STRATEGIC FLOOD RISK ASSESSMENT

FOR THE

DRAFT OFFALY
COUNTY DEVELOPMENT PLAN 2021-2027

for: **Offaly County Council**

Áras an Chontae

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Table of Contents

Section 1 Introduction and Policy Background

1.1 Introduction and Terms of Reference

Offaly County Council is reviewing the Offaly County Development Plan 2014-2020 (as varied) and preparing a new Offaly County Development Plan 2021-2027.

The preparation of the Draft Plan is undergoing an appropriate level of Strategic Flood Risk Assessment (SFRA) in accordance with *The Planning System and Flood Risk Management - Guidelines for Planning Authorities* (Department of the Environment, Heritage and Local Government and Office of Public Works, 2009) and Department of the Environment, Community and Local Government Circular PL 2/2014. The SFRA provides an assessment of flood risk and includes mapped boundaries for Flood Risk Zones.

The SFRA in an ongoing process, alongside the Plan-preparation process, and will be updated to take into account, for example, any new information or any future changes to the Draft Plan on foot of submissions.

1.2 Summary of Conclusion and Recommendations

The purpose of this document is to detail the findings of the SFRA that is being undertaken alongside the preparation of the Draft Plan.

The SFRA has informed the Draft Plan and enables compliance with the Flood Risk Management Guidelines. All SFRA recommendations – including those related to land use zoning and flood risk management provisions – have been integrated into the Draft Plan.

1.3 Flood Risk and its Relevance as an Issue to the Plan

1.3.1 Flood Risk

Flooding is an environmental phenomenon and can pose a risk to human health as well as causing economic and social effects. Some of the effects of flooding are identified on Table 1 below.

Certain lands within the County have the potential to be vulnerable to flooding and this vulnerability could be exacerbated by changes in both the occurrence of severe rainfall events and associated flooding. Local conditions such as low-lying lands and slow surface water drainage can increase the risk of flooding.

Table 1 Potential effects that may occur as a result of flooding

Tangible Effects	Intangible Human and Other Effects
Damage to buildings (houses)	Loss of life
Damage to contents of buildings	Physical injury
Damage to new infrastructure e.g. roads	Increased stress
Loss of income	Physical and psychological trauma
Disruption of flow of employees to work causing knock on effects	Increase in flood related suicide
Enhanced rate of property deterioration and decay	Increase in ill health
Long term rot and damp	Homelessness
	Loss of uninsured possessions

1.4 Flood Risk Management Policy

1.4.1 EU Floods Directive

The European Directive 2007/60/EC on the assessment and management of flood risk aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU. The Directive requires Member States to:

- Carry out a preliminary assessment by 2011 in order to identify the river basins and associated coastal areas where potential significant flood risk exists (preliminary mapping was prepared and a list of Areas for Further Assessment finalised in 2012).
- Prepare flood extent maps for the identified areas (finalised in 2016 for inclusion in Flood Risk Management Plans – see below).
- Prepare flood risk management plans focused on prevention, protection and preparedness. These plans are to include measures to reduce the probability of flooding and its potential consequences. These Plans were adopted in 2018.

Implementation of the EU Floods Directive is required to be coordinated with the requirements of the EU Water Framework Directive and the current National River Basin Management Plan.

1.4.2 National Flood Policy

Historically, flood risk management focused on land drainage for the benefit of agricultural improvement. With increasing urbanisation, the Arterial Drainage Act, 1945, was amended in 1995 to permit the Office of Public Works (OPW) to implement localised flood relief schemes to provide flood protection for cities, towns and villages.

In line with changing national and international paradigms 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 a review 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 Ireland into the future. The adopted policy was accompanied by many specific recommendations, including:

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

1.4.3 National CFRAM Programme

The national Catchment Flood Risk Assessment and Management (CFRAM) programme commenced in Ireland in 2011. The CFRAM Programme is intended to deliver on core components of the National Flood Policy, adopted in 2004, and on the requirements of the EU Floods Directive. The Programme is being implemented through CFRAM studies that have been undertaken for each of the river basin districts in Ireland.

The CFRAM Programme comprises three phases as follows:

- The Preliminary Flood Risk Assessment[1] (PFRA) mapping exercise, which was completed in 2012;
- The CFRAM Studies and parallel activities, with Flood Risk Management Plans finalised in 2018; and
- Implementation and Review.

The Programme provides for three main consultative stages as follows:

- Consultation for the PFRA mapping that was adopted in 2012;
- Consultation for Flood Extent mapping, that was finalised in 2016 for inclusion in Flood Risk Management Plans; and
- Consultation for Flood Risk Management Plans, that were adopted in 2018.

The OPW is the lead agency for flood risk management in Ireland. The coordination and implementation of Government policy on the management of flood risk in Ireland is part of its responsibility. The European Communities (Assessment and Management of Flood Risks) Regulations 2010 (S.I. No. 122) identifies the Commissioners of Public Works as the 'competent authority' with overall responsibility for implementation of the Floods Directive 2007/60/EC. The OPW is the principal agency involved in the preparation of CFRAM Studies.

1.4.4 Flood Risk Management Guidelines

1.4.4.1 Introduction

In 2009, the OPW and the then Department of the Environment and Local Government (DEHLG) published Guidelines on flood risk management for planning authorities entitled *The Planning System and Flood Risk Management - Guidelines for Planning Authorities*. The Guidelines introduce mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. Implementation of the Guidelines is intended to be achieved through actions at the national, regional, local authority and site-specific levels. Planning authorities and An Bord Pleanála are required to have regard to the Guidelines in carrying out their functions under the Planning Acts.

The core objectives of the Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

1.4.4.2 Principles of Flood Risk Management

The key principles of flood risk management set out in the flood Guidelines are to:

- Avoid development that will be at risk of flooding or that will increase the flooding risk elsewhere, where possible;
- Substitute less vulnerable uses, where avoidance is not possible; and
- Mitigate and manage the risk, where avoidance and substitution are not possible.

[1] The PFRAs identified areas at risk of significant flooding and includes maps showing areas deemed to be at risk. The areas deemed to be most significant risk, where the flood risk that is of particular concern nationally, are identified as Areas for Further Assessment (AFAs). AFAs were identified in County Offaly at Birr, Clara, Daingean, Edenderry and Environs, Pollagh, Rahan, Shannon Harbour, Shannonbridge Power Station and Tullamore. The OPW has undertaken a detailed assessment on the extent and degree of fluvial flood risk for various areas in County Offaly, including these AFAs, producing Flood Extent Mapping.

The Guidelines follow the principle that development should not be permitted in flood risk areas, particularly floodplains, except where there are no alternative and appropriate sites available in lower risk areas that are consistent with the objectives of proper planning and sustainable development.

