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The Planning System and Flood Risk Management



Guidelines for Planning Authorities

November 2009



Comhshaoil, Oidhreacht agus Rialtas Áitiúil
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Ministers' Foreword

The planning system plays a major national and local role in ensuring that development is promoted and guided in a manner that is sustainable in economic, social and environmental terms.

The Government's National Spatial Strategy 2002-2020, the National Development Plan 2007-2013, the National Sustainable Development Strategy - Making Ireland's Development Sustainable (2002) and the Planning and Development Act 2000, provide the frameworks and policies under which proper planning and sustainable development can be achieved.

In recent years, we have become increasingly aware of the importance of factoring the risk to people, property, the overall economy and the environment from flooding into the planning system, and the role that good planning has in avoiding and reducing such risk that could otherwise arise in the future. The 2004 Report of the Flood Policy Review Group which was approved by the Government highlighted the need to pro-actively manage flood risk.

There are many areas, including towns and cities that are already at risk from periodic flooding. The effects of climate change, such as more severe rainfall events and rising sea levels, will increase these risks and may put other areas at risk that may not have flooded in the past. Adapting to the reality of climate change therefore requires us to be even more vigilant in ensuring that risks of flooding into the future are integrated into the planning process, first through the spatial planning process at regional, city and county and local levels, and also in the assessment of development proposals by planning authorities and An Bord Pleanála.

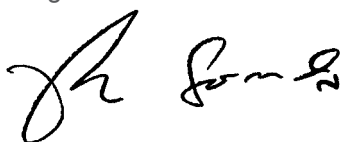
These guidelines require the planning system at national, regional and local levels to:

- :: Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level without increasing flood risk elsewhere;
- :: Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk; and
- :: Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The Government places a high degree of importance on planning and development measures as a critically important element of its overall strategic approach to adaptation to climate change and flood risk management, building upon its long-standing acknowledgement of flooding in legislation as an important planning issue.

We urge planning authorities, An Bord Pleanála, regional authorities, applicants for planning permission, their agents and developers to study the guidelines and implement them fully. In particular, we would urge elected members to implement these guidelines in reviewing development plans, especially in zoning land for development.

While the consideration of flood risk may, for valid and justifiable reasons, constrain development in some areas, these guidelines also recognise the fact that many of the areas where people live and work are already subject to flood risk, and that the needs for regeneration and growth can be reconciled, while taking due account of the need to minimise and mitigate such risks.



Mr. John Gormley, T.D.,
Minister for the Environment, Heritage and Local Government.



Dr. Martin Mansergh, T.D.,
Minister of State at the Department of Finance, with special responsibility for the OPW.



Overview of the Guidelines

These Guidelines introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. Implementation of the Guidelines will be achieved through actions at the national, regional, local authority and site-specific levels.

At the national level:

1. The Minister for the Environment, Heritage and Local Government has introduced these Guidelines as a comprehensive statement of good planning practice and as a key step towards a National Climate Change Adaptation Strategy. The Minister will further monitor the development plans of local authorities to ensure that they are prepared in a manner that is consistent with the Guidelines.
2. The Department of the Environment, Heritage and Local Government will ensure that all relevant departmental publications and regulations encourage and promote the use of Sustainable Drainage Systems (SuDS).
3. The Office of Public Works, as the lead agency for flood risk management in Ireland, will continue its work in developing indicative flood maps and catchment-based Flood Risk Management Plans (FRMPs) in partnership with local authorities, the Environmental Protection Agency and other relevant departments and bodies in accordance with national flood policy and the EU Floods Directive.
4. DEHLG and OPW will work with regional and local authorities in assisting with technical aspects of the implementation of these Guidelines on an ongoing basis, learning from experience within Ireland and internationally.

At the regional level:

5. Regional Authorities will be required to prepare a strategically focused flood risk appraisal at the regional level as an integral input to the preparation of regional planning guidelines (RPG's) which act as a framework for ongoing co-ordination of the development plans of local authorities in their areas. The preparation of this element of the RPG's will be co-ordinated with the preparation of River Basin Management Plans (RBMP's) under the EU Water Framework Directive and future work required to prepare Flood Risk Management Plans under the EU Floods Directive by the OPW.

At city and county level:

6. Planning authorities will introduce flood risk assessment as an integral and leading element of their development planning functions under the Planning Code and at the earliest practicable opportunity in line with the requirements of these Guidelines.
7. The new flood risk assessment system will be aligned with the existing Strategic Environmental Assessment (SEA) process introducing processes for identifying flood risk and determining what flood risk assessment is required and carrying out such assessments similar to the overall system for screening and scoping under the SEA process.
8. City and county development plans will establish the flood risk assessment requirements for their functional areas including other planning authorities such as Town Councils and any local area plans (LAP) which may be supplemented by more detailed site-specific flood risk assessment required to comply with these Guidelines.
9. Planning authorities will assess planning applications for development in accordance with the provisions of these Guidelines following the guidance of their own or any OPW Strategic Flood Risk Assessment and the application of the sequential approach and, if necessary, the Justification Test required by these Guidelines.
10. Planning authorities will ensure that development is not permitted in areas of flood risk, particularly floodplains, except where there are no suitable alternative sites available in areas at lower risk that are consistent with the objectives of proper planning and sustainable development. Where such development has to take place, in the case of urban regeneration for example, the type of development has to be carefully considered and the risks should be mitigated and managed through location, layout and design of the development to reduce flood risk to an acceptable level.
11. Planning authorities will ensure that only developments consistent with the overall policy and technical approaches of these Guidelines will be approved and permission will be refused where flood issues have not been, or cannot be, addressed successfully and where the presence of unacceptable residual flood risks to the development, its occupants or users and adjoining property remains. Under the Planning and Development Act 2000, planning permission refused for the reason that the proposed development is in an area which is at risk of flooding excludes compensation.

In the case of applications for planning permission and development consents to planning authorities and An Bord Pleanála, applicants and their agents are required to:

12. Carefully examine their development proposals to ensure consistency with the requirements of these Guidelines including carefully researching whether there have been instances of flooding or there is the potential for flooding, on specific sites and declaring any known flood history in the planning application form as required under the Planning and Development Regulations 2006.
13. Engage with planning authorities at an early stage, utilising the arrangements for pre-planning application consultation with regard to any flood risk assessment issues that may arise.
14. Carry out a site-specific flood risk assessment, as appropriate, and comply with the terms and conditions of any grant of planning permission with regard to the minimisation of flood risk.

Chapter 1

Background and Objectives

The issue

- 1.1 Flooding is a natural process that can happen at any time in a wide variety of locations. Flooding from the sea and from rivers is probably best known but prolonged, intense and localised rainfall can also cause sewer flooding, overland flow and groundwater flooding. Flooding has significant impacts on human activities, it can threaten people's lives, their property and the environment. Assets at risk can include housing, transport and public service infrastructure, and commercial, industrial and agricultural enterprises. The health, social, economic and environmental impacts of flooding can be significant and have a wide community impact.
- 1.2 The frequency, pattern and severity of flooding are expected to increase as a result of climate change. Development can also exacerbate the problems of flooding by accelerating and increasing surface water run-off, altering watercourses and removing floodplain storage.

Purpose of the Guidelines

- 1.3 Planning authorities (both elected members and officials) must implement these Guidelines in ensuring that, where relevant, flood risk is a key consideration in preparing development plans and local area plans and in the assessment of planning applications. The Guidelines will also assist regional authorities in preparing regional planning guidelines and should be utilised by developers and the wider public in addressing flood risk in preparing development proposals. Fig. 1 summarises the role that flood risk should play at different levels of the planning system.

A route map for these Guidelines is presented in Fig. 1.1.

Status of the Guidelines

- 1.4 These Guidelines are being issued by the Minister of the Environment, Heritage and Local Government under Section 28 of the Planning and Development Act 2000. Planning authorities and An Bord Pleanála are required to have regard to the Guidelines in carrying out their functions under the Planning Acts. They are also required to make the Guidelines available for inspection by members of the public. These Guidelines supersede previous interim guidance on flooding in Appendix E to the Development Plan Guidelines in 2007.
- 1.5 These Guidelines are accompanied by a separate document containing technical appendices, which planning authorities, applicants and their agents must use in addressing more detailed implementation of the Guidelines. The appendices to these Guidelines may be updated and circulated from time to time reflecting improvements in flood risk and climate change data as well as techniques in flood risk assessment.

Objectives of the Guidelines

- 1.6 The core objectives of the Guidelines are to:
- :: Avoid inappropriate development in areas at risk of flooding;
 - :: Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
 - :: Ensure effective management of residual risks for development permitted in floodplains;
 - :: Avoid unnecessary restriction of national, regional or local economic and social growth;
 - :: Improve the understanding of flood risk among relevant stakeholders; and
 - :: Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.
- 1.7 These Guidelines outline methodologies for the transparent consideration of flood risk at all levels of the planning process, ensuring a consistency of approach throughout the country. The Guidelines will contribute to the avoidance or minimisation of potential flood risk through a more systematic approach within a river catchment context.
- 1.8 In achieving the aims and objectives of the Guidelines, the key principles that should be adopted by regional and local authorities, developers and their agents should be to:
- :: Avoid the risk, where possible,
 - :: Substitute less vulnerable uses, where avoidance is not possible, and
 - :: Mitigate and manage the risk, where avoidance and substitution are not possible.

Report of the Flood Policy Review Group

- 1.9 The Report of the Flood Policy Review Group, published in 2004 following Government approval of its recommendations, including the decision that the OPW should be the lead agency for implementing flood risk management policy in Ireland, highlighted the need to pro-actively manage flood risk. A particular emphasis was placed in the report on the need to avoid or minimise potential future increases in risk. The Report recognised that planning and development management should be a key component of the strategy for

achieving this objective, and set requirements for the OPW, DEHLG and local authorities in this regard. The OPW advises Government in relation to policy development and legislative requirements for flood risk management, and develops, coordinates and implements programmes and measures to reduce the national level of flood risk. These Guidelines have been developed as a direct response to the report above.

1.10 A number of other policy documents have been published by the Government in recent years, which cover issues relevant to flooding. These include:

- :: Sustainable Development: A Strategy for Ireland (1997);
- :: National Climate Change Strategy (2000);
- :: Making Ireland's Development Sustainable (2002);
- :: National Biodiversity Plan, 2002-2006;
- :: National Spatial Strategy, 2002-2020;
- :: A Framework for Major Emergency Management (2006);
- :: National Development Plan, 2007-2013; and
- :: National Climate Change Strategy, 2007-2012.

1.11 The key messages arising from these documents are that:

- :: Government recognises the significance of flood risk and the need to integrate flood risk assessment and its management into the planning process in order to deliver a policy of avoidance or minimisation of potential future flood risk, and as part of a range of responses to flooding including risk evaluation, flood forecasting and warning, emergency-response systems and capital projects of an engineering nature;
- :: Proper planning and sustainable development may at the same time require in exceptional circumstances some development in areas of flood risk, provided that the issue of flood risk is managed appropriately;
- :: Implications for biodiversity should be considered at all stages of flood risk assessment and its management;
- :: Climate change is a dynamic process that requires a precautionary and flexible approach to ensure appropriate provision for, or adaptation to, its potential consequences; and
- :: Investment in flood risk management under the National Development Plan needs to be focused on the areas of greatest need through a strategically led flood risk management approach.

- 1.12 In addition, implementation of these Guidelines will need to be integrated with the ongoing implementation of relevant EU Directives on water quality and flooding that recognise the importance of managing the water environment on a catchment or river basin basis.

¹Council Directive 2000/ 60/ EC of 23 October 2000 establishing a framework for Community action in the field of water policy ("the Water Framework Directive") Official Journal L197/ 30-37.

:: In this regard, the Water Framework Directive (WFD)¹ has established the overall concept of river basin management embodied in River Basin Management Plans (RBMPs) to enable all rivers and coastal waters to achieve good ecological status by 2015. River Basin Districts made up of groupings of local authorities have been established and are finalising the relevant management plans.

²Directive 2007/ 60/ EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risk: Official Journal L288/ 27-34.

:: The 'Floods' Directive² requires Member States to undertake a national preliminary flood risk assessment by 2011 to identify areas where significant flood risk exists or might be considered likely to occur. Member States are also required to prepare catchment-based Flood Risk Management Plans (FRMPs), by 2015, that will set out flood risk management objectives, actions and measures. In Ireland, the OPW is responsible for overall implementation of the Floods Directive. Under the Floods Directive, the EU recognises the importance of land use management and spatial planning as a key tool in flood risk management.

- 1.13 Preparation of River Basin Management Plans (RBMPs) under the Water Framework Directive, catchment-based Flood Risk Management Plans (FRMPs) under the Floods Directive and flood risk assessment within the planning process will in the longer term promote integrated river basin management and sustainable development. In addition, plans and projects arising from the integration of flood risk assessment into the planning process, must where there are implications for sensitive habitats, be subject to appropriate assessment of plans and projects under the Birds and Habitats Directives³ (see also paragraph 3.14).

³ Council Directive 79/ 409/ EEC of 2 April 1979 establishing the Birds Directive on the conservation of wild birds and Council Directive 92/ 43/ EEC of 21 May 1992 establishing the Habitats Directive on the conservation of natural habitats and of wild fauna and flora.

- 1.14 To recap, Fig. 1.1 summarises what integrating flood risk into the planning process is about.

Policy Documents / Instruments	Flood Risk Assessment Technique	Decision-making Tools	Key Chapters
National Spatial Strategy, National Planning Guidelines	Flood Risk Management Guidelines	n/a	1 2
Regional planning guidelines	Regional Flood Risk Appraisal, Catchment Flood Risk Management Plans	Sequential approach, Strategic Environmental Assessment	3 4
City / county development plan	Strategic Flood Risk Assessment, Catchment Flood Risk Management Plans	Sequential approach, dev. plan Justification Test, SEA	3 4
Local area plan	Strategic Flood Risk Assessment	Sequential approach, dev. plan Justification Test, SEA	3 4
Master plan, non-statutory plan, site brief	Site-specific Flood Risk Assessment	Sequential approach, dev. plan Justification Test, SEA / Env. Impact Assessment	3 5
Planning application	Site-specific Flood Risk Assessment	Sequential approach, dev. management Justification Test, EIA	3 5

Fig. 1.1: Flood risk management and the planning system

Chapter

2



Flooding - Key Concepts

Key Messages

- Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land by water and presents a risk only when people, their property and/or environmental assets are present in the area which floods.
- Understanding flood risk is an essential step in managing the associated impacts of flooding and in making informed decisions in addressing such impacts. The science is complex, and datasets are currently being enhanced by detailed studies. Therefore, these Guidelines recommend a staged approach.
- High level regional appraisals, strategic assessments at county/city level and more detailed site specific assessments of flood risk, taking account of the impacts of climate change, will need to be carried out by regional, local authorities and developers respectively.

Types and causes of flooding

2.1 Different types of flooding present different forms and degrees of danger to people, property and the environment, due to varying depth, velocity, duration, rate of onset and other hazards associated with flooding. With climate change, the frequency, pattern and severity of flooding are expected to change, becoming more uncertain and more damaging.

2.2 There are essentially two major causes of flooding:

Coastal flooding which is caused by higher sea levels than normal, largely as a result of storm surges, resulting in the sea overflowing onto the land. Coastal flooding is influenced by the following three factors, which often work in combination:

- :: High tide level;
- :: Storm surges caused by low barometric pressure exacerbated by high winds (the highest surges can develop from hurricanes); and
- :: Wave action which is dependent on wind speed and direction, local topography and exposure.

