

Carmarthenshire & Pembrokeshire Stage 1 Strategic Flood Consequence Assessment (SFCA)

Pembrokeshire County Council and Carmarthenshire County Council

September 2019



Notice

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This document has 25 pages including the cover.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Author-ised	Date
Rev P1.2	Internal draft for check	CWB	HR/ DMH			06-05-19
Rev P1.3	For Internal Review	CWB	HR/DMH	CN	DF	15-05-19
P1.0	Draft Issue to Client for review and comment	CWB	HR/DMH	CN	DF	20-05-19
P02	Final Report	NJ	DMH	CN	ARH	25-07-19
P03	Final Report – Issue 2	DMH	CWB	ARH	ARH	26-09-19

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Acronyms

- CCC**- Carmarthenshire County Council
- DAM** - Development Advice Map
- FCA** –Flood Consequence Assessment
- LDP** – Local Development Plan
- LPA** – Local Planning Authority
- LLFA** - Lead Local Flood Authority
- LPA** – Local Planning Authority
- NRW** – Natural Resources Wales
- PCC** – Pembrokeshire County Council
- PCNPA** - Pembrokeshire Coast National Park Authority
- PPW 10** – Planning Policy Wales (10th edition)
- SAB** – Sustainable Drainage Approval Body
- SFCA** – Strategic Flood Consequence Assessment
- SuDS** – Sustainable Drainage Systems
- TAN 15** – Technical Advice Note 15: Development and Flood Risk

Executive Summary

1. Atkins was commissioned by Carmarthenshire County Council and Pembrokeshire County Council to conduct a Stage 1 Strategic Flood Consequences Assessment (SFCA) for the proposed Candidate Sites being considered within the Replacement/ Revised Local Development Plans (LDP); due to be adopted in 2021. A Stage 1 SFCA is a high-level, scoping study that will provide the Local Planning Authority (LPA) with information about the level and nature of flood risk at the proposed Candidate Sites, along with existing LDP allocations as appropriate. This will aid the planning decision making process to ensure that plans are made in line with Planning Policy Wales 10 (PPW) and Technical Advice Note 15 (Development and Flood Risk (TAN 15) guidance).
2. A Stage 1 SFCA is a broad scale assessment on the nature of flood risk, assessing the available information in order to evaluate the cause and extent of potential flooding. The potential flooding for Candidate Sites and current LDP allocations across Carmarthenshire and Pembrokeshire were assessed against existing flood datasets, which were provided by Natural Resources Wales (NRW) and the LPAs. These datasets were:
 - NRW Flood Map Flood Zone 2 – 0.1% (1 in 1000) annual chance Fluvial and Tidal Flood Event.
 - NRW Flood Map Flood Zone 3 - 1% (1 in 100) annual chance Fluvial and 0.5% (1 in 200) Tidal Flood Events.
 - Surface Water Flood – Extent – 3.3% (1 in 30) annual chance Surface Water Flood Event.
 - Surface Water Flood – Extent – 1% (1 in 100) annual chance Surface Water Flood Event.
 - Surface Water Flood – Extent – 0.1% (1 in 1000) annual chance Surface Water Flood Event.
 - South of Wales Shoreline Management Plan (SMP2) 2 metre buffer – 0.1% (1 in 1000) annual chance tidal flood event with 2 metre Sea Level Rise.
3. Analysis of flood risk was conducted in a Geographical Information System (GIS) database, whereby the extents of the flood outlines from the layers listed above were assessed against the outline of the current LDP allocations and the Replacement/ Revised LDP Candidate Sites. The flood risk for each site was categorised as either Red (High Risk), Amber (Medium High Risk), Yellow (Medium Risk) or Green (Low Risk). This was based on the area of flooding at each site. The primary source of flooding at each site was also identified.
4. The potential impacts of climate change were assessed using broad scale assumptions. It was assumed that current day 0.1% (1 in 1000) annual chance events for fluvial and tidal flooding, are indicative of the 1% (fluvial) and 0.5% (tidal) annual chance events in the future. For Surface Water Flooding, it was similarly assumed that the 0.1% annual chance event would be indicative of a 1% chance event in the future.
5. For future extreme tidal flood risk (i.e. 0.1% annual chance event), the “SMP2 2m Buffer” dataset was also applied. This dataset consists of the 0.1% annual chance tidal flood level plus 2m sea level rise. Alternative assessments of the potential extent of future tidal risk were undertaken for areas not covered by the available SMP data, or where it was identified to underestimate flood extents.
6. The results are presented as a series of map outputs depicting the Candidate Sites and existing allocations and their risk category along with the flood datasets used to determine the level of risk. These maps were produced at 1:25,000 and 1:10,000 scales. The result of the analysis for each site is also given in accompanying tables (Appendix B), which record the percentage of each site covered, the risk rating, and the primary source of flooding. The risk rating is based on the percentage of each site which lies in a flood boundary, categorised as Red, Amber, Yellow, Green (RAYG).
7. Sites given a Green rating at Stage 1 of the SFCA are at low risk of flooding. A qualitative assessment of flood risk at the site is likely to be sufficient and water management at the site should be assessed in the planning application. The assessment of flood risk and water management at the site will be a matter for the site proposer.
8. Red, Amber or Yellow sites should be considered further, as the tests outlined in Sections 6 and 7 of TAN 15 will need to be applied. The percentage of the site affected gives an indication of the likely severity of the problem at each site and thus should not be interpreted as definitive. Sites

categorised at risk of flooding will need further work to understand the flood risk and justification will need to be provided for their further inclusion in the Replacement/ Revised LDP.

9. For these sites, additional assessment in the form of an intermediate “Stage 1b” SFCA would look in more detail for supporting information, such as existing site-specific FCAs . This exercise could provide sufficient detail to inform a revision of the RAYG risk rating resulting from the initial GIS screening.
10. If the intermediate “Stage 1b” assessment does not result in additional flood risk information being available for a site, then it is likely that a Stage 2 SFCA would be required. NRW provides guidance on the scope of further investigations that would comprise a Stage 2 SFCA.

1. Overview

Atkins have been commissioned to provide Carmarthenshire and Pembrokeshire County Councils with a Stage 1 Strategic Flood Consequence Assessment (SFCA). The SFCA will underpin the evidence base for their Replacement / Revised Local Development Plans (LDP), which are due for adoption in 2021. LDPs need to take flood risk into account in its strategies, policies and proposals to avoid putting developments and properties at risk, both now and in the future. Thus, the SFCA can be used to avoid placing developments in areas at risk of flooding. The SFCA will also supplement the evidence base of Pembrokeshire Coast National Park Authority (PCNPA).

This document will provide an overview to the different stages of an SFCA and outline what level of detail is required for a Stage 1 SFCA. Specifically, this document will outline

- the nature of the flood risk present in both Carmarthenshire and Pembrokeshire;
- the planning policies that developers must adhere to from a flood risk perspective;
- the datasets used to assess the flood risk;
- how climate change is considered;
- how flood risk was categorised for each Candidate Site and existing allocation.

These results will then be summarised, with a final section detailing the additional assessments that could be undertaken.

