

# County Laois Strategic Flood Risk Assessment

## Live Document

November 2020

[www.jbaconsulting.ie](http://www.jbaconsulting.ie)



**Laois County Council**  
Áras an Chontae, Portlaoise, Co Laois

**Laois County Council**  
**Aras an Chontae**  
**Portlaoise**  
**Co. Laois**

## JBA Project Manager

Ross Bryant  
 Unit 24 Grove Island  
 Corbally,  
 Limerick,  
 Ireland

## Revisionhistory

Revision Ref/Date	Amendments	Issued to
S3-P01 October 2020	Draft Report	Laois County Council
A1-C01 November 2020	For Elected Members	Laois County Council

## Contract

This report describes work commissioned by Laois County Council. Laois County Council’s representative for the contract was Angela McEvoy. Ross Bryant and Caoimhe Downing of JBA Consulting carried out this work.

Prepared by ..... Caoimhe Downing BEng MSc  
 Assistant Engineer

Reviewed by ..... Ross Bryant BSc MSc CEnv MCIWEM C.WEM  
 Principal Analyst

## Purpose

This document has been prepared as a SFRA for Laois County Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Laois County Council.

## Copyright

© JBA Consulting Engineers and Scientists Limited 2019.

## Carbon footprint

A printed copy of the main text in this document will result in a carbon footprint of 58g if 100% post-consumer recycled paper is used and 73g if primary-source paper is used. These figures assume the report is printed in black and white on A4 paper and in duplex.

JBA is aiming to reduce its per capita carbon emissions.

## Contents

1	Introduction	1
1.1	SFRA Legacy in County Laois	1
1.2	Terms of Reference	1
1.3	Report Structure	1
2	Laois Study Area	2
2.1	Planning Policy	3
2.1.1	Ireland 2040 – National Planning Framework	3
2.1.2	Regional Spatial & Economic Strategy (Eastern & Midland Regional Assembly)	3
2.1.3	Laois County Development Plan 2017-2023	4
3	The Planning System and Flood Risk Management	5
3.1	Introduction	5
3.2	Definition of Flood Risk	5
3.3	Likelihood of Flooding	6
3.4	Consequences of Flooding	6
3.5	Definition of Flood Zones	6
3.6	Objectives and Principles of the Planning Guidelines	7
3.7	The Sequential Approach & Justification Test	8
3.8	Scales and Stages of Flood Risk Assessment	9
4	Data Collection and Review	10
4.1	Flood Zone Development	12
5	Sources of Flooding	13
5.1	Fluvial Flooding	13
5.2	Arterial Drainage Schemes	13
5.3	Drainage Districts	13
5.4	Fluvial Summary	13
5.5	Flooding from Defence Overtopping or Breach	14
5.6	Pluvial Flooding	15
5.7	Flooding from Drainage Systems	15
5.8	Groundwater Flooding	16
6	Flood Risk Management Policy	17
6.1	Flood Risk Policy LCC 2021-2027	17
6.2	Surface water Policy	18
6.3	CFRAM Recommendations	19
7	Development Management and Flood Risk	21
7.1	Requirements for a Flood Risk Assessment	21
7.2	Drainage Design	21
7.3	Development Proposals in Flood Zone C	22
7.4	Applications for Developments in Flood Zone A and B	22
7.4.1	Minor Developments	22
7.4.2	Highly Vulnerable Development in Flood Zone A or B	23
	New Development	23
	Existing Developed Areas	23
7.4.3	Less Vulnerable Development in Flood Zone A or B	24
7.5	Key points for FRA for all types of developments	24
7.6	Incorporating Climate Change into Development Design	24
7.7	Flood Mitigation Measures at Site Design	26
7.7.1	Site Layout and Design	26
7.7.2	Ground Levels, Floor Levels and Building Use	26
7.7.3	Raised Defences	27

