

1.1 Introduction to the Strategic Flood Risk Assessment (SFRA)

The Louth County Development Plan 2021-2027 will replace the existing Louth County Development Plan 2015-2021. This report details the SFRA for County Louth, and has been prepared in accordance with requirements of the Department of Environment Communities and Local Government (DECLG) and Office Public Works OPW Planning Guidelines, 'The Planning System and Flood Risk Management' (2009). 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.

1.2 Report Structure

The SFRA prepared for and informing the draft Louth County Development Plan 2021-2027 considers the broad settlement strategy of the Eastern Midland Region, the Regional Spatial and Economic Strategy (RSES) and the countywide policy objectives of the Louth County Development Plan. Framed within this context, the report will *inter alia*:

- Provide a brief background to the study area;
- Explain the concepts and definitions of flood risk terms;
- Review the indicators of flood risk based on the data available;
- Detail the methodology behind the preparation of the Flood Zone

Mapping;

- Discuss recommended policy objectives for flood risk management in relation to the draft Louth County Development Plan 2021-2027.

The SFRA includes a review of flood risk in each settlement identified in the Louth Settlement Hierarchy (See Table 5 Section 2), including Drogheda, Dundalk, Ardee and Dunleer indicating where application of these policy objectives is adequate to allow future development or where high development pressures require a more detailed assessment of flood risk.

1.3 Scope and Objective

The purpose of the SFRA under the 'Planning System and Flood Risk Management' is,

"To provide a broad (area-wide) assessment of all types of flood risk to inform strategic land-use planning decisions. SFRAs enable the Local Authority to undertake the sequential approach, including the Justification Test, allocate appropriate sites for development and identify how flood risk can be reduced as part of the development plan process."

More specifically, the SFRA will complete the following tasks

- Undertake a flood risk assessment for the settlements within the LCDP
- Review and update Flood Zone mapping to include the CFRAM mapping,
- Assist LCC in the review of land use zoning objectives and the application of the sequential approach and justification test;
- Prepare flood risk management policies, objectives and recommendations.

1.4 Flood Legislation and Policy

1.4.1 European Union (EU) Floods Directive

The OPW is the national authority responsible for the implementation of the EU Directive on the Assessment and Management of Flood Risks [2007/60/EC] which was transposed into Irish law by the EU (Assessment and Management of Flood Risks) Regulations SI 122 of 2010. An objective of the CFRAM Programme is to achieve compliance with the requirements of the EU Floods Directive.

The aim of the EU Floods Directive, which came into force in 2007, is to reduce the adverse consequences of flooding on human health, the environment, cultural heritage and economic activity. The Directive requires Member States to undertake three key steps of analysis and planning:

- The Preliminary Flood Risk Assessment (PFRA): A screening of flood risk to identify Areas of Potentially Significant Flood Risk (APSFR), which were referred to as Areas for Further Assessment (AFA) for the National CFRAM Programme. The PFRA is a preliminary assessment,

based on available or readily-derivable information.

- The Flood Maps: The preparation of flood hazard and risk maps for the APSFRs.
- The Flood Risk Management Plans (FRMPs): The preparation of plans setting out objectives and a set of measures aimed at the management and reduction of flood risk within the APSFR.

In undertaking these three key steps, the Directive also requires Member States to exchange information and coordinate across borders, to coordinate with the implementation of the Water Framework Directive (WFD) and to publish the PFRA and Maps as well as encouraging the active involvement of interested parties in the preparation of the FRMPs. The 'Floods' Directive is cyclical, requiring a review of the PFRA, the Flood Maps and the FRMP's on a six yearly cycle.

1.5 National Policy

In line with changing national and international concepts on how to manage flood risk most effectively and efficiently, a review of national flood policy was undertaken in 2003/2004. The review was undertaken by an Inter-Departmental Review Group, led by the Minister of State at the Department of Finance with special responsibility for the OPW. The Review Group prepared a report that was put to Government, and subsequently approved and published in September 2004 (Report of the Flood Policy Review Group, OPW, 2004). The scope of the review included an evaluation of the roles and responsibilities of the different bodies with responsibilities for managing flood risk, and to set a new policy for flood risk management in the State into the future. This led to the development and implementation of the National Catchment-based Flood Risk Assessment and Management (CFRAM) Programme that was designed to:

- Focus on managing flood risk, rather than relying only on flood protection measures aimed at reducing flooding;
- Taking a catchment-based approach to assess and manage risks within the whole-catchment context;
- Being proactive in assessing and managing flood risks, including the preparation of flood maps and flood risk management plans.

The OPW undertook the National Catchment Flood Risk Assessment and Management (CFRAM) Programme to give a clear and comprehensive picture of flood risk in areas of potentially significant flood risk and to set out how to manage the flood risk effectively and sustainably.

The Programme focused on 300 communities in Six CFRAM study areas (covering 29 River Basins), at potentially significant flood risk, referred to as Areas for Further Assessment (AFAs), eight of which were located in County Louth:

- Dundalk & Blackrock (Neagh Bann Study)
- Drogheda (Eastern Study)
- Carlingford (Neagh Bann Study)
- Greenore (Neagh Bann Study)
- Annagassan (Neagh Bann Study)
- Ardee (Neagh Bann Study)
- Termonfeckin (Neagh Bann Study)
- Baltray (Eastern Study).

The CFRAM Programme led to the development of 29 Flood Risk Management Plans:

The 29 Flood Risk Management Plans, (FRMP's), set out the proposed measures, both structural and non-structural, to manage flood risk and were approved by the Minister for Public Expenditure and Reform in 2018.

The Neagh Bann FRMP and the Eastern FRMP were, subsequently adopted by LCC. These Plans set out the strategy, including a set of proposed measures, for the cost-effective and sustainable long-term management of flood risk in the River Basins, including the areas where the flood risk has been determined as being potentially significant.

Implementing all the measures set out in these plans requires a significant capital investment and it has, therefore been necessary to prioritise the investment required to implement the national set of proposed measures. LCC has been allocated funding to implement the following Flood Relief Schemes and is now working with the OPW on their delivery, which will occur during the lifetime of this Plan:

- Dundalk and Ardee Flood Relief Scheme.
- Drogheda and Baltray Flood Relief Scheme.
- Carlingford and Greenore Flood Relief Scheme.

Section 2

2.1 Study Area

This Section provides an overview of the study area, on which the impact of flooding will be determined in this SFRA. The study area comprises the entire County of Louth, which is the most northern county in the Eastern and Midland Region. The County is 827km² (319sq miles) in area and had a population in 2016 of 128,884. The County contains the largest and third largest towns in Ireland, which were classified as Regional Growth Centres. Drogheda lies at the southern extremity of the County whilst Dundalk is in the northern portion of the County. Despite being Ireland's smallest county, it is also one of the most densely populated outside of Dublin with a population density of 156 persons per km². The landscape is one of contrasts. The south is generally flat with gentle rolling hills, whilst the north is characterized by the mountainous landscapes of the Cooley Peninsula with Slieve Foy, the highest mountain reaching a height of 588mts.



Map 1: Map of Ireland indicating County Louth

2.1.1 Drainage Catchments

The County is defined along its entire eastern edge by the Irish Sea coastline that extends to in excess of 88km. Whilst, the northern section of the County is

defined by Carlingford Lough, inland the Rivers Dee, Fane, Glyde and Boyne drain the lowlands of the County.

2.1.2 People and Infrastructure

Louth's population in 2016 was 128,884 persons with in excess of 66% of the entire population living in urban areas. Of this, 56.7% of the population lives in Drogheda and Dundalk. Other significant settlements within the County include Ardee, Dunleer, Clogherhead,

Termonfeckin, Tullyallen, Carlingford and Castlebellingham/Kilsaran. In national terms, County Louth can be considered as relatively urbanised. Settlements of significant size in County Louth are as indicated in Table 1 below:

Table 1: Settlements of Significant Size in County Louth

Settlement	Population 2016
Drogheda	34,199 ¹
Dundalk	39,004
Ardee	4,928
Dunleer	1,822
Clogherhead	2,145
Termonfeckin	1,579
Tullyallen	1,547
Carlingford	1,445
Castlebellingham/Kilsaran	1,126

¹ Drogheda in County Louth (excluding Drogheda in County Meath)

County Louth is strategically located on the Dublin-Belfast Economic Corridor an important cross border network upon which are located the two designated Regional Growth Centres of Drogheda and Dundalk, whose future population growth seeks to build on their potential to develop as cities of scale and drivers of national and regional economic growth, investment and prosperity.

As a result of its strategic location, combined with high quality road and rail infrastructure, accessibility to ports and airports both north and south of the border, high speed broadband and a skilled and educated workforce, County

Louth is well placed to continue to grow and prosper in terms of population and economic terms, into the future. Louth has two hospitals, (Our Lady of Lourdes in Drogheda and the Louth Hospital in Dundalk), one third-level institute (DKIT) and a considerable number of primary and post primary schools.

In addition, there are three commercial ports in the County at Drogheda, Greenore and Dundalk together with a major fishing port at Clogherhead.

The County possesses a network of attractive and inviting towns and villages interspersed with a diverse range of landscapes and natural environment, home to its rich and varied natural and built heritage, which collectively, contribute substantially to the County's character, identity and sense of place.

2.2 Environment

County Louth has a variety of natural and semi natural habitats supporting a range of wild plant and animal species and ecosystems, which collectively contribute to the unique biodiversity of the County.

In total, there are 11 designated European Sites which are located wholly or partly in County Louth forming part of the EU-wide Natura 2000 network. This network includes both Special Areas of Conservation (SACs) and Special

Protection Areas (SPAs) representing the prime wildlife conservation areas in the country which are considered to be of significant importance at both European and Irish levels. The boundaries of the protected areas may alter during the lifetime of the Plan and additional areas may be designated. There are five Special Protection Areas (SPA's) in County Louth as detailed in Table 2 below:

Table 2: Special Protection Areas (SPA's) in County Louth

Special Protection Areas	Site Code
Carlingford Lough	004078
Dundalk Bay	004026
Stabannan and Braganstown	004091
Boyne Estuary	004080
River Boyne and River Blackwater	004232

In addition to the SPA's there are 6 Special Areas of Conservation (SAC's) in County Louth which are detailed in Table 3 below.

Table 3: Special Areas of Conservation (SAC's) in County Louth

Special Areas of Conservation	Site Code
Carlingford Mountain	000453
Dundalk Bay	000455
Clogherhead	001459
Boyne Coast and Estuary	001957
River Boyne and River Blackwater	002299
Carlingford Shore	002306

The National Parks and Wildlife Service (NPWS) proposed 24 ecological Natural Heritage Areas in Louth, which are listed in Table 4. The process of designation of

these sites is ongoing and it is anticipated that a number of pNHAs will be awarded full designated status during the course of this plan.