1.1. Background

The Planning and Compulsory Purchase Order Act (2004) requires planning authorities in Wales to produce a Local Development Plan (LDP). Strategic Flood Consequence Assessments (SFCAs) will inform the LDP process, allowing flood risk to be managed at an early stage. The SFCA will inform and provide a broad level overview of flood risk to potential developments in both Counties; providing clarity to the Councils and potential developers.

Planning Policy Wales (PPW), supported by Technical Advice Note 15 (TAN15), advises caution when considering new development in areas at high risk of flooding. A precautionary framework is set out in TAN15 to guide planning decisions.

The overarching aim of this precautionary framework is to direct new development away from those areas which are at high risk of flooding. In particular, vulnerable development must be directed away from flood risk areas. Definitions of vulnerable development and advice on permissible uses in relation to the location of development and the consequences of flooding are described in TAN15.

Where development has to be considered in high risk areas, only those developments which can be justified on the basis of tests described in TAN 15 are permissible.

Highly vulnerable developments, such as housing, schools and hospitals and other emergency services in flood risk areas will not be permitted unless they can be demonstrated to meet the justification criteria as set out in planning policy guidance (See Section 2 below).

Some less vulnerable development types might be appropriate in areas identified to be at risk of flooding. A precautionary approach will be taken in assessing the justification for any such development and the likelihood that the consequences can be managed in line with planning policy guidance (described in Section 2 below).

Avoiding development in areas that are susceptible to flood risk can contribute to sustainable development. Therefore, to promote sustainable development, flood risk must be considered within the LDP process.

With Carmarthenshire and Pembrokeshire's Replacement/ Revised LDPs due to be adopted in 2021, the SFCA can aid the selection of the most suitable areas for development; whereby the Councils are able to demonstrate that they are encouraging patterns of development that are economically, socially and environmentally sustainable.

1.2. Stages of SFCAs

The aim of an SFCA is to aid the Local Planning Authority (LPA) to make informed decisions when considering future development within their area. This promotes, wherever possible, that development would be directed towards areas at lower risk of flooding. To provide rigorous assessments of potential flood risk, SFCAs should

involve the collection, analysis and presentation of all the available information from all sources in the study area.

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

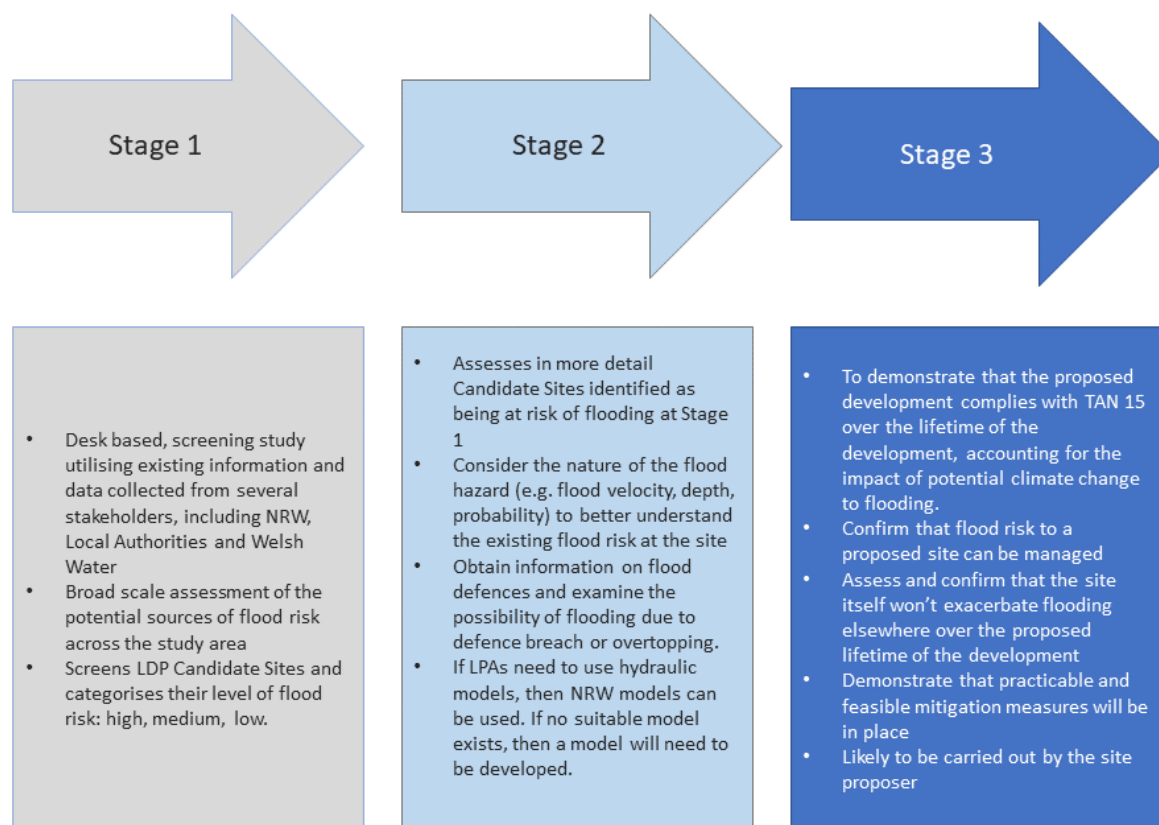


Figure 1-1 - An outline of the SFCa process.

1.3. The aim of the Stage 1 SFCa

The aim of this Stage 1 scoping study is to identify the principal flood risks affecting the proposed development sites in Carmarthenshire and Pembrokeshire. This desk-based study examines existing flood datasets to provide information on the potential level of flood risk for each Candidate Site and existing allocation. This allows the LPAs to make strategic, informed decisions on which of the Candidate Sites and existing LDP allocations are included within the Replacement/ Revised LDPs. This aims to encourage development towards the zones with the lowest flood risk, or failing that, to ensure that flood risk is appropriately managed. This study includes analysis on the allocation sites for the existing LDPs in Carmarthenshire (adopted in 2014) and Pembrokeshire (adopted in 2013), which are due to finish in 2021.

It is important to note that a Stage 1 SFCa is a broad level assessment of flood risk and thus some sites may still be subject to a more detailed assessment at a later stage, including site specific Flood Consequence Assessments (FCA). This document does not remove the need for site-specific FCAs to be undertaken by developers in the planning process.

1.4. Study area

The study covers the Counties of Carmarthenshire (2,395km²) and Pembrokeshire (1,590km²), totalling a study area of 3,985km². Both counties are predominantly rural. However, there are some more urban areas that have historically developed around the main rivers and the coast in order to use them for transportation and as a resource. This presents a problem in itself for managing existing development that has occurred on floodplains. A summary of the main towns and conurbations in both counties are given below:

- **Carmarthenshire:** Carmarthen, Llanelli, Ammanford, Cross Hands, Burry Port, Pembrey, Llangennech, Hendy, Llandeilo, Llandovery, Newcastle Emlyn, Whitland, Kidwelly & St. Clears.
- **Pembrokeshire:** Haverfordwest, Milford Haven, Fishguard, Pembroke Dock, Tenby, Narberth, Neyland, Goodwick & Pembroke.