Inland flooding which is caused by prolonged and/or intense rainfall. Inland flooding can include a number of different types:

- :: *Overland flow* occurs when the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. This excess water flows overland, ponding in natural hollows and low-lying areas or behind obstructions. This occurs as a rapid response to intense rainfall and eventually enters a piped or natural drainage system.
- :: *River flooding* occurs when the capacity of a watercourse is exceeded or the channel is blocked or restricted, and excess water spills out from the channel onto adjacent low-lying areas (the floodplain). This can occur rapidly in short steep rivers or after some time and some distance from where the rain fell in rivers with a gentler gradient.
- :: *Flooding from artificial drainage systems* results when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity and the system becomes blocked, and / or cannot discharge due to a high water level in the receiving watercourse. This mostly occurs as a rapid response to intense rainfall. Together with overland flow, it is often known as pluvial flooding. Flooding arising from a lack of capacity in the urban drainage network has become an important source of flood risk, as evidenced during recent summers.

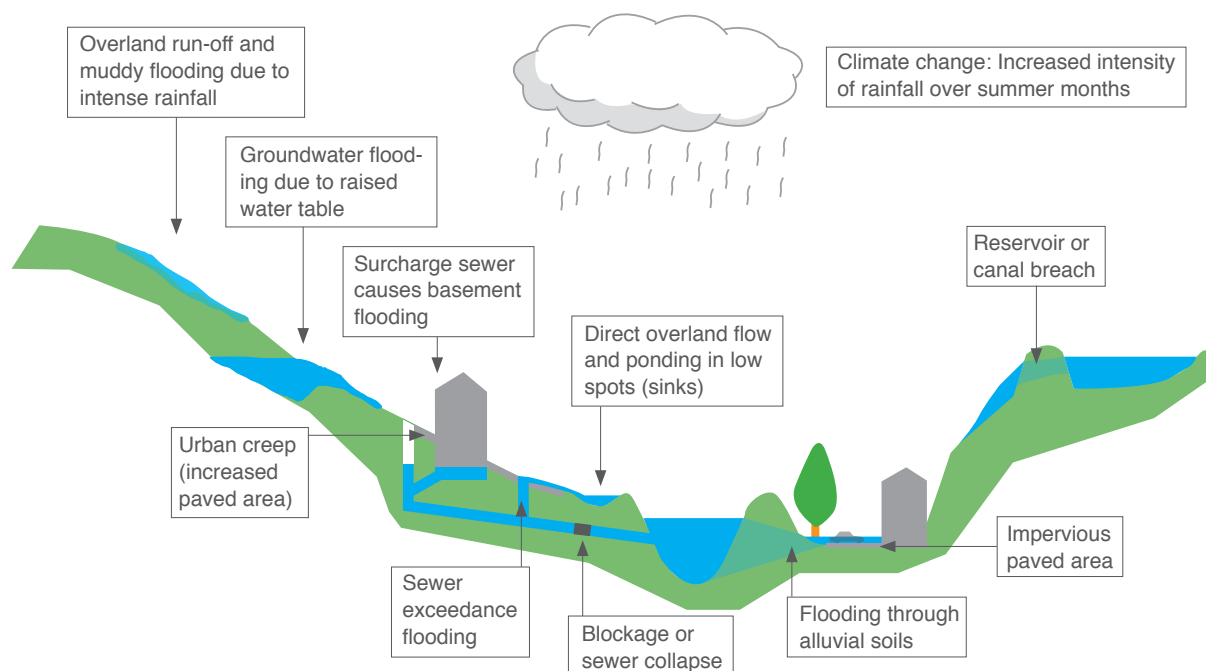


Fig. 2.1: Principal causes and types of flooding

- :: *Groundwater flooding* occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it, i.e. when the capacity of this underground reservoir is exceeded. Groundwater flooding tends to be very local and results from interactions of site-specific factors such as tidal variations. While water level may rise slowly, it may be in place for extended periods of time. Hence, such flooding may often result in significant damage to property rather than be a potential risk to life.
- :: *Estuarial flooding* may occur due to a combination of tidal and fluvial flows, i.e. interaction between rivers and the sea, with tidal levels being dominant in most cases. A combination of high flow in rivers and a high tide will prevent water flowing out to sea tending to increase water levels inland, which may flood over river banks.

2.3 Flooding can also arise from the **failure of infrastructure** designed to store or carry water (e.g. the breach of a dam, a leaking canal, or a burst water main), or to protect an area against flooding (e.g. breach of a flood defence, failure of a flap valve or pumping station or blockage of a pipe or culvert). Because of the sudden onset, the impacts of this form of flooding can be severe and where appropriate should be assessed.

2.4 **Coastal erosion** of both the foreshore and the shoreline itself is intimately linked with coastal flooding. The loss of natural coastal defences, such as sand dunes, due to erosion (or mechanical removal of sand) can increase the risk of flooding in coastal areas. Coastal erosion should therefore be considered in coastal areas within the planning process, although this issue is not specifically within the focus of these Guidelines.

2.5 Increases in flood risk as a result of new development may be caused:

- :: *Upstream* by restricting the capacity and conveyance function of the watercourse and floodplain system; or
- :: *Downstream* by decreasing the volume available for flood storage on the floodplain, altering flow routes on the floodplain or by changes to the channel which can increase the flow discharged to downstream locations; and by increasing run-off due to changes in land management and introducing surfaces with reduced permeability, such as roads, roofs and car parks.



River and coastal flooding in Dublin, 2002 (Source: Dublin City Council)



River flooding in Clonmacnoise

Impacts of flooding

- 2.6 *Impacts on people and communities* – Flooding can cause physical injury, illness and loss of life. Deep, fast flowing or rapidly rising flood waters can be particularly dangerous. For example, even shallow water flowing at 2 metres per second (m/sec) can knock children and many adults off their feet, and vehicles can be moved by flowing water of only 300mm depth. The risks increase if the floodwater is carrying debris. Some of these impacts may be immediate, the most significant being drowning or physical injury due to being swept away by floods. Floodwater contaminated by sewage or other pollutants (e.g. chemicals stored in garages or commercial properties) is particularly likely to cause such illnesses, either directly as a result of contact with the polluted floodwater or indirectly as a result of sediments left behind. Flood water may also hide other hazards for wading pedestrians, such as manhole openings where the covers have been lifted by flood flows. Those most likely to be at risk are those outdoors on foot or in a vehicle, in a tent or caravan, or in a building, such as a single-storey bungalow or below ground in a basement.
- 2.7 The impact on people and communities as a result of the stress and trauma of being flooded, or even of being under the threat of flooding, can be immense. Long-term impacts can arise due to chronic illnesses and the stress associated with being flooded and the lengthy recovery process.
- 2.8 The ability of people to respond and recover from a flood can vary. Vulnerable people, such as those who are old, disabled or have a long-term illness, are less able to cope with floods than others. Some people may have difficulty in replacing household items damaged in a flood and may lack the financial means to recover and maintain acceptable living conditions after a flood.
- 2.9 The 2006 Framework for Major Emergency Management enables the principal response agencies such as An Garda Síochána, the Health Service Executive and local authorities to prepare for and make a co-ordinated response to a variety of major emergencies including flooding. A guidance and protocol document has been developed in conjunction with the OPW for responding to flood events (see <http://www.mem.ie>).

- 2.10 *Impacts on property* - Flooding can cause severe damage to properties. Floodwater is likely to damage internal finishes, contents and electrical and other services and possibly cause structural damage. The physical effects can have significant long-term impacts, with re-occupation sometimes not being possible for over a year. The costs of flooding are increasing, partly due to increasing amounts of electrical and other equipment within developments. Sea-water flooding may cause additional damage due to corrosion.
- 2.11 *Impacts on Infrastructure* - The damage flooding can cause to businesses and infrastructure, such as transport or utilities like electricity and water supply, can have significant detrimental impacts on local and regional economies. Flooding of primary roads or railways can deny access to large areas beyond those directly affected by the flooding for the duration of the flood event, as well as causing damage to the road or railway itself. Flooding of water distribution infrastructure such as pumping stations or of electricity sub-stations can result in loss of water or power supply over large areas. This can magnify the impact of flooding well beyond the immediate community. The long-term closure of businesses, for example, can lead to job losses and other economic impacts.
- 2.12 *Impacts on the environment* - Significant detrimental environmental effects of flooding can include soil erosion, bank erosion, land sliding and damage to vegetation as well as the impacts on water quality, habitats and flora and fauna caused by bacteria and other pollutants carried by flood water. Flooding can however play a beneficial role in natural habitats. Many wetland habitats are dependant on annual flooding for their sustainability and can contribute to the storage of flood waters to reduce flood risk elsewhere.



Tolka Valley Wetlands, Dublin

Flood risk

- 2.13 Understanding flood risk is a key step in managing the impacts of flooding. Flood risk is a combination of the likelihood of flooding and the potential consequences arising. These Guidelines recommend a staged approach to flood risk assessment that covers both the likelihood of flooding and the potential consequences.
- 2.14 There are two components of flood risk that must be considered in applying this guidance in a consistent manner:
- :: Likelihood of flooding is normally defined as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. For example, a 1% probability indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year.
 - :: Consequences of flooding depend on the hazards associated with the flooding (e.g. depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality), and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the population, the type of development, presence and reliability of mitigation measures etc).

Flood risk is then normally expressed in terms of the following relationship:

$$\text{Flood risk} = \text{Likelihood of flooding} \times \text{Consequences of flooding}$$

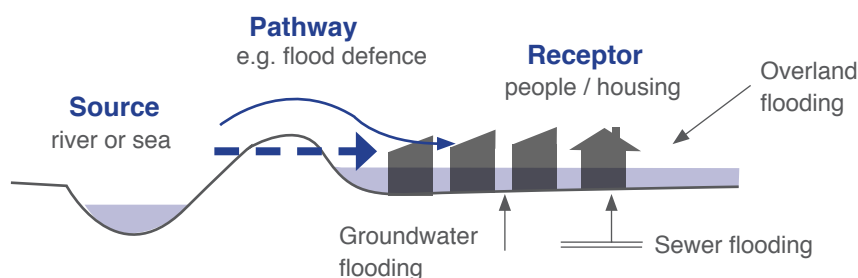


Construction of new masonry wall as part of OPW flood relief scheme in Kilkenny

- 2.15 Flood risk can be measured in monetary terms, as a potential for loss of life or injury, as environmental impacts, or as combinations of all these indicators. Guiding proposed development to areas where the risks arising from inundation in terms of human impact, economic loss or potential environmental damage is minimised, is a key tenet of this guidance.
- 2.16 The vulnerability of development to flooding depends on the nature of the development, its occupation and the construction methods used. For example, a sheltered housing complex would be more vulnerable than a retail unit. A broad classification of vulnerability has been developed (see chapter 3). The classification of different land uses and types of development as highly vulnerable, less vulnerable and water-compatible is influenced primarily by the ability to manage the safety of people in flood events and the long-term implications for recovery of the function and structure of buildings.
- 2.17 Transport and strategic utilities infrastructure can be particularly vulnerable to flooding because interruption of their function can have widespread effects well beyond the area that is flooded. This reinforces the need for decisions to locate development in areas at risk of flooding to be fully justified with regard to wider proper planning and sustainable development considerations (see chapter 3). This was a key lesson learned from recent floods in Ireland when national primary roads and railway lines were flooded, and also the summer 2007 floods in the UK, during which water supply to large areas was cut off for a number of weeks.

Flood risk assessment

- 2.18 The assessment of flood risk requires an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets affected by it (i.e. the receptors).



The Source-Pathway-Receptor Model is described in greater detail in Appendix A.

Fig. 2.2: Source-Pathway-Receptor Model

2

2.19 The principal sources are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. The receptors can include people, their property and the environment. All three elements must be examined as part of the flood risk assessment including the vulnerability and exposure of receptors to determine its potential consequences. Mitigation measures typically used in development management can reduce the impact on people and communities, for example, by blocking or impeding pathways but they have little or no effect on the sources of flooding. The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk.

2.20 Risks to people, property and the environment should be assessed over the full range of probabilities, including extreme events. The flood risk assessment should cover all sources of flooding, including the effects of run-off from a development on flood risk both locally and beyond the development site.

2.21 A staged approach should be adopted, carrying out only such appraisal and or assessment as is needed for the purposes of decision-making at the regional, development and local area plan levels, and also at the site specific level. The stages of appraisal and assessment are:

Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

Stage 3 Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

The staged approach to flood risk assessment is outlined further in Appendix A.

- 2.22 At regional level the focus will be on Stage 1 (identification of flood risk), where, in general, the need for more detailed flood risk assessment is flagged for city/county and local area plans. County development plans / LAPs may require all three stages depending on the nature of the flood risk and extent of development proposed. Further information on the hierarchy of regional, strategic and site specific flood risk assessments and their application within the planning system, along with sources of information to support the assessments, such as the flood mapping being produced under the CFRAMS programme, is contained in chapters 4 and 5 and Appendix A.

Flood zones

- 2.23 Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three types or levels of flood zones defined for the purposes of these Guidelines:

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);

Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and

Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.



Fig. 2.3: Indicative flood zone map extract

Further guidance on flood zones is available in chapter 3 and Appendix A.

2.24 These flood zones are determined on the basis of the probability of river and coastal flooding only and should be prepared by suitably qualified experts with hydrological experience. The limits of the zones are broadly in line with those in common usage internationally. They are based on the current assessment of the 1% and the 0.1% fluvial events and the 0.5% and 0.1% tidal events, without the inclusion of climate change factors. Climate change impacts are discussed later. The lower probability for coastal flooding reflects the generally more dynamic nature of coastal flooding which often presents a greater risk to life than river flooding. The 0.1% limit is provided in order to guide highly vulnerable development away from areas where flooding is relatively rare but can occur. Floodplains will primarily be found in Zones A and B. In rivers with a well defined floodplain or where the coastal plain is well defined at its rear, the limits of Zones A and B will virtually coincide. Zone B will only be significantly different in spatial extent from Zone A where there is extensive land with a gentle gradient away from the river or the sea. It is in these extensive Zone B areas that less vulnerable development will be allowed to proceed without recourse to the Justification Test (see further discussion on floodplains at paragraph 2.34).

2.25 The provision of flood protection measures in appropriate locations, such as in or adjacent to town centres, can significantly reduce flood risk. However, the presence of flood protection structures should be ignored in determining flood zones. This is because areas protected by flood defences still carry a residual risk of flooding from overtopping or breach of defences and the fact that there may be no guarantee that the defences will be maintained in perpetuity. The likelihood and extent of this residual risk needs to be considered, together with the potential impact on proposed uses, at both development plan and development management stages, as well as in emergency planning and applying the other requirements of these Guidelines in chapter 3. In particular, the finished floor levels within protected zones will need to take account of both urban design considerations and the residual risk remaining.

2.26 The flood zones described above are indicative of river and coastal flooding only. They should not be used to suggest that any areas are free from flood risk, since they do not include the effects of other forms of flooding such as from groundwater or artificial drainage systems.



Construction of flood protection wall and demountable barriers in Clonmel

Further guidance on flood zones is available in chapter 3 and Appendix A.

Climate change and flood risk assessment

2.27 The fourth assessment report of the IPCC concluded that warming of the climate is unequivocal¹. There is a growing scientific consensus that these changes are expected to increase flood risk. In addition, climate change could also influence environmental and socio-economic factors such as national prosperity and social cohesion. The expected effects will most likely be felt first by the most vulnerable in society. While the different global emission scenarios and climate-change models may lead to substantially different positions by the end of this century, the trends for the next 20-30 years do not differ significantly.