7.8	Green Corridor	27
8	Settlement Zoning Review	29
8.1	A Strategic Approach to Flood Risk Management	29
8.2	Abbeyleix	32
8.3	Arles	34
8.4	Ballacolla	35
8.5	Ballinakill	36
8.6	Ballybrittas	37
8.7	Ballylynan	38
8.8	Ballyroan	39
8.9	Borris in Ossory	40
8.10	Camross	41
8.11	Castletown	42
8.12	Clonaslee	43
8.13	Clough	43
8.14	Coolrain	45
8.15	Cullahill	46
8.16	Durrow	47
8.17	Emo	49
8.18	Errill	50
8.19	Killeen	51
8.20	Killenard	52
8.21	Killeshin	53
8.22	Mountmellick	55
8.23	Mountrath	57
8.24	Newtown Doonane	59
8.25	Portlaoise	60
8.26	Rathdowney	62
8.27	Rosenallis	64
8.28	Stradbally	65
8.29	The Swan	66
8.30	Timahoe	67
8.31	Vicarstown	68

## List of Figures

Figure 2-1: Settlement Map	2
Figure 3-1: Source Pathway Receptor Model	5
Figure 3-2: Sequential Approach Principles in Flood Risk Management	8

## List of Tables

Table 2-1: Settlements contained within the LCDP 2021 – 2027	2
Table 3-1: Probability of Flooding	6
Table 3-2: Definition of Flood Zones	7
Table 3-3: Matrix of Vulnerability versus Flood Zone	9
Table 4-1: Available Flood Risk Data	10
Table 4-2: Other Available Data	11
Table 7-1: Allowances for Future Scenarios (100-year Time Horizon)	25
Table 8-1: Zoning Objective Vulnerability	30

## Abbreviations

1D	One Dimensional (modelling)
2D	Two Dimensional (modelling)
AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
CFRAM	Catchment Flood Risk Assessment and Management
DTM	Digital Terrain Model
EPA	Environmental Protection Agency
FEH	Flood Estimation Handbook
FFL	Finished Floor Level
FRA	Flood Risk Assessment
FRMP	Flood Risk Management Plan
FRR	Flood Risk Review
FSU	Flood Studies Update
GIS	Geographical Information System
HEFS	High End Future Scenario
HPW	High Priority Watercourse
JFLOW	2-D hydraulic modelling package developed by JBA
JT	Justification Test
LA	Local Authority
LCC	Laois County Council
LCDP	Laois County Development Plan
MPW	Medium Priority Watercourse
MRFS	Medium Range Future Scenario
OPW	Office of Public Works
OSi	Ordnance Survey Ireland
PFRA	Preliminary Flood Risk Assessment
RSES	Regional Spatial and Economic Strategy
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
SPR	Standard percentage runoff
Tp	Time

to

Peak

## **1 Introduction**

JBA Consulting was commissioned by Laois County Council (LCC) to provide assistance in the preparation of the Strategic Flood Risk Assessment (SFRA) to inform the Laois County Development Plan 2021-2027 (LCDP).

The SFRA is a live document that is designed to be updated as further flood risk information becomes available and changes to the development plan are proposed under any future variations.

### **1.1 SFRA Legacy in County Laois**

The 2021 LCDP SFRA represents an update to the previous version of the SFRA under the 2017 LCDP.

### **1.2 Terms of Reference**

Under the "Planning System and Flood Risk Management" guidelines, the purpose for a Strategic Flood Risk Assessment (SFRA) is detailed as being "to provide a broad (wide area) assessment of all types of flood risk to inform strategic land-use planning decisions. SFRAs enable the LA to undertake the sequential approach, including the Justification Test, allocate appropriate sites for development and identify how flood risk can be reduced as part of the development plan process".

More specifically the SFRA will complete the following tasks;

1. Undertake a flood risk assessment for the settlements within the LCDP,
2. Review the various sources of potential Flood Zone mapping,
3. Assist LCC in the review of land use zoning objectives and the application of the sequential approach and justification test,
4. Prepare flood risk management policies, objectives and recommendations.