Development in areas that have the highest flood risk should be avoided and/or only considered in exceptional circumstances (through a prescribed *Justification Test*) if adequate land or sites are not available in areas that have lower flood risk. Most types of development would be considered inappropriate in areas that have the highest flood risk. Only water-compatible development such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation and essential transport infrastructure that cannot be located elsewhere would be considered appropriate in these areas.

1.4.4.3 Stages of SFRA

The Flood Risk Management Guidelines recommend a staged approach to flood risk assessment that covers both the likelihood of flooding and the potential consequences. The stages of appraisal and assessment are:

> **Stage 1 Flood risk identification** – to identify whether there may be any flooding or surface water management issues related to either the area of Regional Spatial and Economic Strategies, Development Plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels.
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> **Stage 2 Initial flood risk assessment** – to confirm sources of flooding that may affect a Plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment are scoped.
>
> **Stage 3 Detailed flood risk assessment** – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

1.4.4.4 Flood Zones

Flood risk is an expression of the combination of the flood probability or likelihood and the magnitude of the potential consequences of the flood event. It is normally expressed in terms of the following relationship:

Flood risk = Likelihood of flooding x Consequences of flooding

Likelihood of flooding is normally defined as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. For example, a 1% Annual Exceedance Probability (AEP) indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year.

Consequences of flooding depend on the hazards associated with the flooding (e.g. depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the population, the type of development and the presence and reliability of mitigation measures).

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning.

There are three types of flood zones defined for the purposes of the Flood Guidelines:

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding[2]);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all other areas that are not in zones A or B.

A summary of the requirements of the Flood Guidelines for land uses across each of the above flood zones is provided at **Appendix I**.

1.5 Emerging Information and Disclaimer

It is important to note that compliance with the requirements of the Flood Risk Management Guidelines is currently based on emerging and best available data at the time of preparing the assessment, including Flood Risk Management Plans, which will be updated on a cyclical basis as part of CFRAM activities. The SFRA process for the Draft Plan is ongoing and will be updated as relevant, including to take account of any Material Alterations that arise during the Plan-preparation process.

Following adoption of the Plan, information in relation to flood risk may be altered in light of future data and analysis, by, for example, the OPW, or future flood events. As a result, all landowners and developers are advised that Offaly County Council and their agents can accept no responsibility for losses or damages arising due to assessments of the vulnerability to flooding of lands, uses and developments. Owners, users and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands and buildings (including basements) in which they have an interest prior to making planning or development decisions.

Any future SFRAs for the area will integrate other new and emerging data.

1.6 Content of the County Development Plan

The Offaly County Development Plan is a land use plan and provides an overall strategy for the proper planning and sustainable development of the functional area of County Offaly over the six-year period 2021-2027. The Plan includes a Written Statement, that provides the development policies, Core Strategy and mandatory and discretionary objectives for different policy areas addressed by the Development Plan, and Settlement Plans for the County's towns, villages and Sráids.

The most relevant parts of the Plan for this SFRA relate to land use zoning[3] and provisions relating to flood risk management[4].

[2] Coastal flooding is not relevant to County Offaly

[3] Land use zoning is included in the Plan for Tullamore, Birr (including Crinkill), Banagher, Clara, Daingean, Ferbane, Kilcormac, Ballinagar, Ballycumber, Belmont, Bracknagh, Cloghan, Clonbullogue, Cloneygowan, Coolderry, Geashill, Killeigh, Kinnitty, Moneygall, Mountbolus, Mucklagh, Pollagh/ Lemanaghan, Rhode, Riverstown, Shannon Harbour, Shannonbridge, Shinrone and Walsh Island.

[4] Flood risk management recommendations made by the SFRA process and integrated into the Draft Plan by the Council, are provided under Section 4.

Section 2 Stage 1 SFRA - Flood Risk Identification

2.1 Introduction

Stage 1 SFRA (flood risk identification) was undertaken in order to identify whether there may be any flooding or surface water management issues within or adjacent to zoned lands and consequently whether Stage 2 SFRA (flood risk assessment) should be proceeded to.

County Offaly is located across three River Basin Districts (RBDs): most of the County, including the centre, south and west is located within the Shannon RBD; the east of the County is located within the Eastern RBD; and small parts of the south east of the County along the border with Counties Laois and Tipperary are located within the South Eastern RBD. **Appendix II** shows the spatial distribution of surface waters across County Offaly **(page 1)** and the RBD boundaries **(page 2)**.

Stage 1 SFRA is based on existing information on flood risk indicators based on historical evidence and computational models. **Appendix II (page 2)** shows the spatial distribution of County-wide historical flood risk indicators, while **Appendix II (page 3)** shows the spatial distribution of County-wide predictive flood risk indicators relating to fluvial flooding.

Appendix II also provides maps of these historical and predictive indicators for each of the settlements for which land use zoning is included in the Plan[5].

2.2 Drainage, Defences and Early Warning Systems

With regard to areas benefitting from drainage and defences (flood relief scheme works), there are various measures that have been implemented in County Offaly that will contribute towards flood risk management. These include: the culverting of various streams and rivers in many urban areas; the Tullamore Flood Relief Scheme; flood remediation work on the Bog Road, Portarlington; and flood defence walls at Shannonbridge.

Embankments and associated predicted benefitting lands under a number of historical government schemes are mapped in **Appendix II**.

Arterial Drainage Schemes were carried out by the Office of Public Works under the Arterial Drainage Act 1945 to improve land for agricultural purposes and to mitigate flooding. Arterial drainage maintenance and monitoring of these schemes is still carried out by OPW on rivers, lakes, weirs, bridges and embankments to maintain adequate conveyance and ensure that flood waters (of varying magnitude but typically the 3-year flood) are retained in bank by lowering water levels during the growing season thus reducing waterlogging on the adjacent land during wetter periods. Arterial drainage maintenance schemes are common in Offaly and as can be seen in **Appendix II**, various settlements and/or their surrounding areas benefit from these schemes. This includes various settlements in the Brosna/Shannon, Camcor/Shannon, Barrow and Boyne catchments.

The 2018 Flood Risk Management Plan (FRMP) for the Shannon Upper and Lower catchment identifies various general measures applicable to County Offaly as part of the wider Shannon Upper and Lower catchment under "Measures Applicable for all Areas"[6]. With regard to Tullamore, the FRMP

[5] Land use zoning is included in the Plan for Tullamore, Birr (including Crinkill), Banagher, Clara, Daingean, Ferbane, Kilcormac, Ballinagar, Ballycumber, Belmont, Bracknagh, Cloghan, Clonbullogue, Cloneygowan, Coolderry, Geashill, Killeigh, Kinnitty, Moneygall, Mountbolus, Mucklagh, Pollagh/ Lemanaghan, Rhode, Riverstown, Shannon Harbour, Shannonbridge, Shinrone and Walsh Island.