¹Inter-Governmental Panel on Climate Change (IPCC), 4th assessment report. "Climate Change 2007".

2.28 Rising sea levels and more frequent and more severe coastal storms will significantly increase the risk of coastal and estuarial flooding as well as that of coastal erosion. For example, the flooding that occurred in Dublin in 2002, when a 1 metre surge coincided with one of the highest spring tides of the year, could change from a relatively rare to a more common occurrence. Assuming a correlation between the rate of sea-level rise and the rate of coastal erosion, the current rate of coastal erosion and the consequential economic impacts of flooding are expected to multiply over the next century. Where the floodplain or coastal plain is well defined, climate change is expected to change the probability of flooding and the depth for a particular event with little change in spatial extent. Only where extensive areas of land rise gently from the river or the sea is climate change expected to significantly increase the area affected by flooding.

2.29 Specific advice on the expected impacts of climate change and on appropriate allowances for sea-level rises, increased river flood flows etc., in relation to flood risk management, are provided on the OPW website (<http://www.opw.ie>).

2.30 There is a great deal of uncertainty in relation to the potential effects of climate change, and therefore a precautionary approach should be adopted. Examples of the precautionary approach include:

- :: Recognising that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopting a cautious approach to zoning land in these potential transitional areas;
- :: Ensuring that the levels of structures designed to protect against flooding, such as flood defences, land-raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect; and
- :: Ensuring that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.



South Wall, Dublin Bay

Flood risk management

- 2.31 Parallel to flood risk assessment by regional and local authorities, flood risk management under the EU Floods Directive mentioned earlier and being overseen by the OPW, aims to minimise the risks arising from flooding to people, property and the environment. Minimising risk can be achieved through structural measures that block or restrict the pathways of floodwaters, such as river or coastal defences, or non-structural measures that are often aimed at reducing the vulnerability of people and communities, such as flood warning, effective flood emergency response, or resilience measures (e.g. public preparedness for flood events - see <http://www.flooding.ie>) for communities or individual properties.
- 2.32 Under the Floods Directive catchment-based Flood Risk Management Plans (FRMPs) are currently being developed by the OPW in partnership with local authorities, the EPA and other relevant Departments, to provide the focal point and strategic direction for flood risk management in Ireland. These Plans, which will be co-ordinated with the Water Framework Directive (WFD) River Basin Management Plans (RBMPs), will be a key input into future regional planning guidelines and development plans, and will establish a prioritised set of flood risk management measures for their relevant areas, including the use of structural and non-structural responses as outlined above.
- 2.33 Planning can have a significant role to play with respect to flood risk management, in particular in ensuring that future development needs avoid or minimise future increases in flood risk. The planning process therefore constitutes a parallel, but inter-dependent process to that of flood risk management.



Clare Abbey flooding

Floodplains

- 2.34 A major function performed by the floodplain and wetlands is to hold excess water until it can be released slowly back into a river system or seep into the ground as a storm subsides. Floodplains have, therefore, a valuable function both in attenuating or storing floodwater and through their ability to convey floodwater in a relatively controlled and safe way. Areas of floodplain and wetlands should, therefore, be recognised and preserved to the extent possible as natural defences against flood risk. It is important to identify and, where possible, safeguard areas of floodplain against development in both urban and rural areas. By retaining open spaces for storage and conveyance of floodwater, flood risk to both upstream and downstream areas can be more effectively managed without reliance on flood defences. This is an important element of the now internationally accepted philosophy of “leaving space for water”. The Department has commenced the preparation of good practise guidance on constructed wetlands which will look at, inter alia, the use and performance of constructed wetlands in the attenuation of flood hazard. It is intended that this guidance will be published for consultation before the end of the year.

Sustainable Drainage Systems (SuDS)

2.35 Development of previously 'green', or permeable, land within an urban area (such as gardens) increases the impermeable area. Rain falling on impervious surfaces is usually directed into a receiving watercourse through surface water drainage systems. Although such drainage systems are effective at transferring surface water quickly, they provide only limited attenuation causing the volume of water in the receiving watercourse to increase more rapidly and increasing flood risk. Sustainable Drainage Systems (SuDS) can play a role in reducing and managing run-off to surface water drainage systems as well as improving water quality and contributing to local amenity. SuDS comprise a wide range of techniques, including swales, basins, ponds and infiltration systems. In this context the Department is currently reviewing its document "Recommendations for Site development Works for Housing Areas" which traditionally was used to provide guidance on design standards for smaller drainage systems. The aim of this review is to set out best practice in regard to the use of Sustainable Drainage Systems in respect of surface water drainage.

Further guidance on the design and implementation of SuDS is provided in Appendix B.

2.36 A small-scale yet practical example of a sustainable drainage system (SuDS) is the use of permeable pavements which can help to reduce run-off rates and flow volumes from parking areas as well as access roads. Permeable pavements allow rain-water to infiltrate through the paved surface and into underlying layers and sometimes storage containers allowing gradual release of water after periods of heavy rainfall. Permeable pavement techniques include the use of porous tarmac or solid block pavers with gaps to provide through flow of water.



Permeable drainage channel

2.37 With regard to the increasingly frequent trend of paving over entire residential garden areas to provide off street car parking or hard landscaping under the exempted development provisions of planning legislation, the Department intends to review such provisions to ensure that only those complying with sustainable drainage principles will be exempted thus limiting the run-off which would otherwise contribute to overwhelming the drainage systems.

2.38 In the interim, in considering planning applications for new or extensions to residential development, which include significant hard surfacing, planning authorities should seek to reduce the extent of hard surfacing and paving as well as requiring the use of sustainable drainage techniques, through discussions at the consultation stage, including in particular permeable paving or surfaces such as gravel or slate chippings.



Bioretention device used as part of a Sustainable Drainage System

Chapter

3



Principles and Key Mechanisms

Key Messages

The key principles of a risk-based sequential approach to managing flood risk in the planning system are set out in this chapter. They are:

- **Avoid** development in areas at risk of flooding;
If this is not possible, consider substituting a land use that is less vulnerable to flooding.
Only when both avoidance and **substitution** cannot take place should consideration be given to **mitigation and management of risks**.
- Inappropriate types of development that would create unacceptable risks from flooding should not be planned for or permitted.
- **Exceptions** to the restriction of development due to potential flood risks are provided for through the use of a **Justification Test**, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated.

Planning principles

- 3.1 The principle actions when considering flood risk management in the planning system are:
1. Flood hazard and potential flood risk from all sources should be identified and considered at the **earliest stage** in the planning process and as part of an overall hierarchy of national responses coupled to regional appraisal and local and site-specific assessments of flood risk.
 2. Development should preferentially be located in areas with little or no flood hazard thereby **avoiding** or minimising the risk. Development in the context of these Guidelines includes all construction, such as transport and utility infrastructure as well as residential and other buildings.
 3. Development should only be permitted in areas at risk of flooding when there are no alternative, reasonable sites available in areas at lower risk that also meet the objectives of proper planning and sustainable development.
 4. Where development is necessary in areas at risk of flooding an appropriate land use should be selected.
 5. A **precautionary approach** should be applied, where necessary, to reflect uncertainties in flooding datasets and risk assessment techniques and the ability to predict the future climate and performance of existing flood defences. Development should be designed with careful consideration to possible future changes in flood risk, including the effects of climate change and / or coastal erosion so that future occupants are not subject to unacceptable risks.

6. Decisions on the location of development may be required *before* development plans have been fully reviewed in accordance with these Guidelines and prior to the availability of appropriate flood risk mapping. In such circumstances a planning authority may choose to:
 - i) Vary the development plan to facilitate appropriate development provided that the variation is accompanied by a rigorous assessment of flood risk in accordance with these Guidelines and the application of the Justification Test where necessary;
 - ii) Assess the proposal in accordance with the approach outlined in chapter 5 (5.27); and/or,
 - iii) Await the review of the development plan in accordance with these Guidelines, where such as review is imminent.
7. Land required for current and future flood management, e.g. conveyance and storage of flood water and flood protection schemes, should be pro-actively identified on development plan and LAP maps and safeguarded from development.
8. Flood risk to, and arising from, new development should be managed through location, layout and design incorporating Sustainable Drainage Systems and compensation for any loss of floodplain as a precautionary response to the potential incremental impacts in the catchment.
9. Strategic environmental assessment (SEA) of regional planning guidelines, development plans and local area plans should include flood risk as one of the key environmental criteria against which such plans are assessed where flood risk has been identified. The SEA process provides an opportunity to assess and consider flood risk with respect to other planning and environmental considerations and should be used to show how the sequential approach to managing flood risks has been executed.

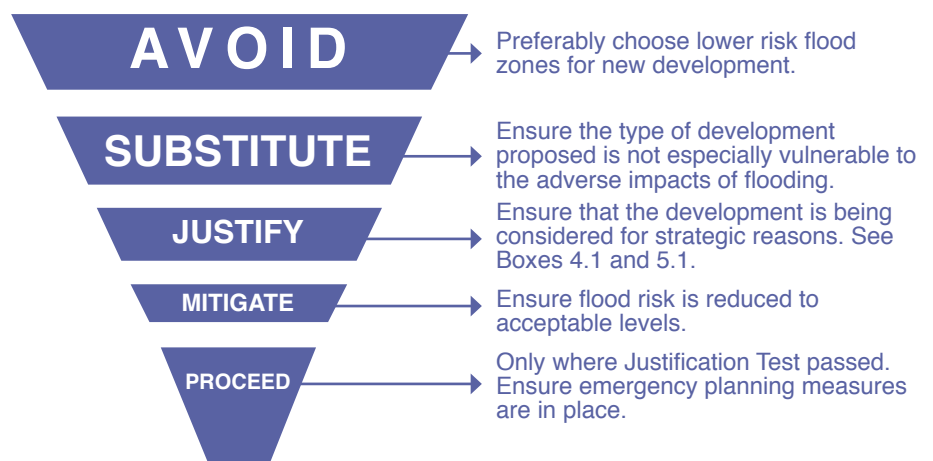


Fig. 3.1 sets out the broad philosophy underpinning the sequential approach in flood risk management, while Fig. 3.2 describes its mechanism for use in the planning process.

Fig. 3.1: Sequential approach principles in flood risk management

Sequential approach

- 3.2 A sequential approach to planning is a key tool in ensuring that development, particularly new development, is first and foremost directed towards land that is at low risk of flooding. Sequential approaches are already established and working effectively in other areas in the plan making and development management processes (e.g. retail planning). The sequential approach described in Fig. 3.1 should be applied to all stages of the planning and development management process. It is of particular importance at the plan-making stage but is also applicable in the layout and design of development within a specific site at the development management stage. Fig. 3.1 sets out the broad philosophy underpinning the sequential approach in flood risk management, while Fig. 3.2 describes its mechanism for use in the planning process.

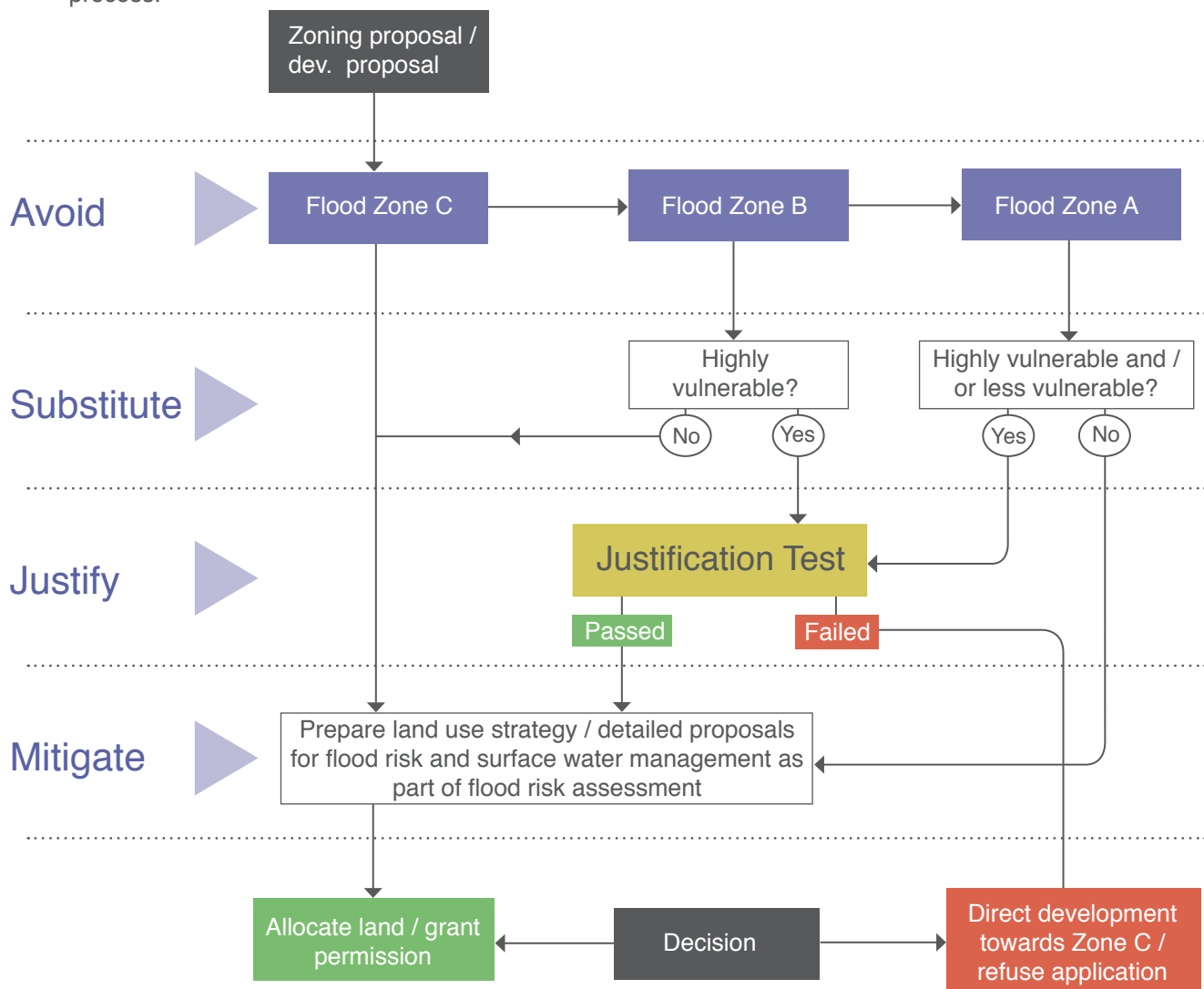


Fig. 3.2: Sequential approach mechanism in the planning process

3

- 3.3 The sequential approach makes use of flood risk assessment and of prior identification of flood zones for river and coastal flooding and classification of the vulnerability to flooding of different types of development, as illustrated in Table 3.1. It is essential that the risk potentially arising from other sources of flooding should also be taken into account in all areas and at all stages of the planning process.
- 3.4 As outlined in paragraph 2.25 the flood zones ignore the presence of defences. Areas that benefit from an existing flood relief scheme or flood defences have a reduced probability of flooding but can be particularly vulnerable due to the speed of flooding when overtopping or a breach or other failure takes place. Because this residual risk of flooding remains, the sequential approach and the Justification Test apply to such defended locations. The range of residual risks is described in Appendix A.

- 3.5 In summary, the planning implications for each of the flood zones are:

Zone A - High probability of flooding. Most types of development would be considered inappropriate in this zone. Development in this zone should be avoided and/or only considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the Justification Test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation, would be considered appropriate in this zone.