Table 4: Proposed Natural Heritage Areas (pNHA) in County Louth

Proposed Natural Heritage Areas (pNHA)	Site Code
Carlingford Lough	0452
Stabannan-Braganstown	0456
Blackhall Woods	1293
Liscarragh Marsh	1451
Ardee Cutaway Bog	1454
Castlecoo Hill	1458
Darver Castle Woods	1461
Drumcah, Toprass & Cortial Loughs	1462
Mellifont Abbey Woods	1464
Woodland at Omeath Park	1465
Trumpet Hill	1468
Louth Hall and Ardee Woods	1616
Barmeath Woods	1801
Stephenstown Pond	1803
King William's Glen	1804
Ravensdale Plantation	1805
Kildemock Marsh	1806
Reaghstown Marsh	1828
Dunany Point	1856

Proposed Natural Heritage Areas (pNHA)	Site Code
Boyne Coast and Estuary	1957
Boyne River Islands	1862
Carlingford Mountain	0453
Clogherhead	1459
Dundalk Bay	0455
Reaghstown Marsh	1828

2.3 Planning Policy

2.3.1 Ireland 2040 – National Planning Framework (NPF)

A Strategic Flood Risk Assessment of the National Policy Objectives (NPO) within the Ireland 2040 – National Planning Framework was undertaken to ensure flood risk is a key consideration in delivering the proposed strategic sustainable land-use planning decisions. It sets out how all levels of the planning process, from national level strategic assessments to individual planning applications, should follow the sequential approach set out in The Planning System and Flood Risk Management Guidelines 2009, prepared jointly by the OPW and the DoEHLG. The NPF acknowledges that it is not always possible to avoid

developing in flood risk areas due to spatial, economic, environmental and physical constraints. Development should be encouraged to continue, and in flood risk areas should follow the sequential approach and application of the Justification Test as set out in the aforementioned Guidelines. These guidelines will facilitate the integration of flood risk and land risk planning in the Eastern and Midland Region, at all tiers of the planning hierarchy from National level through Regional, City/County and Local plans, masterplans and individual planning applications.

2.3.2 Regional Spatial & Economic Strategy (Eastern & Midland Regional Assembly)

The Regional Spatial & Economic Strategy (RSES) for the Eastern & Midland Regional Assembly included a Regional Flood Risk Appraisal Report, undertaken at a high level, but with a view to informing policy decisions within lower tier development plans. The RSES found that an integrated approach to river catchment management is essential to manage and avoid increasing flood risk. The RSES sets out how Development Plans should include Strategic Flood Risk Assessments and all

future zoning of land for development in areas at risk of flooding should follow the sequential approach set out in the Guidelines on Planning and Flood Risk Management (DoEHLG) 2009. The inclusion of policies and actions to support Sustainable Urban Drainage Systems (SuDS) are recommended in future developments as a major component of flood management and prevention.

The settlement hierarchy selected by the RSES takes account of the fact that while areas of Drogheda and Dundalk are vulnerable to flooding, wider, effective management of flood risk coupled with wider environmental, sustainability and economic considerations mean that it is possible to facilitate the continued consolidation of the development of the existing urban structure of the region. In line with the Sequential Approach and Justification Criteria set out in the Department's Guidelines on the Planning System and Flood Risk Management, it is considered that these locations should be encouraged to continue to consolidate and to grow. This will ensure a more compact and sustainable urban development form while at the same time managing flood risk appropriately. The Guidelines outline measures through which the flood risk can be managed to allow the continued development of Louth's Regional Growth Centres of Drogheda and Dundalk.

The RSES included a number of development plan implications:

- An integrated approach to river catchment management is essential to manage and avoid increasing flood risk. Local authorities should fully support the implementation of the Flood Risk Measures identified in the CFRAM Flood Risk Management Plans.
- Development Plans shall include Strategic Flood Risk Assessments and all future zoning of land for development in areas at risk of flooding should follow the sequential approach set out in the 2009 Department Guidelines on Planning and Flood Risk Management
- Development Plans should include policies on the requirement for Sustainable Drainage Systems (SuDS) in future developments as a major component of flood management and prevention.

2.3.3 Louth County Development Plan 2015-2021

A SFRA was undertaken as part of the Louth County Development Plan 2015-2021. The purpose of the SFRA was to present and analyse flood related data at appropriate scales to identify flood risk management priorities for the County. Parts of County Louth are vulnerable to flooding and the vulnerability of these areas can be increased due to human actions such as clearing of vegetation and increased development in flood plains. As flooding cannot be completely eliminated, the Louth County Development Plan 2015-

2021 sought to minimise its impacts through proactive and careful management of catchments and identified flood risk areas and by ensuring that any development does not individually or cumulatively give rise to new flood risk.

The SFRA proposed this be completed by following the Sequential Approach and application of the Justification Test set out in the 2009 Guidelines on Planning and Flood Risk Management (DoEHLG) throughout the planning process.

2.4 Settlement Strategy

The Louth County Development Plan 2021-2027 identifies a hierarchy of

settlements within County Louth as detailed in Table 5 below.

Table 5: Settlement Hierarchy for County Louth

Settlement Level	Settlement Category	Settlement
1	Regional Growth Centres	Drogheda Dundalk
2	Self-Sustaining Growth Towns	Ardee Dunleer
3	Self-Sustaining Town	Carlingford, Clogherhead, Castlebellingham/Kilsaran, Termonfeckin, Tullyallen
4	Small Towns and Villages	Annagassan, Baltray, Collon, Dromiskin, Knockbridge, Louth Village, Omeath, Tallanstown,
5	Rural Villages	Bellurgan, Ballagan, Ballapousta, Darver, Dromin, Faughart, Glenmore, Grange, Grangebellew, Greenore, Gyles Quay, Kilcurry, Kilkerley, Lordship, Mountbagnal, Muchgrange, Philipstown (Collon), Ravensdale, Reaghstown, Sandpit, Sheelagh, Stabannon, Tinure, Willville

This Louth County Development Plan 2021-2027 incorporates the functional area of the entire county. It includes the two Regional Growth Centres of Drogheda and Dundalk, the Self-Sustaining Growth

Towns of Ardee and Dunleer, the Self-Sustaining Towns, the small towns and villages and the rural Villages. The rural village settlements pertain to mapped development envelopes only.

Section 3

3.1 Flood Risk

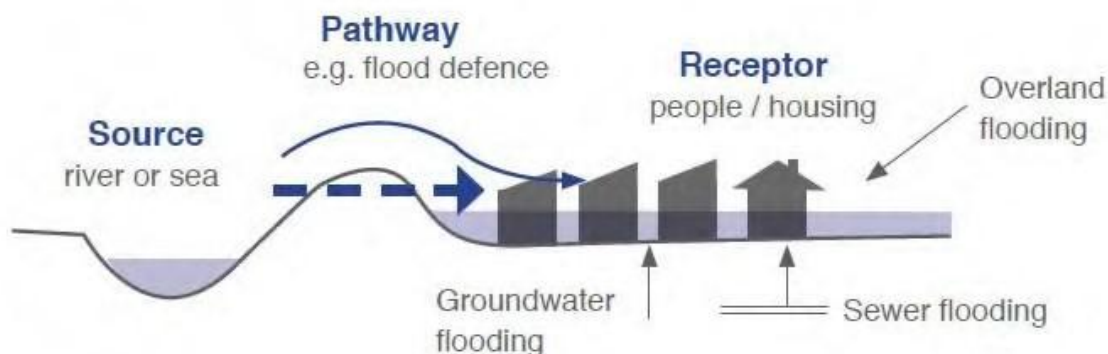
In order to manage flood risk it is important to understand what the term “flood risk” implies and to define the components of flood risk in order to apply the principals of the 'The Planning System and Flood Risk Management' guidelines. The Guidelines describe flooding as a natural process that can occur at any time and in a wide variety of locations. Flooding can often be beneficial, and many habitats rely on periodic inundation. However, when flooding interacts with human development, it can threaten people, their property and the environment.

Flood risk is generally accepted to be a combination of the likelihood of flooding and the potential consequences arising, and is normally expressed in terms of the following relationship:

$$\text{Flood Risk} = \text{Probability of Flooding} \times \text{Consequences of Flooding}$$

The assessment of flood risk requires an understanding of the sources, the flow path of floodwater and the people and property that can be affected. The *source - pathway - receptor model*, shown in Figure 1 below, illustrates this and is a widely used environmental model to assess and form the management of risk.

Figure 1 Source-Pathway-Receptor Model



Source: Planning System and Flood Risk Management 2009

This is a standard environmental risk model common to many hazards and should be the starting point of any Flood Risk Assessment. Principal sources of flooding are intense or prolonged rainfall or higher than normal sea levels which can be of particular concern in a coastal county such as Louth, while the most

common pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. Receptors can include people, their property and the environment. All three elements must be present for flood risk to arise.

Mitigation measures, such as defences or flood resilient construction have little or no effect on sources of flooding but they can block or impede pathways or remove receptors. Flood risk assessments require identification and assessment of all three components listed below:

1. The probability and magnitude of the source(s) (e.g. high river levels, sea levels and wave heights).

2. The performance and response of pathways and barriers to pathways such as floodplain areas and flood defence systems
3. The consequences to receptors such as people, properties and the environment.

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.

3.2 Probability of Flooding

The likelihood of flooding is normally expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached, on average once in 100 years, i.e. it has a 1 in 100 chance of occurring in any one year.

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

- A 1% flood has a 22% (1 in 5) chance of occurring at least once in a 25-year period - the period of a typical residential mortgage;
- And a 53% (1 in 2) chance of occurring in a 75-year period - a typical human lifetime.

3.3 Consequences of Flooding

Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure of the population, presence and reliability of mitigation measures etc.). Table 3.1 of the 'Planning System and Flood Risk Management' guidelines provide three vulnerability categories, based on the type of development and are summarised as:

- Highly vulnerable, including residential properties, essential infrastructure and emergency service facilities;
- Less vulnerable, such as buildings used for retail and commercial and local transport infrastructure
- Water compatible, including amenity open space, outdoor recreation and associated essential infrastructure, such as changing rooms.

3.4 Definition of Flood Zones

In the 'Planning System and Flood Risk Management' guidelines, the likelihood of a flood occurring is established through the identification of Flood Zones. These zones indicate a high, moderate or low risk of flooding from fluvial or tidal sources, as defined in Table 6.

It is important to note that the Flood Zones do not take other sources of flooding, such as groundwater or pluvial, into account, so an assessment of risk arising from such sources should also be made.