There are also a number of settlements that are set within in more rural areas. In this SFCA, the sites which have been assessed are listed in Appendix B. This assessment has also incorporated key areas where regeneration and development are forecast; namely around the Swansea Bay City Region, notably Llanelli (Carmarthenshire) and the Haven Waterway Enterprise Zone (Pembrokeshire).

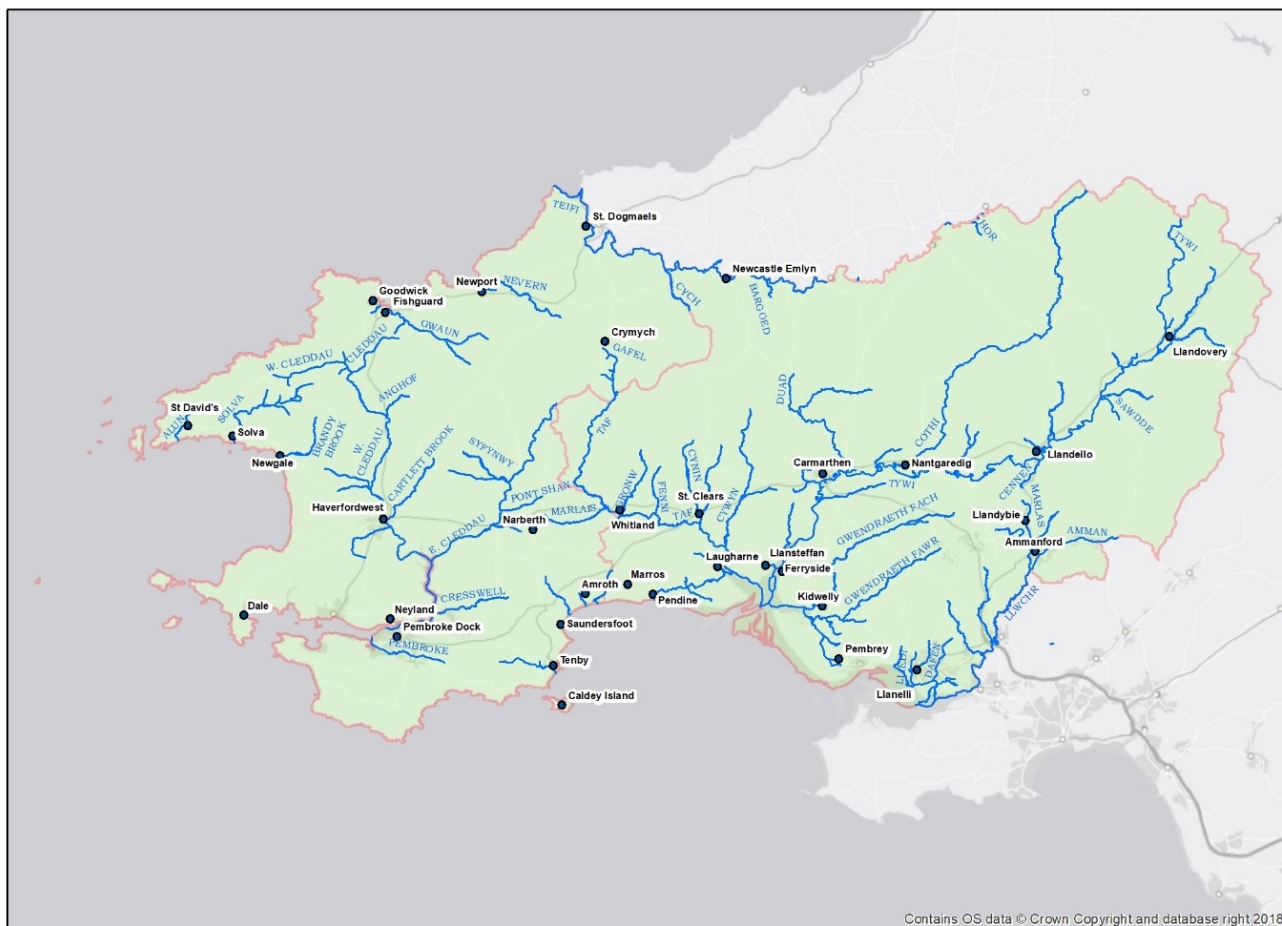


Figure 1-2 - Carmarthenshire and Pembrokeshire Study Area

1.4.1. Main watercourses

Fluvial flooding is typically caused by prolonged, intense rainfall, resulting in water flowing out of a river's banks and onto the adjacent floodplain. Various situations can exacerbate fluvial flood risk, such as culvert or bridge blockage or infrastructure failure. Fluvial flooding poses significant risks to both counties, as many of the main settlements have developed near rivers.

1.4.1.1. Carmarthenshire

- The **River Tywi** is approximately 111km in length from its source in the Cambrian Mountains to the sea at Llansteffan & Ferryside, where it flows into Carmarthen Bay alongside the rivers Taf and Gwendraeth. The main tributary to the Tywi is the **River Cothi**, which is 55km long with a confluence at Nantgaredig. The Tywi flows through a number of towns and villages, including Llandovery, Llandeilo and Carmarthen. The catchment plays an important role in the supply of water to South Wales, whereby abstractions are undertaken at Capel Dewi and flow is regulated at the Llyn Brianne reservoir. The Tywi becomes tidal at Whitemill.
- The **River Teifi** flows in a westerly direction from its source in Llyn Teifi, north Ceredigion, and forms the administrative boundary between the Counties of Carmarthenshire and Ceredigion. The Teifi is

122km long and flows into the sea to the south of Cardigan into Carmarthen Bay. The Teifi flows through a number of Carmarthenshire's towns and villages including: Cwmann, Llanybydder, Pontweli, Newcastle Emlyn and Cenarth.

- The **River Loughor** flows from its source in the Black Mountains, through Ammanford where it meets its main tributary, the Amman. Other tributaries to the Loughor include the Gwili and Morlais. The river's estuary flows around Llanelli.
- The **River Taf** is 35km long and flows from the Preseli Hills in Pembrokeshire to the sea at Laugharne. It travels through Whitland and St Clears, which are served by flood defences.
- The **River Gwendraeth** consists of two branches that have their confluence in the estuary at Kidwelly. The Gwendraeth Fawr is 18km long and flows from its source in Maesybont through towns and villages including Cefneithin, Drefach, Pontyberem and Pontyates to the estuary south of Kidwelly. The Gwendraeth Fach is 24km long and flows further north, from its source in Llyn Llech Owain Country Park through towns and villages including Kidwelly, Porthyrhyd and Llangyndeyrn.