Zone B - Moderate probability of flooding. Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone, unless the requirements of the Justification Test can be met. Less vulnerable development, such as retail, commercial and industrial uses, sites used for short-let for caravans and camping and secondary strategic transport and utilities infrastructure, and water-compatible development might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone C and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to and from the development can or will adequately be managed.

Zone C - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

Further details on the flood zones is contained in Chapter 2.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	<p>Garda, ambulance and fire stations and command centres required to be operational during flooding;</p> <p>Hospitals;</p> <p>Emergency access and egress points;</p> <p>Schools;</p> <p>Dwelling houses, student halls of residence and hostels;</p> <p>Residential institutions such as residential care homes, children's homes and social services homes;</p> <p>Caravans and mobile home parks;</p> <p>Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and</p> <p>Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.</p>
Less vulnerable development	<p>Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions;</p> <p>Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;</p> <p>Land and buildings used for agriculture and forestry;</p> <p>Waste treatment (except landfill and hazardous waste);</p> <p>Mineral working and processing; and</p> <p>Local transport infrastructure.</p>
Water-compatible development	<p>Flood control infrastructure;</p> <p>Docks, marinas and wharves;</p> <p>Navigation facilities;</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;</p> <p>Water-based recreation and tourism (excluding sleeping accommodation);</p> <p>Lifeguard and coastguard stations;</p> <p>Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).</p>
*Uses not listed here should be considered on their own merits	

Table 3.1 Classification of vulnerability of different types of development

- 3.6 Tables 3.1 and 3.2 illustrate those types of development that would be appropriate to each flood zone and those that would be required to meet the Justification Test. Inappropriate development that does not meet the criteria of the Justification Test should not be considered at the plan-making stage or approved within the development management process.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

Justification Test

- 3.7 Notwithstanding the need for future development to avoid areas at risk of flooding, it is recognised that the existing urban structure of the country contains many well established cities and urban centres, which will continue to be at risk of flooding. At the same time such centres may also have been targeted for growth in the National Spatial Strategy, regional planning guidelines and the various city and county development plans taking account of historical patterns of development and their national and strategic value. In addition, development plans have identified various strategically located urban centres and particularly city and town centre areas whose continued growth and development is being encouraged in order to bring about compact and sustainable urban development and more balanced regional development. Furthermore, development plan guidelines, issued by the Minister for the Environment, Heritage and Local Government under Section 28 of the Planning and Development Act 2000, have underlined the importance of compact and sequential development of urban areas with a focus on town and city centre locations for major retailing and higher residential densities.
- 3.8 The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of particular developments that, for the reasons outlined above, are being considered in areas of moderate or high flood risk. The test is comprised of two processes.
- :: The first is the **Plan-making Justification Test** described in chapter 4 and used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.

- :: The second is the **Development Management Justification Test** described in chapter 5 and used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Flooding and Strategic Environmental Assessment

- 3.9 The Planning Guidelines for Strategic Environmental Assessment (SEA) (DEHLG, 2004) outline an integrated process for SEA and plan-making. SEA is required to be undertaken for regional planning guidelines, development plans and variations, many local area plans and SDZ planning schemes.
- 3.10 The SEA process provides a good practice framework for scoping and considering a range of planning and environmental issues, including flooding in the plan making process. Flood risk assessments carried out in response to these Guidelines should be integrated with the SEA process in, for example, a distinct chapter of the SEA where a full environmental report is required. Where SEA and the environmental report is required, flood risk assessment should be undertaken as early as possible in the process so that the SEA is fully informed of the flood risks and impacts of the proposed zoning or development (See Appendix A).

Flood risk assessment and Environmental Impact Assessment

- 3.11 At the project level, development either exceeding the specified thresholds for Environmental Impact Assessments (EIA) or development under the thresholds but with significant environmental effects and in an area at risk of flooding will require EIS. Flood risk will therefore need to be an integral part of the EIA process. Screening for EIA should be an integral element of all planning applications in an area at risk of flooding. For further details on how EIA would be applied see paragraph 5.18.
- 3.12 As indicated in the Department's Circular Letter SEA 1/ 08 & NPWS 1/ 08, appropriate assessments are required for plans and programmes potentially affecting Natura 2000 sites under the EU Birds and Habitats Directives. These assessments provide a structured process within which the flood risk assessment should relate. Important aspects of the processes are outlined in more detail in chapter 4.

Chapter

4



Flooding and Spatial Planning

Key Messages

- Flood risk management should be integrated into spatial planning policies at all levels to enhance certainty and clarity in the overall planning process.
- The existing Strategic Environmental Assessment (SEA) process for plans should be harnessed as a mechanism within which the identification and assessment of flood risk should be aligned.
- Regional planning guidelines should address flood risk by carrying out flood risk appraisal at a strategic level, focusing on the identification of the need for better co-ordination of local plans within their areas and between regional authority areas.
- Development plans should address flood risk by having the necessary flood risk assessments, including mapping of flood zones, in place at the critical decision making phases and the consideration of any subsequent amendments.
- The application of the sequential approach and, in some exceptional cases, the Justification Test should be used by planning authorities in successfully and transparently incorporating flood risk into the decision-making process on development plans and enabling town centre and minor infill developments to proceed. Development plans must include a statement of how the Guidelines have been implemented.

Flooding and the National Spatial Strategy

- 4.1 National planning policy supports the consideration of flood risk management as an important part of achieving proper planning and sustainable development. The National Spatial Strategy (NSS) sets out a framework within which a more balanced and sustainable pattern of development can be achieved. Spatial planning at regional and local levels is an essential part of the overall implementation mechanisms for the NSS and planning at these levels should address the suitability of locations for development including considerations relating to flood risk. Chapter 2 illustrated how flood risk assessment can be undertaken at a range of scales relevant to the planning process.

Flooding and regional planning guidelines

- 4.2 Regional planning guidelines (RPGs) are essential in translating the overall national approach of the NSS to the regional authority level, providing a framework for greater co-ordination of local authorities and their development plans. RPGs were adopted in 2004 and are statutorily reviewed every 6 years. Therefore, the next round of RPGs will need to take account of these Guidelines in addressing the issue of flood risk. Flood risk at the regional level will focus on identification and initial appraisal and should include the following:
- :: Incorporate **a high level flood risk appraisal** as part of the existing SEA process for the preparation of regional planning guidelines;
 - :: Identify **high level flood risk and spatial planning issues** for the area covered by the RPGs;
 - :: Set out a **high level policy framework for development plans and local area plans** of planning authorities to address the flood risk issues identified at a regional level; and
 - :: Outline, with due consideration of the national flood risk assessment and management planning programme, any **further requirements for flood risk assessments and/or studies** at local authority level.
- 4.3 Regional authorities should work closely with other agencies, such as the OPW, DEHLG, local authorities and other agencies, including neighbouring regional authorities, in addressing the spatial planning implications of flooding at the regional level.

Regional Flood Risk Appraisal and SEA

- 4.4 Consideration of flood risk within the RPG process, as set out above, should be strategic in nature and regional in scope (i.e. bearing in mind that more detailed assessments will be carried out when development plans and LAPs are being prepared) and ideally should be an integral part of the SEA process. It will generally comprise of flood risk identification stage outlined in chapter 2 and described in more detail in Appendix A.
- 4.5 A regional level flood risk appraisal (RFRA) generally comprises a desktop study, drawing upon existing published sources of information, such as those identified in Appendix A, working with the OPW, DEHLG and making use of knowledge supplied by the constituent local authorities in each regional authority area. The appraisal should confirm the nature and sources of flooding that may affect the region and identify it on a broad, locational basis. It should

also appraise the availability and adequacy of existing information on flood risk and the possible impact of proposed development on flood risk outside the region.

4.6 Key outputs from a regional level flood risk appraisal include the following:

- :: Summary plans/figures and **statement** showing the broad spatial distribution of flood risk and any potential conflicts with growth/development areas;
- :: Supplementary description of any areas of a region where addressing flood risk is especially important – e.g. central urban areas in Gateways or areas of development pressure, with a view to highlighting these as priority locations for further assessment of flood risk, and / or the need for coordinated action at development plan level.
- :: Suggested policies for sustainable flood risk management for incorporation into the regional planning guidelines (RPGs); and
- :: Guidance on the preparation of city and county level SFRAs and the management of surface water run-off within new development, highlighting significant flood risk issues, potential infrastructure investment requirements and the need for co-operation between planning authorities and identifying any need for more detailed assessment.

Integrating RFRA and SEA processes

- 4.7 Scoping of the SEA will normally include flood risk as an environmental criterion and the preparation of the relevant issues paper should be informed by the findings of the RFRA. Flood risk management issues should be balanced with other broad environmental and planning considerations, including water management under the Water Framework Directive and Appropriate Assessment under the Habitats Directive.
- 4.8 Flood risk management should inform the evaluation of strategic development options developed as part of the RPG and SEA processes. Where such development options include proposals for significant new settlements and/or significant extensions to urban areas (as part of an overall settlement strategy) and/or significant public infrastructure projects, the sequential approach and the Justification Test, if appropriate, should be applied in the evaluation process.

4

- 4.9 Once a preferred strategic development option is selected, any significant effects it may have on flood risk should be identified and used as a basis for the development of broad, regional flood risk management and mitigation measures for inclusion in the RPGs. Appropriate monitoring measures should also be put in place which will be informed by SFRAAs and by the relevant planning authorities.

Co-ordination of development plans

- 4.10 RPGs should also identify opportunities where adjoining planning authorities can and should work together to prepare such further joint studies as might be necessary to address the issue of flood risk at a more detailed level to inform their preparation of spatial plans. Given the nature of flood risk, it is likely that more than one planning authority will be affected by, for example, coastal or river flooding of an extensive floodplain. Effective co-ordination and consistency between the development plans and local area plans of planning authorities will be essential in achieving the overall objectives of the RPGs and in turn, the NSS.

For information regarding integrating flood risk management into LAPs see paragraphs 4.28 and 4.29.

Integrating flood risk into development plans

- 4.11 The importance of including robust flood risk policies in the development plan cannot be overstated. While development plans will be informed by national planning policy such as these Guidelines and regional planning guidelines addressed above, they must take all practicable steps to ensure the prior identification of any areas at risk of flooding and flood zones in order to effectively shape the drafting process.
- 4.12 The OPW is a statutory consultee for development plans and is the lead agency for implementing flood risk management policy in Ireland. As such, planning authorities should ensure that they consult effectively with the OPW at the start of the plan preparation and take careful account of observations made by the OPW on flood-related matters, and to the FRMPs, if available for the area in question. There may also be collaborative consultation between the OPW and the Department of the Environment, Heritage and Local Government when preparing Ministerial observations in relation to development plans.

Strategic Flood Risk Assessment

- 4.13 The steps in the development plan process and its Strategic Environmental Assessment need to be supported by appropriate analysis of flood risk. Again a staged approach should be adopted, carrying out only such assessment as is needed for the purposes of decision-making. All stages may not be needed to complete a flood risk assessment. This will depend on the level of risk and the potential conflict with proposed development and the scale of mitigation measures being proposed. For the purposes of applying the sequential approach, once a flood risk has been identified it can be avoided, or if following the initial assessment the risks are too significant, again avoidance may be the outcome. These iterations should be captured in the SEA. Where development is planned in flood risk areas, a detailed flood risk assessment may have to be carried out within the SFRA, so that the potential for development of the lands and their environmental impact can be assessed.
- 4.14 A Strategic Flood Risk Assessment (SFRA) can therefore encompass all levels of flood risk assessment. These are outlined in chapter 2 and described in more detail in Appendix A. Local authorities will need to undertake an identification exercise, an initial assessment and in some locations across the plan area detailed flood risk assessments.
- 4.15 The SFRA is initially based on existing sources of information but it may require the gathering of new information for all or part of the area of the development plan or local area plan through a detailed flood risk assessment. Taking account of the above, a plan at county level, will not normally have to undertake detailed flood risk assessment involving the production of a flood risk map for all watercourses or coastal frontage. In general, this will only be necessary if it is intended to zone land for development or identify the location of future strategic infrastructure within flood risk areas. Where flooding is not a major issue in the location of new development, as will be the case in many county development plans, a less detailed approach will be required than in core urban areas with high development pressures and significant flood risk issues. The SFRA will provide more detailed information on the spatial distribution of flood risk to enable adoption of the sequential approach and to identify where it will be necessary to apply the Justification Test.
- 4.16 Each SFRA is designed individually to match the availability of data, scale and nature of the flood risk issues, the type of development planned and any focus on regeneration. Therefore SFRAs for county and city plans will be different, and whilst some of these may well be combined due to the common sources of flooding, county SFRAs will contain some detailed investigation of how the sequential approach should be applied in key towns or to the identification of the location of future strategic infrastructure within flood risk areas. City development plan SFRAs will be more detailed and may tend to focus on how residual flood risks will be managed.

For information regarding Strategic Flood Risk Assessment at city and county levels see Fig. 4.1.

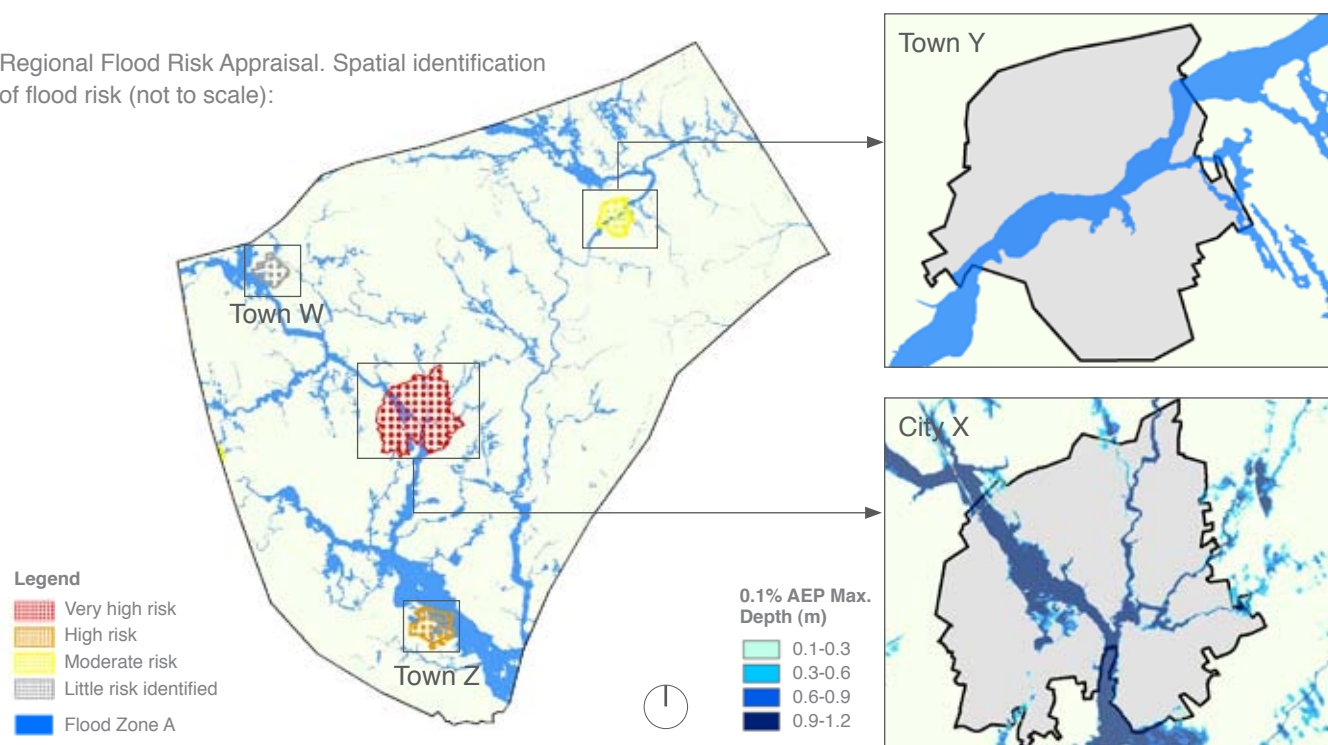
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- 4.17 The SFRA should provide sufficient information to make sound planning decisions, including an identification and assessment of the impacts and mitigation strategies for development options. The SFRA should also be used to ensure that the elected members have the information with regard to the Strategic Environmental Assessment, application of the sequential approach and, if necessary, the Justification Test, in coming to decisions about the draft development plan and all subsequent stages. The structure of the SFRA should reflect the multiple uses that this document has within the planning process and beyond.
- 4.18 The key outputs from an SFRA and the key steps in its delivery are outlined in detail in Appendix A, The objectives of an SFRA are summarised below:
- :: To provide for an improved understanding of flood risk issues within the development plan and development management process, and to communicate this to a wide range of stakeholders;
 - :: To produce an assessment of existing flood defence infrastructure and the consequences of failure of that infrastructure and also identification of areas of natural floodplain to be safeguarded;
 - :: To produce a suitably detailed flood risk assessment, drawing on and extending existing data and information, leading to a suite of flood risk maps that support the application of the sequential approach, in key areas where there may be tension between development pressures and avoidance of flood risk;
 - :: To inform, where necessary, the application of the Justification Test;
 - :: To conclude whether measures to deal with flood risks to the area proposed for development can satisfactorily reduce the risks to an acceptable level while not increasing flood risk elsewhere; and
 - :: To produce guidance on mitigation measures, how surface water should be managed and appropriate criteria to be used in the review of site specific flood risk assessments.
- 4.19 In some instances improvements to existing flood defences may be required to manage residual flood risks. Where such flood defence works are considered, the SFRA should include an appraisal of the extent of any works required to provide or raise the flood defence to an appropriate standard. In addition the SFRA should identify local or surface water flooding issues that may influence the zoning of land.