[6] Under the headings of:

- Prevention: Sustainable Planning and Development Management
- Prevention: Sustainable Urban Drainage Systems
- Prevention: Voluntary Home Relocation

states that: *"A flood relief scheme has been implemented for Tullamore as described in Section 2.6.7. No additional measures specific to Tullamore are proposed."* Of the Tullamore Flood Relief Scheme, the FRMP states that: *"The Tullamore Scheme was initiated in 2008 and was constructed from 2012 to 2013. The Scheme comprises flood defence walls and embankments along the Tullamore River and the Barony Stream and provides protection against a 1% AEP (100 year) fluvial event for 100 properties."* The Scheme protected Whitehall Estate and ongoing developments (at the time this included Cluain Darach and Church Hill) from a 1% AEP event. A weir was also removed which provides some protection from smaller floods including to a commercial premise at Cloncollog.

The provision of flood protection measures can significantly reduce flood risk. However, the Ministerial Guidelines require that the presence of flood protection structures should be ignored in determining flood zones. This is because of risks relating to failure and severe flood events that exceed design capacity (the risk of severe events is exacerbated with climate change). Notwithstanding this, new development can proceed in areas that are at elevated levels of flood risk subject to the Justification Test provided for by the Guidelines being passed, which takes into account proposals to manage flood risk, such as the development of defences. Although insurance can be challenging to attain in these instances.

Various rivers and their banks and culverts in the County are maintained by the Office of Public Works and Offaly County Council. Offaly County Council, for example, undertake maintenance works on the River Figile (in combination with other local authorities that came under the Barrow Drainage District/Board in the past, including Laois and Kildare County Councils).

As provided for under Draft Plan measure CAEP-55, it is "Council policy to consult with the Office of Public Works (OPW) in relation to proposed developments in the vicinity of drainage channels and rivers for which the OPW are responsible, and the Council will retain a strip of 10 metres on either side of such channel where required, to facilitate access thereto". Such retention will, in combination with the direction of development within the existing footprints of settlements, safeguard flood plains from development throughout the County.

Met Éireann currently issues flood warnings for County Offaly. Met Éireann, in collaboration with the OPW, is currently engaged in the establishment of a National Flood Forecasting and Warnings Service to forecast for fluvial and coastal flood events.

2.3 Other Flood Studies

Other Flood Studies considered in the preparation of this assessment include:

- Portarlington Flood Risk and Management Strategy, 2007;
- Tullamore Flood Risk Assessment and Management Study, 2008;
- SFRA for the Offaly County Development Plan 2014-2020, 2014;
- SFRA for the Edenderry Local Area Plan 2017-2023, 2017;
- Flood Risk Management Plan (Shannon Upper and Lower), 2018; and
- Regional Flood Risk Assessment for the Eastern and Midland Regional Spatial and Economic Strategy, 2019.

- Prevention: Local Adaptation Planning
- Prevention: Land Use Management and Natural Flood Risk Management Measures
- Protection: Minor Works Scheme Maintenance of Arterial Drainage Schemes and Existing Flood Relief Schemes
- Protection: Maintenance of Drainage Districts Maintenance of Channels Not Part of a Scheme Preparedness: Flood Forecasting
- Preparedness: Review of Emergency Response Plans for Severe Weather Preparedness: Individual and Community Resilience
- Preparedness: Individual Property Protection
- Preparedness: Flood-Related Data Collection
- Management of water levels on the River Shannon
- Operation and Maintenance of ESB and Waterways Ireland Infrastructure

2.4 Flood Risk Indicators

Indicators of flood risk that are based on historical flooding events are identified and described on Table 2 and mapped at county and settlement level in **Appendix II**.

Indicators of flood risk that are based on computational models – predictive flood risk indicators – are identified and described on Table 3 and mapped at county and settlement level in **Appendix II**.

Table 2 Historical Flood Risk Indicators

Information Source	Description	Strategic Limitations
Recorded Flood Events from the OPW	A flood event is the occurrence of recorded flooding at a given location on a given date. The flood event is derived from different types of information (reports, photographs etc.).	This dataset only provides a spot location
Recurring Flood Events	A flood event that has occurred more than once at a certain area is named a recurring flood event.	This dataset only provides a spot location
OPW Flood Extent	A flood extent is an inundated area as recorded at a certain moment in time. This layer of information includes floods recorded in 1999/2000 and 1954.	Coverage limited
Alluvium Soils	Mineral alluvial soil mapping is indicative of recurrent or significant fluvial flooding at some point in the past and was generated by Teagasc with co-operation of the Forest Service, EPA and GSI. This project was completed May 2006.	Drainage may have changed significantly since these soils were deposited.
Benefitting lands (OPW)	Benefitting lands mapping is a dataset identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land estimated or reported to be subject to flooding or poor drainage.	Identifies broad areas - low resolution for flood risk management
Drainage Districts (OPW)	This drainage scheme mapping dataset was prepared on behalf of the Drainage Districts (Local Authorities with statutory responsibility for maintenance under the Arterial Drainage Act, 1925). These maps identify land that might benefit from the implementation of Arterial (Major) Drainage Schemes and indicate areas of land subject to flooding or poor drainage.	Identifies large broad areas - very low resolution for flood risk management
Land Commission (OPW)	This dataset indicates areas of land defended to some degree against flooding that were formerly the responsibility of the Land Commission.	Identifies broad areas - low resolution for flood risk management

Table 3 Predictive Flood Risk Indicators

Information Source	Description	Strategic Limitations
CFRAM Study, Flood Extent Mapping, 2016	Following the undertaking of the PFRA, the OPW, through its engineering consultants and working with local authorities and other stakeholders, conducted extensive engineering assessments to better understand and detail the actual risk from flooding for areas that were at highest levels of risk. This was the subject of public consultation. The outcome of that work includes Predicted Flood Extent maps that were finalised in 2016. For fluvial flood levels, calibration and verification of the models make use of the best available data including hydrometric records, photographs, videos, press articles and anecdotal information.	Spatial spread is limited, including to the areas that are considered to be at most risk of flooding.
OPW Preliminary Flood Risk Assessment (PFRA) Fluvial, Groundwater and Pluvial flood maps, 2012[7]	The OPW PFRA mapping dataset has been arrived at by: • 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 authorities and other Government departments and agencies. This assessment has considered all types of flooding, including that	The PFRA is only a preliminary assessment, based on available or readily derivable information. Analysis has been undertaken to identify areas prone to flooding, and the risks associated with such flooding, but this analysis

[7] **Appendix II** of this assessment includes PFRA Fluvial mapping. Pluvial and groundwater flood risk is present in the County, as indicated by the PFRA mapping, however; it is not taken into account in the delineation of flood zones. Nonetheless, it has informed the development of recommendations detailed in Section 4. Pluvial risk is indicated by the PFRA in areas across the County. Groundwater risk is indicated by the PFRA as being significantly less common and is present in local areas in the north west of the County.

	which can occur from rivers, the sea and estuaries, heavy rain, groundwater, the failure of infrastructure, and so on. It has also considered the impacts flooding can have on people, property, businesses, the environment and cultural assets. Further information on the purpose and development of the OPW PFRA Maps are available on www.cfram.ie.	is purely indicative and undertaken for the purpose of completing the PFRA. The mapping has been developed using simple and cost-effective methods and is based on broad-scale simple analysis and may not be accurate for a specific location/use.