Table 6: Definitions of Flood Zones

Flood Zone	Description
Zone A High Probability of Flooding	More than 1% probability (1 in 100) for river flooding and more than 0.5% probability (1 in 200) for coastal flooding. Most types of development would be considered inappropriate in this zone.
Zone B Medium Probability of Flooding	0.1% to 1% probability (between 1 in 100 and 1 in 1000) for river flooding and 0.1% to 0.5% probability (between 1 in 200 and 1 in 1000) for coastal 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.
Zone C Low Probability of Flooding	This zone defines areas with a low risk of flooding from rivers and the coast (i.e. less than 0.1% probability or less than 1 in 1000). Development in this zone is appropriate from a flooding perspective (subject to assessment of flood hazard from sources other than rivers and the coast).

Source: Planning System and Flood Risk Management

It is important to note that the definition of Flood Zones is based on an undefended scenario and does not take into account the presence of flood protection structures such as flood walls or embankments. This is to allow for the fact that there is a residual risk of flooding behind the defences due to overtopping or breach and that there may be no guarantee that the defences will be maintained in perpetuity.

Section 4

4.1 Objectives and Principles of the Planning System and Flood Risk Management Guidelines

'The Planning System and Flood Risk Management' guidelines describe good flood risk practice in planning and development management. Planning authorities are required to have regard to the Guidelines in the preparation of Development Plans and Local Area Plans, and for development control purposes. The objective of the 'Planning System and Flood Risk Management' guidelines is to integrate flood risk management into the planning process, thereby assisting in the delivery of sustainable development. For this to be achieved, flood risk must be assessed as early as possible in the planning process. The Guidelines state that the core objectives 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 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;
- 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.

The Guidelines aim to facilitate "the transparent consideration of flood risk at all levels of the planning process, ensuring a consistency of approach throughout the country." SFRAs therefore become a key evidence base in meeting these objectives.

The 'Planning System and Flood Risk Management' works on a number of key principles, including:

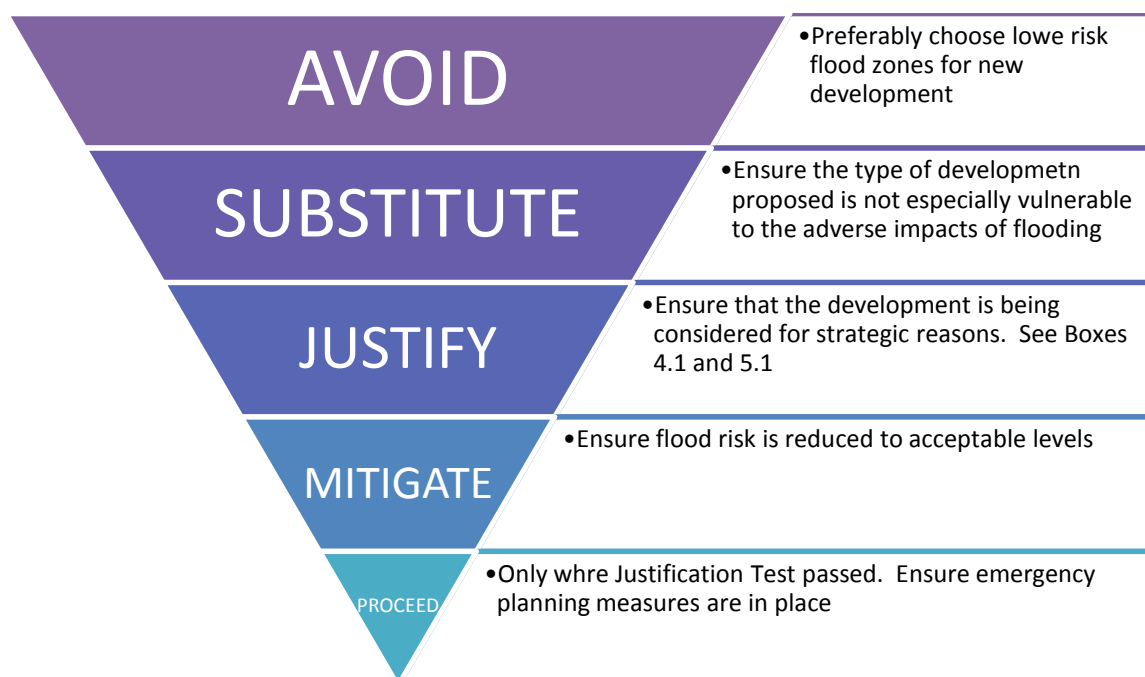
- Adopting a staged and hierarchical approach to the assessment of flood risk;
- Adopting a sequential approach to the management of flood risk, based on the frequency of flooding (identified through Flood Zones) and the vulnerability of the proposed land use.

4.2 The Sequential Approach and the Justification Test

Each stage of the FRA process aims to adopt a sequential approach to management of flood risk in the planning process (See Figure 2). For the purposes of applying the sequential approach, once flood risk has been identified, it should be considered whether it can be avoided. If following the initial assessment that the risks are too significant, it should consider

whether avoidance is the only outcome. Where possible, development in areas identified as being at flood risk should be avoided; this may necessitate dezoning lands within the development plan. If dezoning is not possible, then rezoning from a higher vulnerability land use, such as residential, to a less vulnerable use, such as open space may be required.

Figure 2: Sequential approach to management of flood risk in the planning process



4.3 Sequential Approach Principles in Flood Risk Management

Where rezoning is not possible, exceptions to the development restrictions are provided for, by way of a Justification Test. Many towns and cities have central areas that are affected by flood risk and have been targeted for growth. In County Louth, these include the Regional Growth Centres of Drogheda and Dundalk as identified in the RSES for the Eastern Midland Region. To allow the sustainable and compact development of these urban centres, development in areas of flood risk may be considered necessary. For development in such areas to be allowed, the Justification Test must be passed.

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of such developments. The test is comprised of two processes; the Plan-making Justification Test, which is

undertaken for zoned settlements, and the Development Management Justification Test. This is used at the planning application stage where it is intended to develop land that is at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be considered inappropriate for that land.

Tables 7 and 8 below, indicate those types of development that would be appropriate to each flood zone and those that would be required to meet the Justification Test. 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.

Table 7: Classification of vulnerability of different types of development

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

Table 8: Matrix of Vulnerability versus Flood Zone to illustrate Appropriate Development and that required to meet the Justification Test

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

Source: Planning System and Flood Risk Management

4.4 Scales and Stages of Flood Risk Assessment

Within the hierarchy of regional, strategic and site-specific flood-risk assessments, a tiered approach ensures that the level of information is appropriate to the scale and nature of the flood-risk issues and the location and type of development

proposed, avoiding expensive flood modelling and development of mitigation measures where it is not necessary. The stages and scales of flood risk assessment comprise:

4.4.1 Regional Flood Risk Appraisal (RFRA)

The Regional Flood Risk Appraisal (RFRA) has been prepared as part of the Strategic Environmental Assessment of the Eastern & Midland RSES in accordance with National and EU legislation. The RFRA was prepared by considering the requirements of 'The Planning System and Flood Risk Assessment Guidelines' for Planning Authorities (2009) and CircularPL02/2014 (August 2014). The purpose of the RFRA is to ensure that the RSES follow the principles of the Guidelines and implements policies and development strategies that:

- Avoid inappropriate development in areas at risk of flooding, 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;

- Avoid developments 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;
- Avoid unnecessary restriction of National, Regional or Local economic and social growth;
- Incorporate flood risk assessments into the planning process;
- 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.

4.4.2 Strategic Flood Risk Assessment (SFRA)

This provides an assessment of all types of flood risk informing land use planning decisions. This will enable the Planning Authority to allocate appropriate sites for development, whilst identifying opportunities for reducing flood risk. This SFRA for Louth will revisit the flood risk identification undertaken in the RFRA, and give consideration to a range of potential sources of flooding. An initial flood risk assessment, based on the identification of

Flood Zones, will also be carried out for those areas, which will be zoned for development. Where the initial flood risk assessment highlights the potential for a significant level of flood risk, or there is conflict with the proposed vulnerability of development, then a SFRA will be recommended for the settlement, which will necessitate a detailed flood risk assessment.

4.4.3 Site Specific Flood Risk Assessment (FRA)

This involves a site or project specific flood risk assessment to consider all types of flood risk associated with the site and propose appropriate site management and mitigation measures to reduce flood risk to and from the site to an acceptable

level. If the previous tiers of study have been undertaken to appropriate levels of detail, it is highly likely that the site specific FRA will require detailed channel and site survey, and hydraulic modelling.

Table 9: Flood Risk Assessment Stages Required per Scale of Study Undertaken

	Flood Risk Identification	Initial Flood Risk Assessment	Detailed Flood Risk Assessment
Regional Flood Risk Assessment	R	U	U
Strategic Flood Risk Assessment – County Wide	R	P	U
Strategic Flood Risk Assessment, town within County Plan area	R	R	P
Site Specific Flood Risk Assessment	R	R	R

Source: Planning System and Flood Risk Management

P – Probably need to meet the requirements of the Justification Test

U – Unlikely to be needed

R – Required to be undertaken

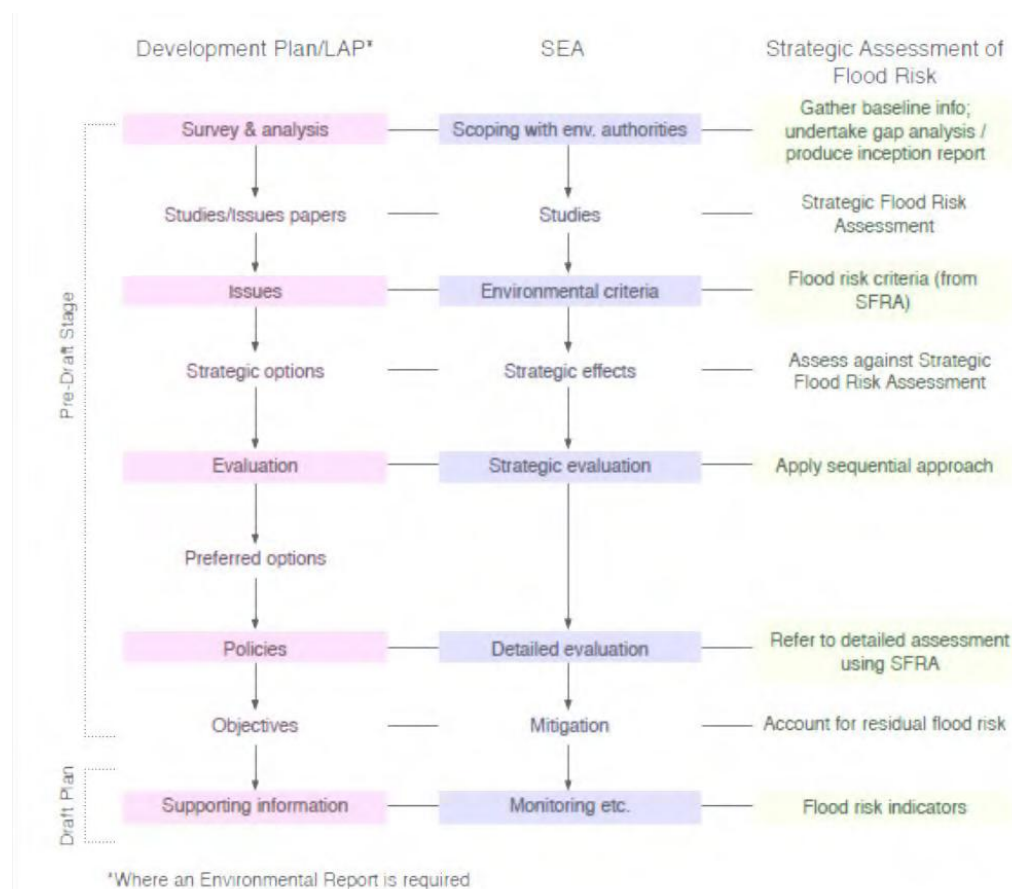
4.5 Strategic Flood Risk Assessment (SFRA) and Strategic Environment Assessment (SEA)

As detailed in the 'Planning System and Flood Risk Management Guidelines' 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. Within the process of preparing the draft Louth Development Plan, the Strategic Environmental Assessment (SEA) report will consider the environmental effects of the Plan against environmental criteria for the plan area, including mitigation measures and future monitoring of effects. 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.

