Draft Roscrea Local Area Plan 2023 – 2029

APPENDIX 7

STRATEGIC FLOOD RISK ASSESSMENT

for: **Tipperary County Council**

Civic Offices

Nenagh

County Tipperary

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Section 1 Introduction and Policy Background

1.1 Introduction

Tipperary County Council has prepared a new Draft Local Area Plan (LAP) for Roscrea under the Planning and Development Act 2000 (as amended). The Plan sets out an overall strategy for the proper planning and sustainable development over the years 2023-2029.

This Strategic Flood Risk Assessment (SFRA) document has been prepared alongside the LAP taking into account *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.

1.2 The Draft Local Area Plan

LAPs are required to be consistent with the policies and objectives of the County Development Plan and its Core Strategy, as well as the National Planning Framework and Regional Spatial Economic Strategies.

The LAP should be read in conjunction with the Tipperary County Development Plan 2022-2028, which sets out the overarching development strategy for the County. Where conflicting objectives arise between the County Development Plan and the LAP, the objectives of the relevant County Development Plan shall take precedence.

The general development management standards, zoning matrix/descriptions and policies and objectives in the County Development Plan (including provisions relating to flood risk management and drainage) can be applied to the Plan area, while additional policies and objectives that are specific to Roscrea are included in the LAP.

In addition, land use zoning contained within the Draft Plan has been informed by the SFRA process and associated delineation of flood risk zones. The detailed Plan preparation process undertaken by the Planning Department combined with specialist input from the SFRA process facilitated zoning that helps to avoid inappropriate development being permitted in areas of high flood risk.

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.

Certain lands within the Plan area 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 has been 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

[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). Roscrea was identified as an AFA. The OPW has undertaken a detailed assessment on the extent and degree of fluvial flood risk for various areas in County Tipperary, including these AFAs, producing Flood Extent Mapping.

- 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.

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.
>
> **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 submissions made and 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 Tipperary 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 Plan area or for the County will integrate other new and emerging data.

[2] Coastal flooding is not relevant to the LAP

Section 2 Stage 1 SFRA - Flood Risk Identification

2.1 Introduction

Stage 1 SFRA (flood risk identification) has been 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. It is reproduced in part this document.

Roscrea is located within the Shannon Upper and Lower Catchment for which the Flood Risk Management Plan for the Shannon Upper & Lower River Basin (UOM25-26) has been prepared. Stage 1 SFRA is based on existing information on flood risk indicators based on historical evidence and computational models. A selection of key indicators is mapped for Roscrea in Appendix II.

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 Tipperary that will contribute towards flood risk management. These include the culverting of various streams and rivers in many urban areas and embankments.

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. Various channels within the wider area within which Roscrea is situated benefit from Drainage District works (see Appendix II mapping).

The 2018 Flood Risk Management Plan (FRMP) for the Shannon Upper & Lower River Basin (UOM25-26) identifies various general measures applicable to the catchment under "Measures Applicable for all Areas"[3]. The Plan identifies the following measures for Roscrea in particular:

- **Proposed Measure:** Progress the development of a Flood Relief Scheme for Roscrea
  Outline: Progress the project-level development and assessment of a Flood Relief Scheme for Roscrea, including environmental assessment as necessary and further public consultation, for refinement and preparation for planning / exhibition and, if and as appropriate, implementation. The proposed measure for Roscrea that may be implemented after project-level assessment and planning or Exhibition and confirmation might include construction of 630m of new structural flood defence walls and 213m of flood defence embankments.

[3] Under the headings of:
- Prevention: Sustainable Planning and Development Management
- Prevention: Sustainable Urban Drainage Systems
- Prevention: Voluntary Home Relocation
- Prevention: Adaptation Planning
- Prevention: Land Use Management and Natural Flood Risk Management Measures
- Protection: Maintenance of Channels Not Part of a Scheme
- Preparedness: Promotion of Individual and Community Resilience
- Preparedness: Flood Forecasting and Warning
- Preparedness: Emergency Response Planning
- Preparedness: Individual Property Protection
- Preparedness: Flood-Related Data Collection

The Plan also includes various specific measures such as:

- **Existing Measure:** Maintenance of Drainage Districts
  Outline: The statutory duty of maintenance for 4,600 km of river channel benefiting from Drainage District Schemes rests with the relevant Local Authorities.

- **Proposed Measure:** Improve Long-Range Forecasting on the river Shannon to Optimise Operation of Water Level Management Infratructure
  Outline: The introduction of a long range flood forecasting system to allow, within current water level requirements, the optimisation of the sluices at Athlone weir and storage within Lough Ree in advance of forecasted Summer flood events

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.

Met Éireann currently issues flood warnings for County Tipperary. 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:

- Flood Risk Management Plan for the Shannon Upper & Lower River Basin (UOM25-26);
- Previous SFRAs in County Tipperary; and
- Regional Flood Risk Assessment for the Southern Regional Spatial and Economic Strategy, 2020.

2.4 Flood Risk Indicators

Indicators of flood risk that are based on historical flooding events are identified and described on Table 2. Indicators of flood risk that are based on computational models – predictive flood risk indicators – are identified and described on Table 3. A selection of the historical and predictive flood risk indicators that were considered by the SFRA are mapped at settlement level for Roscrea 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

Information Source	Description	Strategic Limitations
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
Geological Survey of Ireland (GSI) Flood Event	Probabilistic and historic groundwater flood maps available on the GSI's Groundwater Flooding Data Viewer have been prepared by Geological Survey Ireland through the 2016-2019 GWFlood Project. The Groundwater Flood Probability Maps show the probabilistic flood extent of groundwater flooding in limestone regions and are focused primarily (but not entirely) on flooding at seasonally flooded wetlands known as turloughs. The Historic Groundwater Flood Map shows the observed peak flood extents caused by groundwater in Ireland and are largely based on the winter 2015 / 2016 flood event which was the largest flood on record in many areas.	This 2015-2016 data shows surface water flooding and does not distinguish between fluvial and pluvial flooding.