### **1.3 Report Structure**

Section 2 provides an introduction to the study area. Section 3 provides an introduction to the Planning System and Flood Risk Management and covers important information on the philosophy and approach of the guidelines.

Section 4 provides a review of data collection, flood history and predicted flood extent (including climate change impacts) in each of the settlements. Section 5 discusses the different sources of flooding in Laois.

Section 6 provides policy guidance and Section 7 provides guidance on suggested approaches to managing flood risk and development. Section 8 discusses the settlement review.

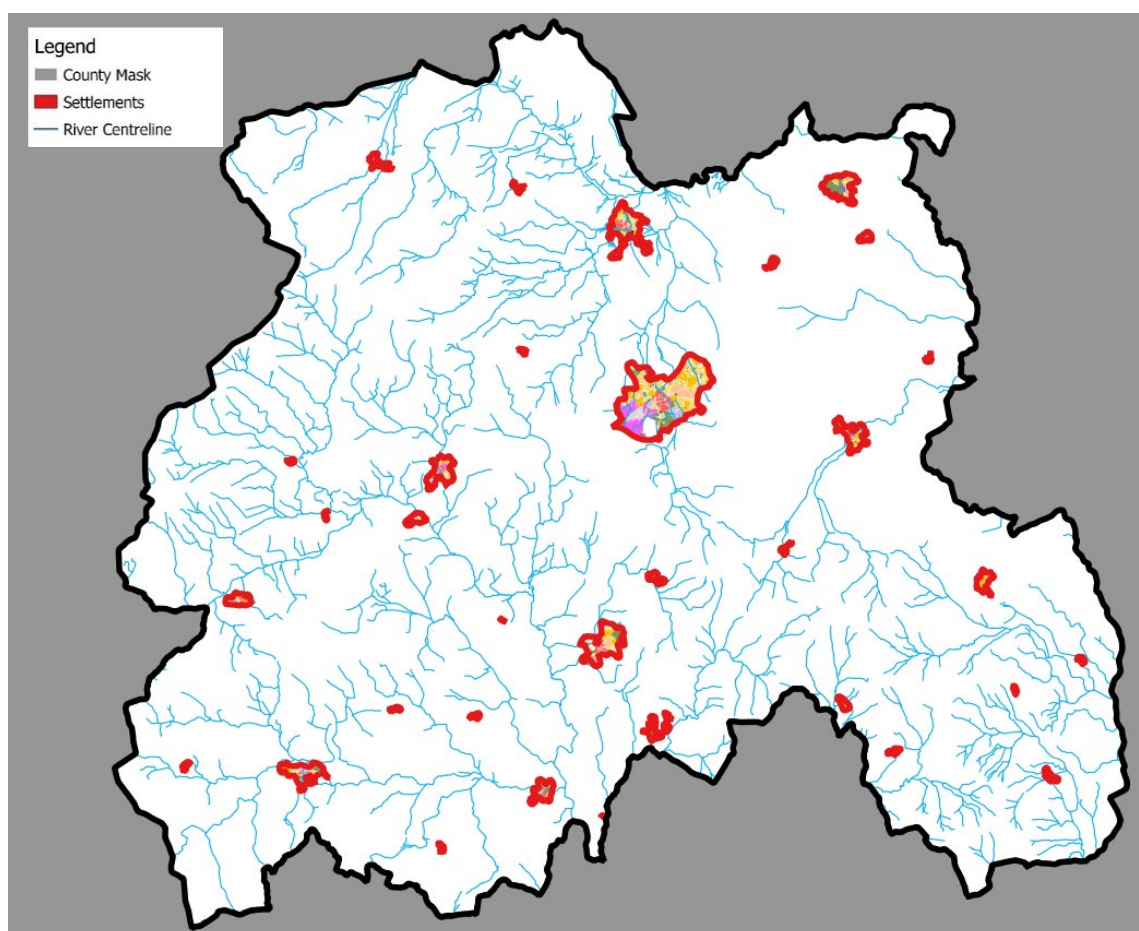


## 2 Laois Study Area

The study area is the County of Laois, with a focus on the land use zoning objectives of the 31 settlements, which are defined in the plan and identified in Table 2-1.