2.5 Conclusion of Stage 1 SFRA

The information detailed above indicates elevated levels of flood risk in various locations across the County; therefore, a Stage 2 SFRA has been proceeded to.

Section 3 Stage 2 SFRA - Flood Risk Assessment

3.1 Introduction

Stage 2 SFRA (flood risk assessment) has been undertaken to:

- Confirm the sources of flooding that may affect zoned and adjacent areas;
- Appraise the adequacy of existing information as identified by the Stage 1 SFRA; and
- Scope the extent of the risk of flooding through the preparation of flood zone maps.

3.2 Findings and Adequacy of Existing Information and Delineation of Flood Zones

Desk and in-field studies were undertaken taking into account the following factors:

- OPW's CFRAMS fluvial flood extent mapping (2016) and other predictive indicators
- Historical indicators of flood risk
- Documented Council knowledge of lands;
- Council Engineer review and input into indicators and flood zones (local knowledge);
- The potential source and direction of flood paths from rivers and streams;
- Vegetation indicative of flood risk; and
- The locations of topographic/built features that coincide with the flood indicator related boundaries/topographical survey.

Within the annual exceedance probabilities specified by the Flood Guidelines for Flood Zones A and B, there are elevated levels of flood risk within the majority of the County's settlements for which land use zoning is included in the Plan, as shown in **Appendix II**.

Furthermore, in addition to reviewing all flood risk zones, the Council Engineering Department identified pluvial flood risk from rainfall-generated overland flows at the settlements of Cadamstown, Brosna and Moneygall.

Following a Council meeting in June 2020, an Elected Member identified an area likely to be at risk of pluvial/surface water drainage issues in the north east of Tullamore. Although there is no implications for land use zoning, future developments on these lands need to comply with the Flood Risk Management Guidelines.

A summary of in-field groundtruthing of flood risk indicators undertaken in June 2020 is provided on Table 4.

Table 4 Summary of in-field groundtruthing

No.	Settlement	Groundtruthing of Fluvial Flood Risk
1	Tullamore	Fluvial flood risk in the town is presented by the Tullamore River and its tribuatary the Corndarragh Stream. The area has been subject to detailed CFRAMS assessment and mapping that has taken into account relevant flood risk management measures (see Section 2.2). Flood risk indicator boundaries coincide with topography and flood paths. The CFRAMS mapping identifies the fluvial flood risk in lower lying areas. Although most of the Plan area and the established envelope of the settlement are on higher ground and avoid the flood plain, some areas that have been previously developed are within areas at high or moderate risk of flooding. Riverside Bridge and the Bridge Centre Bridge were observed and have the potential to affect upstream water levels and conveyance capacity.
2	Birr, including Crinkill	The Camcor River has a flood plain outside and upstream of the Plan area – as identified by the flood indicator mapping. The Camcor's flood plain is relatively confined within Birr with built development within the settlement generally avoiding areas at elevated levels of fluvial flood risk. Areas to the north of Crinkle are at risk from the Rock (Birr) River and the available flood risk indicators reflect the topography and flood paths observed and the flood plain is clearly defined.

No.	Settlement	Groundtruthing of Fluvial Flood Risk
3	Edenderry	Not applicable; no zoning provided by the County Development Plan.
4	Portarlington	Not applicable; no zoning provided by the County Development Plan.
5	Banagher	Flood risk is from the Shannon and there are various indicators of flood risk mapped. The Rapemills River presents flood risk in the western parts of the Plan boundary. Vegetation indicative of flood risk were identified at numerous locations. Built development within the settlement generally occurs away from areas with elevated levels of fluvial flood risk however recurrent flooding of commercial, residential and industrial properties have been reported in certain locations. The available flood risk indicators reflect the topography and flood paths observed and the flood plain is clearly defined. An overgrown area behind and beyond a currently closed hotel was identified as being at risk of flooding by various flood risk indicators and the topography surrounding is consistent with this. However, the hotel and an extent of surrounding lands are not within areas at elevated levels of flood risk.
6	Clara	Inadequacies in the surface water drainage system has contributed towards flood events in Clara in the past. The River Brosna provides fluvial flood risk. The town benefits from upstream and downstream flood plain storage. The Brosna's flood plain is relatively confined within the town and the development of built structures have generally avoided areas of elevated fluvial flood risk. Available flood risk indicators generally reflect the topography and flood paths.
7	Daingean	The Philipstown River causes annual flooding of agricultural lands to the south of the town. The CFRAMS mapping identifies risk in this low lying area. However most of the Plan area and the established envelope of the settlement are on higher ground and avoid the flood plain.
8	Ferbane	The Brosna flows through the south of the Plan area. Most built development within Ferbane is not within the flood plain and has been developed on higher ground. Elevated levels of flood risk exist to the west of Gallen View and east of Mill Race. The Ferbane Stream was not included within the scope of the CFRAMS mapping however there are numerous flood risk indicators here and flood paths and topographical features are generally consistent with these.
9	Kilcormac	The Silver River provides flood risk in the north of settlement. Alluvial soil boundaries generally coincide with topography. A degree of bank maintenance was evident and a swale feature exists along the left bank. A community building and car parking have been built downstream of swale. Walled grassed area in the north west of the town slopes towards water body. The town's waste water treatment plant is adjacent to the river and surrounded on river side by wall.
10	Ballinagar	The Ballinagar Stream rises to the immediate west of the town, draining a relatively small area upstream of the town. No evidence of river exceeding its banks observed. A tributary of the Ballinagar Stream rises to the north of the town. Again, no evidence of flood risk observed within the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B.
11	Ballycumber	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
12	Belmont	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
13	Bracknagh	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
14	Cloghan	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
15	Clonbullogue	This Figile River and its tributaries present flood risk to the west and south of Clonbullogue. The CFRAMS mapping identifies risk in this low lying area. However most of the Plan area and the established envelope of the settlement are on higher ground and avoid the flood plain. Most areas at elevated levels of flood risk within the Plan area are green spaces adjacent to existing development. A pumping station is located within Flood Zone A to the south of Figile Manor. The Clnobullogue Stream adds to the flood risk in the east of the town.
16	Cloneygowan	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
17	Coolderry	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
18	Geashill	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
19	Killeigh	The Killeigh Stream and its tributary rise in the north of the settlement before flowing westwards towards the Clodiagh River. The Stream was barely visible at a number of locations and the greatest amount of flow was observed at the culvert under the N80. Available flood risk indicators reflected topography and flood paths observed. Most built development within the settlement occurs within areas that have low levels of fluvial flood risk.
20	Kinnitty	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
21	Moneygall	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
22	Mountbolus	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
23	Mucklagh	Fluvial flood risk is presented by the Clodiagh River at Mucklagh. Flooding has been experienced in the past along Brocca Road. The CFRAMS mapping reflects the topographical conditions observed, including levees along the river. Most built development within the settlement occurs within areas that have low levels of fluvial flood risk.

