This suggests that a further joined up approach to reporting on flood events may have the potential to provide a more robust dataset on the economic costs of responding to flood events. Whilst it is noted that the Flood and Coastal Erosion Committee is currently undertaking a review of the Section 19 process, the Section 19 Report function, as statutory requirement, may serve as a mechanism for data gathering and reporting.

4.3.5 Emergency Response on New Development in Flood Risk Areas

The above discussion focuses on the costs to the public purse for the whole flood event during the Autumn 2000 floods, Summer 2007 floods and Storms Dennis and Ciara. No information is available on the costs to the public purse specifically in relation to new development sites specifically.

It may however be assumed that if new development takes place in flood risk areas, in accordance with TAN-15, it should have been appropriately assessed and designed to minimise the flood risk such that flooding is very unlikely (requirements of TAN-15 A1.14). Furthermore, should flooding occur, it should be less extreme (requirements of TAN-15 A1.15).

Consequently, it would not be anticipated that the public purse should accrue emergency response costs for new development sites during the smaller design event. For events of greater magnitudes, some costs may be accrued given the associated permissible flood depths in these events. However, the acceptability criteria of TAN-15 states that all new development must be built considering:

- *'Effective flood warnings are provided at the site,*
- *Escape/ evacuation routes are shown by the developer to be operational under all conditions,*
- *Flood emergency plans and procedures produced by the developer must be in place.'*

Considering these elements, emergency response actions such as deployment of temporary flood defences and assisting in evacuation of flooded property should not be required. As such the portion of the cost attributed to fire and rescue services, will be lower for new developments.

The highest portion of costs in the 2000, 2007, and 2020 events were for repairs to flood defences, both from LA's and the EA/ NRW.

The acceptability criteria of TAN15 states that:

- *'Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a probability of occurrence of 0.1%).'*
- *The cost of future maintenance for all new/ approved flood mitigation measures, including defences must be accepted by the developer and agreed with the Environment Agency.'*

In practice, it is our experience in Wales, that new development very rarely relies on the implementation of new formal flood defences, as the practicalities of the regulatory approach, ownership, adoption, costs of construction and long term maintenance pose understandable and significant challenges. Where flood mitigation measures are implemented these tend to be passive in nature, such as raising site levels and the floor levels of new buildings. Consequently, there may not be a direct relationship between damage to flood defences (a cost on the public purse) and new development. Where new development relies on existing flood defences it can be assumed that there would generally be no additional cost on the public purse for managing and maintaining the defences, although the imperative to do so might increase.

5 Conclusions and Recommendations

The following sections draw out the conclusions to the study findings and provides a series of recommendations in relation to the aims of the study. The aims of the study are as follows:

- Establish how much development has been consented in Flood Risk Areas in Wales over the last 10 years, establishing the type of development and category of flood zone.
- Establish the availability, use and barriers to collection of data to monitor the quantity of development in flood risk areas.
- Determine the attitude towards permitting new development in flood risk areas with stakeholders on a national and local scale.
- Estimate the cost to the public purse for agencies to respond to flood emergency situations within new development, considering a range of scenarios and scales of development.

5.1 Monitoring of Planning Consents to Quantify the Extent of Development in Flood Risk Areas

5.1.1 Planning Consents for New Development

The study found that **there exists no reliable nationally consistent monitoring data** for developments consents in the flood risk areas.

Monitoring has previously been undertaken by Welsh Government via Sustainable Development Indicator 4: Flood Risk and Climate Change. However, the associated uncertainties with data collection and verification are extensive, resulting in no nationally robust quantification of development in flood risk areas.

Additionally, Local Planning Authorities (LPAs) collate planning monitoring metrics on an annual basis in line with their requirements under Section 76 of the Planning and Compulsory Purchase Act 2004. However, a range of inconsistencies arise across the Annual Monitoring Reports from LPAs which result from misalignment of policy cycles on a national and local level. This renders LPA to LPA comparisons difficult and contribute to the associated uncertainties with the subsequent data.