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.
National Indicative Fluvial Mapping (NIFM) 2021	The PFRA indicative flood maps have now been superseded by the recently published NIFM. The OPW NIFM project has produced second generation indicative fluvial flood spatial data that are of a higher quality and accuracy to those produced for the first cycle PFRA. This project has covered 27,000 km of river reaches, separated into 37 drainage areas, consisting of 509 sub-catchments.	Does not cover smaller sized catchments.
GSI Predictive groundwater flood map	The predictive groundwater flood map presents the probabilistic flood extents for locations of recurrent karst groundwater flooding. It consists of a series of stacked polygons at each site representing the flood extent for specific AEP's mapping floods that are expected to occur every 10, 100 and 1000 years (AEP of 0.1, 0.01, and 0.001 respectively). The map is focussed primarily (but not entirely) on flooding at seasonally inundated wetlands known as turloughs. Sites were chosen for inclusion in the predictive map based on existing turlough databases as well as manual interpretation of SAR imagery. The mapping process tied together the observed and SAR-derived hydrograph data, hydrological modelling, stochastic weather generation and extreme value analysis to generate predictive groundwater flood maps for over 400 qualifying sites.	Not all turloughs are included in the predictive map as some sites could not be successfully monitored with SAR and/or modelled.

Information Source	Description	Strategic Limitations
OPW Preliminary Flood Risk Assessment (PFRA) Fluvial, Groundwater and Pluvial flood maps, 2012	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 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.	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 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. Pluvial flood risk is likely to be present in local areas, however; it is not taken into account in the delineation of flood zones. Furthermore, PFRA indicative pluvial maps (2012) are not considered to be reliable for the purposes of zoning or decision-making.

2.5 Conclusion

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

Section 3 Stage 2 SFRA - Flood Risk Assessment

3.1 Introduction

Stage 2 SFRA (flood risk assessment) has been undertaken in order 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 in the wider area;
- 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 at certain areas in Roscrea, as shown in Appendix II.

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[4].

The Flood Risk Zone map for Roscrea is provided in Appendix II and identifies Flood Zone A (darker blue) and Flood Zone B[5] (lighter blue). All other areas fall within Flood Zone C. As per the Guidelines, the flood zones 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).

[4] 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.

[5] 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.

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[6], 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
- 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 4. 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 4 Allowances for Future Scenarios (100-Year Time Horizon)[7]

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

The CFRAM Programme include maps for two potential future scenarios taking account of different degrees of climate impact, the Mid-Range Future Scenario (more likely to occur over the coming decades) and the High-Range Future Scenario (less likely to occur over the coming decades). A selection of Future Scenario Mapping is provided under Appendix II of this SFRA report. In compliance with the Guidelines, the Flood Zones identified by the SFRA are defined on the basis of current flood risk. The CFRAMS potential future scenarios mapping and the potential impacts of climate change, including increased rainfall intensities and increased fluvial flood flows, are required to be further taken into account at lower tiers of decision making concerning individual projects.

Flood Risk Assessments shall apply the precautionary approach recommended in the Guidelines and shall be informed by the advice on the expected impacts of climate change and the allowances to be provided for future flood risk management provided in the OPW's (2019) Flood Risk Management Climate Change Sectoral Adaptation Plan.

[6] Defended areas are highly sensitive to climate change as the likelihood of defence failure and resulting flooding increases.
[7] OPW Draft Guidance on Assessment of Potential Future Scenarios for Flood Risk Management (2009)

3.5 Sustainable Drainage Systems and Surface Water Guidance and Strategy

As provided for by measures integrated into both the existing, already in force, Tipperary County Development Plan (including the 'Nature Based Solutions' to SUDS as further detailed in Chapter 11 of the County Development Plan) and the Draft Local Area Plan (including the measures reproduced at Section 4 of this report), new developments will be required to incorporate the requirement for Sustainable Urban Drainage Systems (SuDS) where appropriate. In combination, these provisions contribute towards a sustainable drainage strategy for the Plan area.

It is likely that some or all of the following SuDS techniques will be applicable to key development sites within Roscrea, including to manage surface water run-off:

- Rainwater harvesting
- Green roofs
- Infiltration systems
- Proprietary treatment systems
- Filter strips
- Filter drains
- Swales
- Bioretention systems
- Trees
- Pervious pavements
- Attenuation storage tanks
- Detention basins
- Ponds and wetlands

Each land use zoning objective, including those for opportunity sites, allows for a range of possible uses and the Local Area Plan, and associated County Development Plan, allow for a range of scales, heights, densities configurations/layouts and designs. The application of different SuDS techniques will be dependent on a combination of the site's characteristics and the development (when known) being considered.

Some sites, such as those for which guidance is provided for below, will pose particular challenges for SuDS. The best practice manuals cited at the end of this sub-section should be considered in determining solutions at these and other development sites.

At sites with high groundwater levels:

- Infiltration techniques may be particularly challenging and shallow infiltration basins or permeable pavements, may be most appropriate.
- Storage and conveyance systems need to be kept above maximum groundwater levels and membranes of appropriate robustness should be used to line any tanks
- Locating storage tanks or lined sub-base systems below the maximum likely groundwater level can cause result in flotation and structural risks

At sites that are steeply sloping:

- Effective utilisation of SuDS storage capacity should be considered, which can benefit from aligning with contours of roads and other structures, where these sites are terraced. Terraced car-parking areas can allow for storage of water through pervious pavements. Basins on terraces can provide open space. The runoff catchment on these sites can also be divided into smaller sub catchments.
- Velocities in swales and basins due to the steep slope can be managed by using check dams in swales or in storage layers, such as below permeable pavements.
- The possibility of infiltrating water resurfacing downslope or to increase pressure on downslope structures, such as walls, causing them to fail should be considered.