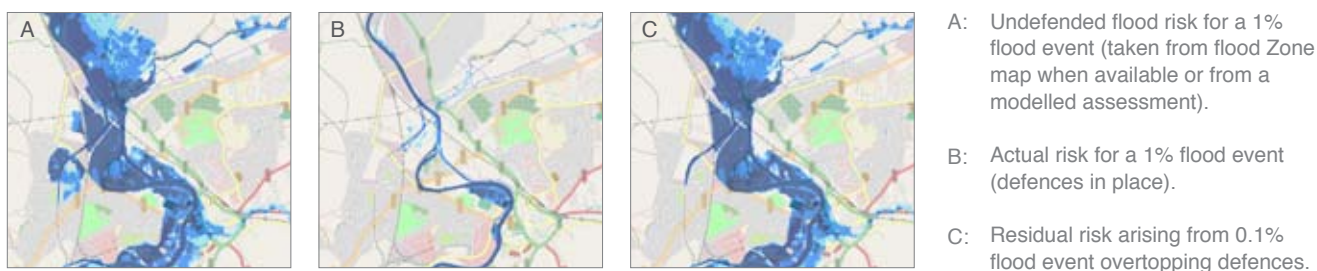
A county level view of Strategic Flood Risk Assessments undertaken (left) is supported by the following information:

- :: Town Y (LAP) Initial Assessment for zoning purposes: Map is based on flood zones constructed from available information. Conclusion: Sufficient available land in lower flood risk zones. All lands in town zoned to AVOID flood risk.
- :: City X (development plan) Detailed Assessment: New river model used to graduate flood risk in key regeneration areas. Land zoned for lower vulnerability use, and mitigation strategy developed for mixed use development.
- :: Town W (LAP): Initial assessment indicates little development pressure/minor planned development, no further stages in flood risk assessment required.
- :: Town Z: Initial assessment shows impacts elsewhere and scale of mitigation measures are significant. Zoning of lands to avoid indicative Flood Zone A and B.

Regional Flood Risk Appraisal. Spatial identification of flood risk (not to scale):



Detail of SFRA carried out for City X:



Background Map Source: Map data (c) OpenStreetMap (and) contributors, CC-BY-SA

Fig. 4.1: Strategic Flood Risk Assessments exemplified at county and city scale

Strategic Flood Risk Assessment and SEA

- 4.20 The SEA process addresses any likely significant effects on the environment and their amelioration, from the implementation of development plans through all stages of the plan-making process. Flood risk identification (Stage 1) to assess whether full flood risk assessment is required, should ideally be carried out in a manner that is integrated with the SEA process rather than constituting an additional and separate process. Any subsequent stages of flood risk assessment should also be carried out in a way that is integrated with the SEA process. Within the process of preparing the draft development plan, the draft SEA environmental report will consider the environmental effects of the draft plan against environmental criteria for the plan area, including mitigation measures and future monitoring of effects.
- 4.21 As with SEA, it will be important to knit flood risk assessment into the development plan structure, and provide a coherent and transparent approach as to how it has been considered in making spatial planning decisions.
- 4.22 A summary of the likely effects of the plan on the environment, through exposing new development and their occupants to potential flood risks and any adverse impacts as a result, will be addressed in the SEA process and summarised in the environmental report element of the overall development plan.

Development plan Justification Test

- 4.23 Having prepared a Strategic Flood Risk Assessment and mapped flood zones as part of its development plan review process and any more detailed flood risk assessments as necessary, situations can arise where a planning authority will need to consider the future development of areas at a high or moderate risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out in Table 3.2. In such cases, the planning authority must be satisfied that it can clearly demonstrate on a solid evidence base that the zoning or designation for development will satisfy the Justification Test outlined in Box 4.1 opposite.

Box 4.1: Justification Test for development plans

Where, as part of the preparation and adoption or variation and amendment of a development/local area plan¹, a planning authority is considering the future development of areas in an urban settlement that are at moderate or high risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out in Table 3.2, all of the following criteria must be satisfied:

- 1 The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.
- 2 The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:
 - (i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement²;
 - (ii) Comprises significant previously developed and/or under-utilised lands;
 - (iii) Is within or adjoining the core³ of an established or designated urban settlement;
 - (iv) Will be essential in achieving compact and sustainable urban growth; and
 - (v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.
- 3 A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere.

N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment.

¹Including Strategic Development Zones and Section 25 Schemes in the area of the Dublin Docklands Development Authority.

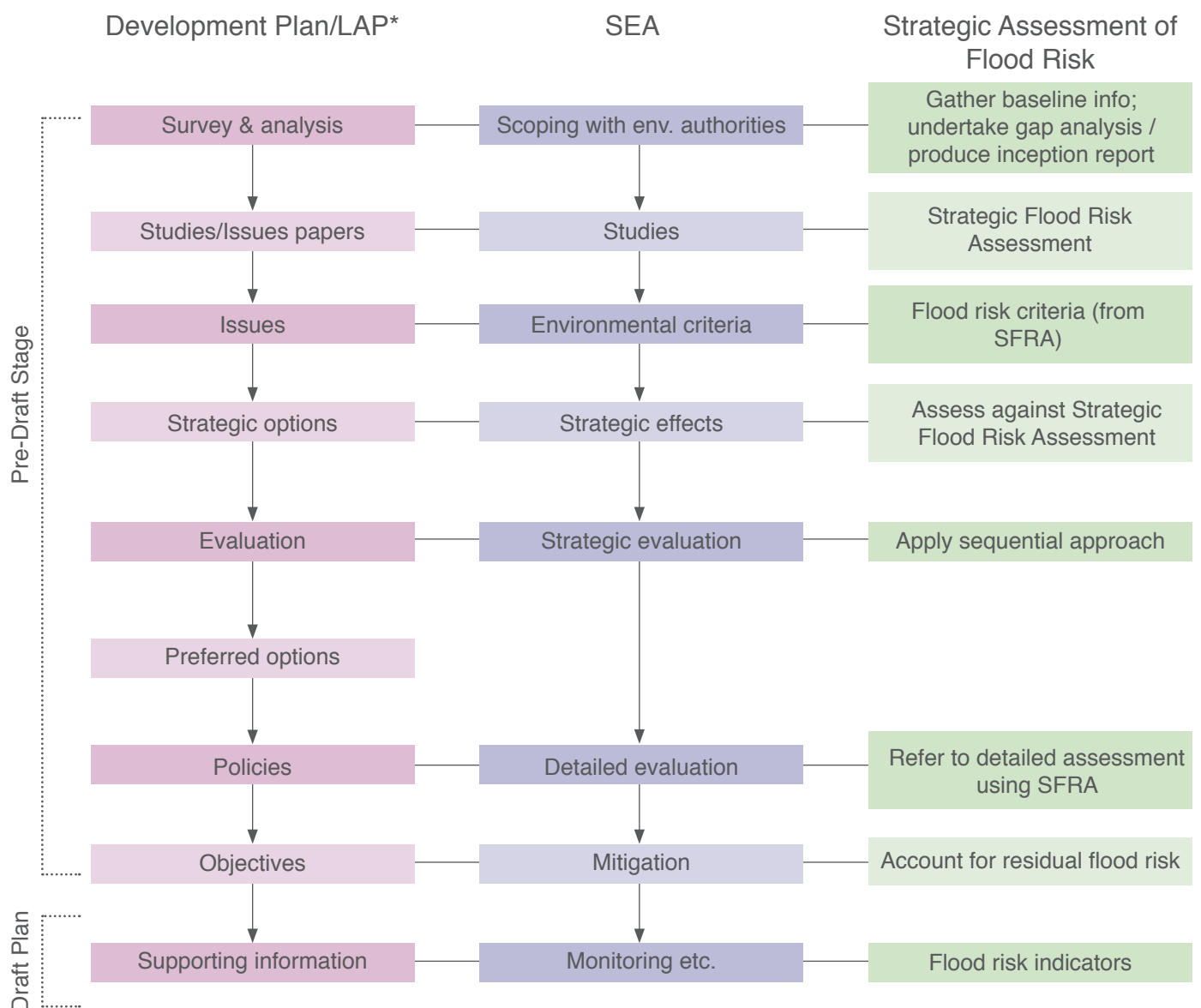
²In the case of Gateway planning authorities, where a number of strategic growth centres have been identified within the overall area of the authority, the Justification Test may be applied for vulnerable development within each centre.

³See definition of the core of an urban settlement in Glossary of Terms.

Other development plan objectives

- 4.24 Plans should also be pro-active in addressing flooding by including, for example, general policies to protect, improve or restore floodplains or the coastal margins. Planning authorities should consider whether there are areas where a previous and natural flood risk management function can be restored through appropriate actions, such as managed re-alignment of existing coastal defences or river or wetland restoration projects and the provision of flood storage. As well as restoring the flood risk management function, actions such as those above may provide opportunities to introduce green/open space within congested urban areas, with consequent benefits to amenity and biodiversity as well as helping to reduce the future impact of climate change.
- 4.25 Other objectives that planning authorities should consider for inclusion in their development plans are:
- :: Preservation of riparian strips alongside river channels free of development and of adequate width to permit access for river maintenance;
 - :: Development management standards and checklists to provide more detailed assessment frameworks for planning applications where flooding is or may be an issue, including highlighting the need for assessment of types of flooding other than river and coastal flooding and of the impacts of run-off from development;
 - :: Requirements for development proposals to be accompanied by a detailed explanation of how the Development Management Justification Test has been met, where vulnerable development is being considered in the flood risk zones;
 - :: Design and development standards that seek to manage the risks to acceptable levels through flood-resistant and flood-resilient construction methods, where avoidance is not possible and requirements such as Sustainable Drainage Systems and other design features (outlined in Appendix B); and
 - :: The provisions of flood risk management infrastructure such as flood defences including the programme of planned investment by the OPW, a local authority's own works or the provision by private developers. Actions to be carried out in the plan area relating to flood risk management or infrastructure whether the responsibility of the planning authority or may be required of other parties such as developers, to facilitate development or to protect existing development, including any further studies or plans to be prepared relating to flood risk management.

Fig. 4.2 outlines how the key processes of the development plan and SEA and can be aligned with the strategic assessment of flood risk.



*Where an Environmental Report is required

Fig. 4.2: Development plan preparation where flood risk is scoped as an issue

Existing undeveloped, zoned areas at risk of flooding

- 4.26 Information about flooding and flood risk is improving and will improve further as a result of national exercises undertaken by OPW and others, and implementation of these Guidelines. Future flood risk assessments required to support the development plan process may highlight existing, undeveloped areas which, on their own merits, were zoned for development in previous development plans but which new information indicates may now, or in the future, be at risk of flooding.
- 4.27 In the type of case set out above, planning authorities should reconsider the zoning objective of the current or previous plan for any such lands where flood risk is assessed to be potentially significant and likely to increase in the future. Following this reconsideration, planning authorities may decide to:
- :: Remove the existing zoning for all types of development on the basis of the unacceptable high level of flood risk;
 - :: Reduce the zoned area and change or add zoning categories to reflect the flood risk; and/or
 - :: Replace the existing zoning with a zoning or a specific objective for less vulnerable uses;
 - :: Prepare a local area plan informed by a detailed flood risk assessment to address zoning and development issues in more detail and prior to any development; and/or
 - :: Specify, in exceptional circumstances and where the criteria of the Justification Test have been met, design of structural or non-structural flood risk management measures as prerequisites to development in specific areas, ensuring that flood hazard and risk to other locations will not be increased or, if practicable, will be reduced.

Local area plans

- 4.28 The preparation of a development plan in accordance with these Guidelines should identify the key flooding issues that need to be addressed at the local area plan (LAP) level. The local area plan is now an important part of the planning process allowing for more detailed and area-based planning. Many LAPs are equivalent in size to smaller development plans. Where flood risk may be an important issue as flagged in the relevant development plan, they must follow the methodology and staged approach including SEA, as outlined above. However, resolving flood risk issues and its impact on deliverability of zoned land should be addressed in the development plan primarily.

- 4.29 SEAs are not mandatory for certain LAPs below a certain scale and non-statutory plans. However, a screening process is required for most LAPs and this should identify any significant flooding issue. Indeed, the SEA process for LAPs is triggered where the plan is likely to have a significant effect on the environment regardless of thresholds. While non-statutory plans and studies have an important role to play in promoting integrated and sustainable development, they are not an appropriate means of strategic area planning where flood risk is a significant issue. The preparation of such plans should be within the context of a statutory development plan or local area plan, which has fully considered flood risk in accordance with these Guidelines and determined the appropriate policies and constraints within which non-statutory plans should be prepared.

In other cases, planning authorities should use their discretion in addressing flood risk in a manner more appropriate to small-scale LAPs.