Consequently, **it is recommended that a new nationally consistent monitoring framework for planning performance should be established and utilised by all LPAs on an annual basis**. This monitoring framework should build on the mandatory requirements on LPAs to meet their duties under Section 76 of the Planning and Compulsory Purchase Act 2004 (including any forthcoming updates), ensuring that no additional burden be placed on the already limited resources across LPAs. Stakeholders consulted on this were generally of the view that Welsh Government should co-ordinate the approach to monitoring, so that local figures can be appropriately rolled up to generate a national picture and inform national reporting requirements. Monitoring should be

undertaken of development in flood risk areas from all sources of flood risk. **The aim of the monitoring framework should be to provide a robust national picture that enables evidence led policy and decision making on development and flood risk.**

The study found that across most LPAs the data held was only as good as the data obtained from the planning application form, allowing for variations in wording of development proposals, development type, and application type. In addition, different software systems for managing planning processes across the LPAs added to the variation in quality seen across the data received.

To ease data collection, **it is recommended that planning applications forms are revised to assist in obtaining the relevant information for data analysis.** Revisions to application forms should be considered on a data-led basis, determining the attributes requested based on the analysis and monitoring required of the planning system. Application forms should be more prescriptive, setting pre-determined options for selection to minimise the variations that can arise in submissions, and subsequently, the variation in datasets between LPAs.

With current uncertainties around the monitoring metrics available, it has not been possible to quantify the extent of new development in flood risk areas within the scope and timeframe of this study.

5.1.2 Development in Flood Risk Areas

An alternative to quantifying planning consents (as per the workstream aim), would be to quantify the new development that takes place in flood risk areas. What actually gets built, as opposed to what gets permission to be built. Such an approach potentially addresses many of the shortcomings of counting planning approvals, such as multiple approvals for the same site, spatial distribution of development and flood risk within a site boundary and consistent data on number of dwellings or building area.

We therefore recommend an alternative approach to assessing development in the flood risk areas based on analysis of existing data products. This approach would use OS AddressBase products to identify the date of construction, National Receptor Database (NRD) to classify the type and building area of development, and flood maps to assess the level of flood risk to each individual property.

As all these products are regularly updated, (OS AddressBase every six weeks, flood maps every six months), the analysis could routinely and consistently be repeated without the need for specific additional data collection.

On first being performed, this approach to assessing development in areas of flood risk could be charted back to implementation of TAN-15 in 2004 and also performed against a range of flood maps (Flood Map for Planning, Development Advice Map, and Flood Risk Assessment Wales). This one-time exercise would deliver considerable insight into development and flood risk in Wales, as eagerly asked for by many consultees.

The general viability of the proposed methodology has been confirmed by GeoPlace who are responsible for collating, managing and maintaining the primary UK authoritative

geospatial address and street data. Furthermore, a similar approach already underpins National Wellbeing Indicator 32, a metric supporting performance against the wellbeing goals defined within the Wellbeing for Future Generations (Wales) Act.

To support Wellbeing of Wales: National Indicator 32, NRW determine the extent of existing development within the Flood Zones. Amendments to this methodology would enable annual updates to the number of properties at flood risk in Wales based on best available data, together with the quantification of new development built in flood risk areas. This will provide for greater consistency in flood statistics, creating the evidence and confidence to support better decision making. For this reason, **NRW may be best placed to undertake such data analysis work.**

Currently National Indicator 32 is defined against the Flood Risk Assessment Wales (FRAW) flood maps only. These do not include consideration for climate change and are therefore inconsistent with the aims of considering future wellbeing in Wales. This metric also does not cover areas at risk from surface water and small watercourse flooding. It is therefore recommended that the methodology behind National Indicator 32 is updated to utilise **both** FRAW and the Flood Map for Planning to provide additional insight into development and climate change impacts, and expanded to cover surface water flood risk.

In summary, we make the following key recommendations for improving the monitoring of development and flood risk in Wales:

R1: The current approaches to collecting planning performance statistics for flood risk is inconsistent and often lacks verification. The implementation of the new TAN-15 provides the ideal opportunity to establish a new nationally consistent planning performance flood metric which considers all sources of flooding. Alongside this, it may be beneficial to introduce changes to the planning application forms to simplify and provide consistency in data capture.

R2: To simplify the process and improve data quality and consistency, utilise existing OS AddressBase products to quantify new development within the flood risk areas.

R3: Align work to quantify new development in flood risk areas (R2) with similar work currently undertaken for National Wellbeing Indicator 32, and other climate change indicators, to provide greater consistency and efficiency in flood risk metrics.