1.4.1.2. Pembrokeshire

- The **River Cleddau** is 74km long, consisting of two main tributaries, the Western and Eastern Cleddau, which become the Daugleddau Estuary at their confluence at Picton Point. The **Western Cleddau** is 34km long (7km of which is tidal) and flows through Wolf's Castle to Haverfordwest. The river is tidal below Haverfordwest. The **Eastern Cleddau** is 40km long (10km of which is tidal) and flows from the Preseli Mountains to the confluence at Picton point. The Daugleddau Estuary, along with its tidal tributaries, are known collectively as Milford Haven. Milford Haven is the largest port in Wales. The natural harbour has been a port since the Middle Ages. Important settlements in the vicinity of the rivers and the haven include: Milford Haven, Pembroke, Pembroke Dock, Neyland and Haverfordwest.
- The **River Gwaun** rises in the Preseli Hills and flows for 15km to the sea at Fishguard. Its tributaries include the Afon Cwmau.
- The **River Taf** has its source in the Preseli Hills and flows along the boundary of Pembrokeshire and Carmarthenshire at Whitland. The river has an estuarine confluence with the Bristol Channel at Laugharne.
- The **River Teifi** is 117km long and forms the boundary between Ceredigion and Pembrokeshire, where it flows passed St Dogmaels and out to the Irish sea.

1.4.2. Coasts

Both counties have extensive coastlines that are a mix of rugged cliffs and extensive estuaries with coastal communities. The coastal location of these communities together with their key development areas makes them susceptible to tidal flooding. Tidal surge events caused by low pressure systems and wave overtopping of coastal defences during stormy weather threaten low lying communities around the coast. A rise in the mean sea level due to climate change will increase this risk with time.

Carmarthenshire's coastline extends from the Loughor estuary at Bynea to the west of Marros, near Pendine. Some key urban areas in Carmarthenshire are located near the coast, which include: Pendine, Laugharne, Llansteffan, Ferryside, Kidwelly, Burry Port and Llanelli. Sea defences provide a number of these areas with protection from tidal flooding, but they do not eliminate the risk completely.

Pembrokeshire's coastline is vital for tourism to the county, extending 299km from Amroth to St Dogmaels. It includes the Pembrokeshire Coast Path and is the focus for Wales' only coastal National Park. It covers a range of maritime landscapes which include a variety of natural landforms such as exposed cliffs, coves and natural beaches. Many of Pembrokeshire's towns are located along the coast, including Tenby, St David's, Solva, Newport, Goodwick, Fishguard and St. Dogmaels.

1.4.3. Surface Water and Sewer Flooding

As developments have expanded over time, it has created a new form of flooding, caused by a combination of heavy rainfall and impermeable land cover in urban areas. The UK floods of 2007, which caused a rethink of flood risk management in the UK and saw 35,000 properties affected by surface water flooding. The Pitt Review¹ (2008), which was conducted in response to the 2007 floods, outlined the lack of information and regard for surface water flooding in the UK. Surface water flooding has increased as inappropriate development

¹ Pitt, M., 2008. The Pitt Review: Lessons learned from the 2007 floods. *Cabinet Office, London, 505(4)*.

has created swathes of impermeable surfaces, which has increased surface runoff. Existing drainage systems struggle to accommodate the increased runoff resulting in overland flow paths, which threaten existing and new development.

The large existing urban areas in Carmarthenshire and Pembrokeshire are therefore more vulnerable to surface water flooding. This should also be considered when allocating development sites, as the existing risk of surface water flooding can be exacerbated by new development.

2. Planning Policy Context

The SFCA is undertaken in compliance with: The Wellbeing of Future Generations Act (2015)², Planning Policy Wales 10 (PPW)³ and Technical Advice Note 15, Development and Flood Risk (TAN 15)⁴. These three documents aim to guide sustainable development in Wales. From the perspective of flood risk, a robust approach is sought to ensure sustainable development solutions are promoted, whereby development is discouraged within areas at risk of flooding. This approach avoids creating developments that are likely to compromise flood risk now or in the future. The accepted approach is direct development away from flood plains and flood risk areas. If the development within a flood zone can be justified, then it is essential that the flood consequences are understood and that the risk profile meets the acceptability criteria set out in TAN 15.

2.1. Well-being of Future Generations (Wales) Act 2015

The Wellbeing of Future Generations (Wales) Act 2015 enshrines in law a duty, falling on public bodies such as NRW and Local Authorities, to safeguard the well-being of future generations. This duty is based on the principle of sustainable development and encompasses social, economic, environmental and cultural factors. It requires public bodies to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change. Its aim is to present Wales with an opportunity to make a long-lasting, positive change to current and future generations.

In respect of flood risk management, this means that developments should not occur in areas at risk of flooding, nor should flood mitigation works for an LDP increase flood risk elsewhere. With the potential risks of future climate change uncertain, a precautionary approach to flood risk will be promoted in order not to compromise the well-being of future generations.

2.2. Planning Policy Wales (PPW) guidance

The Welsh Government's Planning Policy Wales (PPW) is currently on its 10th edition, published in December 2018. PPW promotes action at all levels of the planning process to ensure that it maximises its contribution to the well-being of Wales and its communities, both now and in the future. Rather than dealing with issues in isolation, it encourages a wider, sustainable outlook that considers multiple disciplines and issues to promote developments that will achieve multiple benefits. Underpinning the principles of PPW are the high standards and level of evidence required in preparation for each proposed development to take full advantage of the benefits and to ensure that development is conducted sustainably.

2.3. Technical Advice Note 15: Development and Flood Risk (July 2004)

PPW is supplemented by 'Technical Advice Note 15: Development and Flood Risk' (TAN 15), which provides guidance for LPAs to reduce flood risk and to encourage new development away from areas that are considered to be at high risk of flooding. It also states that the mitigation of flood risk in one area, such as for a new development, should not enhance potential flood risk in another.

2.3.1. Draft new National Strategy on Flood and Coastal Erosion Risk Management (FCERM) for Wales

The consultation period for Welsh Government's new National Strategy for Flood and Coastal Erosion Risk Management closed on 16th September 2019. In this document, Welsh Government states that it "wants its

² <https://gweddiill.gov.wales/docs/dsjlg/publications/150623-guide-to-the-fg-act-en.pdf>

³ <http://www.mobileuk.org/planning-policy-wales-edition-10.pdf>

⁴ Planning Policy Wales: Technical Advice Note: 15 Development and Flood Risk: Welsh Assembly Government July 2004

Planning and FCERM policies to complement each other, reducing risk by preventing inappropriate development in the flood plain and helping Planning Authorities make clear decisions based upon the best available information”. To deliver this, Welsh Government intends to “update TAN15 by 2020”. Although no detail is known, it was announced as part of the consultation process for the draft FCERM Strategy that TAN15 has been reviewed and is being completely updated prior to issue of the new draft for consultation. The revised TAN15 guidance is understood to move from the current precautionary approach to a more risk based approach to assessments of development. A date for the issue of the draft new TAN15 has not been announced at the time of writing. This current assessment is, therefore, based on the existing guidance.

2.3.2. Development Advice and Flood Risk Maps

The Development Advice maps (DAMs) provide indicative flood risk zones for Wales, based on fluvial and tidal flooding. These maps help to inform LPAs where and when flood risk issues should be considered within the development planning process. The designated DAM zones are based on the level of flood risk proposed to them. The DAM flood risk maps provide an initial indication for LPAs and developers as to the level of flood risk to a proposed site and inform the justification test within TAN 15 (see below). The zones are defined as follows;

Table 2-1 - DAM Zones, as expressed in TAN 15 (2004)

Description of Zone		Use within the precautionary framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A	Used to indicate that justification test is not applicable and no need to consider flood risk further.
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further.
Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.
Areas of the floodplain without significant flood defence infrastructure.	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

It is noted that the DAM Zone C is based on Flood Zone 2 of the NRW Flood Map (0.1% annual chance flood outline). Changes to Flood Zone 2 are applied to Zone C.