No.	Settlement	Groundtruthing of Fluvial Flood Risk
24	Pollagh/ Lemanaghan	There is flood risk surrounding and within parts of these settlements. The risk comes from the River Brosna and its tributary the Pollagh. Vegetation indicative of flood risk and standing water was observed in numerous locations. The CFRAMS mapping reflects the topographical conditions observed, including levees along the Brosna.
25	Rhode	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.
26	Riverstown	Settlement has developed away from area at elevated risk of flooding. Available flood risk indicators reflect the topography and flood paths observed and the flood plain is clearly defined.
27	Shannon Harbour	There is history and impact of flooding at Shannon Harbour. However, much of the Plan area is not within areas of elevated flood risk. Most built development has avoided the areas of highest flood risk. Available flood risk indicators reflected topography and flood paths observed.
28	Shannonbridge	There is history and impact of flooding at Shannonbridge. However, much of the Plan area is not within areas of elevated flood risk. Most built development has avoided the areas of highest flood risk. Available flood risk indicators reflected topography and flood paths observed – the back gardens of many residential properties are located within areas of elevated risk, while the properties themselves are on higher ground beyond these areas.
29	Shinrone	Clearly defined flood plain has been avoided by vulnerable built development within the town. Riverside walk and recreation area.
30	Walsh Island	No significant fluvial flood risk (with regard to the annual exceedance probabilities identified by the Guidelines for Flood Zone A and B) warranting groundtruthing.

3.3 Flood Risk Zone Mapping

Flood Risk Zone maps have been produced taking into account the findings of the Stage 1 and Stage 2 SFRA desk and in field studies as identified above[8].

The maps are provided in **Appendix II** and identify Flood Zone A (darker blue) and Flood Zone B[9] (lighter blue). All other areas fall within Flood Zone C. As per the Guidelines, the flood zones in County Offaly are as follows:

- Flood Zone A – where the probability of flooding from rivers is highest (greater than 1% or 1 in 100 for river flooding);
- Flood Zone B – where the probability of flooding from rivers is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding); and
- Flood Zone C – where the probability of flooding from rivers is low (less than 0.1% or 1 in 1000 for river flooding).

3.4 Sensitivity to Climate Change

'The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009' recommends that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects. In this regard, the Guidelines recommends:

- Recognising that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopting a cautious approach to zoning land in these potential transitional areas;
- Ensuring that the levels of structures designed to protect against flooding such as flood defences[10], land raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect (normally 85-100 years); and

[8] Including taking into account predictive and historical indicators of flood risk, documented Council knowledge of lands, Council Engineer review and input into indicators and flood zones (local knowledge), the potential source and direction of flood paths from rivers and streams, vegetation indicative of flood risk and the locations of topographic/built features that coincide with the flood indicator related boundaries/topographical survey.

[9] As identified by the Guidelines, in rivers with a well-defined floodplain or where the coastal plain is well defined at its rear, the limits of Zones A and B will virtually coincide. Zone B will only be significantly different in spatial extent from Zone A where there is extensive land with a gentle gradient away from the river or the sea.

[10] Defended areas are highly sensitive to climate change as the likelihood of defence failure and resulting flooding increases.

- Ensuring that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.

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 Draft Guidance on Assessment of Potential Future Scenarios for Flood Risk Management (2009). 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 recommended allowances for climate change in relation to river flows and sea levels are given in Table 5. These climate change allowances are particularly important at the development management stage of planning, and will ensure that proposed development is designed and constructed to take into account best current knowledge. Climate change allowances have been integrated into the recommendations provided at Section 4 of this report and MRFS and HEFS mapping is available from the OPW for certain areas, including AFAs.

Table 5 Allowances for Future Scenarios (100-Year Time Horizon)[11]

Criteria	MRFS – to be considered for most development scenarios	HEFS – to be considered in relation to high value, high vulnerability development which cannot be relocated
Extreme Rainfall Depths	+20%	+30%
Flood Flows	+20%	+30%
Mean Sea Level Rise	+500mm	+1000mm

[11] OPW Draft Guidance on Assessment of Potential Future Scenarios for Flood Risk Management (2009)

Section 4 Recommendations

4.1 Introduction

In order to comply with *The Planning System and Flood Risk Management - Guidelines for Planning Authorities* (Department of the Environment, Heritage and Local Government and Office of Public Works, 2009) and Department of the Environment, Community and Local Government Circular (*PL 2/2014*) and contribute towards flood risk management within the Plan area, the recommendations below have been made by the SFRA process and integrated into the Draft Plan.

4.2 Land Use Zoning

That the Flood Zones identified by the SFRA are used in line with the requirements provided for by the Flood Guidelines for land uses in Flood Zones A and B. Undeveloped land should not be zoned for incompatible uses and can be zoned as, for example, Open Space, Recreation and Amenity.

With respect to lands which have already been developed, the potential conflict between zonings and *highly* and *less vulnerable* development (see Tables 5 and 6 in **Appendix I**) will be avoided by applying the constrained land use approach, with blue hatched shaded zone, 'Constrained Land Use', applied on the land use zone mapping in order to differentiate that there is a flood risk issue. This approach is established and tested and consistent with the requirements of the Flood Risk Management Guidelines and associated Circular PL 2/2014.

To this effect, the following provisions have been integrated into the Plan:

Chapter 12 Land Use Zoning

12.6.1 Constrained Land Uses

Flood risk areas in settlement plans are represented by a 'Constrained Land Use' designation. This designation generally limits new development, but will facilitate existing development uses within these areas that may require small scale development such as small extensions. Development proposals within these areas shall be accompanied by a detailed Flood Risk Assessment, carried out in accordance with The Planning System and Flood Risk Assessment Guidelines and Circular PL 2/2014 (or as updated), which shall assess the risks of flooding associated with the proposed development.