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. A summary will be provided in the environmental report element of the overall development plan. The integration of the SFRA with the SEA and wider Development Plan process is shown in Figure 3.

Figure 3: The integration of the SFRA with the SEA and wider Development Plan process



Source: Planning System and Flood Risk Management

Section 5

5.1 Compilation of Data

There are a number of sources of flood data available for County Louth.

These are listed in Table 10 below and are detailed in the sections following thereafter.

Table 10: Flood data available for County Louth

Description	Coverage	Confidence	Used
National Preliminary Flood Risk Assessment (PFRA))	Countywide	Moderate	Yes
Neagh Bann and Eastern Region CFRAM Studies and Flood Risk Management Plans	Annagassan, Ardee, Baltray Blackrock, Carlingford, Drogheda, Dundalk, Greenore, Termonfeckin.	High	Yes
Dunleer Flood Risk Assessment Study and Dunleer Flood Risk Management Plan	Dunleer	High	Yes
Arterial Drainage Benefitting Land Maps	Countywide	Low	
2010 Irish Coastal Protection Strategy Study, Phase 3a - North East Coast	Whole Coastline of County	High	Yes
Regional Flood Risk Appraisal	Eastern & Midland Region	High	Yes
Office of Public Works (OPW) National Flood Hazard Mapping Reports – Listed by settlement (Historic Events including photos, aerial photos and reports)	Countywide (but only for specific sites)	High	Yes
• Ardee • Baltray • Blackrock • Carlingford • Clogherhead • Dundalk • Dunleer • Drogheda • Dromiskin			
River Basin Management Plans and reports (Neagh Bann and Eastern)			

5.2 National Preliminary Flood Risk Assessment

The Preliminary Flood Risk Assessment (PFRA) was an important first step in determining how flood risk would be assessed and managed in the future; both at County Louth level and nationally. The purpose of the Preliminary Flood Risk Assessment (PFRA) was to identify areas at risk of significant flooding. The PFRA involved:

- Reviewing records of floods that have happened in the past,
- Undertaking analysis to determine which areas might flood in the future, and what the impacts might be and
- Extensive consultation with each Local Authority, as principal partners in the CFRAM Programme as well as with other Government departments and agencies.

This assessment considered all types of flooding, including that which can occur from rivers, the sea and estuaries, heavy rain, groundwater, the failure of infrastructure, and so on. It also considered the impacts flooding can have on people, property, businesses, the environment and cultural assets. Areas where on-site inspections were required to investigate the issues more closely were identified and these investigations formed part of the CFRAM Studies.

The PFRA is only a preliminary assessment, based on available or readily derivable information. Analysis had been undertaken to identify areas prone to flooding, and the risks associated with such flooding, but it should be stressed that the PFRAM analysis is purely indicative and undertaken for the purpose of completing the PFRA.

5.3 Neagh Bann and Eastern Region Flood Risk Management Plans

The OPW undertook the National Catchment Flood Risk Assessment and Management (CFRAM) Programme to give a clear and comprehensive picture of flood risk in areas of potentially significant flood risk and to set out how to manage the flood risk effectively and sustainably. The CFRAM Programme included nine settlements in County Louth:

- Dundalk & Blackrock (Neagh Bann Study)
- Drogheda (Eastern Study)
- Carlingford (Neagh Bann Study)
- Greenore (Neagh Bann Study)
- Annagassan (Neagh Bann Study)

- Ardee (Neagh Bann Study)
- Termonfeckin (Neagh Bann Study)
- Baltray (Eastern Study).

The CFRAM Programme produced Fluvial and Coastal Flood Maps for all the settlements which are available to view on www.floodinfo.ie and also led to the development of 28 Flood Risk Management Plans, (FRMP's) including the Eastern Region FRMP and the Neagh Bann FRMP. These FRMP's set out the proposed measures, both structural and non-structural, to manage flood risk and were approved by the Minister for Public Expenditure and Reform in 2018.

5.4 Dunleer Flood Risk Management Plan

Dunleer was subject to a significant flood event in November 2014 when up to 17 commercial and residential properties were affected by flooding from the White River. The town of Dunleer was not identified through the North Western – Neagh Bann Catchment Flood Risk Assessment and Management (CFRAM) Study as an Area for Further Assessment as the Preliminary Flood Risk Assessment (PFRA) as being at potentially significant risk of flooding. At the time of the PFRA (2011) there was no recorded significant history of flooding to properties in the town and a national high level predictive analysis did not establish that the town was at significant risk.

This Dunleer Flood Risk Management Plan, (FRMP), represented a continuation from the Dunleer Flood Risk Assessment (FRA) Study carried out by Louth County

Council and delivered in November 2016. The 2016 Study included survey, hydrological analysis, hydraulic modelling and mapping in order to identify the level of fluvial flood hazard in Dunleer. Mapping produced identified the flood extent and depth for a range of event frequencies from 50% AEP (2 year return period) to 0.1% AEP (1000 year return period) for the present day and two climate and catchment change scenarios; the Mid-Range and High End Future Scenarios. The analysis is summarised in the report ‘Dunleer Flood Risk Assessment (FRA) Study’.

The Dunleer FRMP included a review and analysis of Dunleer FRA Study and the development of potentially viable flood relief works in Dunleer that suitably protect those properties at risk from Fluvial Flooding.

5.5 Arterial Drainage Benefitting Land Maps

The Benefitting Land Maps show land which would, (or have), benefitted from a land drainage scheme. This is not based on a “design flood”, (i.e. the events do not have a return period), but indicate low-lying poorly drained land. It is not the same as lands, which are protected by a

flood relief scheme. The Benefitting Land Maps may be superseded by the PFRAM and CFRAM Studies, although they may be used to cross check Flood Zones particularly in the River Dee and River Glyde catchments.

5.6 Irish Coastal Protection Strategy Study 2013

The Irish Coastal Protection Strategy Study (ICPSS) is a national study that was commissioned in 2003 with the objective of providing information to support decision making about how best to manage risks associated with coastal flooding and coastal erosion. The Study was completed in 2013 and provides strategic current scenario and future scenario (up to 2100) coastal flood hazard maps and strategic coastal erosion maps

for the national coastline.

This major study provides invaluable and essential information required to inform policy in this area, particularly for local authorities in relation to the proper planning and sustainable development of coastal areas. County Louth was examined under Phase 3 of the study (North East and South Coast).

The ICPSS is considered to be one of the more robust studies carried out to date into flooding potential and is invaluable in

relation to County Louth given the County's extensive coastline.

5.7 EMRA Regional Flood Risk Appraisal Report for the RSES

The RSES for the Eastern and Midland Regional Assembly included a Regional Flood Risk Appraisal report, undertaken at a high level, but with a view to informing policy decisions within lower tier development plans.

Table 11 identifies the towns in County Louth, which are specifically designated in the Settlement Hierarchy of the RSES.

Table 11: RSES Settlement Hierarchy for Louth

Settlement Hierarchy RSES	Location
Regional Growth Centre	Drogheda
Regional Growth Centre	Dundalk

Regional Growth Centre - Drogheda

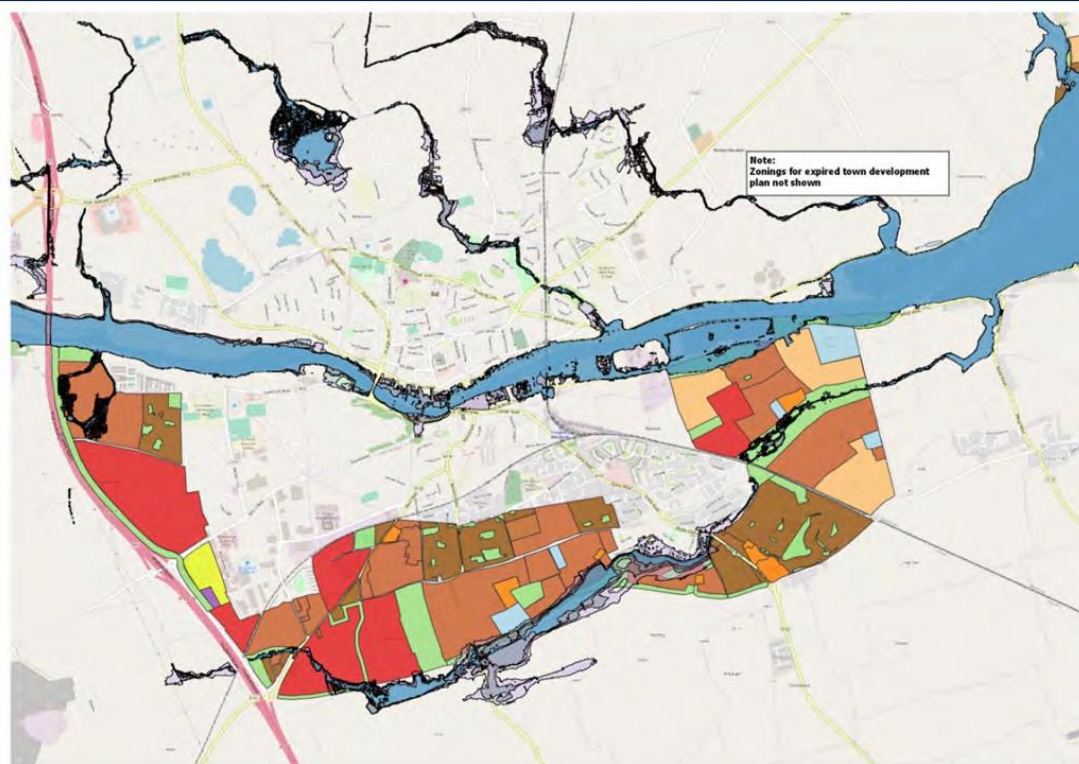


Figure 4 – Broad spatial distribution of flood risk in Drogheda

Flood Zone Mapping	CFRAM Flood Zone mapping
Commentary	Drogheda sits at the mouth of the River Boyne discharging into the Irish Sea. Aerial photography would indicate the town will expand to the north and south. There is partial flooding in these areas and the principle of avoidance should be implemented to avoid flood risk areas. Fluvial and tidal flooding from banks the River Boyne affects the quays of the town as well as, partially propagating inland in areas between St. Marys Bridge and St. Dominick's Bridge for higher return periods. Development in this area should follow the sequential approach and appropriate land use types adopted.