2.3.3. Justification Tests

In principle, proposed developments should be encouraged away from Zone C and towards areas of lower flood risk. i.e. Zone A, or otherwise towards Zone B. Where development in a high-risk area is essential or strategically important for regeneration, then there are a range of justification tests outlined in TAN 15 (Section 6) that must be satisfied to guide decisions regarding whether a specific development may proceed.

TAN 15 promotes the preparation of robust justification for development in flood risk areas and fosters detailed assessment of flood risks and thorough planning, managing the consequences of flooding to people and property. The justification tests are a matter for the local planning authority in allocating sites as part of the local development planning process.

Summary of the justification test

Development, including transport infrastructure, will only be justified if it can be demonstrated that:

- i. Its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; **or**,
- ii. Its location in Zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;

and,

- iii. It concurs with the aims of PPW and meets the definition of previously developed land (PPW fig 2.1); and,
- iv. The potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in sections 5 and 7 and appendix 1 found to be acceptable.

2.3.4. Acceptability Criteria

Where consideration of a development site can be justified, the development must then meet the acceptability criteria outlined in Section 7 and Appendix 1.

TAN 15 guidance states that there is a frequency threshold of flooding below which flooding of development should not be allowed (Appendix A1.14). This requires that any new development should remain flood free during a 1% (1 in 100) annual chance fluvial event, and a 0.5% (1 in 200) annual chance tidal event for the lifetime of the development.

For more extreme, (less probable), events, TAN 15 provides indicative acceptance criteria (Appendix A1.15), for flood depths and velocities in the area of the development during a 0.1% (1 in 1000) annual chance event. Flood risk must be considered over the anticipated lifetime of each development. Development within Zone C1 or C2 must be flood free in the 1% (1 in 100) annual chance fluvial and 0.5% (1 in 200) annual chance tidal event (including climate change). The development must have acceptable consequences of flooding in the extreme 0.1% (1 in 1000) annual chance event as defined by TAN 15 (par. A1.15). New development must not increase flood risk elsewhere.

Development must be undertaken in a sustainable manner; whereby the effects on the catchment as a whole must be considered. The flood consequences of developing a site, along with any mitigation works, must be assessed, as TAN 15 does not permit flood risk elsewhere to be increased.

In addition, any proposed or existing flood defences must be shown to be structurally adequate under extreme overtopping conditions. An emergency flood plan, including a flood warning system and identified evacuation routes, must be in place. Emergency services and highly vulnerable development (as defined by TAN 15 Section 5), including residential development, should not be considered within Zone C2.

2.3.5. Development lifetime

Welsh Government Guidance for climate change allowances (2018)⁵ states that it is necessary to take account of the potential impact of climate change over the lifetime of a development.

⁵ <https://gov.wales/sites/default/files/publications/2018-11/flood-consequence-assessments.pdf>

Residential developments are assumed to have a lifetime of 100 years, while non-residential developments are assumed to have a lifetime of 75 years.

2.4. Schedule 3 of Flood and Water Management Act 2010 (FWMA)

Since 7th January 2019, Sustainable Drainage Systems Approval Body (SAB) approval is required for all new developments of more than one house, or where the construction area is of 100m² or more. Schedule 3 to the Flood and Water Management Act 2010 requires surface water drainage for new developments to comply with mandatory National Standards for sustainable drainage. The Sustainable Drainage Systems (SuDS) approval process is independent of the planning process. SuDS approval ensures that surface water systems on new development are designed and constructed in accordance with the standards and guidelines for sustainable drainage mandated by Welsh Ministers. Construction must not commence until the relevant consent has been received from the SAB and the relevant conditions discharged.

Although this has not been accounted for at Stage 1 of the SFCA, Schedule 3 approval will be required for each site, irrespective of its risk rating, to prove that flood risk can be effectively and sustainably managed as part of the overall water management at the site.

For more information, please see the summary of Schedule 3 in Appendix A.

3. Methodology

3.1. Datasets used

The datasets listed below were collated from Natural Resources Wales and the LPAs. They were assessed in a Geographic Information System (GIS) database to spatially analyse patterns of potential flood risk.

- NRW Flood Map Flood Zone 2 – 0.1% (1 in 1000) annual chance Fluvial and Tidal Flood Event.
- NRW Flood Map Flood Zone 3 - 1% (1 in 100) annual chance Fluvial and 0.5% (1 in 200) Tidal Flood Events.
- NRW Risk of Flooding of Surface Water Flooding – 1 in 30 annual chance event.
- NRW Risk of Flooding of Surface Water Flooding – 1 in 100 annual chance event.
- NRW Risk of Flooding of Surface Water Flooding – 1 in 1000-annual chance event.
- Shoreline Management Plan (SMP2) 2-metre buffer – 1 in 1000 annual chance tide level plus 2 metre sea level rise)⁶.
- Historic flood events in Pembrokeshire.

3.1.1. Flood datasets omitted in this study

- Sewer Flood Risk – Welsh Water being consulted through the process.
- Groundwater Flooding – no such dataset from either council.

3.2. Climate Change

The impact of climate change is critical for the Replacement/ Revised LDP, ensuring sustainable development over the development's lifetime. The approach adopted for climate change in this assessment is described below.

Fluvial and Surface Water Sources

The datasets available for use in this Stage 1 screening assessment do not take account of the potential future impacts of climate change (except where noted for the SMP2 dataset). In order to address this, it has been assumed that for fluvial and surface water flooding, the 0.1% annual chance flood event extents shown for the present day, are indicative of the 1% annual chance event extents in the future.

This is considered to be a conservative assumption, which provides an indication of the potential increase in future flood risk as a result of climate change.

⁶ South of Wales Shoreline Management Plan (2010) <http://www.southwalescoast.org/>

Tidal flood risk using the Shoreline Management Plan (SMP) Dataset

The Pembrokeshire and Carmarthenshire coastlines are covered by two SMPs:

- South of Wales SMP2 (SoW SMP2)
- West of Wales SMP2 (WoW SMP2)

The SoW SMP2 covers the coast in Carmarthenshire and around to Nolton Haven, St. Brides Bay in Pembrokeshire. The rest of the Pembrokeshire coast is covered by the WoW SMP2.

Flood datasets were available for the SoW SMP2, but no corresponding flood dataset was available for the WoW SMP2 area.

The SoW SMP2 FloodRisk_2m_Buffer layer was used to estimate future flood risk. This SMP layer shows the 0.1% annual chance tide level, incorporating an assumed 2m rise in sea levels. This is considered to be a conservative indication of future risk, since TAN15 only requires a site to be flood free during the less severe 0.5% annual chance tide event.