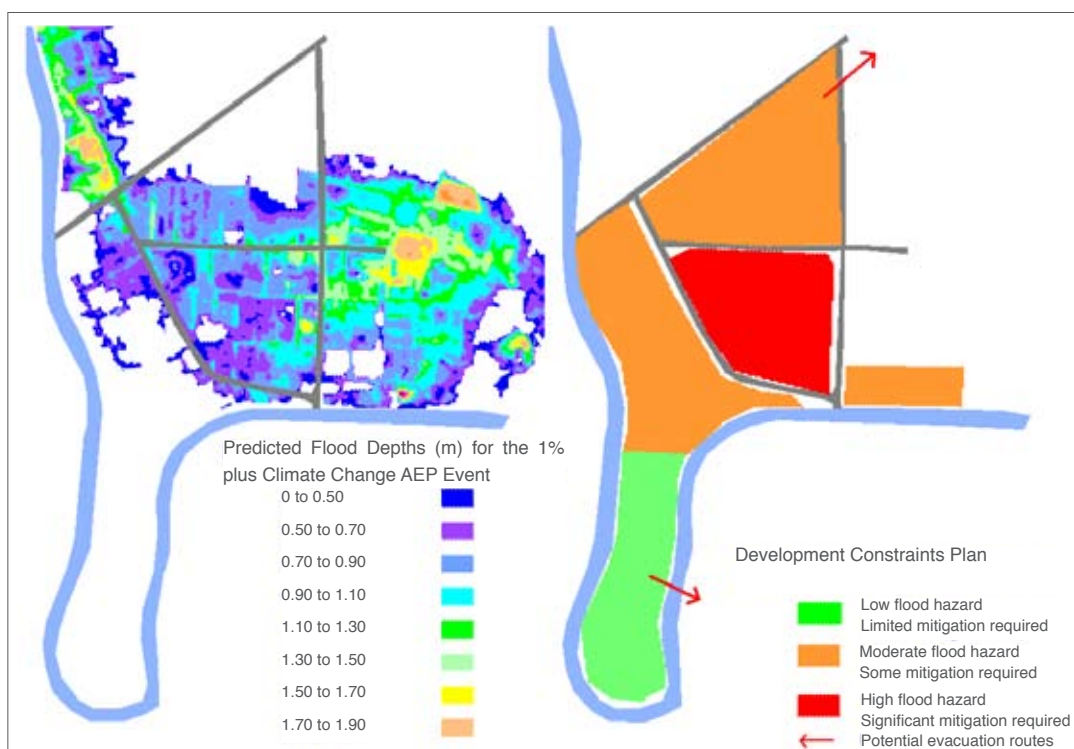


Fig. 4.3: Use of flood risk assessment at local / master planning level

Chapter

5



Flooding and Development Management

Key Messages

- Planning authorities should apply the sequential approach in aiming to avoid development in areas at risk of flooding, through the development management process.
- Planning applications will, where appropriate, need to be accompanied by a detailed flood risk assessment to be considered by planning authorities in determining applications.
- Development within flood risk areas, that would be defined as inappropriate as set out in chapter 3, but which are considered to be necessary to meet the objectives of proper planning and sustainable development, will be subject to the Justification Test.
- Most flood risk issues should be raised within strategic assessments undertaken by local authorities at the plan-making stage. Therefore, as more plans are reviewed and zoning reconsidered, there should be less need for development management processes to require detailed flood risk assessment.

The role of good development management

- 5.1 Development management for flooding should be based on sound strategy, policies and objectives within the development plan and LAP where appropriate, setting out the basis for considering planning applications in principle and in detail. Where plans have been adopted before publication of these Guidelines, planning authorities should use the flood risk information available to them to identify the flood zones within their area. They should then ensure that planning applicants submit any necessary flood risk assessment so that flood risk issues within these flood zones can be taken into account in accordance with these Guidelines. Notwithstanding the availability of flood zone maps and a SFRA, the applicant is primarily responsible in the first instance for assessing whether there is a flood risk issue and how it will be addressed in the development they propose.
- 5.2 Where flood risk may be an issue for any proposed development, a more detailed flood risk assessment should be carried out appropriate to the scale and nature of the development and the risks arising. The detailed Site-specific Flood Risk Assessment should quantify the risks and the effects of any necessary mitigation, together with the measures needed or proposed to manage residual risks. Information on site-specific flood risk assessments and potential sources of information are contained in Appendix A.

5

Stages of development management

5.3 In essence, the 2007 DEHLG Development Management Guidelines identify 5 stages in the development management process as follows:

- :: Pre-application;
- :: Lodgement;
- :: Assessment;
- :: Decision; and
- :: Appeals.

Pre-application and identification of flood risk

5.4 The pre-application stage is critical to the consideration of flood risk in the planning application. It is the responsibility of the applicant at this stage and in the first instance to gather relevant information sufficient to identify and assess all sources of flood risk and the impact of drainage from the proposal. In addition planning authorities should ensure that applicants are made aware of any flood risk issues and of the need for them to submit an appropriate flood risk assessment.

5.5 Pre-application discussions will be particularly important in identifying the broad range of issues affecting a site and present an opportunity for the planning authority to make clear to applicants that an appropriate flood risk assessment should be carried out as part of the application preparation process.

5.6 Where flood issues are present, the planning authority should highlight the policies and objectives of the development plan in relation to flood risk and, if available information on flood zones.



Non-residential ground-floor use in a waterside apartment scheme

- 5.7 Ideally, at this preliminary stage, development proposals being put forward by applicants for pre-planning discussion should show the location, broad nature and extent of a proposed development including, where appropriate, the provision of adequate development-free, riparian strips for river maintenance. Where flood risk is present, applicants preparing development proposals, should be advised of the importance of addressing flood risk by adopting a sequential approach in terms of location of uses in areas of lower risk, the consideration of less vulnerable use types and other mitigation through design measures. Sustainable drainage should be integral to the design and formulation of proposals at this stage.

Lodgement

- 5.8 Any known flood history on or affecting the application site must be declared on the application form, as required by the Planning and Development Regulations 2006. However, an area with no history of flooding does not mean that it is not at risk from flooding. An application for permission in an areas at risk from flooding should be accompanied, where necessary, by an appropriate Site-specific Flood Risk Assessment, having been identified at the pre-application stage from sources of information listed in Appendix A. Flood risk assessment at the site-specific level in areas at risk of flooding is required for all planning applications, even developments appropriate to the particular flood zone. However, the detail of such a flood risk assessment will depend on the level of risk and scale of development. Therefore, small developments, with low risk, will be able to address the issue in a summary manner. The site specific flood risk assessment follows the initial risk assessment stages introduced in chapter 2 and described in more detail in Appendix A. The scope of the flood risk assessment will depend on the type and scale of development and the sensitivity of the area. It will also depend on whether SFRA has been carried out by the planning authority on the development plan in accordance with these Guidelines.



Permeable paving detail

5.9 The key outputs from a site-specific Flood Risk Assessment will depend on the level of detail within the Strategic Flood Risk Assessment of the development plan/local area plan. A site specific flood risk assessment should provide the information detailed in Appendix A but in general should include:

- :: Plans showing the site and development proposals and its relationship with watercourses and structures which may influence local hydraulics;
- :: Surveys of site levels and cross-sections relating relevant development levels to sources of flooding and likely flood water levels;
- :: Assessments of:
 - All potential sources of flooding;
 - Flood alleviation measures already in place;
 - The potential impact of flooding on the site;
 - How the layout and form of the development can reduce those impacts, including arrangements for safe access and egress;
 - Proposals for surface water management according to sustainable drainage principles;
 - The effectiveness and impacts of any necessary mitigation measures;
 - The residual risks to the site after the construction of any necessary measures and the means of managing those risks; and
 - A summary sheet which describes how the flood risks have been managed for occupants of the site and its infrastructure.



Detention basin and public open space, Carrickmines, Dublin

- 5.10 Given the potential complexity of the processes inherent in a site specific flood risk assessment and the likely costs to an applicant in preparing one, planning authorities should carefully evaluate calling for site specific flood risk assessments as a result of pre-application consultations or within the determination of a planning application when there are fundamental objections to the development on other grounds. Applicants should not have to undergo unnecessary delay or expense preparing such an assessment if a refusal is probable.

Further information on surface water management and basic requirements for the drainage aspects of flood risk assessment are contained in Appendix A.

- 5.11 The flood risk assessment should be incorporated into any EIA process where one is required. The flood risk assessment should be approved/certified by a competent person, qualified and experienced in flood risk assessments (see Appendix A).

Processing and assessment

- 5.12 The planning regulations and the Development Management Guidelines (2007) set out in detail the appropriate procedures for processing an application. All applications with flood risk issues should be forwarded to the relevant technical sections of the planning authority for comment and at the earliest possible opportunity. Where these issues are complex in nature, the planning authority may wish to engage appropriate external advice.
- 5.13 In terms of flooding, it will be important to notify prescribed bodies of the application, e.g. the fisheries board, if mitigation measures to river banks are proposed and to assess the application, based on the full range of planning considerations of any submissions made.
- 5.14 Assessment of the application should be based principally on the policies and detailed objectives of the development plan, with flood risk considered along with the full range of planning considerations for the application. In assessing development proposals in areas at risk of flooding, planning authorities should adopt a risk-based sequential and balanced approach that gives priority to development in areas of lowest risk, while at the same time allowing consideration of appropriate and necessary development, through the use of the sequential approach based on flood zones and application of the Justification Test.

For further information regarding the basic requirements of the Flood Risk Assessment see Appendix A.

Application of the Justification Test in development management

- 5.15 Where a planning authority is considering proposals for new development in areas at a high or moderate risk of flooding that include types of development that are vulnerable to flooding and that would generally be inappropriate as set out in Table 3.2, the planning authority must be satisfied that the development satisfies all of the criteria of the Justification Test as it applies to development management outlined in Box 5.1 below.

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
 - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
 - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
 - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
 - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

- 5.16 Where development has to take place in areas at risk of flooding following the application of these Guidelines, the risks should be mitigated and managed through the location, lay-out and design of the development to reduce such risks to an acceptable level. The residual risks to the proposed development should be considered carefully, taking into account the type of development and its vulnerability, how flood risks to the occupants will be managed, insurance provision, scale of the risks and the provision of flood defence works. A precautionary approach would be to set floor levels above the 1% flood level ignoring the moderating effects of flood defences. However, within an existing built-up area the approach above may not produce an appropriate streetscape and therefore for proposed developments with a lower vulnerability, flood resistant and flood resilient construction methods to reduce the impact of flooding would be appropriate. In this situation the flood risk assessment should be thorough and measures to manage these residual risks carefully detailed. More information on flood risk management by design is available in Appendix B. In all cases, a precautionary approach should be taken to allow for uncertainties in data and risk assessment procedures and to enable adaptability to future changes in risk, including the effects of climate change.
- 5.17 Where new development in flood risk areas is approved, details of the flood risk, mitigation measures and residual risk should be supplied by the planning authority to the major emergency management committee (MEMC) of the relevant local authority for inclusion in their major emergency risk assessment.

Flood risk assessment and EIS

- 5.18 Flood risk may constitute a significant environmental effect of a development proposal that in certain circumstances may trigger a sub-threshold EIS. Flood risk assessment should therefore be an integral part of any EIA. An appropriate assessment of the impacts of the development on sensitive habitats under the EU Habitats Directive and reiterated in Circular NPWS 1/08 must also be factored in to the evolution of developments that potentially affects sites designated under the EU's Natura 2000 programme.

5

Making the decision

- 5.19 Planning legislation (Schedules of Planning and Development Act, 2000 as amended) allows for the framing of conditions to deal with flood risk and the refusal of permission for reasons of flood risk without attracting compensation. The Department's 2007 Development Management Guidelines (DEHLG, 2007) provide guidance on the appropriate nature and type of conditions.
- 5.20 Where flood risk is an issue, the planning authority may consider granting permission subject to conditions to ensure that the Justification Test is satisfied. Overall, conditions should deal with any residual risk and should be guided by the development management objectives set out in the development plan.
- 5.21 Only in very limited circumstances should conditions which require the provision of significant drainage systems, major alterations, flood related structural work or significant relocation of development be attached to planning permissions. Ideally, all these matters should be adequately dealt with in the pre-application and processing stages such that any necessary work(s) are included as an integral part of the development proposal.
- 5.22 In most cases, conditions will be required to amend, clarify or further detail flood mitigation measures. These might include, for example, the removal of barriers or buildings on a water flow route, the requirement for flood resistant street furniture and fittings, or, the requirement for detailed flood resistance or flood resilience measures for buildings. Conditions relating to maintenance may include, for example, the regular inspection, maintenance and repair of local or secondary flood defences such as earth bunds or elements of the sustainable drainage system such as swales, basins or ponds. Conditions relating to the ongoing monitoring of flood defences and overall flood risk may also be appropriate. Conditions may also be required in dealing with potential flood issues in minor residential development and residential extension proposals.



Gully and sink, Stockholm

- 5.23 Where the risk to people remains significant after mitigation measures, conditions may require arrangements to be put in place by the developer and in the case of multi-unit developments, the relevant management company to ensure the installation, operation and maintenance of an adequate flood warning system and the preparation and regular updating of an emergency plan for all users of the site. Such plans should be guided by A Framework for Major Emergency Management (2006) and be consistent with the Major Emergency Plans of the relevant Principal Response Agencies (An Garda Síochána, the HSE and the local authority). These conditions should be consistent with the provisions of the Development Management Guidelines.
- 5.24 Permission should be refused where flood issues have not been, or cannot be, addressed successfully and where the presence of unacceptable residual flood risks remain for the development, its occupants and adjoining property. Only developments which are consistent with the overall policy and technical approaches of these Guidelines should be permitted.
- 5.25 Where development proposals include the construction or amendment of bridges, culverts or similar structures the applicant should have regard to the requirements of Section 50 of the Arterial Drainage Act, 1945.
- 5.26 It is recognised that flood map data sets, predictive models of flood risk and a strategic assessment of the flood risks across a county or city area may not have been undertaken at the time that a planning decision is required. This does not mean that the sequential approach should not be applied or that a Justification Test need not be undertaken. A precautionary approach should be applied, and either the application should be refused on grounds of prematurity where a review of a development plan is imminent or a flood risk assessment should be undertaken, and the Justification Test applied following advice in paragraphs below.



Retention pond, Stepaside, Dublin

Assessment of major proposals for development in areas of flood risk pending implementation of these Guidelines

- 5.27 From a flood risk management perspective, proposals fitting into this category should be considered as though the land was not zoned for development. In such situations the applicant should be required, in consultation with the planning authority, to prepare an appropriate SFRA and to meet the criteria for the Justification Test as it applies to development plan preparation. The planning authority must then assess the proposal against the Justification Test as it applies to the development management process. Where the information is not sufficient to fully assess the issues involved, the development should not be approved on the basis of flood risk and / or on the grounds of prematurity prior to addressing flood risk as part of the normal review of the development plan for the area.

Assessment of minor proposals in areas of flood risk

- 5.28 Applications for minor development, such as small extensions to houses, and most changes of use of existing buildings and or extensions and additions to existing commercial and industrial enterprises, are unlikely to raise significant flooding issues, unless they obstruct important flow paths, introduce a significant additional number of people into flood risk areas or entail the storage of hazardous substances. Since such applications concern existing buildings, the sequential approach cannot be used to locate them in lower-risk areas and the Justification Test will not apply. However, a commensurate assessment of the risks of flooding should accompany such applications to demonstrate that they would not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities. These proposals should follow best practice in the management of health and safety for users and residents of the proposal.