RPO – Regeneration of Westgate	Sections of the existing Westgate area zoned for future regeneration are inundated within the predicted Flood Zone A and B extents. The low lying areas adjacent to the bank of the River Boyne are the worst affected. Development and regeneration in this area should be carried out in accordance with the Guidelines specifically circular PL02/2014 (August 2014). The circular specifically addresses regeneration areas and flood risk management of their development. The sites identified can be cognisant of the progression and implementation of the Drogheda Flood Alleviation Scheme as identified as a measure in the FRMP. The scheme could protect parts of the town centre for the 1% AEP event.
RPO – Regeneration of lands at McBride Station	The predicted Flood Zone A & B extents encroaches the land between the River Boyne and the Marsh Road zoned for future employment use. The extent of the flooding is limited to the lands north of Marsh Road and does not extend to the remaining land zoned adjacent to McBride Station for future employment and residential uses south of Marsh Road. An open space area has been zoned to maintain the floodplain along the Silverstream watercourse.
RPO – Drogheda Docklands and Port	The lands within Drogheda Docklands and Port zoned for future expansions are within the predicted Flood Zone A and B extents. Water compatible development is appropriate in this area. However, flood risk assessments for development of the port should still be carried out to ensure that there is no residual flood risk to the surrounding areas (upstream and downstream) due to development on these floodplains.
RPO – Regeneration and redevelopment of areas near Mell/ North Road and the town centre	There is no predicted fluvial or coastal flooding in the Mell/ North Road areas and regeneration of these should not be hindered from a flood risk perspective. The existing mixed use developments located on low lying lands within Drogheda Town Centre from Wellington Quay to West Street are inundated with the predicted Flood Zone A and B extents. Development and regeneration in this area should be carried out in accordance with the Guidelines specifically circular PL02/2014 (August 2014).
RPO: Support the proposed Drogheda Flood Relief Scheme	This will aid in protecting existing development and reduce the flood risk. It will also enable further sustainable development of at risk undeveloped land.
Existing - Flood Risk Management Measures	No current existing flood risk management measures.

Proposed - Flood Risk Management Measures	Flood defences measures were proposed for Drogheda, as part of the OPW FRMP for the Boyne Catchment, to provide protection for up to a 1 in 100 year fluvial event and also a 1 in 200 year coastal event. The flood relief works proposed for Drogheda include a series of hard defences along the River Boyne and improvement of conveyance and a flow diversion channel on various tributaries. There may be some sealing of manholes, localised raising of roads and automated defences to allow continued operation of port activities. The hard defences consist of an average height of 1.95m and a total length of 4.3km. The improvement of channel conveyance consists of 215m of additional 1.5m diameter twin culvert within the vicinity of the old Usher's Mill at Greenhills and 91m of dredged and widened channel. The FRMP outlined that a detailed study is required to investigate non-fluvial flooding sources in the vicinity of a proposed development.
Flood Risk Summary	Existing Flood Risk The CFRAM study provides the best source of existing fluvial and coastal flooding information for Drogheda. This mapping is presented in Figure 4. This does not provide a complete assessment of flood risk to the area nor does it assess flood risk from all sources. This must be covered in the SFRA informing the LAP and FRAs for any other development plans in the town. Flood Risk Impact and Spatial Planning Integration The areas within lands zoned for future residential and employment use identified within the predicted Flood Zone A & B require site specific flood risk assessments to ensure no adverse flood risk impacts. Existing residential and mixed use developments at Drogheda Town Centre zoned for future regeneration located within the predicted Flood Zone A & B require flood risk management to ensure flood risk is mitigated and does not have an adverse impact elsewhere. Applications for major development within these areas require a site specific flood risk assessment to ensure no increase in flood risk to the development and surrounding areas. FRAs should be carried out in accordance with the Guidelines and the sequential approach for these sites to be developed in a sustainable manner and avoid flood risk. An assessment of climate and catchment changes shows Drogheda to be vulnerable to the increases as modelled in the mid-range and high end future scenarios. Future development plans and flood risk assessments should consider the potential of climate change influence on flood extents in accordance with the Guidelines.

Recommendations For Flood Risk Management

As detailed above the CFRAM FRMP has outlined a flood alleviation scheme for the town that should be reviewed by the planning authorities in conjunction with the OPW to deliver a flood alleviation scheme if it is deemed appropriate and viable. The planning authority should also review and implement where appropriate the suggested CFRAM flood risk management policy measures as outlined in Appendix B and the FRMP. SFRAs should be undertaken for all development plans and existing SFRAs should be updated and reviewed in line with statutory timelines for development plans. An assessment of climate and catchment changes shows Drogheda to be vulnerable to the increases as modelled in the mid- range and high end future scenarios. The proposed flood alleviation scheme should be designed to incorporate the potential impacts of climate change or be adaptable to increase the height of defences to provide the required standard of protection (or other measures including Natural Flood Risk Management Measures may be adopted to monitor and/or adapt the scheme.

Opportunities for Joint Studies

Meath and Louth County Councils should collaborate on future SFRAs for the Drogheda area to ensure that all flood issues are captured to inform their preparation of spatial plans.

Regional Growth Centre – Dundalk

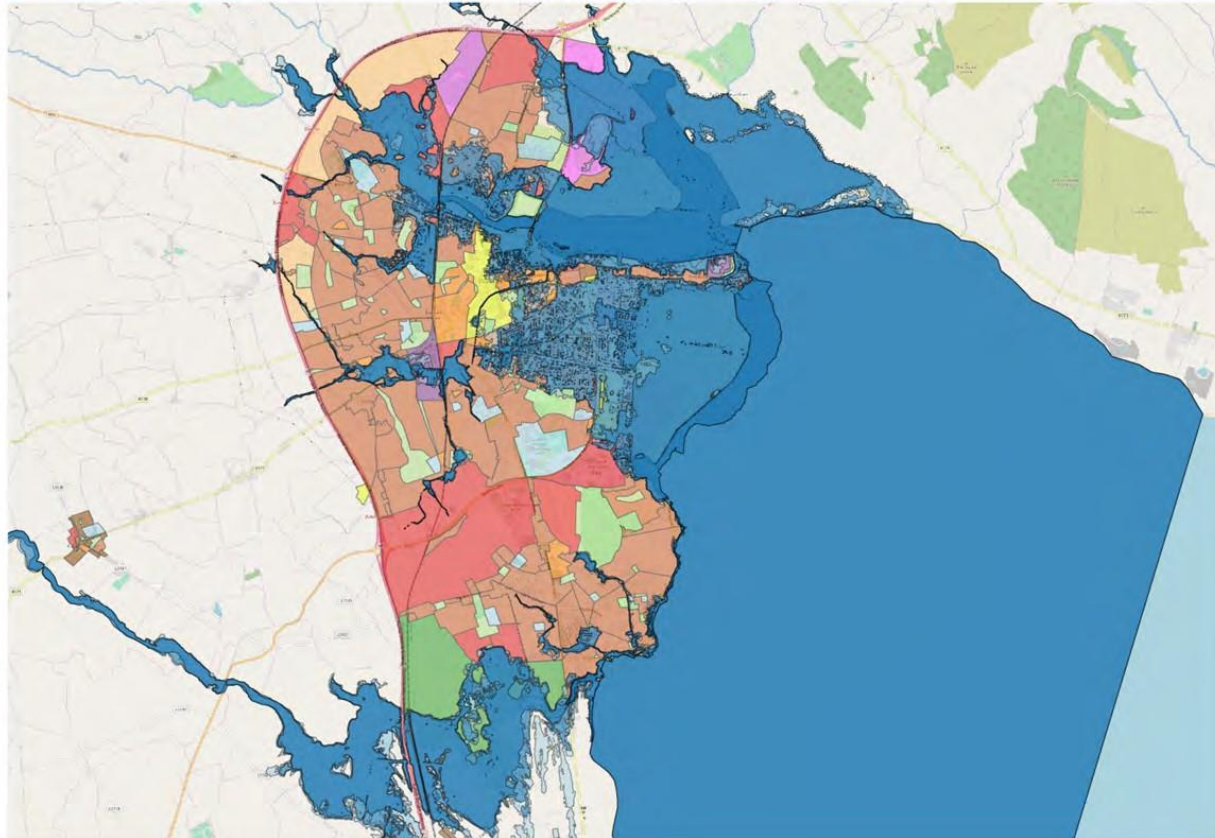


Figure 5 Broad spatial distribution of flood risk in Dundalk

Flood Zone Mapping	CFRAM Flood Zone mapping
Commentary	Dundalk town centre is susceptible to fluvial flooding along the Castletown River but also from tidal flooding propagating inland from the Irish Sea. The Cooley Mountains to the north of the town and hilly terrain to the west with the Irish Sea to the east have resulted in the town growing southward towards the village of Blackrock. The M1 circumnavigates the town which will consolidate growth to the south of the town centre. The extent of the CFRAM mapping would indicate that the growth of Dundalk will largely be comprised of infill development between the boundary of the existing town and the M1.
RPO – Town Centre Regeneration	Current Scenario flooding is not a significant risk to the regeneration of the town centre areas such as Clanbrassil Street / St. Nicholas Quarter and infill/brownfield sites including Long Walk Shopping Centre, Carroll's Village Shopping Centre, Williamson's Mall, and Dunne's Park Street. However, there is some potential for climate change influences to expand flood extents towards Clanbrassil Street and Seatown place. Development and regeneration in this area should be carried out in accordance with the Guidelines specifically circular PL02/2014 (August 2014).
RPO – Regeneration of Port Harbour	The land within the Port area zoned for future expansion is within the predicted Flood Zone A and B extents. Water compatible development is appropriate in this area. However flood risk assessments for development in the port should still be carried out to ensure that there is no residual flood risk to the surrounding areas (upstream and downstream) due to development on these floodplains.
RPO – Development of Mount Avenue Masterplan Lands	Some lands within the Mount Avenue masterplan area are inundated with Flood Zone A and B. As the development area is currently largely greenfield, the sequential approach of the Guidelines should be applied to ensure sustainable growth of Dundalk.
RPO – Identification of suitable sites for industry to support Dublin- Belfast Economic Corridor	Several greenfield sites identified for industrial expansions on the periphery of the town have Flood Zone A and B extents. Any development in these areas should include a site specific FRA and follow the Guidelines sequential approach.
RPO: Support the proposed Dundalk Flood Relief Scheme	This will aid in protecting existing development and reduce the flood risk. It will also enable further sustainable development of at risk undeveloped land.
Existing - Flood Risk Management Measures	There are embankments protecting parts of the Point Road but they are only effective up to the 10% AEP coastal event. Louth County Council is also progressing extension of an existing 1350mm surface drainage pipe as an interim flood relief method in the Balmers Bog area. The pipe will provide additional flow capacity which may be significant during high frequency events and affords partial upstream flood mitigation during a 1% AEP event, however alternative FRM methods would still require to be added to provide the preferred SoP under CFRAM for Dundalk AFA.