For this Stage 1 SFCA, an indicative single level contour for a 0.5% chance tide level⁷, including sea level rise⁸, was generated. The resulting single tide level contour of 7m⁹ was used to cover both counties. The 7m contour was generated based on OS Terrain 50 ground level data, which is a relatively coarse grid resolution. A visual check was undertaken to ensure the resulting flood risk outline was reasonable.

It is noted that this will likely overestimate tide levels in north Pembrokeshire, as the predicted tide levels reduce from Burry Estuary (where the single level was calculated) around to Fishguard. However, it is considered an applicable approach to minimise the possibility that some sites, which may be at flood risk in the future, are not missed by this screening study.

For example, a relatively recent FCA for potential sites in Pembrey, indicated that they would be at flood risk in climate change scenarios. However, these same sites were found to be outside of the SMP Flood Risk_2m Buffer boundary. The 7m contour did capture these sites, thereby ensuring that they will receive due consideration of flood risk for future development.

Sites captured by this conservative approach will be subject to further assessment if carried forward for consideration in the Replacement/ Revised LDP.

3.3. GIS methodology

The data sets noted in section 3.1 were loaded into a GIS platform along with the current LDP allocations and proposed Replacement/ Revised LDP Candidate Sites given by the respective LPAs. An intersect query was then conducted to assess the area of flood coverage at each site. This was converted to a percentage value for each dataset at each site. The dataset causing the highest percentage of flooding at each Candidate Site or existing allocation site was attributed as the primary source of flooding.

3.4. Steering Group Meetings

A steering group meeting was held in Carmarthen on 28/03/2019 with representatives present from Carmarthenshire County Council, Pembrokeshire County Council, Pembrokeshire Coast National Park Authority, NRW, Welsh Water and Atkins.

The meeting presented an opportunity to discuss the draft outputs, and changes were agreed.

3.5. Red, Amber, Yellow and Green (RAYG) Risk Rating

To assess the risk of flooding at each proposed site, a Red, Amber, Yellow and Green Risk Rating was used, as explained by the Table below. This allows for visual representation of the proportion of each site which is potentially at risk from flooding, and so support the council planners in their initial screening process. The objective of the risk categorisation rating is to understand the level of risk sufficiently at each site, and to be able to determine if the consequences of flooding can be acceptably managed.

⁷ Coastal Boundary Conditions, Environment Agency/Defra R&D project no. SC060064, 2011.

⁸ <https://gweddiill.gov.wales/docs/desh/publications/160831guidance-for-flood-consequence-assessments-climate-change-allowances-en.pdf>

⁹ The calculated value of 6.99mAOD was rounded up.

Table 3-1 - The Red, Amber, Yellow and Green (RAYG) Risk Categorisation for Criteria for the Sites.

Risk Category	Criteria Description (at least one of the following criteria is met)	Category Overview
HIGH	<ul style="list-style-type: none"> • Greater than 50% of the site's plan area is: <ul style="list-style-type: none"> ○ Within Flood Zone 2 (Note 1) ○ Within Surface Water flood extent (Note 2) ○ Within SMP2 – Flood extent with 2m SLR (Note 3) ○ Below 7m contour at the coast (Note 4) • Known history of flooding on the site. 	<ul style="list-style-type: none"> • The percentage of the site area flooded gives a screening level indication of how much of the site may comply with TAN 15 for threshold of flooding criteria (TAN 15 A1.14). • Further analytical work will be required to understand the flood risk at the site. • The underlying evidence base may need updating.
MEDIUM HIGH	<ul style="list-style-type: none"> • Greater than 25% up to 50% of the site's plan area is: <ul style="list-style-type: none"> ○ Within Flood Zone 2 (Note 1) ○ Within Surface Water flood extent (Note 2) ○ Within SMP2 – Flood extent with 2m SLR (Note 3) ○ Below 7m contour at the coast (Note 4) 	
MEDIUM	<ul style="list-style-type: none"> • Up to 25% of the site's plan area is: <ul style="list-style-type: none"> ○ Within Flood Zone 2 (Note 1) ○ Within Surface Water flood extent (Note 2) ○ Within SMP2 – Flood extent with 2m SLR (Note 3) ○ Below 7m contour at the coast (Note 4) 	
LOW	<ul style="list-style-type: none"> • Less than 5% of the site's plan area is within: <ul style="list-style-type: none"> ○ Flood Zone 2 (Note 1) ○ Surface Water Flood Extent (Note 2) ○ SMP2 – Flood Extent with 2m SLR (Note 3) ○ The area below the 7m contour at the coast (Note 4) • No history of flooding in the site. 	<ul style="list-style-type: none"> • Based on criteria description, flood risk in the area is likely to be acceptably managed. • Development likely to proceed subject to agreement by the SuDS Approval Body. • Flood Risk to the site access routes and compliance with TAN 15 will need to be confirmed.

- Note 1 – NRW Flood Zone 2 – Assumed to approximate 1 in 100 (1%) annual chance event with climate change.
- Note 2 – The Surface Water Flood Extents are based on NRW's updated Flood Map for Surface Water (uFMfSW). For future/climate change scenario, a broad scale assumption has been made for Stage 1 screening:
 - Current 1 in 1000 (0.1%) annual chance flood outline becomes 1 in 100 (1%) with climate change.
- Note 3 – Shoreline Management Plan 2 data – Flood extent is current 1 in 1000 (0.1%) tidal event plus 2m Sea Level Rise (SLR)

- Note 4 – The maximum 0.5% annual chance or greater extreme tide level plus sea level rise is 6.9m. A coarse 7m contour has also been used to screen tidal risk for coastal sites.

4. Results

Please refer to the associated map outputs and tables summarising the results of the Stage 1 SFCA analysis. For both LPAs, 1 in 25,000 and 1 in 10,000 scale maps have been produced, together with summary tables of the flood analyses. These are summarised for each county below:

4.1. Carmarthenshire

Allocation Sites:

1 in 25,000 scale maps 1 to 15 entitled - RAYG_CC_25K_CarmsAllocationSites_1

1 in 10,000 scale maps 1 to 51 entitled - RAYG_CC_10K_CarmsAllocationSites_1

Summary table for Carmarthenshire allocation sites entitled - 5186360-ATK-XX-XX-SP-HY-0005_Carms_AllocationSites_RAYG_Matrix

Candidate Sites:

1 in 25,000 scale Maps 1 to 15 entitled - RAYG_CC_25K_CarmsCandidateSites_1

1 in 10,000 scale maps 1 to 53 entitled - RAYG_CC_10K_CarmsCandidateSites_1

Summary table for Carmarthenshire Candidate Sites entitled - 5186360-ATK-XX-XX-SP-HY-0003_Carms_CandidateSites_RAYG_Matrix

4.2. Pembrokeshire

Allocation Sites:

1 in 25,000 scale maps 1 to 10 entitled - RAYG_CC_25K_PembsAllocationSites_1

1 in 10,000 scale maps 1 to 25 entitled - RAYG_CC_10K_PembsAllocationSites_1

Summary table for Carmarthenshire allocation sites entitled - 5186360-ATK-XX-XX-SP-HY-0006_Pembs_AllocationSites_RAYG_Matrix

Candidate Sites:

1 in 25,000 scale Maps 1 to 10 entitled - RAYG_CC_25K_PembsCandidateSites_1

1 in 10,000 scale maps 1 to 37 entitled - RAYG_CC_10K_PembsCandidateSites_1

Summary table for Carmarthenshire Candidate Sites entitled - 5186360-ATK-XX-XX-SP-HY-0004_Pembs_CandidateSites_RAYG_Matrix

5. Discussion and suggested further work

A Stage 1 SFCA provides a broad overview of flood risk for each Candidate Site and existing allocation site, whereby the RAYG rating at each site is based on broad scale, national datasets. Whether a development should proceed or not will depend upon whether the consequences of flooding of that development can be managed down to a level which is acceptable for the nature/type of development being proposed, including its effects on existing development.