Development Management Stage

Consideration of Flood Risk Management

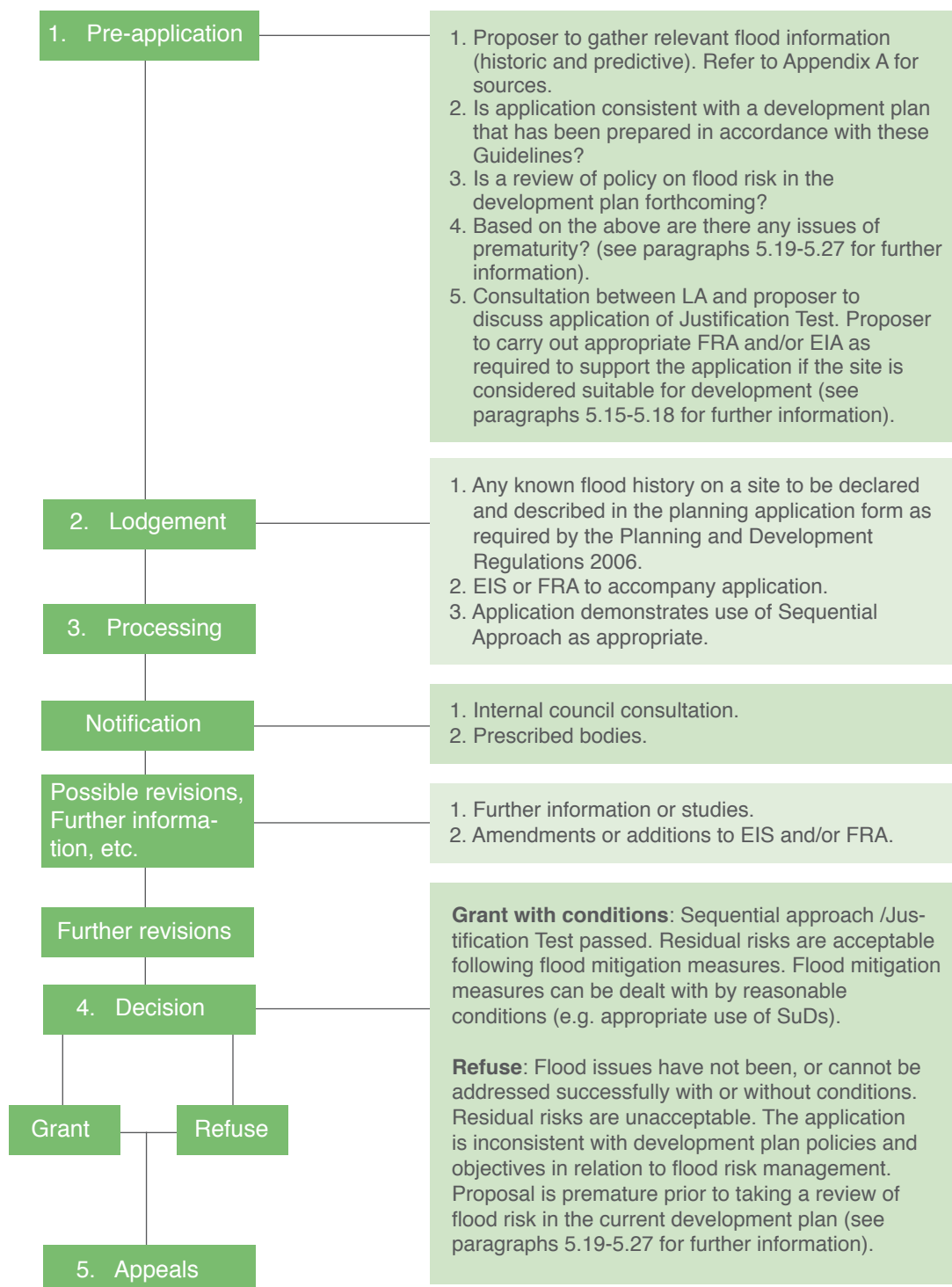


Fig. 5.1: Consideration of flood risk in the development management process

Chapter

6



Conclusion

- 6.1 Under these Guidelines, regional authorities and planning authorities have a key role to play in ensuring that effective policy frameworks are put in place to require that new development is both located and provided in such a manner as to minimise the risk from flooding. Applicants for planning permission, their agents and developers also have a key role to play in working with the policy framework referred to above and in completing development in compliance with planning permissions granted.
- 6.2 The Government is undertaking significant work to enhance the level of detail and coverage of flood maps and other information on flood risks, primarily through the preparation of flood risk management plans and to support the development of the policy framework referred to above. However, in advance of the preparation of these maps and plans for any particular area, it is to be expected that planning authorities should identify flood risk issues and, where necessary, undertake further stages of flood risk assessment at relevant stages of the planning and development management processes.
- 6.3 Assessment of flood risk should inform the on-going revision of development plans and local area plans. Planning applications submitted after the publication of these Guidelines should be accompanied as appropriate by flood risk assessments, enabling their proper consideration by planning authorities and An Bord Pleanála with regard to flood risk, even though the relevant development plan or local area plan may not yet have been reviewed in the light of these Guidelines.
- 6.4 Planning authorities must strike a fair balance between avoiding flood risk and facilitating necessary development, enabling future development to avoid areas of highest risk and ensuring that appropriate measures are taken to reduce flood risk to an acceptable level for those developments that have to take place, for reasons of proper planning and sustainable development, in areas at risk of flooding.
- 6.5 The Minister will monitor the on-going implementation of these Guidelines to ensure that flood risk management is fully integrated into the planning process.

Glossary of Terms

Terms	Definition
Breach of defences	A structural failure at a flood defence allowing water to flow through.
Catchment	The area that is drained by a river or artificial drainage system.
Catchment Flood Risk Assessment and Management Studies (CFRAMS)	A catchment-based study involving an assessment of the risk of flooding in a catchment and the development of a strategy for managing that risk in order to reduce adverse effects on people, property and the environment. CFRAMS precede the preparation of Flood Risk Management Plans (see entry for FRMP).
Climate change	Long-term variations in global temperature and weather patterns, which occur both naturally and as a result of human activity, primarily through greenhouse gas emissions.
Coastal erosion	The gradual wearing away of the coastline through a combination of wave attack and, in the case of coastal cliffs, slope processes (e.g. high groundwater levels). This may include cliff instability, where coastal processes result in the periodic reactivation of landslide systems or promote rock falls.
Coastal flooding	Flooding from the sea which is caused by higher than normal sea levels and/or high waves resulting in the sea overflowing onto the land.
Consequence of flooding	Health, social, economic and environmental effects of flooding, some of which can be assessed in monetary terms, while other less tangible impacts are more difficult to quantify. Consequences depend on the hazards associated with the flooding and the vulnerability of receptors.
Conveyance function	When a river overflows its banks, it continues to flow over the flood plain, conveying water down-stream, as well as storing water where the flood plain may be obstructed and releasing it slowly.
Core of an urban settlement	The core area of a city, town or village which acts as a centre for a broad range of employment, retail, community, residential and transport functions.

Terms	Definition
Detailed flood risk assessment	A methodology to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of flood hazard and potential risk to an existing or proposed development, of its potential impact on flood elsewhere and of the effectiveness of any proposed measures.
Environmental Impact Assessment (EIA)	Pursuant to EU Directive 85/ 337/ EEC (as amended in 1997), EIA is a legislative procedure used for identifying the environmental effects of development projects to be applied to the assessment of the environmental effects of certain public and private projects which are likely to have significant effects on the environment.
Estuarial flooding	Flooding from an estuary, where water level may be influenced by both river flows and tidal conditions, with the latter usually being dominant.
Flash Flood	A flash flood is a rapid flooding of an area of land as a result of intense or extreme rainfall events or failure of infrastructure designed to store or carry water or protect against flooding and is distinguished from general flooding by the sudden onset.
Flooding (or inundation)	Flooding is the overflowing of water onto land that is normally dry. It may be caused by overtopping or breach of banks or defences, inadequate or slow drainage of rainfall, underlying groundwater levels or blocked drains and sewers. It presents a risk only when people, human assets and ecosystems are present in the areas that flood.
Flood Relief Schemes (FRS)	A scheme designed to reduce the risk of flooding at a specific location.
Flood defence	A man-made structure (e.g. embankment, bund, sluice gate, reservoir or barrier) designed to prevent flooding of areas adjacent to the defence.
Flood-detention reservoirs	An embanked area designed to hold floodwater from areas upstream and release it slowly to reduce flooding downstream. Embankments may be constructed across the river or adjacent to the river, with flood flows being diverted into the reservoir area.

Terms	Definition
Flooding from artificial drainage systems	This occurs when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity, becomes blocked or when the system cannot discharge due to a high water level in the receiving watercourse.
Flood hazard	The features of flooding which have harmful impacts on people, property or the environment (such as the depth of water, speed of flow, rate of onset, duration, water quality etc).
Flood hazard assessment	An assessment of the hazards that would arise from flooding, e.g. identifying where flooding would occur, how deep the water would be, how fast it would flow, how rapidly would it rise and how long it would remain.
Floodplain	A floodplain is any low-lying area of land next to a river or stream, which is susceptible to partial or complete inundation by water during a flood event.
Flood risk	An expression of the combination of the flood probability or likelihood and the magnitude of the potential consequences of the flood event.
Flood risk assessment (FRA)	FRA can be undertaken at any scale from the national down to the individual site and comprises 3 stages: Flood risk identification, initial flood risk assessment and detailed flood risk assessment.
Flood risk identification	A desk-based study to identify whether there may be any flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation.
Flood Risk Management (FRM)	FRM combines the function of mitigating and monitoring flood risks and may include pre-flood, flood-event or post-flood activities.
Flood Risk Management Plans (FRMP)	Plans which are developed in accordance with national flood policy and the EU Floods Directive and which provide the strategic direction for flood risk management decisions in a catchment. These will describe a range of traditional river or coastal defences to non-structural responses such as flood warning and resilience measures at property level.

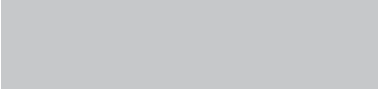
Terms	Definition
Flood storage	The temporary storage of excess run-off or river flow in ponds, basins, reservoirs or on the floodplain.
Flood zones	A geographic area for which the probability of flooding from rivers, estuaries or the sea is within a particular range as defined within these Guidelines.
Flooding Directive	The EU Directive 2007/ 60/ EC of 23 October 2007 on the assessment and management of flood risks which is aimed at integrating the way flood risk is managed throughout the European Union.
Fluvial flooding	Flooding from a river or other watercourse.
Groundwater flooding	Flooding caused by groundwater escaping from the ground when the water table rises to or above ground level.
Indicative Floodplain Map (IFM)	A map that delineates the areas estimated to be at risk of flooding during an event of specified flood probability. Being indicative, such maps only give an indication of the areas at risk but, due to the scale and complexity of the exercise, cannot be relied upon to give precise information in relation to individual sites.
Initial flood risk assessment	A qualitative or semi-quantitative study to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information, to provide a qualitative appraisal of the risk of flooding to development, including the scope of possible mitigation measures, and the potential impact of development on flooding elsewhere, and to determine the need for further detailed assessment.
Inland flooding	Any flooding away from the sea, the primary cause of which is prolonged and/or intense precipitation (or the failure of water-retaining infrastructure, such as burst water pipes or dam breaks).

Terms	Definition
Justification Test	An assessment of whether a development proposal within an area at risk of flooding meets specific criteria for proper planning and sustainable development and demonstrates that it will not be subject to unacceptable risk nor increase flood risk elsewhere. The justification test should be applied only where development is within flood risk areas that would be defined as inappropriate under the screening test of the sequential risk based approach adopted by this guidance.
Likelihood (probability) of flooding	A general concept relating to the chance of an event occurring. Likelihood is generally expressed as a probability or a frequency of a flood of a given magnitude or severity occurring or being exceeded in any given year. It is based on the average frequency estimated, measured or extrapolated from records over a large number of years and is usually expressed as the chance of a particular flood level being exceeded in any one year. For example, a 1 in 100 or 1% flood is that which would, on average, be expected to occur once in 100 years, though it could happen at any time.
Mitigation measures	Elements of a development design which maybe used to manage flood risk to a development, either by reducing the incidence of flooding both to the development and as a result of it and/or by making the development more resistant and/or resilient to the effects of flooding.
Natura 2000	The EU-wide network of protected areas, recognised as 'sites of Community importance' under the EC Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). They comprise "Special Areas of Conservation" (SACs) under the Habitats Directive and "Special Protection Areas" (SPAs) under the Birds Directive (Council Directive 79/409/EC on the conservation of wild birds).
Overtopping of defences	Failure of a flood defence or exceedance mechanism, when flood water reaches levels that are higher than the flood defence level and flows over the top of the structure. While the structure may remain stable, however, erosion of the landward face of the defence could cause the defence to collapse.

Terms	Definition
Pathways	These provide the connection between a particular source (e.g. high river or tide level) and the receptor that may be harmed (e.g. property). In flood risk management, pathways are often 'blocked' by barriers, such as flood defence structures, or otherwise modified to reduce the incidence of flooding.
Pluvial flooding	Usually associated with convective summer thunderstorms or high intensity rainfall cells within longer duration events, pluvial flooding is a result of rainfall-generated overland flows which arise before run-off enters any watercourse or sewer. The intensity of rainfall can be such that the run-off totally overwhelms surface water and underground drainage systems.
Precautionary approach	The approach to be used in the assessment of flood risk which requires that lack of full scientific certainty, shall not be used to assume flood hazard or risk does not exist, or as a reason for postponing cost-effective measures to avoid or manage flood risk.
River Basin Management Plan (RBMP)	As required by the EU Water Framework Directive (2000/ 60/ EC), these plans will establish a strategic plan for the long-term management of the River Basin District, set out objectives for waterbodies, and in broad terms identify what measures are planned to meet these objectives, and act as the main reporting mechanism to the European Commission.
Regional Flood Risk Appraisal	A desk-based study to provide a broad overview of the source and significance of flooding across a region and identify potential conflicts with existing and proposed areas of development, thus highlighting areas where further studies will be required at county or city scale as part of development plan preparation.
Regional planning guidelines (RPG)	These provide the regional context and priorities for applying national planning strategy to each NUTS III region and encourage greater co-ordination of planning policies at the city / county level. RPGs are an important part of the flood policy hierarchy as they can assist in co-ordinating flood risk management policies at the regional level.

Terms	Definition
Resilience	Sometimes known as “wet-proofing”, resilience relates to how a building is constructed in such a way that, although flood water may enter the building, its impact is minimised, structural integrity is maintained, and repair, drying & cleaning and subsequent re-occupation are facilitated.
Resistance	Sometimes known as “dry-proofing”, this relates to how a building is constructed to prevent flood water entering the building or damaging its fabric.
Receptors	Things that may be harmed by flooding (e.g. people, houses, buildings or the environment).
Residual risk	The risk which remains after all risk avoidance, substitution and mitigation measures have been implemented, on the basis that such measures can only reduce risk, not eliminate it.
Run-off	The flow of water, caused by rainfall, from an area which depends on how permeable the land surface is. Run-off is greatest from impermeable areas such as roofs, roads and hard standings and less from vegetated areas – moors, agricultural and forestry land.
Sequential approach	The sequential approach is a risk-based method to guide development away from areas that have been identified through a flood risk assessment as being at risk from flooding. Sequential approaches are already established and working effectively in the plan-making and development management processes.
Site-specific Flood Risk Assessment	An examination of the risks from all sources of flooding of the risks to and potentially arising from development on a specific site, including an examination of the effectiveness and impacts of any control or mitigation measures to be incorporated in that development.
Source	Source refers to a source of hazard (e.g. the sea, heavy rainfall).