At sites that are very flat:

- On very flat sites, it is often not possible to construct piped drainage systems with sufficient falls to achieve minimum self-cleansing velocities. The solution can involve the use of shallow SuDS components such as swales, pervious pavements or high-capacity linear drainage channels, often dividing the site into small sub-catchments and providing local combined storage and conveyance components.
- A slight fall on any subgrade exposed to water is preferred in order to avoid ponding of water and reduction in strength in the soil due to waterlogging. If this is not possible then reduction in strength should be taken into account in the structural design of tanks or pervious pavements.
- Pumping should be a last resort and only allowable in situations where guaranteed maintenance of the pumps can be ensured.

At sites that include areas of floodplain:

- Notwithstanding that all storage volume should normally be provided within the development footprint, outside of the floodplain, SuDs on floodplains can be effective in managing routine rainfall/treatment for frequent events.
- SuDs should be selected and designed taking account of the likely high groundwater table and vulnerability to erosion during periods of high flows/water levels and SuDS should not reduce floodplain storage or conveyance.
- Conveyance routes should limit grading and the creation of surface features that could either reduce floodplain capacity or be washed out in a flood.
- Surface discharge from SuDS should be dispersed with point discharges minimised or eliminated.
- All SuDS within or crossing a floodplain should take full consideration of the likely influence of river water levels on the design performance. Combined probability assessments may be required.
- Siltation and subsequent clearance after a flood event has subsided should also be taken into account in the design.

SuDS are effective technologies, which aim to reduce flood risk, improve water quality and enhance biodiversity and amenity.

The systems should aim to mimic the natural drainage of the application site to minimise the effect of a development on flooding and pollution of existing waterways. SuDS include devices such as swales, permeable pavements, filter drains, storage ponds, constructed wetlands, soakways and green roofs. The integration of nature-based solutions, such as amenity areas, ecological corridors and attenuation ponds, into public and private development initiatives, is applicable within the provisions of the Plan and should be encouraged.

In some exceptional cases, and at the discretion of the Council, where it is demonstrated that SuDS devices are not feasible, approval may be given to install underground attenuation tanks or enlarged pipes in conjunction with other devices to achieve the required water quality. Such alternative measures will only be considered as a last resort. Proposals for surface water attenuation systems should include maintenance proposals and procedures.

Urban developments, both within developments and within the public realm, should seek to minimise and limit the extent of hard surfacing and paving and require the use of sustainable drainage techniques for new development or for extensions to existing developments, in order to reduce the potential impact of existing and predicted flood risk. Development proposals should be accompanied by a comprehensive SuDS assessment that addresses run-off rate, run-off quality and its impact on the existing habitat and water quality.

For larger sites (i.e. multiple dwellings or commercial units) master planning should ensure that existing flow routes are maintained, through the use of green infrastructure. In addition, where multiple individual proposals are being made SUDS should be integrated where appropriate and relevant.

All proposed development, should consider the impact of surface water flood risks on drainage design e.g. in the form of a section within the flood risk assessment (for sites in Flood Zone A or B) or part of a surface water management plan.

Pluvial flood risk is likely to be present in local areas, however; it is not taken into account in the delineation of flood zones. Furthermore, PFRA indicative pluvial maps (2012) are not considered to be reliable for the purposes of zoning or decision-making. Particular attention should be given to development in low-lying areas which may act as natural ponds for collection of run-off. The drainage design should ensure no increase in flood risk to the site, or the downstream catchment. Where possible, and particularly in areas of new development, floor levels should at an appropriate height above adjacent roads and hard standing areas to reduce the consequences of any localised flooding. Where this is not possible, an alternative design appropriate to the location may be prepared.

Further to the above, proposals for development should consider the Construction Industry Research and Information Association (CIRIA) SuDS Manual 2015 and any future update of this guidance and Greater Dublin Strategic Drainage Study documents in designing SUDS solutions, including the New Development Policy, the Final Strategy Report, the Code of Practice and "Irish SuDS: guidance on applying the GDSDS surface water drainage criteria".

Section 4 Flood and Drainage Provisions

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 in order to contribute towards flood risk management within the Plan area, the measures below have been integrated into the Draft Roscrea Local Area Plan and the existing, already in force, Tipperary County Development Plan 2022-2028.

4.2 Land Use Zoning

That Flood Zones identified by the SFRA were used in line with the requirements provided for by the Flood Guidelines for land uses in Flood Zones A and B.

As supported under Section 8 of the Draft Plan:

In order to reduce flood risk, land-use objectives are subject to a 'Constrained Land Use Objective' as follows:

> "To ensure the appropriate management and sustainable use of flood risk areas designated as 'Constrained Land Use'". Where this constrained land-use objective applies, compliance with the approach outlined below must be adhered to. Constrained land use is not included within the Zoning Matrix as sufficient guidance has been provided below.
>
> - Land Use Zoning
>
> In accordance with The Planning System and Flood Risk Management: Guidelines for Planning Authorities, (DEHLG, 2009) the Plan has been subject to Stage 1 Flood Risk Identification process and the report and findings of this process are set out in the accompanying SFRA. In this respect, a sequential and a precautionary approach has been applied to the zoning of land. Undeveloped land which is liable to flood has generally been zoned for amenity or town environs purposes.
>
> With respect to lands which have been developed and identified in the Strategic Flood Risk Assessment (SFRA) as at risk of flooding, flood risk will be appropriately managed to ensure the sustainable use of flood risk areas.
>
> - Flood Risk Management[8]
>
> A SFRA has been prepared in accordance with the requirements of the Planning System and Flood Risk Assessment Guidelines (DEHLG, 2009) and Circular PL02/2014 (2014). All SFRA recommendations have been integrated into the Plan with a precautionary approach applied to the zoning of lands identified as potentially at risk of flooding.
>
> The Land Use Zoning Objectives Map has excluded vulnerable uses to the effects of flooding on previously undeveloped areas that are at elevated risk of flooding.
>
> - Constrained Land Uses
>
> The extent of the 'Constrained Land Uses' are shown with a hatching corresponding to the extent of Flood Zones A and B which are overlain on the land use zoning objective underneath. Where such flood risk extents correspond with undeveloped lands, an appropriate land use zoning objective which would not facilitate the development of classes of development vulnerable to the effects of flooding has been identified, such as 'Amenity'.
>
> The 'Constrained Land Use' designation extends to existing developed lands. In other incidences, the actual buildings may be located outside of areas identified as being at risk of flooding but the curtilage of the property to the rear may be located at a lower level falling towards a watercourse and identified as being located within Flood Zone A and / or B. The 'Constrained Land Use' designation overlain on land use zoning objectives generally restricts new development vulnerable to the effects of flooding being permitted while recognising that

[8] Advice Note: Flood hazard mapping and flood risk information as set out in this Draft Plan may change in light of further analysis and having consideration to the potential impacts of climate change. Therefore, all landowners, users and developers are advised by the Council to take all reasonable measures to assess the vulnerability to flooding of any development or property in a particular area at all times, and prior to submitting a planning application.

existing development uses may require small scale additional development which would contribute towards the compact and sustainable urban development of the town. Where development proposals submitted to the Planning Authority relate to existing buildings or developed areas, the sequential approach cannot be used to locate them in lower-risk areas and the Justification Test will not therefore apply.

Proposals in Flood Zones A and/or B seeking to change the use of existing buildings from a less vulnerable use to a more vulnerable use to the effects of flooding will not normally be considered acceptable to the Planning Authority whilst some change of use proposals not increasing the vulnerability to the effects of flooding or small-scale extensions to such buildings will be considered on their individual merits but are acceptable in principle.

An existing dwelling or building that is not located within an area at risk of flooding but has a large rear garden / curtilage that is located within Flood Zone A or B would not be suitable for a more in-depth residential development proposal that would propose a residential use within a designated constrained land use area.

Development proposals within the areas designated as 'Constrained Land Use' shall be accompanied by a detailed Flood Risk Assessment, carried out in accordance with 'The Planning System and Flood Risk Assessment Guidelines' (DEHLG, 2009) 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 by the Planning Authority where it is demonstrated 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. 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 (see County Development Plan Volume 3, Appendix 6, Development Management Standard 2.2 Flooding), 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. Specifications for developments in flood vulnerable areas set out in this Plan shall be complied with as appropriate.

Tables 1.4 and 1.5 from the 'The Planning System and Flood Risk Assessment Guidelines' (DEHLG, 2009) will guide the Planning Authority in the assessment of development proposals within areas designated as 'Constrained Land Uses'. These tables demonstrate the vulnerability of differing land uses in the 3 different flood risk zones to demonstrate the appropriateness of development in each zone and that which is required to meet the Justification Test. It has not been considered necessary to include this designation within the land use zoning objectives matrix as it is not considered a land use.

4.3 Integration of provisions relating to flood risk management into the existing, already in force, Tipperary County Development Plan

Provisions relating to flood risk management, including the following, have also been integrated into the Tipperary County Development Plan 2022-2028:

Table 5 County Development Plan Provisions relating to Flood Risk Management

Provisions including:
11.5.1 Flood Risk Data The most significant water bodies in Tipperary are the Rivers Shannon and Suir, forming the core of a network of water bodies. The control of flooding, in the face of climate change, is a key land-use management issue and collective responsibility for everyone. The EU Directive on the Assessment and Management of Flood Risks, often referred to as the 'Floods Directive' requires management of flood risk on a RBMP basis, and having consideration to national water retention measures. The Office of Public Works (OPW) manages relevant data, available on www.floodinfo.ie. including, and not limited to Past Flood Events, Predicative Flood Risk Maps, and Arterial Drainage Schemes etc. The Council is committed to supporting and implementing, in co-operation with the OPW, the requirements of the 'Flood Directive', the Flood Risk Regulations (2010) and the provisions of The Planning System and Flood Risk Management Guidelines (DEHLG and OPW, 2009) and Circular PL2/2014. This Plan has been subject to a SFRA (Volume 5), having consideration to available and relevant data.

Provisions including:

11.5.2 Assessing Flood Risk
In accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities, (DEHLG 2009), the Council will adopt a precautionary approach to flood risk management, and will seek to avoid inappropriate development in all areas at risk of flooding[9]. In this respect, the Council will have regard to planning applications within Flood Risk Zones A and B as outlined in OPW predicative flood mapping. Applicants should, and may be requested to, consider a 'Staged Approach' to individual site assessment in line with Section 2.21 of the Guidelines in support of development. Where proposals for new development are located in flood Zones A and B, the applicant should consider a site outside of the flood zones, or may be required to submit a flood risk assessment to demonstrate that the development complies with the 'Justification Test' set out in the Guidelines. 'Constrained Land Use' approach was applied to land use zoning as set out within Volume 2 of this Draft Plan.

Flood risk assessments submitted shall consider climate change impacts and adaptation measures, including details of structural and non-structural flood risk management measures, such as those relating to floor levels, internal layout, flood-resistant construction, flood-resilient construction, emergency response planning and access and egress during flood events. These structural and non-structural flood risk management measures are further addressed in Volume 3 Development Management standards.