**Table 2-1: Settlements contained within the LCDP 2021 – 2027**

Position	Description	Settlement
Tier 1	Key Town	Portlaoise, Graiguecullen
Tier 2	Self Sustaining Growth Town	Portarlington
Tier 3	Self Sustaining Town	Abbeyleix, Mountrath, Stradbally, Mountmellick
Tier 4	Towns	Rathdowney, Durrow, Ballylynan
Tier 5	Villages (>500 population)	Clonaslee, Borris in Ossory, Ballyroan, Killenard
Tier 6	Villages and settlements (<500 population)	Arles, Ballacolla, Ballybrittas, Ballinakill, Camross, Castletown, Clough, Coolrain, Cullahill, Emo, Errill, Killenard, Killeen, Killeshin, Newtown Doonane, Rosenallis, The Swan, Timahoe, Vicarstown



**Figure 2-1: Settlement Map**

Laois is a land-locked county located to the south of the Midlands Region. The county has an area of 1,740km<sup>2</sup>. The central plain containing most of the productive agricultural land, is surrounded by a number of upland areas including the Slieve



Bloom Mountains in the northwest which rise to an elevation of approximately 500mOD (Malin). The Killeslin Plateau and Cullahill Mountain lie along the south eastern and southern county boundaries respectively. These range to approximately 300mOD.

County Laois includes parts of the Nore and Barrow river catchments. There are two River Basin Districts in Laois, namely the South Eastern River Basin District and the Shannon River Basin District.

## **2.1 Planning Policy**

### **2.1.1 Ireland 2040 – National Planning Framework**

A Strategic Flood Risk Assessment of the National Policy Objectives (NPO) within the Ireland 2040 – National Planning Framework was undertaken with the aim of ensuring that flood risk is a key consideration in delivering the proposed strategic sustainable land-use planning decisions. It sets out how all levels of the planning process, from national level strategic assessments to individual planning applications, should follow the sequential approach set out in the 2009 Guidelines on Planning and Flood Risk Management.

The NPF recognises that it is not always possible to avoid developing in flood risk areas due to spatial, economic, environmental and physical constraints. Development should be encouraged to continue, and in flood risk areas should follow the sequential approach and application of Justification Test set out in the Department’s Guidelines on the Planning System and Flood Risk Management. These guidelines will facilitate the integration of flood risk and land risk planning in the Eastern and Midland region, at all tiers of the planning hierarchy from national level through regional, city/county and local plans, masterplans and individual planning applications.

### **2.1.2 Regional Spatial & Economic Strategy (Eastern & Midland Regional Assembly)**

The Regional Spatial & Economic Strategy (RSES) for the Eastern & Midland Regional Assembly included a Regional Flood Risk Appraisal Report, undertaken at a high level, but with a view to informing policy decisions within lower tier development plans. The RSES found that an integrated approach to river catchment management is essential to manage and avoid increasing flood risk. The RSES sets out how Development Plans should include Strategic Flood Risk Assessments and all future zoning of land for development in areas at risk of flooding should follow the sequential approach set out in the 2009 Guidelines on Planning and Flood Risk Management (DoEHLG). The inclusion of policies and actions to support Sustainable Urban Drainage Systems is recommended in future developments as a major component of flood management and prevention.

The settlement hierarchy selected by the RSES takes account of the fact that while Portlaoise, amongst others, is vulnerable to fluvial flooding, wider, effective management of flood risk coupled with wider environmental, sustainability and economic considerations mean that it is possible to facilitate the continued consolidation of the development of the existing urban structure of the region. In line with the sequential and justification criteria set out in the Department’s Guidelines on the Planning System and Flood Risk Management it is considered that these locations should be encouraged to continue to consolidate and to grow in order to bring about a more compact and sustainable urban development form while at the same time managing flood risk appropriately. These guidelines outline measures through which both the flood risk and the continued development of Portlaoise, Laois’ Gateway town, and county towns can be reconciled.