Existing Residential Areas	There is a fluvial flood risk to existing residential areas in the Upper and Lower Marshes areas as well as, the Demesne area. There is a coastal flooding risk to St. Marys, Seatown and to large extents of the eastern part of the town between St Alphonsus Road and Red Barns Road. Applications for minor development to these existing buildings in areas of flood risk such as small extensions and most changes of use must include a flood risk assessment of appropriate detail to demonstrate that they would not have adverse flood risk impacts and employ flood resilient construction. Large scale developments for regeneration or infill development for these areas will require a site-specific FRA.
Proposed - Flood Risk Management Measures	Flood defences measures were proposed for Dundalk and Blackrock South AFA, as part of the OPW FRMP to provide protection for up to a 1 in 100 year fluvial event and also a 1 in 200 year coastal event. Two proposed measures were identified that could be implemented after project-level assessment and planning. The preferred solutions are alternate routes for hard defences, combined with improvement of channel conveyance, which would provide the required standard of protection.
	Both measures consists of a series of hard defences, including flood embankments and walls, rock armour coastal protection, demountable barriers, road raising, a sluice gate and tanking of two properties. These defences would be required along with improvement of channel conveyance on the Blackrock River and Dundalk Blackwater River, along with storage on the Castletown River. The conveyance requires a 430m length of the Blackrock River to be lowered, along with the replacement of two undersized culverts. On the Dundalk Blackwater, two undersized parallel culverts should be replaced. The storage area to be created is located upstream of the Castletown River, allowing a volume of 84,329m ³ to be stored during the 1% AEP fluvial flood event. This requires a short 15m embankment, along with a culvert and weir in order to retain flow at the 10% AEP event. The two proposed measures have alternate routes with hard defences either following the existing line of coastal embankments protecting all properties or a new line of coastal defences set back.
Climate Change Adaptability	Dundalk and Blackrock South AFA is considered to be at high vulnerability from the mid-range and high end future scenarios. This should be reflected in the future development plans for the town. A large portion of the eastern edge of the town is susceptible to future coastal flooding if climate change predictions are accurate. Areas from Avenue Road to the coastline have the potential to be inundated in Flood Zone A and B.

	The CFRAM FRMP outlined that any proposed flood risk management proposals for the Dundalk and Blackrock South AFA should be adaptable to climate change. The hard defence's method could be adapted by increasing the height of the walls, embankments, demountables and rising roads. Existing defences would need to be altered, with rock armour widening and sea walls requiring additional length. Additional lengths of hard defences would also be required where properties are not presently at risk. A sluice would need to be replaced. The storage area does not have any more capacity to store water for future scenarios. The improvement of channel conveyance method could be adapted by increasing channel capacity size and upgrading culverts. Other measures including Natural Flood Risk Management Measures may be adopted to monitor and/or adapt the scheme.
Flood Risk Summary	Existing Flood Risk The CFRAM study provides the best source of existing fluvial and coastal flooding information for Dundalk. This mapping is presented in Figure 5. This does not provide a complete assessment of flood risk to the area nor does it assess flood risk from all sources. This must be covered in the SFRA informing the LAP and FRAs for any other development plans in the town. Flood Risk Impact and Spatial Planning Integration The areas within lands zoned future residential and employment hubs identified within the predicted Flood Zone A & B require site specific flood risk assessments to ensure no adverse flood risk impacts. The Justification Test applies to applications within these areas. Existing residential and mixed use developments at Dundalk Town Centre zoned for future regeneration located within the predicted Flood Zone A & B requires flood risk management to ensure flood risk is mitigated and does not have an adverse impact elsewhere.

	Applications for major development within these areas required a site specific flood risk assessment to ensure no increase in flood risk to the development and surrounding areas. FRAs should be carried out in accordance with the Guidelines and the sequential approach for these sites to be developed in a sustainable manner and avoid flood risk. An assessment of climate and catchment changes shows Dundalk has been identified as being particularly susceptible to flooding from climate change scenarios. Future land use planning for the town should incorporate this into their FRA and development policies. Future development plans and flood risk assessments should consider the potential of climate change influence on flood extents in accordance with the Guidelines. Recommendations For Flood Risk Management As detailed above the CFRAM FRMP has outlined a flood alleviation scheme for the town that should be reviewed by the planning authorities in conjunction with the OPW to deliver a flood alleviation scheme if it is deemed appropriate and viable. The planning authority should also review and implement where appropriate the suggested CFRAM flood risk management policy measures as outlined in Appendix B and the FRMP. SFRAs should be undertaken for all development plans and existing SFRAs should be updated and reviewed in line with statutory timelines for development plans. An assessment of climate and catchment changes shows Dundalk has been identified as being particularly susceptible to flooding from climate change scenarios. The proposed flood alleviation scheme should be designed to incorporate the potential impacts of climate change or be adaptable to increase the height of defences to provide the required SoP, or other measures including Natural Flood Risk Management Measures may be adopted to monitor and/or adapt the scheme. Opportunities for Joint Studies N/A
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Table 11: Reports extracted from Office of Public Works, National Flood Hazard Mapping Application (www.floodmaps.ie), County Louth

Settlement	Date of Flood	Location/Description Synopsis
Ardee	November 1968	River Dee downstream of Ardee lasting up to two days
Ardee	17 th August 2008	Prolonged rainfall in the River Dee catchment led to extensive flooding in the area around Ardee Bog including local roads. The floods persisted for some time.
Ardee	30 th December 2015	The ground floor of Riverside Apartment block and the junction of John Street and Stoney Lane were flooded when the adjacent stream flowing down Stoney Lane overflowed.
Ardee Area	1 st December 2015	Aclint & Reaghstown Townlands - fields flooded for 1 month; Ardee Bog - fields flooded for 1 month; Corbollis & Mapastown Townlands - fields flooded for 1 month. All due to the overtopping of the River Glyde.
Baltray	02 nd November 2000	Major coastal flooding incident in residential area
Blackrock	07 th March 2001	Localised flooding of small river flowing through part of Rock Court caused by heavy rainfall
Blackrock	February 2002	Blackrock Promenade. High tide severely flooded this area. Houses along main Street were damaged. Also badly affected Village Green/Golf Links Road and Wallace Road/Rock Road junction.
Blackrock	3 rd January 2014	Flooding caused due to high tides and surge raising water levels and together with significant wave heights resulted in sea wall along Main Street Blackrock being overtopped causing flooding of street and adjacent retail properties on the 3 rd , 5 th and 7 th of Jan 2014.
Settlement	Date of Flood	Location/Description Synopsis
Carlingford	1995	Market Street, flooding of public house due to flash flood. Grove Road, Carlingford. Road closed due to flooding caused by runoff from adjacent lands following prolonged, heavy periods of rain.

Settlement	Date of Flood	Location/Description Synopsis
Carlingford	3 rd January 2014	A combination of high tide, low air pressure and wind direction caused flooding at the Snooker/Pool Hall and Old Quay Lane.
Clogherhead	02 nd November 2000	Flooding at Port Oriel Caravan Park
Drogheda	17 th October 2012	Reports of tidal flooding of road and houses along Ship Street & Marsh Road and of Wellington Quay, Marsh Rd, Queensboro (Baltray Rd).
Drogheda	03 rd January 2014	Extensive flooding caused by overtopping of the River Boyne due to tidal surge, low air pressure and wind direction. 100 residential properties, 62 commercial properties, several roads including access to Railway Station car park and Waste Water Treatment Plant all flooded. The flood occurred twice on the 3 rd and 6 th of January.
Drogheda	14 th November 2014	Overtopping at culvert inlet at top of Flaxmill Lane caused flooded of four ground floor apartments at Flaxmill Lane Apartments.
Dundalk	02 nd November 2000	Fatima (North West Dundalk) Major flooding incident in residential area. Mounthamilton, Ardee Road (West Dundalk) major flooding incident in residential area. Dundalk Brewery, flooding of commercial premises
Settlement	Date of Flood	Location/Description Synopsis
Dundalk	14 th November 2014	Rampart River broke its banks causing flooding of four industrial units in Mounthamilton Industrial Estate and three residential properties along Ardee Road. Two properties along Regan's Terrace also flooded.
Gallstown	14 th November 2014	Overtopping at bridge on the L2254 in Gallstown flooding two residential properties along the L2254.
Termonfeckin	14 th November 2014	Termonfeckin River breached its banks at the Riverside Pub and then also overtopped its banks along the Strand Road. Three residential properties along Strand Road and one pub flooded.

5.6 Sources of Flooding

This SFRA has reviewed flood risk from fluvial, coastal/estuarine, pluvial and groundwater sources. It also considers flooding from drainage systems, reservoirs and other artificial or man-made systems. The focus of the study is on risk from fluvial and tidal (coastal/estuarine) flooding. There are two main reasons for this decision. Firstly, the review of historical flooding shows these to be the most common, and most damaging, sources of flooding. Secondly, Flood Zones in the 'Planning System and Flood Risk Management Guidelines' are defined on

the basis of fluvial, and where appropriate, tidal flood risk. In addition, the SFRA should be based on readily derivable information, and records and indicators for fluvial and coastal flood risk are generally more abundant than for other sources of flooding. With climate change, the frequency, pattern and severity of flooding are expected to change and become more damaging so the likely impact of climate change on fluvial and coastal flood extents has also been appraised.

5.6.1 Fluvial Flooding

Flooding of watercourses is associated with the exceedance of channel capacity during higher flows. The process of flooding on watercourses depends on a number of characteristics associated with the catchment including; geographical location and variation in rainfall, steepness of the channel and surrounding floodplain and infiltration and rate of runoff, associated with urban and rural catchments. Generally, there are two main types of catchments: large and relatively flat or small and steep. The two give two very different responses during large rainfall events.