In Flood Zone C, where the probability of flooding is low (less than 0.1%, Flood Zone C), site-specific flood risk assessment may be required, and the developer should satisfy themselves that the probability of flooding is appropriate to the development being proposed. The Plan SFRA datasets and the most up to date Catchment Flood Risk Assessment and Management (CFRAM) Programme climate scenario mapping, should be consulted by prospective applicants for developments in this regard. SFRAs and site-specific flood risk assessment shall 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) shall be consulted with to this effect.

Applications for development on land identified as benefitting land may be prone to flooding, and as such site-specific flood risk assessments may be required in these areas.

The Council will also, though both public and private sector development, and in collaboration with the OPW, seek opportunities to enhance biodiversity and amenity, and to ensure the protection of environmentally sensitive sites and habitats, through methods such as SUDS (refer to Chapter 15 Water and Energy Utilities), non-porous surfacing etc in new development to minimise the risk of flooding.

11.5.3 Climate Change and Flooding
'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 potential effects. In contributing towards compliance with the Guidelines, climate change scenario mapping has been considered as part of the Plan SFRA.
The Plan requires that SFRA mapping, and the most up to date Catchment Flood Risk Assessment and Management (CFRAM) Programme climate scenario mapping is consulted by prospective applicants for developments, and that it is made available to lower-tier Development Management processes in the Council.
Chapter 11.5.2 Assessing Flood Risk of this Plan requires that:

- Flood risk assessments submitted shall consider climate change impacts,
- CFRAM Programme climate scenario mapping should be consulted by prospective applicants for developments; and,

SFRAs and site-specific flood risk assessment shall provide information on the implications of climate change with regard to flood risk in relevant locations.

11.5.4 Arterial Drainage Schemes and Drainage Districts
There are a number of Arterial Drainage Schemes (ADS) and Drainage Districts (DD) in Tipperary. Under the Arterial Drainage Acts, 1945 and 1995, construction and alteration of watercourses, bridges, weirs and embankments require the prior consent of the OPW. These legal requirements mainly serve to ensure that proposed construction and alteration projects do not increase the risk of flooding or have a negative impact on drainage of land. The Council will have consideration to developments proposed in ADS and DD and the impact a new development may have on these areas.
Policy 11 - 9 Assess all new developments (both within and without designated Flood Risk Zones) in line with the 'Staged Approach' and pre-cautionary principle set out in the Planning System and Flood Risk Management Guidelines for Planning Authorities, (DEHLG, 2009) and any amendment thereof, and the following:
(a) Require the submission of site-specific Flood Risk Assessments for developments undertaken within Flood Zones A & B and on lands subject to the mid-range future scenario floods extents, as published by the OPW. These Flood Risk Assessments shall consider climate change impacts and adaptation measures including details of structural and non-structural flood risk management measures, such as those relating to floor levels, internal layout, flood-resistant construction, flood-resilient construction, emergency response planning and access and egress during flood events.
(b) SFRAs and site-specific flood risk assessments shall provide information on the implications of climate change with

[9] Flood hazard mapping and flood risk information as set out in this Draft Plan may change in light of further analysis and having consideration to the potential impacts of climate change. Therefore, all landowners, users and developers are advised by the Council to take all reasonable measures to assess the vulnerability to flooding of any development or property in a particular area at all times, and prior to submitting a planning application.

Provisions including:
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) shall be consulted with to this effect. (c) 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 for Flood Risk Management applicable at the time. (d) Applications for development on land identified as 'benefitting land' may be prone to flooding, and as such site-specific flood risk assessments may be required in these areas. (e) Require applications for new development, or for an extension to an existing development on land zoned for 'Social and Public' or 'Amenity' use and where a potential flood risk is identified, and where the proposed use might be vulnerable, to be subject to site-specific flood risk assessment to the satisfaction of the Council. **Policy 11 - 10** (a) Ensure that new developments proposed in Arterial Drainage Schemes and Drainage Districts do not result in a significant negative impact on the integrity, function and management of these areas. (b) Consult with the OPW in relation to proposed developments in the vicinity of Flood Relief Schemes and drainage channels and rivers for which the OPW are responsible, and to retain a strip on either side of such channels, where required, to facilitate maintenance access thereto. (c) Protect the integrity of any formal flood risk management infrastructure (see key flood risk infrastructure identified in Section 2.2 "Drainage, Key Flood Risk Infrastructure and Early Warning Systems" of the SFRA), thereby ensuring that any new development does not negatively impact any existing defence infrastructure or compromise any proposed new defence infrastructure. **Objective 11 - F** (a) To support and facilitate the CFRAM Programme, and to support the OPW in the development and implementation of sustainable flood risk management plans and actions. (b) To consider, as appropriate any new and/or emerging data, including, when available, any relevant information contained in the CFRAM Flood Risk Management Plans. **11 -0** (a) Require flood risk assessments to incorporate consideration of climate change impacts and adaptation measures with regard to flood risk, and, (b) Require that flood risk management planning determines actions to embed and provide for effective climate change adaptation as set out in the OPW Climate Change Sectoral Adaptation Plan for Flood Risk Management applicable at the time. **Policy 8 - J** In conjunction with Coillte and other stakeholders to support the development of forestry resources with a number of functions including, flood retention, biodiversity, water quality/catchment management and tourism and recreation. **Policy 12 – 8** Ensure that in assessing new development, the capacity and efficiency of the national road network drainage regimes in County Tipperary will be safeguarded for national road drainage purposes. **Section 15.3 Sustainable Surface Water Management**, including: The Council is responsible for the on-going maintenance and monitoring of sustainable drainage systems within our towns and villages, and will seek to maintain drainage having consideration **to Water Sensitive Urban Design and application of** a SuDS approach. The Council will require **all new development to provide a separate foul and surface water drainage system and to incorporate Water Sensitive Urban Design and a SuDS approach, where appropriate, in new development and the public realm. The provisions of Nature-Based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas (water sensitive urban design) Best Practice Interim Guidance Document (DHLGH, 2001) and any review there off, will apply.** The Council will require the implementation of **water sensitive urban design** as an integral part of the design of new developments to reduce the generation of storm water run-off, and to ensure that all storm water generated is disposed of on-site or is attenuated and treated prior to discharge to an approved storm water system, with consideration to the following:… **Volume 3 Appendix 6** **2.2 Flooding** The Council will require proposals for development to comply with requirements of the Planning System and Flood Risk Assessment Guidelines (DEHLG and OPW, 2009) and any up-dated thereof) including providing detailed design specifications as may be required to facilitate the impact of development. (a) Extensions of existing uses or minor development within flood risk areas will be supported, provided they do not: obstruct important flow paths; introduce a number of people into flood risk areas; entail the storage of hazardous substances; have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities; or increase the risk of flooding elsewhere. (b) Applications for development on previously developed lands within Flood Zones A or B, shall be subject to site specific flood risk assessment and shall provide details of structural and non-structural flood risk management measures, to include, but not be limited to specifications of the following: **2.2.1 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