Proposals shall only be considered favourably where it is demonstrated to the satisfaction of the Planning Authority that they would not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities, or increase the risk of flooding to other locations and be in accordance with the proper planning and sustainable development of the area. The nature and design of structural and non-structural flood risk management measures required for development in such areas will also be required to be demonstrated, to ensure that flood hazard and risk will not be increased. Measures proposed shall follow best practice in the management of health and safety for users and residents of the development.

LUZO-14 Constrained Land Use

Facilitate the appropriate management and sustainable use of flood risk areas designated as 'Constrained Land Use' on Settlement Plan zoning maps.

Chapter 13 Development Management Standards

DMO-106 Flood Risk assessments

Flood Zones and Appropriate Uses

The table below indicates the types of land uses that are appropriate in each of the Flood Zones identified within the Plan area, in accordance with the 2009 Flood Risk Management Guidelines for Planning Authorities and Departmental Circular PL2/2014 (or any updated/superseding legislation or policy guidance).

Where developments/land uses are proposed that are considered inappropriate to the Flood Zone, then a Development Management Justification Test and site-specific Flood Risk Assessment will be required in accordance with The Planning System and Flood Risk Management Guidelines 2009 (and as updated).

Flood Zones	Overall probability	Planning implications for land uses		
		Highly Vulnerable Development	Less Vulnerable Development	Water Compatible Development
Flood Zone A	**Highest**	Inappropriate – if proposed then Justification Test and detailed Flood Risk Assessment is required	Inappropriate – if proposed then Justification Test and detailed Flood Risk Assessment is required	Appropriate – screen for flood risk
Flood zone B	**Moderate**	Inappropriate – if proposed then Justification Test and detailed Flood Risk Assessment is required	Inappropriate due to climate change – if proposed then Justification Test and detailed Flood Risk Assessment is required	Appropriate – screen for flood risk
Flood Zone C	**Lowest**	Appropriate - detailed Flood Risk Assessment may be required	Appropriate - detailed Flood Risk Assessment may be required	Appropriate – screen for flood risk

Note (refer to Flood Risk Management Guidelines 2009 and 'SFRA for the Offaly County Development Plan 2021-2027' for additional detail):

- Highly Vulnerable Development - Houses, schools, hospitals, residential institutions, emergency services, essential infrastructure, etc.
- Less Vulnerable Development - Economic uses (retail, leisure, warehousing, commercial, industrial, non-residential institutions, etc.), land and buildings used for agriculture or forestry, local transport infrastructure, etc.
- Water Compatible Development - Docks, marinas, wharves, water-based recreation and tourism (excluding sleeping accommodation), amenity open space, sports and recreation, flood control infrastructure, etc.

Site-specific Flood Risk Assessments

The detail of these site-specific FRAs will depend on the level of risk and scale of development but it is advised that The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DEHLG and OPW, 2009) (or any superseding document) and available information from the CFRAM Studies shall be consulted with to this effect. A detailed site-specific FRA should quantify the risks, the effects of selected mitigation and the management of any residual risks. The assessments shall consider and provide information on the implications of climate change with regard to flood risk in relevant locations.

Structural and Non-Structural Risk Management Measures in Flood Vulnerable Zones

Applications for development in flood vulnerable zones shall provide details of structural and non-structural risk management measures to include, but not be limited to specifications of the following:

Floor Levels

In areas of limited flood depth, the specification of the threshold and floor levels of new structures shall be raised above expected flood levels to reduce the risk of flood losses to a building, by raising floor heights within the building structure using a suspended floor arrangement or raised internal concrete platforms.

When designing an extension or modification to an existing building, an appropriate flood risk reduction measure shall be specified to ensure the threshold levels into the building are above the design flood level. However, care must also be taken to ensure access for all is provided in compliance with Part M of the Building Regulations.

Where threshold levels cannot be raised to the street for streetscape, conservation or other reasons, the design shall specify a mixing of uses vertically in buildings - with less vulnerable uses located at ground floor level, along with other measures for dealing with residual flood risk.

Internal Layout
Internal layout of internal space shall be designed and specified to reduce the impact of flooding [for example, living accommodation, essential services, storage space for provisions and equipment shall be designed to be located above the predicted flood level]. In addition, designs and specifications shall ensure that, wherever reasonably practicable, the siting of living accommodation (particularly sleeping areas) shall be above flood level.

With the exception of single storey extensions to existing properties, new single storey accommodation shall not be deemed appropriate where predicted flood levels are above design floor levels. In all cases, specifications for safe access, refuge and evacuation shall be incorporated into the design of the development.

Flood-Resistant Construction
Developments in flood vulnerable zones shall specify the use of flood-resistant construction aimed at preventing water from entering buildings - to mitigate the damage floodwater caused to buildings.

Developments shall specify the use of flood resistant construction prepared using specialist technical input to the design and specification of the external building envelope – with measures to resist hydrostatic pressure (commonly referred to as "tanking") specified for the outside of the building fabric.

The design of the flood resistant construction shall specify the need to protect the main entry points for floodwater into buildings - including doors and windows (including gaps in sealant around frames), vents, air-bricks and gaps around conduits or pipes passing through external building fabric.

The design of the flood resistant construction shall also specify the need to protect against flood water entry through sanitary appliances as a result of backflow through the drainage system.

Flood-Resilient Construction
Developments in flood vulnerable zones that are at risk of occasional inundation shall incorporate design and specification for flood resilient construction which accepts that floodwater will enter buildings and provides for this in the design and specification of internal building services and finishes. These measures limit damage caused by floodwater and allow relatively quick recovery.

This can be achieved by specifying wall and floor materials such as ceramic tiling that can be cleaned and dried relatively easily, provided that the substrate materials (e.g. blockwork) are also resilient. Electrics, appliances and kitchen fittings shall also be specified to be raised above floor level, and one-way valves shall be incorporated into drainage pipes.

Emergency Response Planning
In addition to considering physical design issues for developments in flood vulnerable zones, the developer shall specify that the planning of new development also takes account of the need for effective emergency response planning for flood events in areas of new development.

Applications for developments in flood vulnerable zones shall provide details that the following measures will be put in place and maintained:
• Provision of flood warnings, evacuation plans and ensuring public awareness of flood risks to people where they live and work;
• Coordination of responses and discussion with relevant emergency services i.e. Local Authorities, Fire and Rescue, Civil Defence and An Garda Siochána through the SFRA; and
• Awareness of risks and evacuation procedures and the need for family flood plans.