In a large, relatively flat catchment, flood levels will rise slowly and natural floodplains may remain flooded for several days, acting as the natural regulator of the flow. In small, steep catchments, local intense rainfall can result in the rapid onset of deep and fast-flowing flooding with little warning. Such "flash" flooding, which may only last a few hours, can cause considerable damage and possible threat to life.

The form of the floodplain, either natural or urbanised, can influence flooding along watercourses. The location of buildings and roads can significantly influence flood depths and velocities by altering flow directions and reducing the volume of storage within the floodplain. Critical structures such as bridges and culverts can also significantly reduce capacity creating pinch points within the floodplain. These structures are also vulnerable to blockage by natural debris within the channel or by fly tipping and waste.

Flood risk to specific settlements is discussed in Section 6 and has been used to inform the zoning objectives for the towns and villages. Outside the zoned settlements, there is the potential for developments, which must also be allocated according to the principles of the 'Planning System and Flood Risk Management Guidelines'. Where development is proposed within Flood Zones A or B, the Justification Test must be applied, and passed.

5.6.2 Coastal Estuarine Flooding

Coastal flooding 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);
- Wave action, which is dependent on wind speed and direction, local topography and exposure.

Estuarial flooding may occur due to a combination of tidal and fluvial flood mechanisms, i.e. interaction between rivers and the sea, with tide levels being dominant in most cases. A combination of high flow in rivers and a high tide will prevent water flowing out to sea, causing increase in water levels inland, which may flood over river banks.

Significant tracts of coastal lands in Louth are considered to be at risk from flooding as are areas adjacent to rivers and streams. Some areas located upstream of constrained open channels where streams have been culverted or outfalls tide locked, may be at risk of flooding. Equally, development of these areas also may pose a significant risk to downstream lands. Both Drogheda and Dundalk are at risk of Coastal / Estuarine Flooding with inundation occurring, most notably in 2014.

Coastal erosion of the foreshore and the shoreline is intimately linked with coastal flooding. The loss of natural coastal defences, such as sand, due to erosion (or mechanical removal of sand) can increase the risk of flooding in coastal areas. The Planning Guidelines state that coastal erosion should, therefore, be considered in coastal areas within the planning process.

5.6.3 Pluvial Flooding

Flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. The resulting water follows natural valley lines, creating flow paths along roads, through and around developments and ponding in low spots, which often coincide with fluvial floodplains in low lying areas. Any areas at risk from fluvial flooding will almost certainly be at risk from surface water flooding. SFRAs require a strategic assessment of the likelihood of surface water flooding for which overland routing is suitable and appropriate. This includes consideration of the following:

- Are there zoned lands, which may need to accommodate and retain surface water flow routes?
- Are there zoned lands which might discharge upstream of an area vulnerable to surface water flooding?

Whilst the potential for surface water flow paths or ponding, should not necessarily impede or restrict development, applications in such areas need to consider drainage thoroughly so as to ensure risks do not increase in the future. A detailed drainage assessment should be undertaken for specific applications.

5.6.4 Groundwater Flooding

Groundwater flooding is caused by the emergence of water originating from underground, and is particularly common in karst landscapes, which are prevalent in the Cooley Peninsula area of County Louth. This can emerge from either point or diffuse locations. The occurrence of groundwater flooding is usually very local and unlike flooding from rivers and the sea, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause

significant damage to property, especially in urban areas and pose further risks to the environment and ground stability. Groundwater flooding can persist over a number of weeks and poses a significant but localised issue that has attracted an increasing amount of public concern in recent years. In most cases groundwater flooding cannot be easily managed or lasting solutions engineered, although the impact on buildings can be mitigated through various measures.

5.6.5 Flooding from Drainage Systems

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity, it becomes blocked or it cannot discharge due to a high water level in the receiving watercourse. Flooding in urban areas can also be attributed to sewers.

Sewers have a finite capacity, which, during certain load conditions will be exceeded. In addition, design standards vary and changes within the catchment areas draining to the system, in particular planned growth and urban creep will reduce the level of service provided by the asset. Sewer flooding problems will often be associated with regularly occurring storm events during which sewers and associated infrastructure can become blocked or fail.

This problem is exacerbated in areas with under-capacity systems. In the larger

events that are less frequent but have a higher consequence, surface water will exceed the capacity of the sewer system and flow across the surface of the land, often following the same flow paths and ponding in the same areas as overland flow. Foul sewers and surface water drainage systems are spread extensively across the urban areas with various interconnected systems discharging to treatment works and into local watercourses.

There are limited records of flooding from drainage systems in Louth. Whilst information on such incidents can give an idea of those areas with limited drainage capacity, it is only a record of the hydraulic inadequacies of the sewer systems, not properties at risk of flooding. Therefore, it has limiting usefulness in predicting future flooding.

5.6.6 Flooding from Reservoirs and other Artificial Sources

Reservoirs can be a major source of flood risk, as demonstrated in the 2009 flooding event, when waters from the Inniscarra dam flooded significant sections of Cork. Whilst the probability of dam failure or breach occurring is very small, the consequences of such an event can be devastating thereby presenting a risk of flooding which has to be considered.

Water supply to County Louth comes in two forms. Much of the north of the County including Dundalk receives water from Lough Muckno in County Monaghan via the Cavan Hill treatment plant, whilst

parts of the south of the County, including Drogheda is supplied from the River Boyne in County Meath via the Staleen treatment plant. This supply is augmented by small reservoirs, north of Drogheda in the Balgatheran area. These sources of water supply are augmented by additional abstraction from the rivers Dee, Glyde, Lislea, Fane and Mattock and from boreholes across the County. As such, there are no major artificial water bodies such as large reservoirs or canals, which could contribute to flood risk if overwhelmed.

5.7 Flooding Impacts

Flood impacts may be direct or indirect, immediate or long term and may affect households and communities, individuals as well as the environment, infrastructure and economy of an area.

In the following sections, the impacts of flooding to people, property, infrastructure and the environment is discussed, and assessed in the context of County Louth.

5.7.1 Flooding Impacts on People

Flooding has a wide range of social impacts, which may be difficult to delineate as they are interconnected, cumulative and often not quantifiable.

In small urban or steep upland catchments which have a very rapid response to rainfall, or with flooding due to infrastructure failure, flood waters can rise very quickly and put life at risk. Even shallow water flowing at 2m/s can knock children and many adults off their feet and vehicles can be moved by water of 300mm depth. The risks rise if the flood water is carrying debris.

The impact on people 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 stress. Flood water 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 flood water or indirectly as a result of sediments left behind.

The degree to which populations are at risk from flooding is not solely dependent upon proximity to the source of the threat or the physical nature of the flooding. Social factors also play a significant role in determining risk.

Although people may experience the same flood, in the same area, at the same time, their levels of suffering are likely to differ greatly as a result of basic social differences. These differences will affect vulnerability in a variety of ways, including an individual or community's response to risk communication (flood warning) and physical and psychological recovery in the aftermath of a flood.

How individuals and communities experience the impact will also vary depending on their awareness of the risk of flooding, preparedness for the flood event and the existence or lack of coping strategies.

Impacts of flooding on people are difficult to measure and quantify. There is currently no spatially referenced dataset of social vulnerability, although, in time, the census could be adapted into the format of the Social Flood Vulnerability Index, as used in the UK.

5.7.2 Flooding Impacts on Property and Infrastructure

Flooding can cause severe property damage. Flood water is likely to damage internal finishes, contents, electrical and other services and possibly cause structural damage. The physical effects can have significant long-term impacts, with re-occupation sometimes not possible for over a year. The costs of flooding are increasing, partly due to increasing amounts of electrical and other sophisticated equipment within developments.

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. The long term closure of businesses, for example, can lead to job losses and other economic impact

The vulnerability of buildings is important to understand in terms of their occupants and their type. For example, it is much more difficult to evacuate the old and ill from hospitals and care homes than people working in offices or industrial areas. Building types that need to be operational during and post-flood, such as ambulance stations and emergency

response centres are also vulnerable as if the services they provide are disrupted by flooding, it will place the immediate community at greater risk. Transport and strategic utilities infrastructure can be particularly vulnerable to flooding because interruption of their function can have widespread effects well beyond the area of flooding. For example, flooding of primary roads or railways can deny access to areas for the duration of the flooding, as well as causing damage to the road or railway. Flooding of water distribution infrastructure, such as pumping stations, or of electricity sub-stations can result in loss of water or power over large areas. This can magnify the impact of flooding beyond the immediate community and reinforces why decisions to locate development in floodplain should be taken very carefully.

Placing new development or regenerating in flood risk areas has additional short and long term costs. The need to build resistant and resilient properties could significantly increase overall costs of development, whilst ongoing maintenance and insurance increase future expenditure.

5.7.3 Flooding Impacts on the Environment

Environmental impacts can be significant and 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 floodwater.

Flooding can have a beneficial role in natural habitats. Many wetland habitats are dependent on annual flooding for their sustainability and can contribute to the storing of flood waters to reduce flood risk elsewhere. It is important to recognise the value of maintenance or restoration of natural riparian zones such as grasslands, which protect the soils from erosion and 'natural' meadows which can tolerate flood inundation. The use of Green Infrastructure throughout the river centre can also play a vital role in enhancing the river environment as well as safeguarding land from future development, protecting people and buildings from flooding and reducing flood risk downstream.

A natural floodplain can help accommodate climate change and improve the quality of rivers and associated wetlands to help achieve good status by 2015 under the Water Framework Directive. Meeting WFD objectives involves not only ecosystems, water quality, drought and flood impact considerations but also the physical characteristics and morphology of the river channel, floodplain and associated structures.

In County Louth, Carlingford Shore SAC, Dundalk Bay SAC and Boyne Coast / Estuary SAC all lie within PFRA modelled Flood Zones A and B. Furthermore, Carlingford Lough SPA, Dundalk Bay SPA and Boyne Estuary SPA lie within the same zones. Development in the designated sites will be constrained by the SAC and SPA objectives, but would also be required to pass the Justification Test if proposed in the vicinity of the watercourses.

5.8 Climate Change

The 'Planning System and Flood Risk Management' guidelines recommend that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects. A significant amount of research into climate change has been undertaken at both a National and International front. This section will briefly examine some of the key findings of the research to date.

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 and its first report in 1990 justified concern about the effects of climate change on a scientific basis. The more recent IPCC Fourth Assessment Report 2007 concludes that climate change is unequivocal. It projects a global average sea level rise of between 0.18m and

0.59m for different emissions scenarios, up to the end of the century.

More specific advice on the expected impacts of climate change and the allowances to be provided for future flood risk management in Ireland is given in the OPW guidance.