Provisions including:
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. **2.2.2 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. **2.2.3 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. **2.2.4 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. **2.2.5 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. **2.2.6 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.

4.4 Integration of other provisions relating to flood risk management into the Draft Local Area Plan

Further to the measures relating to land use zoning integrated into the LAP (see Section 4.2 above) and those already in force through the Tipperary County Development Plan 2022-2028 (see Section 4.3 above), a number of other measures relating to flood risk and drainage have been integrated into the Draft Local Area plan as detailed on Table 6 below. In combination, these provisions contribute towards a sustainable drainage strategy for the Plan area (see also Section 3.5 of this document).

Table 6 Draft Local Area Plan Provisions relating to Flood Risk Management

Provisions including:
Policy 8.1 Enable the sustainable and efficient use of existing capacity in water services and permit new connections to the Roscrea public and waste water supply. Where local network upgrades are required, to ensure that capacity us provided to individual sites in accordance with the Irish Water Connections Charging Policy and Irish Water's Connections and Developer Service Policy 8.2 Require that all development proposals in Roscrea integrate SUDS and nature-based solutions to SUDS as part of an overall sustainable urban drainage and urban greening approach, unless they are demonstrated to be operationally unfeasible to the satisfaction of the Council. Policy 8.3 Permit and encourage the use of renewable energy technologies in residential, commercial and community developments. Policy 8.4 Require proposals for development to comply with requirements of the Planning System and Flood Risk Assessment Guidelines (DEHLG, 2009) and any updated thereof) including providing detailed design specifications as may be required to facilitate the impact of development. The following provisions apply: a) Extensions of existing uses or minor development within flood risk areas will be supported, provided they do not: obstruct important flow paths; introduce a number of people into flood risk areas; entail the storage of hazardous substances; have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities; or increase the risk of flooding elsewhere. b) Applications for development on previously developed lands within Flood Zones A or B, shall be subject to site specific flood risk assessment and shall provide details of structural and non-structural flood risk management measures, such as those relating to floor levels, internal layout, flood-resistant construction, flood-resilient construction, emergency response planning and access and egress during flood events. c) Where a Justification Test applies, it must be demonstrated to the satisfaction of the planning authority that the flood risk can be adequately managed, and that the use and the development of the lands will not cause unacceptable impacts elsewhere. d) Require the submission of site-specific Flood Risk Assessments for developments undertaken within Flood Zones A & B and on lands subject to the mid-range future scenario floods extents, as published by the Office of Public Works. These Flood Risk Assessments shall consider climate change impacts and adaptation measures including details of structural and non-structural flood risk management measures, such as those relating to floor levels, internal layout, flood-resistant construction, flood-resilient construction, emergency response planning and access and egress during flood events e) Groundwater and pluvial flood risks shall be considered by any site-specific flood risk assessment undertaken at project level, in compliance with the Flood Risk Management Guidelines. Objective 8A In conjunction with Irish Water to continually progress water supply and sewer rehabilitation activities, capital maintenance activities, etc in line with the Roscrea Drainage Area Plan and Wastewater Infrastructure Plan, and to continue to monitor the performance of the networks to ensure that the most urgent works are prioritised as required. Objective 8B To integrate a Nature Based Approach to SUDS, with a focus on biodiversity as part of new public realm and public sector development in the town. Objective 8C Support the sustainable management of waste and enable a significant reduction in the production of waste in Roscrea, in line with the principles of the Waste Action Plan for a Circular Economy (DECC, 2021).

4.5 Justification Test

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. The Justification Test (including its various criteria – see **Appendix I**) is required to be passed for uses that would be otherwise considered inappropriate.

Only appropriate land uses are being proposed for previously undeveloped lands within Flood Zones A and B.

Potential conflict between zonings and *highly* and *less vulnerable* development will be avoided by applying the measures which have been integrated into the Plan, including those detailed above under Section 4 of this report.