5.2 Determine the Attitudes Towards Development in Flood Risk Areas

In determining the attitudes towards new development in flood risk areas, **stakeholders have a general perception that there is too much new development consented in flood risk areas.** However, many also acknowledged that there are limited places across Wales on which to build, and current strategic planning policies direct development towards existing growth areas, most of which are located in areas at flood risk. **Many stakeholders also made key distinctions between new and redevelopment opportunities.**

Justification for development is found to arise from:

- A robust evident base supporting decision making through detailed modelling, flood mitigation and consideration of the impact of climate change and potential to increase flooding elsewhere,
- Opportunities for regeneration and an increase in wider resilience through redevelopment, and
- Where sustainable to do so, new- and re-development opportunities within flood risk areas can help to adapt to the risks associated with climate change and flood risk.

Where developments in flood risk areas have been considered sustainable and permissible, **stakeholders identified opportunities for more robustly ensuring suitable access, egress and flood preparedness** through the planning process.

Where development results in opportunities to increase resilience to existing development, stakeholders provided the view that mitigation measures should be:

- developer-led with clear direction for on-going management.
- where possible, be passive, reducing or elimination requirements for ongoing maintenance for the lifetime of the development.
- maximise the opportunities for regeneration and placemaking, adopting a holistic approach to development planning.

The study found **many stakeholders were frustrated by the current uncertainties and delays in revising planning policy for development and flood risk** (TAN15). All stakeholders desired clear guidance and direction in relation to developments in flood risk areas.

Public opinion can be a powerful force shaping attitudes towards development in flood risk areas. However, this study found generally negative and poorly informed perceptions towards land use planning and flood risk. This was often influenced by headlines and portrayals within the media.

Improved public understanding of resilience in relation to flood risk can increase community engagement, preparedness and responsibility taking in the management of flood risk. **A shift in the public perception to resilience would assist in easing the transition towards learning to live with water.**

Consequently, **it is recommended that Risk Management Authorities work to increase the awareness and understanding of flood risk resilience within the public domain and positively influence the media story.** Opportunities could be sought through:

- improving trust and communication on flood risk management to the public;
- clearly defining resilience and the need to adapt, recover and respond to flooding in a sustainable manner, and
- using media to positively shape public opinion through informing and educating on the risks associated with flood risk and climate change.

The National Strategy for Flood Risk in Wales defines NRW as having an oversight role in the general supervision and communication of flood risk management in Wales. It is therefore suggested that awareness raising, and engagement activities are led by NRW in their role, with support from a range of stakeholders, including other RMAs, Welsh Government, and non-technical stakeholders including (but not limited to) political members, media and recognised industry leads. Welsh Government have the overarching role to set direction and objectives and prioritise funding.

In summary, we make the following key recommendation in light of the determined attitudes towards permitting new development in areas of flood risk:

R4: Opportunities should be sought for collaborative working, led by NRW in their strategic oversight role, to raise awareness and understanding of flood risk and resilience; with the aim of positively reshaping public perceptions and encouraging engagement with flood risk activities.

5.3 Estimation of Costs to the Public Purse from Responding to Flood Events on New Developments

To quantify the cost to the public purse of responding to flood events on new developments, the study initially reviewed the methodology behind the Multi-Coloured Manual (MCM), and Multi-Coloured Handbook (MCH). The MCM and MCH provides methods and data which can be used to assess the economic costs of flood and erosion events, and the benefits of subsequent FCERM schemes. Chapter 6 of the MCM details the type of costs to the public purse in emergency situations and how to evaluate them. This methodology therefore applies to whole event response, rather than specifically to new developments.

Current methods for evaluating the costs of responding to flooding to the public purse suggest a percentage uplift to the capped Annual Average Damages (AAD) to both residential and non-residential property. Annual Average Damages are defined as the theoretical average economic damages caused by flooding when considered over a long period of time.

The methodology within the MCM is based on significant flood events from Autumn 2000 and Summer 2007 across England and Wales. The suggested uplift percentage is proposed to be between 10.7 % and 5.6%, with differences in percentage multipliers arising to densely and sparsely populated areas, respectively.