Two climate change scenarios are considered. These are the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). The MRFS is intended to represent a "likely" future scenario based on the wide range of future predictions available. The HEFS represents a more "extreme" future scenario at the upper boundaries of future projections. Based on these two scenarios the OPW recommends allowances for climate change as detailed in Table 12.

Table 12: Climate Change Scenarios

Criteria	Mid-Range Future Scenario (MRFS)	High-End Future Scenario (HEFS)
Extreme Rainfall Depths	+20%	+30%
Flood Flows	+20%	+30%
Mean Sea Level Rise	+500mm	+1,000mm
Land Movement	-0.5mm per year Note; Applicable to southern part of Country only i.e.; Dublin to Galway and south of this line	-0.5mm per year Note; Applicable to southern part of Country only i.e.; Dublin to Galway and south of this line
Urbanisation	No general allowance – Review on a case by case basis	No general allowance – Review on a case by case basis
Forestation	-1/6 TP	-1/3 TP

5.8.1 Climate Change and Flood Risk Assessment

The Flood Zones are determined based on readily available information and their purpose is to be used as a tool to avoid inappropriate development in areas of flood risk. Where development is proposed, within an area of potential flood risk (Flood Zone A or B), a flood risk assessment of appropriate scale will be required and this assessment must take into account climate change and associated impacts. Under the National CFRAM programme, the detailed modelling and assessment stage of each study will include for climate change effects.

Consideration of climate change is particularly important where flood alleviation measures are proposed as the design standard of the proposal may reduce significantly in future years due to increased rainfall, river flows and sea levels.

As recommended by the Planning Guidelines, a precautionary approach should be adopted. Climate change may result in increased flood extents and therefore caution should be taken when zoning lands in transitional areas. In general, Flood Zone B, which represents the 0.1% AEP extent, can be taken as an indication of the extent of the 1% AEP flood event with climate change. In steep valleys, an increase in water level will relate to a very small increase in extent, however in flatter low-lying basins a small increase in water level can result in a significant increase in flood extent. In the design of flood alleviation measures, climate change should be taken into account and design levels of structures, such as flood walls or embankments, must be sufficient to cope with the effects of climate change over the lifetime of the structure or where circumstances permit, be capable of adaption.

Following the Planning Guidelines, development should always be located in areas of lowest flood risk first, and only when it has been established that there are no suitable alternative options should development (of the lowest vulnerability) proceed. In such instances, consideration of suitable flood risk mitigation and management measures is necessary.

It may be technically feasible to mitigate or manage flood risk at site level; however, the potential impacts on the surrounding community must also be considered.

A strategic approach to the management of flood risk is required to consider the impact of flooding on a catchment wide basis.

Section 6

6.1 Management of Flood Risk from a Planning Perspective

The Planning Guidelines recommend a sequential approach. This works well where there are no constraints to development and there is an ample source of developable land. In some areas, development may be constrained due to its location adjacent to the river and natural flood plain.

Spatial planning objectives for the area must coincide with the overall flood management strategy. Flood risk management policies must allow a sustainable approach to development without increasing exposure to flood risk whilst considering the mitigation and management of flood risk to existing communities.

6.2 Flood Risk Policy Objectives

The policy objectives of the Planning Authority will include consideration of the following:

- The Planning System and Flood Risk Management, Guidelines for Planning Authorities.
- The content of this SFRA; the Flood Zones and their use as a planning tool.
- The Neagh-Bann FRMP and the Eastern FRMP.

6.3 Flood Risk Policies

Policy No. 1 - Reduce the risk of new development being affected by possible future flooding by:

- Avoiding development in areas at risk of flooding and
- Where development in floodplains cannot be avoided, taking a sequential approach to flood risk management based on avoidance, reduction and mitigation of risk.

Avoid development other than 'water compatible development' in 'Flood Zone A' and avoid 'highly vulnerable development' in 'Flood Zone B' in accordance with Section 3 of the 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' (2009).

Policy No. 2 – To ensure all proposals for development falling within Flood Zones A or B are consistent with the ‘The Planning System and Flood Risk Management – Guidelines for Planning Authorities’ 2009. Proposals for development identified as being vulnerable to flooding must be supported by a site specific Flood Risk Assessment and demonstrate, to the satisfaction of the Planning Authority that the development, and its infrastructure, will avoid significant risks of flooding and not exacerbate flooding elsewhere.

Policy No. 3 – Where a site specific Flood Risk Assessment demonstrates that there are significant residual flood risks to a proposed development or its occupiers in conflict with “The Planning System and Flood Risk Management – Guidelines for Planning Authorities” 2009, planning permission will normally not be granted unless the requirements of Section 5.28 can be satisfied.

Policy No. 4 – To implement the Flood Risk Management Measures as detailed in the Neagh Bann Flood Risk Management Plan, the Eastern Flood Risk Management Plan and the Dunleer Flood Risk Management Plan.

Policy No. 5 – To actively work with the Office for Public Works in the development and implementation of catchment-based strategies for the management of flood risk – including those relating to storage and conveyance.

Policy No. 6 – The Council will contribute towards the improvement and/or restoration of the natural flood risk management functions of flood plains subject to compliance with the environmental legislation and availability of resources.

Policy No. 7 – To ensure each flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation as set out in the OPW Climate Change Sectoral Adaptation Plan Flood Risk Management applicable at the time.

6.4 Flood Zone Development

As set out in the RSES Regional Flood Risk Appraisal Report, and under the Planning Guidelines, the Flood Zone mapping for the County is principally derived from the CFRAM Studies where possible. However, most settlements in the Louth County Development Plan are not covered by the CFRAM and in this case a range of other datasets, as shown in Table 10 were used as supplementary information to inform this SFRA. Due to recent guidance from OPW regarding the use of the first generation PFRA mapping and the

indicative nature of the flood extents, the approach used under the Louth SFRA has been precautionary. All sources of available flood mapping were reviewed in cases where proposed undeveloped lands are zoned for highly or less vulnerable use (where CFRAM Maps are not available). As such, a single dataset of County Flood Zones has not been prepared, but in each settlement specific guidance is provided based on the data review and a walkover survey.

6.4.1 STRATEGIC FLOOD RISK ASSESSMENT

When the second generation PFRA mapping is issued to Local Authorities, the data will be used in conjunction with the other available datasets and site visits to provide a countywide Flood Zone dataset, subject to further verification.

The review of the suite of flood risk data has been developed as a spatial planning tool to guide Louth County Council in making land-use zoning and development management decisions and it is recognised that site specific information may contradict the Flood Zones, either to

demonstrate a greater or lesser level of flood risk. However, the data has been deemed appropriate for the planning decisions being made at this stage of the plan making process.

In general, where CFRAM Flood maps are available, flood levels are indicated at selected node points along the watercourse or along the coast. Once an appropriate level of validation has been undertaken as part of the site-specific FRA, these flood levels may be used to form the basis of the development design.

6.4.2 Specific Development Planning Applications

The following outlines the key requirements relating to the management of development in areas at risk of flooding:

All development at potential risk of flooding will require an appropriately detailed Flood Risk Assessment. As a minimum this will include;

- **Stage 1** - Identification of Flood Risk; where flood risk is identified
- **Stage 2** - Initial FRA will be required and depending on the scale and nature of the risk
- **Stage 3** - Detailed FRA may be required.

All development proposals, within or incorporating areas at moderate to high flood risk, that are vulnerable to flooding, will require the application of the

development management justification test in accordance with Box 5.1 of the Planning Guidelines,.

The Planning System and Flood Risk Management.

The Planning Authority will explore opportunities to include flood alleviation proposals and upgrades that benefit the county and/or local area as a whole, as part of specific development applications. Any proposal that is considered acceptable in principle shall demonstrate the use of the sequential approach in terms of the site layout and design and, in satisfying the Justification Test, the proposal will demonstrate that appropriate mitigation and management measures are put in place.

6.4.3 Flood Management Action Plan

There are various levels of flood management plans and these include the overall strategy for the river catchment,

the emergency response plan of the Council and the flood risk management plan at a site specific level.

6.4.4 Strategic Flood Risk Management Plan

This will be informed by the detailed assessment of areas at significant flood risk: A Strategic Countywide FRMP will pull together the recommendations from each CFRAM FRMP in the Eastern and Neagh-Bann river basin districts and the Dunleer FRMP. The formulation of a management plan is particularly important in any areas reliant on

protection from flood defences.

The management plan must consider residual risk and an effective emergency response should the defences fail due to overtopping or breach. The CFRAM FRMP's include flood risk management options for all the Areas for Further Assessment (AFA) in Louth.

6.4.5 Site Specific Flood Risk Assessment (FRA)

This will be specific to the development and associated activities. A site specific FRA, which may include an emergency

plan, will be required for any development proposal that is granted approval in an area of flood risk.

6.5 Development Relating To Management of Surface Water

Development has the potential to cause an increase in impermeable area and an associated increase in surface water runoff rates and volumes. This can lead to potential increase in flood risk downstream due to overloading of existing drainage infrastructure.

Managing surface water discharges from new development is crucial in managing and reducing flood risk to other development downstream. The management of surface water is an important concern for all development sites.

6.6 Strategic Flood Risk Assessment, Level 3, 4 and 5 Settlements; Walk over Surveys

(Data & Mapping Derived from Office of Public Works (OPW), OPW CFRAM Study, LCC Dunleer Flood Study and OPW Preliminary Flood Risk Assessment).

Introduction

The Planning System and Flood Risk Management Guidelines for Planning Authorities emphasises the importance of including robust flood risk policies in the development plan. 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.

This section of the Strategic Flood Risk Assessment for the Louth County Development Plan 2021-2027 contains a series of maps detailing potential flood risk for the County as a whole, including the settlements.

It also contains detailed maps illustrating an evaluation of the potential flood risk for each of the Level 3, 4 and 5 Settlements as set out in Chapter 2 of the Louth County Development Plan 2021-2027 and the associated Appendices (Settlements Maps).

6.7 Impact of Strategic Flood Risk Assessment on the Louth County Core Strategy

The Development Strategy for County Louth as contained within Chapter 2 of the Louth County Development Plan (Core Strategy and Settlement Strategy) states that the focus is on growing the Regional Growth Centres of Drogheda and Dundalk to city scale of 50,000 by 2030 serving as economic drivers for the region. The strategy also provides for moderate growth in the Self-Sustaining Growth Towns of Ardee and Dunleer and contained, sustainable growth in the Self-

Sustaining Towns of Carlingford, Clogherhead, Termonfeckin, Tullyallen and Castlebellingham/Kilsaran and the remaining small towns and villages including Annagassan, Baltray, Collon, Dromiskin, Knockbridge, Louth Village, Omeath, Tallanstown and others. Growth will be directed towards urban centres while protecting the rural hinterlands. It will therefore be vital to ensure that flood risk will not be a major constraint for this planned growth.