The RSES included a number of development plan implications:

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

### **2.1.3 Laois County Development Plan 2017-2023**

As part of the Laois County Development Plan 2017-2023 a Strategic Flood Risk Assessment was undertaken. The purpose of the SFRA is to provide a broad assessment of all types of flood risk to inform strategic land use planning decisions. Parts of County Laois are vulnerable to flooding and are mapped as part of the Laois County Development Plan 2017-2023

The Laois County Development Plan 2017-2023 considered flood risk with specific reference to people, business, infrastructure and the environment at risk of flooding. The LCDP proposed to minimise the risk of flooding through the identification and management of existing, and particularly potential future, flood risks. The SFRA proposed this be completed by following the sequential approach and application of the Justification Test set out in the 2009 Guidelines on Planning and Flood Risk Management (DoEHLG) throughout the planning process.

### 3 The Planning System and Flood Risk Management

#### 3.1 Introduction

Prior to discussing the management of flood risk, it is helpful to understand what is meant by the term. It is also important to define the components of flood risk in order to apply the principles of the Planning System and Flood Risk Management in a consistent manner.

*The Planning System and Flood Risk Management: Guidelines for Planning Authorities*, published in November 2009, describe flooding as a natural process that can occur at any time and in a wide variety of locations. Flooding can often be beneficial, and many habitats rely on periodic inundation. However, when flooding interacts with human development, it can threaten people, their property and the environment.

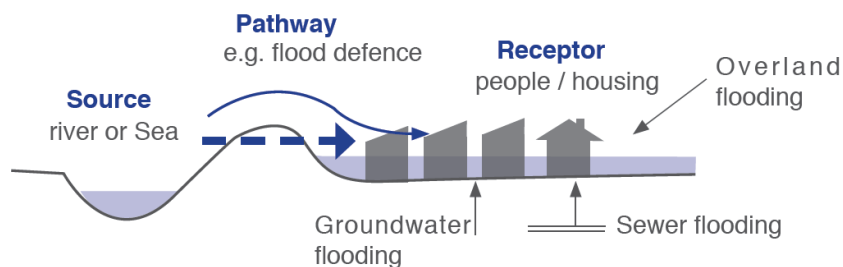
This Section will firstly outline the definitions of flood risk and the Flood Zones used as a planning tool; a discussion of the principles of the planning guidelines and the management of flood risk in the planning system will follow.

#### 3.2 Definition of Flood Risk

Flood risk is generally accepted to be a combination of the likelihood (or probability) of flooding and the potential consequences arising. Flood risk can be expressed in terms of the following relationship:

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

The assessment of flood risk requires an understanding of the sources, the flow path of floodwater and the people and property that can be affected. The source - pathway - receptor model, shown below in Figure 3-1, illustrates this and is a widely used environmental model to assess and inform the management of risk.



**Figure 3-1: Source Pathway Receptor Model**

**Source: Figure A1 The Planning System and Flood Risk Management Guidelines Technical Appendices**

Principal sources of flooding are rainfall or higher than normal sea levels while the most common pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. Receptors can include people, their property and the environment. All three elements must be present for flood risk to arise. Mitigation measures, such as defences or flood resilient construction, have little or no effect on sources of flooding but they can block or impede pathways or remove receptors.

The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk.

### 3.3 Likelihood of Flooding

Likelihood or probability of flooding of a particular flood event is classified by its annual exceedance probability (AEP) or return period (in years). A 1% AEP flood indicates the flood event that will occur or be exceeded on average once every 100 years and has a 1 in 100 chance of occurring in any given year.