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

Table 7 Justification Tests

Site and Zoning in Draft Plan	**Justification Test (**Fails, if one of the following fails; All must be passed for the test to be passed)			
	Is the settlement targeted for growth under the RSES, existing CDP and/or Draft CDP?	**Is the zoning of the lands required to achieve the proper planning and sustainable development of the settlement? All sub-criteria[10] must be satisfied**	**SFRA recommendation integrated into the Plan for management of risk?**	**Overall Result**
1. Existing in-use meat processing facility Employment Note that the meaning of zoning objectives has been influenced by the SFRA process and these meanings are explained in the Plan, including through the provisions repeated in this SFRA report.	Yes – Roscrea is designated as a 'District Town'. As set out in the Core Strategy of the Tipperary CDP 2022	This land use zoning proposal fulfils all sub-criteria and would contribute towards overall sustainable, compact and balanced regional development by inclusion as part of the Development Plan - as confirmed by the Planning Department.	Yes, see provisions repeated in Section 4 of this report	**Pass**
2. Former Pharmaceutical Complex Regeneration site of strategic importance to the further growth of the town centre and part of it floods. Note that the meaning of zoning objectives has been influenced by the SFRA process and these meanings are explained in the Plan, including through the provisions repeated in this SFRA report.	Yes – Roscrea is designated as a 'District Town'. As set out in the Core Strategy of the Tipperary CDP 2022	This land use zoning proposal fulfils all sub-criteria and would contribute towards overall sustainable, compact and balanced regional development by inclusion as part of the Development Plan - as confirmed by the Planning Department.	Yes, see provisions repeated in Section 4 of this report	**Pass**
3. Centre of the town Urban Core Note that the meaning of zoning objectives has been influenced by the SFRA process and these meanings are explained in the Plan, including through the provisions repeated in this SFRA report.	Yes – Roscrea is designated as a 'District Town'. As set out in the Core Strategy of the Tipperary CDP 2022	This land use zoning proposal fulfils all sub-criteria and would contribute towards overall sustainable, compact and balanced regional development by inclusion as part of the Development Plan - as confirmed by the Planning Department.	Yes, see provisions repeated in Section 4 of this report	**Pass**

[10] (i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement;
(ii) Comprises significant previously developed and/or under-utilised lands;
(iii) Is within or adjoining the core 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.

Section 5 Conclusion

Tipperary County Council has prepared a new Draft Local Area Plan (LAP) for Roscrea under the Planning and Development Act 2000 (as amended). The Plan sets out an overall strategy for the proper planning and sustainable development over the years 2023-2029.

The LAP should be read in conjunction with the Tipperary County Development Plan 2022-2028, which sets out the overarching development strategy for the County. Where conflicting objectives arise between the County Development Plan and the LAP, the objectives of the relevant County Development Plan shall take precedence.

The general development management standards, zoning matrix/descriptions and policies and objectives in the County Development Plan (including provisions relating to flood risk management and drainage) can be applied to the Plan area, while additional policies and objectives that are specific to Roscrea are included in the LAP.

In addition, land use zoning contained within the Draft Plan has been informed by the SFRA process and associated delineation of flood risk zones. The detailed Plan preparation process undertaken by the Planning Department combined with specialist input from the SFRA process facilitated zoning that helps to avoid inappropriate development being permitted in areas of high flood risk.

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.