5.1. Green Sites

Sites given a Green rating at Stage 1 of the SFCA are at low risk of flooding. A qualitative assessment of flood risk at the site is likely to be sufficient and water management at the site should be assessed in the planning application. The assessment of flood risk and water management at the site will be a matter for the site proposer. It is likely that the results of the high-level screening assessment should sufficiently determine whether the consequences of flooding at each site can be acceptably managed.

Sites categorised as Green (Low Risk) at Stage 1 of the SFCA are required to demonstrate compliance with the Statutory SuDS Standards for the design, construction, operation and maintenance of surface water systems serving new developments. This must be approved by the SAB.

Please see Appendix A1 for further detail on Schedule 3.

5.2. Yellow, Amber and Red Sites

According to TAN 15, new development should be directed away from zone C and towards suitable land in zone A, otherwise to zone B of the Development Advice Maps. Red, Amber or Yellow sites should have the tests outlined in TAN15 sections 6 and 7 applied, recognising, however, that highly vulnerable development and Emergency Services in zone C2 should not be permitted. All other new development should only be permitted within zones C1 and C2 if determined by the planning authority to be justified in that location.

Red, Amber or Yellow areas should be considered further, based on:

- The percentage of the site affected gives an indication of the likely severity of the problem at each site. It is indicative only and should not be interpreted as definitive.
- How flood risk will be managed at a site, integrated with other factors that will determine a site's suitability for inclusion in the Replacement/ Revised LDP.
- Sites that will be included further in the plan will need to have flood risk assessed against the criteria defined in TAN 15.
- Additional information (e.g. existing site specific FCA). may already be available via the Local Authority's Planning Portal, or other stakeholders. For example, a site may already have an FCA that demonstrates flood consequences are understood and can be managed to an acceptable level.
- If such additional information cannot be sourced, then further work may be required to support/ justify the sites' continued inclusion in the Revised/ Replacement LDP.

5.2.1. Areas for further assessment as part of a Stage 2 SFCA

The potential extent of the flooding across a given site provides an indication of the proportion of that site which may be viable for development from a flood risk perspective in line with TAN 15 guidance. This information will be used by each LPA together with other criteria to evaluate the suitability of potential sites for inclusion in the Replacement/ Revised LDP.

The flood risks associated with development of sites that maybe proposed to be taken forward for further consideration for inclusion in the Replacement/ Revised LDP should be assessed in more detail in a Stage 2 SFCA.

The sites for further assessment will be identified by the LPAs and may include Candidate Sites and potentially a review of some land previously allocated in the current adopted Local Development Plans.

A Stage 2 SFCA would include site-specific assessments of flood risk based where possible on existing information including hydraulic models, topographical and other information from the relevant risk management authorities (RMAs). The Stage 2 SFCA will include a gap analysis of the available information and propose where necessary further studies required to adequately define the flood consequences for a development in line with TAN 15 guidance.

A Stage 2 SFCA should demonstrate that over the lifetime of the development (i.e. including the effects of climate change):

- The flood risk for a site or area is understood.
- The impact of the proposed development on existing flood risk can be defined.
- Mitigation of the consequences both for the development and for existing flood receptors can be achieved.

Appendices



Appendix A.

A.1. FWMA 2010 Schedule 3 – Contemporary Planning Context

Since 7th January 2019 all new developments of more than one house, or where the construction area is of 100m² or more¹⁰ require Sustainable Drainage Systems (SuDS) to manage on-site surface water. The SuDS systems must be designed and built in accordance with mandatory standards published by Welsh Ministers. These systems must be approved by the local authority acting in its role as SuDS Approving Body (SAB) before construction work begins.

The SuDS approval process is independent of the planning process. SuDS approval ensures that surface water systems on new development are designed and constructed in accordance with the standards and guidelines for sustainable drainage mandated by Welsh Ministers. Construction must not commence until the relevant consent has been received from the SAB and the relevant conditions discharged.

The legislation also removes the developers right to connect to a sewer and places the duty on the SAB to adopt approved SuDS features.

A.1.1. Policy Context – TAN15, SFCA and the SAB

Flood Risk is already a material planning consideration, whereby a development that will increase flood risk either on or offsite can be refused planning permission. TAN15 states: “Whether a development should proceed or not will depend upon whether the consequences of flooding of that development can be managed down to a level which is acceptable for the nature/type of development being proposed, including its effects on existing development.”

In practice this process is not necessarily providing an appropriate mechanism for managing flood risk. The SAB role strengthens elements of the guidance already contained within TAN15, by setting very specific hydraulic criteria. The SAB application must provide evidence that the standards have been met.

The SFCA will give a high-level view of the likely consequences of flooding on proposed development areas, to inform whether the site is suitable for development. It is expected that the SFCA will be used primarily as a planning tool. It is expected that for larger development the SAB as well as the LPA will require a site-specific hydrological assessment. This will demonstrate, amongst other things, that the site layout respects existing blue green corridors, and the capacity of any receiving water bodies.

A.1.2. SAB role scope

The SAB is identified as the unitary authority for the area in which it is, or in which the drainage system is to be constructed¹¹. The SuDS Approval Body has the power to refuse development, and to carry out enforcement action.

In deciding whether to approve an application, the SAB will consider the 6 SuDS Standards. Standards S1 and S2 relate to flood risk (controlling water quantity), while standards S3 – S6 relate to other aspects of sustainable water management.

In terms of Flood protection, the SAB will need to see evidence that the following standards have been met:

Flood Protection Off Site - the hydraulic standards include the requirement to control and manage runoff rate and volume up to a 1% (1 in 100) annual chance rainfall event, as well as setting standards for the control of runoff in more frequent events such as the rainfall of less than 5mm, and the 1 in 1-year event. The standards enable the SAB to set the allowable discharge volumes and rates according to flood risk of the receiving waterbody. For previously developed sites, a minimum betterment in runoff rate of 30% is required.

On Site Flood Protection - the national standards specify three principal criteria to be applied to drainage design. These are summarised as follows: 1) 0.33% (1 in 30) annual chance flood protection for roads; 2) Internal flood protection to 1% (1 in 100) annual chance event; 3) An appropriate freeboard must be applied.