Access and Egress During Flood Events
Applications for developments in flood vulnerable zones shall include details of arrangements for access and egress during flood events. Such details shall specify that: • flood escape routes have been kept to publicly accessible land; • such routes will have signage and other flood awareness measures in place, to inform local communities what to do in case of flooding; and this information will be provided in a welcome pack to new occupants.

Further Information
Further and more detailed guidance and advice can be found at http://www.flooding.ie and in the Building Regulations.

4.3 Integration of other provisions relating to flood risk management into the Plan

Other provisions relating to flood risk management, including the following, have also been integrated into the Plan at Chapter 3 Climate Action & Energy under "Flood Risk Management":

No.	Reference	Provision
1	CAEP-49	It is Council policy to support, in co-operation with the OPW, the implementation of the EU Flood Risk Directive, the Flood Risk Regulations (S.I. No. 122 of 2010) and the 'The Planning System and Flood Risk Management Guidelines for Planning Authorities (2009) and Department Circular PI2/2014 or any updated / superseding version.
2	CAEP-50	It is Council policy to protect Flood Zone A and Flood Zone B from inappropriate development and direct developments/land uses into the appropriate Flood Zone in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 (or any superseding document) and the guidance contained in Development Management Standard DMS-106. Where a development/land use is proposed that is inappropriate within the Flood Zone, then the development proposal will need to be accompanied by a Development Management Justification Test and site-specific Flood Risk Assessment in accordance with the criteria set out under with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 and Circular PL2/2014 (as updated/superseded). In Flood Zone C, (See DMS-106 where the probability of flooding is low (less than 0.1%, Flood Zone C), the developer should satisfy themselves that the probability of flooding is appropriate to the development being proposed.
3	CAEP-51	It is Council policy to require a Site-specific Flood Risk Assessment (FRA) for all planning applications in areas at risk of flooding (fluvial, pluvial or groundwater), even for developments deemed appropriate in principle to the particular Flood Zone. The detail of these site-specific FRAs will depend on the level of risk and scale of development. A detailed site-specific FRA should quantify the risks, the effects of selected mitigation and the management of any residual risks. The assessments shall consider and provide information on the implications of climate change with regard to flood risk in relevant locations. The 2009 OPW Draft Guidance on Assessment of Potential Future Scenarios for Flood Risk Management (or any superseding document) and available information from the CFRAM Studies shall be consulted with to this effect.
4	CAEP-52	It is Council policy to ensure that applications to existing developments in flood vulnerable zones provide details of structural and non-structural risk management measures to include, but not be limited to specifications of the following - floor levels, internal layout, flood resilient construction, flood resistant construction, emergency response planning, access and egress during flood events.
5	CAEP-53	It is Council policy to work with other bodies and organisations, as appropriate, to help protect critical infrastructure, including water and wastewater, within the county, from risk of flooding. Any potential future variations to the Plan shall consider, as appropriate any new and/or emerging data, including, when available, any relevant information contained in the CFRAMS Flood Risk Management Plans and as recommended in the SFRA for the Plan.
6	CAEP-54	It is Council policy to have regard to the findings and recommendations of the current Strategic Flood Risk Assessment prepared as part of the County Development Plan.
7	CAEP-55	It is Council policy to consult with the Office of Public Works (OPW) in relation to proposed developments in the vicinity of drainage channels and rivers for which the OPW are responsible, and the Council will retain a strip of 10 metres on either side of such channel where required, to facilitate access thereto.
8	CAEP-56	It is Council policy to consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the construction of flood alleviation measures in Offaly.
9	CAEP-57	It is Council policy to work with the OPW and other relevant Departments and agencies to implement the recommendations of the CFRAM programme to ensure that flood risk management policies and infrastructure are progressively implemented, and to also work with catchment-based Flood Planning Groups, (including where catchments go beyond the Council's administrative boundary) in the development and implementation of catchment-based strategies for the management of flood risk – including those relating to storage and conveyance.
10	CAEP-58	It is Council policy that where resources are available and subject to compliance with the Habitats and Birds Directives, the Council will contribute towards the improvement and / or restoration of the natural flood risk management functions of flood plains.
11	CAEP-59	It is Council policy to take account of and incorporate into local planning policy and decision making, including possible future variations to this plan, the recommendations of the Flood Risk Management Plans (FRMPs), including planned investment measures for managing and reducing flood risk.
12	CAEO-08	It is an objective of the Council to ensure that flood risk management is incorporated into the preparation of Local Area Plans in accordance with 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities (2009).
13	CAEO-09	It is an objective of the Council to co-operate with the Office of Public Works (OPW) in the delivery of the Birr, Portarlington and Rahan Flood Relief Schemes and other schemes that may be brought forward in the lifetime of this Plan.

4.4 Justification Test

The Justification Test (including its various criteria – see **Appendix I**) is required to be passed whereby *highly vulnerable*[12] land uses are being proposed on undeveloped lands in Flood Zone A or whereby *highly* and/or *less vulnerable* land uses are being proposed on undeveloped lands in Flood Zone B.

This requirement did not arise as the levels of flood risk identified by the SFRA were a key informant of land uses in undeveloped areas in Flood Zones A and B. Only appropriate land uses are being proposed for previously undeveloped lands within Flood Zones A and B.

With respect to lands which have already been developed, the potential conflict between zonings and *highly* and *less vulnerable* development will be avoided by applying the constrained land use approach, with blue hatched shaded zone, 'Constrained Land Use', applied on the land use zone mapping in order to differentiate that there is a flood risk issue. This approach is established and tested and consistent with the requirements of the Flood Risk Management Guidelines and associated Circular PL 2/2014.

Although Stage 3 detailed flood risk assessment has not been required for the Plan-preparation process thus far, it may be required for individual projects following adoption of the Plan.

[12] For details on what types of development are considered highly vulnerable, less vulnerable or water compatible please refer to Table 6 in **Appendix I**.

Section 5 Conclusion

Stage 2 SFRA has been undertaken as part of the Plan-preparation process and the SFRA has informed the preparation of the Draft Plan.

The SFRA has mapped boundaries for Flood Risk Zones, taking into account factors including: predictive and historical indicators of flood risk; documented Council knowledge of lands; Council Engineer review and input into indicators and flood zones (local knowledge); the potential source and direction of flood paths from rivers and streams; vegetation indicative of flood risk; and the locations of topographic/built features that coincide with the flood indicator related boundaries/topographical survey.

All SFRA recommendations have been integrated into the Draft Plan and the Draft Plan complies with the Guidelines and associated Circular.

Appendix I: Summary of the requirements of the Flood Guidelines for land uses in Flood Zones

Requirements relating to land uses in Flood Zones as set out in the Department of Environment, Heritage and Local Government (DEHLG) and Office of Public Works (OPW) 2009 Flood Guidelines (including at Chapter 3 Principles and Key Mechanisms and Chapter 5 Flooding and Development Management) and Departmental Circular PL2/2014 should be adhered to.