A number of uncertainties arise in determining the costs to the public purse for emergency response:

- the apportionment of spent fees to flood response in relation to betterment of existing infrastructure,
- contribution 'additional' costs associated with emergency and military services in responding the flood events,
- additional costs associated with Risk Management Authorities supporting and responding to flood events,

- general expenditure from Local Authorities to assets such as car parks, schools, leisure centres, libraries etc,
- attributing costs to the response from Local Authority social services and housing teams to manage the indirect impacts of flooding to Local Authority residents, and
- lost work and school hours to the wider community where premises are damaged as a result of flooding.

The study has identified opportunities to determine an All-Wales cost for quantifying the cost to the economic purse following the events of Storms Dennis and Ciara in 2020. Costs have been obtained from various published flood response reports from Rhondda Cynon Taf Borough Council, Merthyr Tydfil County Borough Council and NRW. Whilst the literature and case studies utilised provide figures in relation to grant scheme funding, Local Authority emergency infrastructure repairs, and NRW infrastructure response, no publicly available information has been found to provide indicative figures for the emergency response effort. As such, **no recommendations of updated percentage multipliers can be made from the data informing this report.** Further information of the provision of emergency response to large flood events such as Storms Dennis and Ciara, as outlined in this report, would be integral to forming an All-Wales figure for associated costs to respond to flood events.

To provide a more robust quantification of the cost to the public purse of responding to flood events, further work would need to be undertaken to address the omissions and uncertainties around the methodology presented within this study. Research within this study has identified Section 19 Reports, as statutory requirement to investigate significant flood events, may serve as a mechanism for data gathering and reporting across a range of stakeholders and Risk Management Authorities. Whilst Section 19 reports are not necessarily well setup to provide the direct costs associated with emergency response to flood events, they do provide a good opportunity for recording the manner of the response (ie. number/range of first responders, sandbags, pumps, waste skips etc.). Provision of a standardised methodology in which to record response efforts could in turn provide a robust evidence base on which others can quantify associated response costs, if required. We note that the function, process and technical content of S19 reports are currently under review by the WG Flood and Coastal Erosion Committee (FCEC)²³. **Opportunities may arise to align the S19 report process with improved standardisation in the collection of flood response data, which would enable emergency response costs to be calculated in the future.**

Evidence shows (ref. Figure 4-6) that most development in flood risk areas, particularly residential development, is in areas of existing flood defences; typically, within major towns and cities. **Where development does take place, whether in a defended area or not, development must be on previously developed land and comply with strict criteria for flood frequency and flood severity. Therefore, given existing development**

23 S19 review 2021: <https://www.gov.wales/sites/default/files/publications/2023-08/independent-review-of-flood-investigations-20-21.pdf>

controls, new development is unlikely to significantly contribute to costs to the public purse. It is also noted that development can contribute to national and local economic growth and sustainability objectives. This is however conditional on the robust application of planning controls and best available science to consenting new development.

In summary, we make the following key recommendation for quantifying the costs to the public purse for responding to flood events across Wales: .

R5: Welsh Government should consider the benefits and value of determining an All Wales cost to the public purse of responding to flood events. It is suggested that relevant data to inform the calculation of an All Wales cost could be sought through the Section 19 flood investigation obligations held by Lead Local Flood Authorities.

A Questionnaire on Emergency Response

EMERGENCY RESPONSE QUESTIONNAIRE

JBA Project Code 2023s1065
Contract Land Use Planning and Flood Risk
Client National Infrastructure Commission for Wales
Date January 2024
Subject Estimation of cost to public purse for agencies to respond to flood emergency situations

1.5 Equipment

7. What items of equipment were used by this organisation in connection with the flood emergency?

Items:

8. What additional equipment costs has this organisation incurred as a result of the flood emergency? i.e. over and above what your organisation would have bought had the flood event not occurred.

Costs:

1.6 Other costs and charges

9. Did your organisation incur any other costs not already identified as a result of the flood emergency?

Please specify:

10. Has your organisation made any charge on any other organisation as a result of the flood emergency?

Please specify:

11. Has your organisation been charged by any other organisation as a result of the flood emergency?

Please specify:

1.7 Additional supporting information

Please provide any further details which may aid our research:

End of questionnaire. Thank you very much for your response and participation.

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