¹⁰ A construction area is any area subject to works that form a hard surface or impact the ability of land to absorb rainwater, such as site storage areas that serve to compact the surface - Paragraph 7, section 1 Flood and Water Management Act – determination of application for approval:
<https://www.legislation.gov.uk/ukpga/2010/29/schedule/3>

¹¹ Section 6 paragraph 1 of The Flood and Water Management Act 2010

Consultees of the SAB include the Sewerage Undertaker and NRW.

The SAB has the ability to charge a fee for their services, including for pre-application advice.

A.1.3. National SuDS Standards

Surface water systems on new development must be designed and constructed in accordance with the *mandatory standards for sustainable drainage* published by Welsh Ministers.¹² A SuDS Approval application will need to demonstrate how the development complies with the 6 standards:

- S1. Surface water runoff destination.
- S2. Surface water runoff hydraulic control.
- S3. Water Quality.
- S4. Amenity.
- S5. Biodiversity.
- S6. Design of drainage for construction, operation and maintenance.

It is critical for a developer to establish the runoff destination (Standard S1) as soon as possible. This will determine the viability of the site. The capacity of a watercourse, drain or sewer needs to be understood, as well as the infiltration potential of the ground. Complying with the remaining standards may also have an impact on development density and therefore commercial viability, for example where space is required for flood storage volumes.

A sustainable drainage system ensures a development mimics natural drainage processes and deals with rainfall as close to source as possible. Typically, this will result in green spaces, enhanced biodiversity and support aligned strategies to improve water and air quality, wellbeing and reduced pollution.

A.1.4. Practical Interaction between SAB and Planning

The SuDS Approval and Planning Approval processes are separate. This means that a site may obtain planning permission, but be refused SAB approval (or vice versa).

Construction cannot commence without SAB approval. SAB Approval requires the presentation of a detailed design, so cannot be obtained until late in the design development process. This presents developers with a significant risk.

In order to mitigate this risk, it is recommended for the SAB to provide pre-application advice to developers. This can be arranged as part of a Planning Pre-Application, or through a dedicated SAB Pre-Application service.

If a development does not require SuDS Approval, the Local Planning Authority (LPA) will consult with the public and with relevant statutory consultees, which is likely to include the drainage department in its capacity as Lead Local Flood Authority (LLFA). It is expected that the principles of how to approach site drainage and acceptable standards will be the same whether SAB approval is required or not.

A.1.5. Further Information

The following website includes links to the Welsh Government legislation, guidance and National SuDS Standards and FAQs:

<https://qweddill.gov.wales/topics/environmentcountryside/epq/flooding/drainage/?lang=en>

¹² Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems; <https://gov.wales/docs/desh/publications/181015-suds-statutory-standards-en.pdf>

A.1.6. Flow Diagram

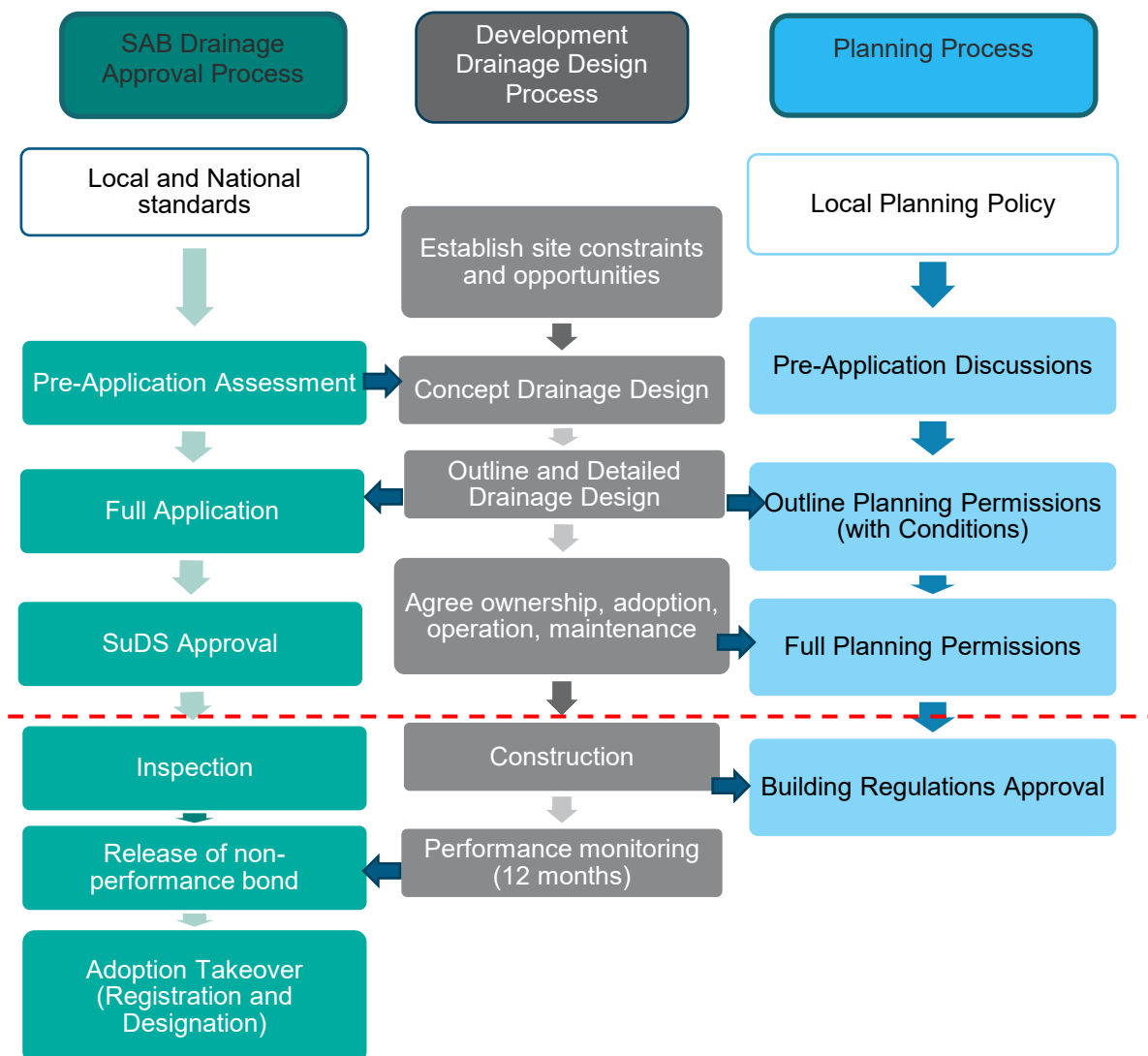


Figure A-1 - Integration of the Drainage Approval Process with the Planning Process - Overview

Appendix B. Tables – Percentage of Sites Flooded by source

Pembrokeshire

5186360-ATK-XX-XX-SP-HY-0004_Pembs_CandidateSites_RAYG_Matrix.pdf

5186360-ATK-XX-XX-SP-HY-0006_Pembs_AllocationSites_RAYG_Matrix.pdf

Carmarthenshire

5186360-ATK-XX-XX-SP-HY-0003_Carms_CandidateSites_RAYG_Matrix.pdf

5186360-ATK-XX-XX-SP-HY-0005_Carms_AllocationSites_RAYG_Matrix.pdf

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