Terms	Definition
Source-Pathway-Receptor Model	For there to be flood risk, the three components of flood risk - the source of the hazard, the receptors affected by the hazard and the mechanism of transfer between the two - must all exist.
Spatial resolution	Defines the density of information produced from the flood risk assessment process across the area of interest. A mosaic of flood risk data produced by different tools and base data, with a range of certainty in the output.
Strategic Environmental Assessment (SEA)	Strategic Environmental Assessment (SEA) is the process by which environmental considerations are required to be fully integrated into the preparation and adoption of plans and programmes. The objective of the SEA process is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of specified plans and programmes with a view to promoting sustainable development.
Strategic Flood Risk Assessment (SFRA)	The assessment of flood risk on a wide geographical area against which to assess development proposed in an area (Region, County, Town).
Surface water management	This activity focuses on the assessment and management of flood risk within the urban environment from sources primarily resulting from intense rainfall. Surface water management should understand the performance of the urban drainage network, where exceedance flow routes would form and what impact this would have. Solutions to surface water flood risk can involve green infrastructure provision to capture and direct these exceedance flows to lower vulnerable areas or open space. New development can provide solutions to reducing runoff not only from the proposed development but also from existing areas. This should be considered in the SFRA in critical areas where development is planned upstream of flooding hotspots.



Terms	Definition
Sustainable Drainage Systems (SuDS)	A form of drainage that aims to control run-off as close to its source as possible using a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.
Vulnerability	The resilience of a particular group of people or types of property or habitats, ecosystems or species to flood risk, and their ability to respond to a hazardous condition and the damage or degree of impact they are likely to suffer in the event of a flood. For example, elderly people may be more likely to suffer injury, and be less able to evacuate, in the event of a rapid flood than younger people.
Water Framework Directive (WFD)	A European Community Directive (2000/ 60/ EC) designed to integrate the way we manage water bodies across Europe. It requires all inland and coastal waters to reach “good status” or “good ecological potential” in the case of heavily modified water bodies by 2015 through a catchment-based system of River Basin Management Plans (RBMP), incorporating a programme of measures to improve the status of all natural water bodies.

Frequently Asked Questions

What is flooding?

Flooding is an event that occurs when land that is normally dry is covered by water. This can have both beneficial and adverse consequences. Deposition of sediments from river floods form the level floodplains alongside rivers and contribute to its agricultural fertility and its biodiversity. When it affects human activities it can threaten life, cause social and health impacts, damage buildings and their contents, interrupt communications and lead to pollution that can cause environmental damage.

What causes flooding?

Flooding at the coast is caused by higher sea levels than normal. Inland flooding is due to intense and or prolonged rainfall which exceeds the capacity for it to sink into the ground. As a result, it runs off over land and into rivers and artificial drainage systems. When the capacity of these is exceeded, the result is river and sewer flooding. The roofs of buildings, roads and hard standings prevent water soaking into the ground thus increasing run-off and exacerbating the problems. Flooding can also occur when water that has soaked into the ground fills the underground storage and overflows onto the surface.

How will climate change influence flooding?

Climate change could potentially have a very significant effect on flooding in the longer term. Higher sea levels and wetter winters, with more intense rain storms, together with possible increases in storminess could significantly increase both the frequency and intensity of flooding. For example, floods which currently have a 1 in 100 chance (1% probability) of occurring in any one year could occur much more frequently.

How is flood risk measured?

Flood risk is a combination of the likelihood of occurrence and the consequences of a flood occurring. This is normally expressed as:

Flood risk = probability x consequences.

Probability is difficult to estimate because it has to take account of the uncertainty of hydrological predictions based on the analysis of many years of flow records. Consequences are also complex to measure in terms of the potential loss of life, damage to property etc, which depend on the vulnerability of the land-use and property affected by the flood.

What is a source-pathway-receptor model?

A source-pathway-receptor model is a representation of the components of flood risk. The three components are a source of floodwater (prolonged or intense rainfall, high sea levels), the receptors (land, buildings and structures, people) that are affected by flooding and the pathway (rivers, floodplain, artificial drainage systems, overland flow etc.) through which the flood reaches those receptors. For a risk to arise, all three components must be present. Flood risk management is essentially concerned with protecting the receptors and/or modifying the pathways.

What is a flood risk assessment?

A flood risk assessment is the identification, quantification and communication of flood risk using the source-pathway-receptor model. It examines the sources of flooding and the pathways by which floodwaters might reach receptors, such as people, property and the environment to determine the likelihood of them being affected by flooding. It also examines the flood hazards that are likely to arise and the vulnerability of receptors to such hazards. Flood risk can be assessed at different scales, from the national, through regional and local to site-specific. For further information on individual assessment types see Table A2 in Appendix A.

What is a flood hazard assessment?

A flood hazard assessment is the identification, quantification and communication of the hazards due to flooding. It seeks to identify areas subject to particular hazards, such as deep or fast-flowing water, and to assess the likelihood of them occurring both now and in the future.

What is a Strategic Flood Risk Assessment?

A Strategic Flood Risk Assessment (SFRA) is an area-wide examination (up to county scale) of the risks of flooding to support spatial planning decisions such as the zoning of particular areas for development. It is an essential element in the adoption of the sequential approach to the consideration of flood risk in spatial planning. A generic example of SFRA mapping is provided in Fig. 4.1.

Will it be very costly to model flooding on a county-wide basis?

To ensure a proportionate response, flood risk assessments need only be as detailed as is necessary to obtain the information required to support the decision that is to be made. A staged approach should be adopted, therefore, comprising a *flood risk identification* stage to identify whether there are flood risks to an area or site, an *initial assessment* stage to confirm the sources of flooding and qualitatively appraise the risks and potential mitigation measures, and a *detailed assessment* stage to quantify the risks, appraise the effects of changes and the effectiveness of mitigation measures. At each stage the adequacy of the assessment to support the decision being made should be determined and the next stage should be initiated only if there is insufficient information to support the decision.

What does the SFRA provide?

The Strategic Flood Risk Assessment provides tools and methods to assist users in identifying the level of flood risk associated with an area to inform planning decisions. It supports the application of the sequential approach and provides data and maps to help in assessing sites against flood risk criteria. Where development is or would be at risk of flooding, it provides information on the mitigation measures considered deliverable to reduce the actual risk to that development and on the residual risks that would remain and how they might be managed.

What does the SFRA not provide?

The SFRA is an area-wide study and the level of detail is commensurate with its strategic nature. It does not provide suitably detailed site-specific information, such as design flood levels. A site-specific flood risk assessment is still required to cover in more detail all sources of flood risk for individual developments. The level of detail required for a site-specific flood risk assessment depends on the scale and nature of the development and the risks involved.



Where does the SFRA fit in the planning process?

The SFRA is not a statutory planning document. It is a consultation document that should be used to inform a development plan or local area plan, enabling the implementation of the sequential approach and the testing of development zoning against flood risk criteria. It can also be used to assist other planning decisions, such as development management, and emergency planning. In any instance, a site-specific flood risk assessment may be required when deciding on the grant of planning permission.

What is the sequential approach?

The sequential approach uses mapped flood zones alongside considerations of the vulnerability of different types of development to give priority to development in zones of low flood probability. Only if there are no reasonable sites available in zones of low flood probability should consideration be given to development in higher flood probability zones. The sequential approach should also be used within sites to help ensure that the most vulnerable uses are sited in the area of lowest probability.

What is the Justification Test?

Where there are insufficient sites available to locate development outside flood risk areas, it may be necessary, to meet the objectives of proper planning and sustainable development, for development to be sited within flood risk areas. The Justification Test is an examination of such proposals against proper planning and sustainable development criteria and, if these are satisfied, against flood risk criteria to ensure that risks are reduced to an acceptable level and that flood risk is not increased elsewhere.

What is appropriate development?

Appropriate development is development whose vulnerability to flooding is such that it is generally acceptable within a particular flood zone. In exceptional circumstances, development that is generally considered inappropriate because of its vulnerability to flooding may be justified as appropriate on the grounds of proper planning and sustainable development provided that the risks are reduced and/or managed to an acceptable level.

How is vulnerability defined?

Different types of development are classified as being highly vulnerable, less vulnerable or water-compatible, depending largely on the risks to people who will use the development, the effects of damage to buildings and structures that might be caused by flooding, and the potential environmental damage that could be caused arising from pollution caused by the development were it to flood.

What is the definition of the flood zones in these Guidelines?

The flood zones are defined on the basis of the probability of flooding from rivers and the sea. Because of the generally more dynamic nature of coastal flooding compared to river flooding, a lower probability of coastal flooding is used to define the highest-risk zone.

Zone A is at highest risk and has a 1 in 100 (or 1%) chance of flooding in any one year from rivers and a 1 in 200 (or 0.5%) chance of flooding from the sea.

Zone B is at moderate risk of flooding from rivers and the sea and its outer limit is defined by a 1 in 1000 (or 0.1%) chance of flooding in any one year.

Zone C is the low risk area, with a less than 1 in 1000 (<0.1%) chance of flooding from rivers, estuaries or the sea in any one year.

The definition of these zones does not, however, take account of the potential for flooding from other sources, such as ground water or artificial drainage systems. Flooding from these sources could occur in any of the zones and as such should always be considered, regardless of zone.

My development is classed as appropriate for the flood zone in which it is located, do I need to carry out a flood risk assessment?

Yes. While the combination of risk and vulnerability is such that the development is generally acceptable, the risk remains and it may change during the lifetime of the development. The flood risk assessment will enable consideration of mitigation measures, such as flood-resistant and flood-resilient construction, that will reduce that risk.

In addition, the flood zones are based on river and coastal flooding only and other causes of flooding may give rise to a higher risk than that from rivers or the sea.



What is a flood defence?

Flood defences comprise man-made structures designed to reduce the likelihood of flooding in an area. They can include embankments, bunds, walls, sluice gates, storage reservoirs or diversion channels.

An area is being considered for zoning but is within Flood Zone A, as is the majority of the urban centre. The town is defended by a substantial coastal flood embankment. How does the sequential approach apply in this situation?

The graduation of the residual risks across the town should be established with the SFRA, so that the scale and nature of the residual risks are understood. When alternative lands are being considered within the development plan the land with the lower residual risk should be given priority.

What is the standard of protection?

The standard of protection is the flood event against which the flood defences are designed to protect an area. It is usually expressed as the annual probability of exceedance of a particular flood level, such as the 1% (or 1 in 100) flood.

What is freeboard?

Freeboard is a safety margin to account for uncertainties in water-level prediction and/or structural performance. It is the difference between the height of the flood defence or floor level and the design flood level. Freeboard should account for uncertainty in hydrological predictions, wave action, modelling accuracy, topographical accuracy and the quality of digital elevation models.

What is meant by overtopping?

Overtopping is a mechanism of failure of flood defences. Flood water reaches levels that are higher than the flood defence level and flows over the crest of the structure. While the structure may remain stable, erosion of the landward face could lead to collapse of the defence.

What is a breach?

A breach is a structural failure of a defence, which allows water to flow through. Breach failure can be caused by internal piping failure and failure due to erosion of the landward face as a result of overtopping of the defence crest. Piping failure is due to small seepage paths through an embankment carrying away fine sediment and rapidly expanding due to a combination of external water level, internal water pressure in the embankment and geotechnical conditions occurring in the soil matrix. Piping can sometimes be initiated by animals burrowing in the embankment.

My site benefits from a high-standard flood defence, should it not be in Zone C?

No. Flood defences can only reduce the risk of flooding, they cannot eliminate it. Therefore, the presence of a flood defence indicates an area at risk, not one that is safe. A flood defence may be overtopped by a flood that is higher than that for which it was designed, or be breached and allow flood water to rapidly inundate the area behind the defence. In addition, no guarantee can be given that flood defences will be maintained in perpetuity. As well as the actual risk, which may be reduced as a result of the flood defence, there will remain a residual risk that must be considered in determining the appropriateness of particular land uses and development. For these reasons, flooding will still remain a consideration behind flood defences and the flood zones deliberately ignore the presence of flood defences.

What is actual risk?

Actual risk is the risk of flooding taking account of all features that act as defences against flooding. These may include custom-made flood defence structures or artificial (such as road or railway embankments) or natural features (such as natural levees, sand dunes or other topographical features). These serve to reduce the actual risk of flooding since they reduce the frequency of flooding to that which will overtop the defence structure.

What is residual risk?

Residual risk is the risk that remains after all mitigation measures to reduce the frequency of flooding have been taken. It can arise through overtopping or breach of the flood defences, usually by a flood that exceeds the design level of the defence.



What is an adequate level of defence?

The level of defence that is required for a particular area is generally commensurate with the degree scale of damage consequences that would occur in the event of the defence being overwhelmed. It is often an economic decision, but also considers social and environmental factors.

What measures can be taken to protect against flooding?

Primary flood-defence measures include barriers to flow, such as embankments, bunds and walls, and measures to control flow, such as storage reservoirs, sluice gates, channel modification and diversion channels. These operate on a community basis but measures can also be taken to resist flood risk for individual developments or even properties. These include land-raising, raising floor levels or individual flood barriers, or ensuring that development at flood level is compatible with flooding. These are known as dry-proofing and aim to prevent water entering a property.

What is flood resilience?

The alternative to dry-proofing a property (because there are certainly economical and possibly physical limits to this) is to wet-proof a property. This entails allowing water to enter the property when flooding occurs but ensuring that the design and materials are such that more rapid drying out and re-occupation is possible than using conventional construction methods. This is flood-resilience and, while it does not eliminate damage, it does reduce it to a more acceptable level.

What should minimum floor levels be to mitigate flood risk?

The minimum floor levels for new development should be set above the 1 in 100 river flood level (1 in 200 coastal flood level) including an allowance for climate change, with appropriate freeboard. However, where the consequences of flooding are significant, a higher standard should be considered. In setting floor levels it is important to ensure that access facilities for the disabled are not compromised. These Guidelines adopt a risk-based approach and therefore, where it can be shown that the consequences of inundation can be managed and recovery delivered quickly (for example, at an industrial or commercial premises), a degree of the residual risk could be accepted and floor levels set at a lower level. These would be exceptional circumstances, supported by good urban design reasons, and described clearly within the FRA.

Why is land-raising not an easy option?

Even in a defended floodplain, land-raising may reduce the potential amount of flood storage or affect a flood-flow route, with consequent effects on flood risk elsewhere. During a flood event that can be contained by the defences, land-raising behind those defences may have little or no impact. However, should overtopping or a breach occur (or the defences be by-passed by flood waters), land-raising could adversely affect the surrounding low-lying areas by causing areas to flood that would not have flooded previously due to loss of floodplain storage. The beneficial effects of land-raising should therefore be balanced against potential increased flood risk elsewhere. New development should be planned in such a way that residual flood risk is equitably shared by new development and maintained or reduced for existing developments.

Can I make a planning application if my site is in an area of flood risk?

Yes. However, development management aims to ensure that planning permission is granted or refused in line with the provisions of the spatial plan that covers the area of the application (the development plan or local area plan). In drawing up these plans, planning authorities should take flood risk into account in accordance with the sequential approach and zone land for development that is at low risk of flooding or that can satisfy the Justification Test if no low-risk land is reasonably available that would meet the objectives of proper planning and sustainable development.

An applicant for planning permission for development that is not in line with the spatial plan would need to satisfy the planning authority and/or An Bord Pleanála that there are no reasonably available alternative sites at low risk of flooding, that the development can be justified on the grounds of proper planning and sustainable development and that the development would not be subject to unacceptable risks of flooding or increase flood risk elsewhere (Parts 1 and 2 of the Justification Test).

Who can tell me if my land is at risk of flooding or where can I go to get this information?

A list of potential sources of information relevant to flooding is provided in Fig. A2 and Table A4 of Appendix A.