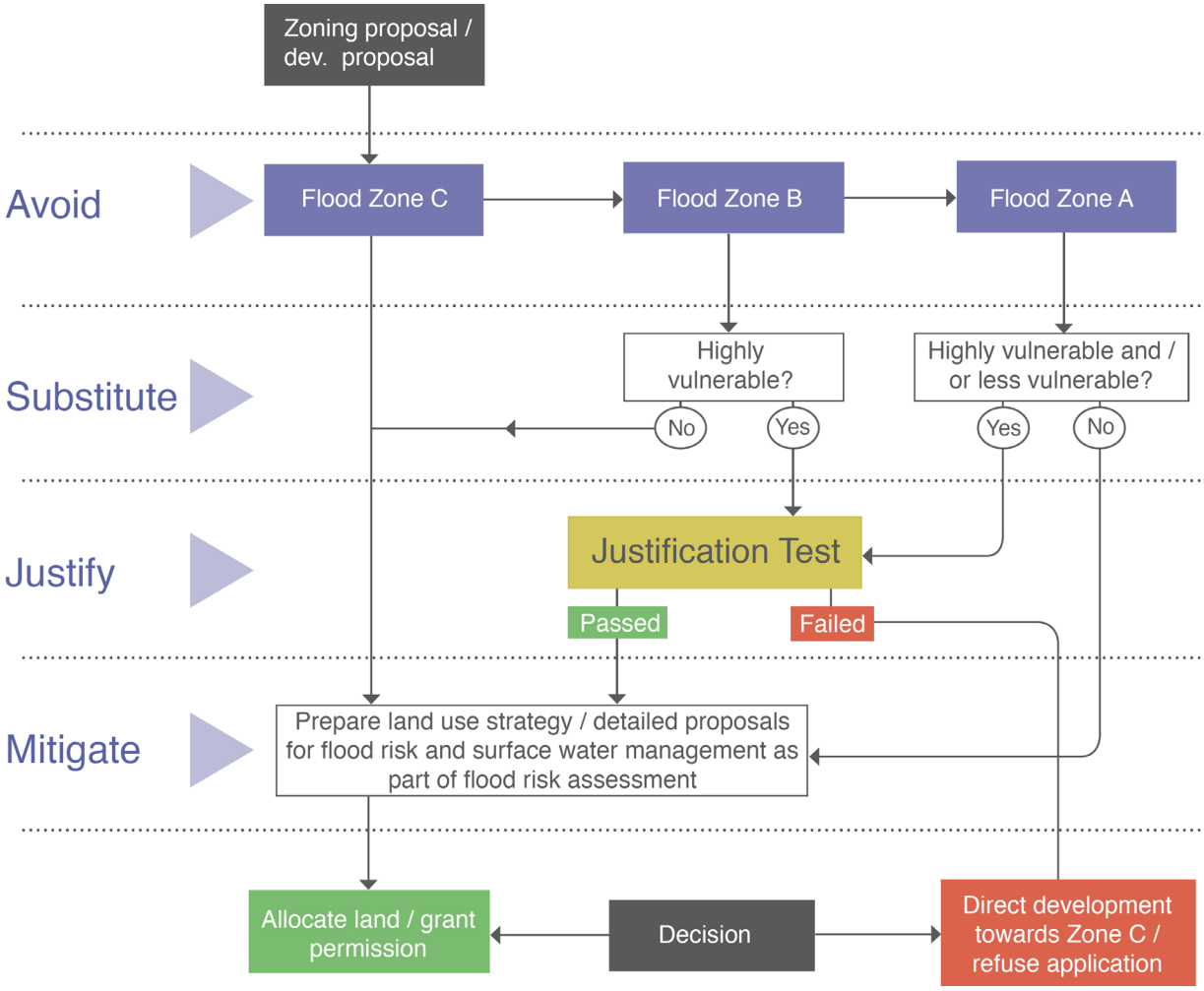


Figure 1 Sequential Approach Process[11]

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

[11] 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 8 overleaf classifies the vulnerability of different types of development while Table 9 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 8 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 9 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 [12]

[12] 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

On Past Flood Event

Single Flood Event

Recurring Flood Event

Layer Queryable: Yes

On Past Flood Event Photos

Legend:

On Past Flood Event Extents

Legend:

Layer Queryable: Yes

On Geological Survey Ireland (GSI) Winter 2015/2016 Surface Water Flooding

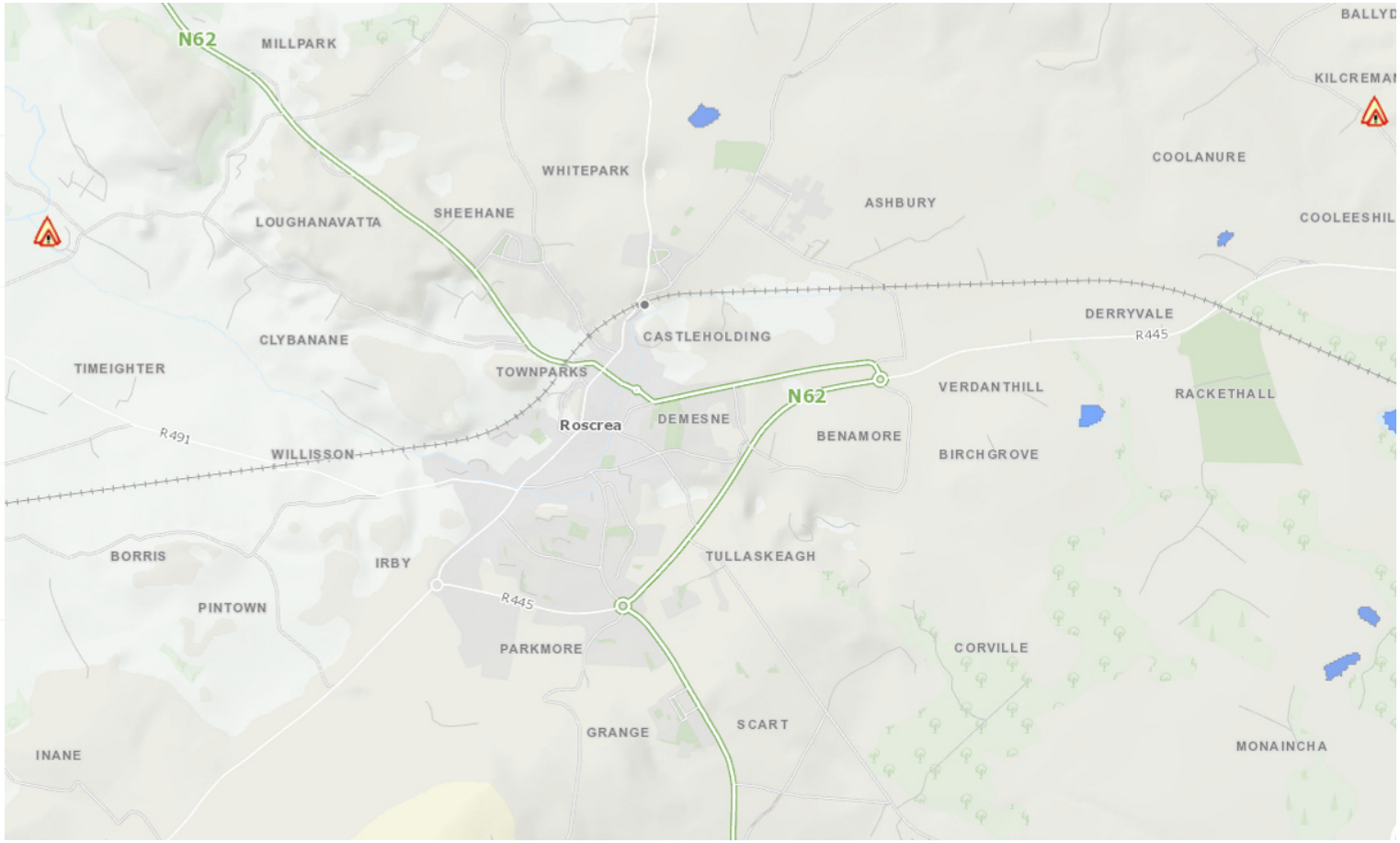
Winter 2015/2016 Surface Water Flooding

On Geological Survey Ireland (GSI) Maximum Historic Groundwater Flooding

Maximum Historic: Flood Type

Groundwater

Groundwater/Surface water



Selection of Historical Indicators

CFRAMS and NIFM Present Day

CFRAMS Mid-Range

CFRAMS High End

Flood Zones A and B