- The Sequential Approach, including the Justification test -

The key principles of the Guidelines' risk-based sequential approach (see Figure 1) are:

- Avoid development in areas at risk of flooding. If this is not possible, consider substituting a land use that is less vulnerable to flooding. Only when both avoidance and substitution cannot take place should consideration be given to mitigation and management of risks.

- Inappropriate types of development that would create unacceptable risks from flooding should not be planned for or permitted.

- Exceptions to the restriction of development due to potential flood risks are provided for through the use of a Justification Test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated.

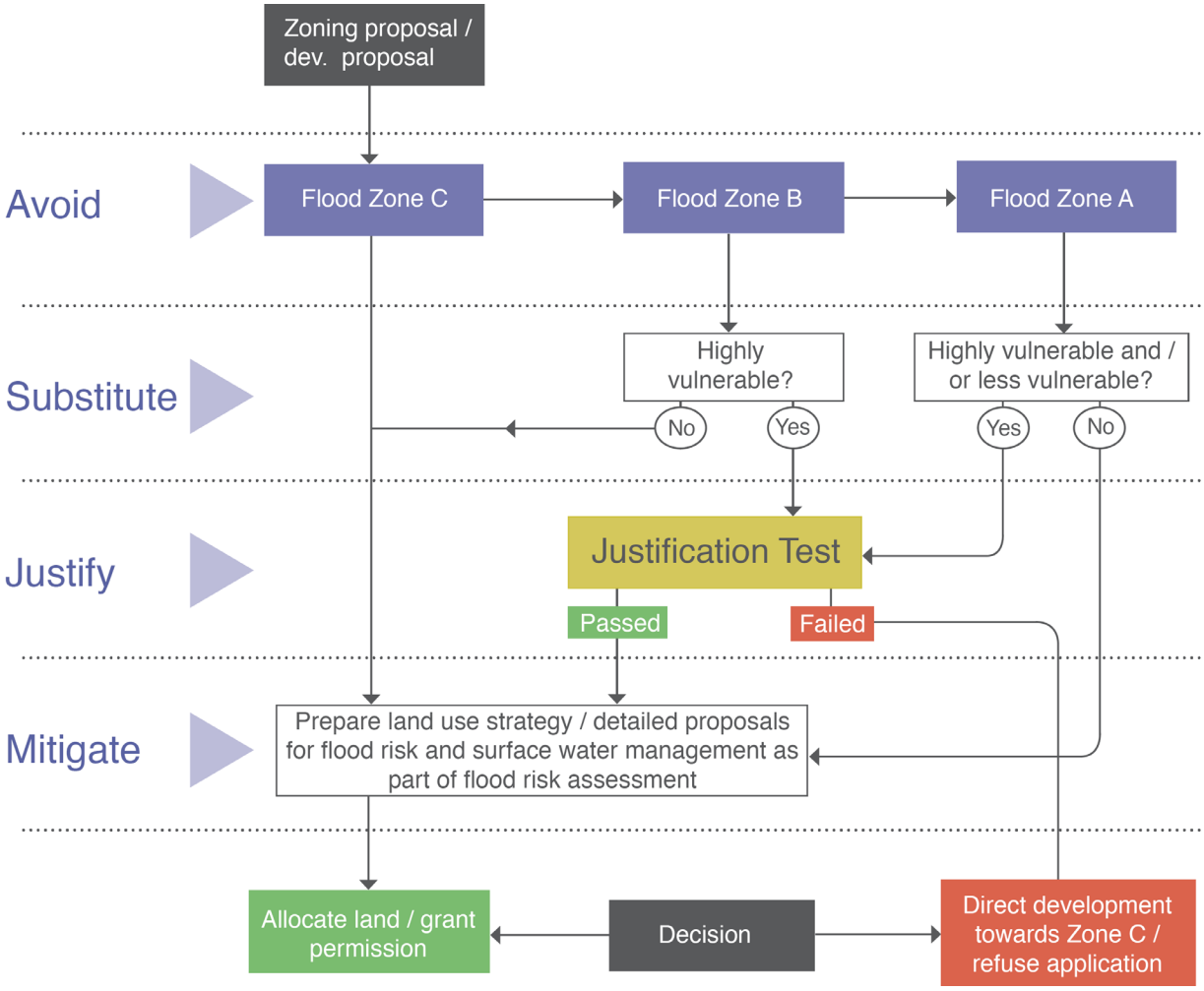

Figure 1 Sequential Approach Process[13]

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

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

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

Zone C - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but

[13] Flood Zone C covers all areas outside of Zones A and B

would need to meet the normal range of other proper planning and sustainable development considerations.

Table 6 overleaf classifies the vulnerability of different types of development while Table 7 identifies the appropriateness of development belonging to each vulnerability class within each of the flood zones as well as identifying what instances in which the Justification Test should be undertaken. Inappropriate development that does not meet the criteria of the Justification Test should not be considered at the plan-making stage or approved within the development management process.

Table 6 Classification of vulnerability of different types of development

Vulnerability class	Land uses and types of development which include*:
Highly 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 7 Vulnerability Classes and Flood Zones

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

The **Justification Test** which is referred to as part of the Sequential Approach is an assessment of whether a development proposal within an area at risk of flooding meets specific criteria for proper planning and sustainable development and demonstrates that it will not be subject to unacceptable risk nor increase flood risk elsewhere. The Justification Test should be applied only where development is within flood risk areas that would be defined as inappropriate under the screening test of the sequential risk based approach outlined above. This Justification Test is shown below.

Where, as part of the preparation and adoption or variation and amendment of a development/local area plan[1], a planning authority is considering the future development of areas in an urban settlement that are at moderate or high risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out in Table 3.2, all of the following criteria must be satisfied:

1 The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.

2 The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:

- (i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement[2];
- (ii) Comprises significant previously developed and/or under-utilised lands;
- (iii) Is within or adjoining the core[3] of an established or designated urban settlement;
- (iv) Will be essential in achieving compact and sustainable urban growth; and
- (v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.[4]

3 A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere.

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

Figure 2 Justification Test [14]

[14] Footnotes: [1] Including Strategic Development Zones and Section 25 Schemes in the area of the Dublin Docklands Development Authority [2]In the case of Gateway planning authorities, where a number of strategic growth centres have been identified within the overall area of the authority, the Justification Test may be applied for vulnerable development within each centre. [3] See definition of the core of an urban settlement in Glossary of Terms. [4] This criterion may be set aside where section 4.27b applies.

Appendix II: Flood Risk Indicator and Zone Mapping