Return period is often misunderstood to be the period between large flood events rather than an average recurrence interval. Annual exceedance probability is the inverse of return period as shown in Table 3-1.

**Table 3-1: Probability of Flooding**

Return Period (Years)	Annual Exceedance Probability (%)
2	50
100	1
200	0.5
1000	0.1

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

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

### 3.4 Consequences of Flooding

Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc).

The Planning System and Flood Risk Management guidelines provide three vulnerability categories, based on the type of development, which are detailed in Table 3.1 of the Guidelines, and are summarised as:

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

### 3.5 Definition of Flood Zones

In the Planning System and Flood Risk Management guidelines, Flood Zones are used to indicate the likelihood of a flood occurring. These Zones indicate a high, moderate or low probability of flooding from fluvial or tidal sources and are defined below in Table 3-2.

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

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

**Table 3-2: Definition of Flood Zones**

Zone	Description
<b>Zone A</b> High probability of flooding.	This zone defines areas with the highest risk of flooding from rivers (i.e. more than 1% probability or more than 1 in 100) and the coast (i.e. more than 0.5% probability or more than 1 in 200).
<b>Zone B</b> Moderate probability of flooding.	This zone defines areas with a moderate risk of flooding from rivers (i.e. 0.1% to 1% probability or between 1 in 100 and 1 in 1000) and the coast (i.e. 0.1% to 0.5% probability or between 1 in 200 and 1 in 1000).
<b>Zone C</b> Low probability of flooding.	This zone defines areas with a low risk of flooding from rivers and the coast (i.e. less than 0.1% probability or less than 1 in 1000).

### 3.6 Objectives and Principles of the Planning Guidelines

The Planning System and Flood Risk Management Guidelines describe good flood risk practice in planning and development management. Planning authorities are directed to have regard to the guidelines in the preparation of Development Plans and Local Area Plans, and for development control purposes.

The objective of the Planning System and Flood Risk Management Guidelines is to integrate flood risk management into the planning process, thereby assisting in the delivery of sustainable development. For this to be achieved, flood risk must be assessed as early as possible in the planning process. Paragraph 1.6 of the Guidelines states that the core objectives are to:

- "Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; 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".

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

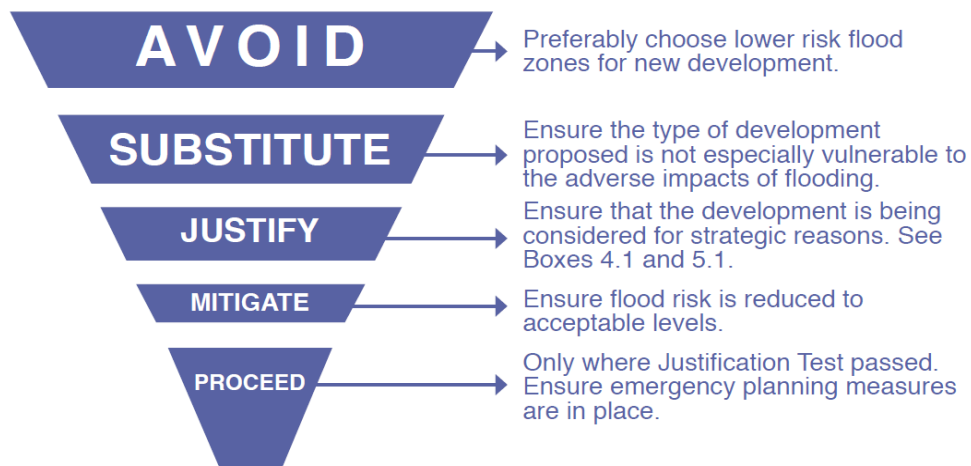
The 'Planning System and Flood Risk Management' works on a number of key principles, including:

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

### 3.7 The Sequential Approach & Justification Test

Each stage of the Flood Risk Assessment(FRA) process aims to adopt a sequential approach to management of flood risk in the planning process.

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



**Figure 3-2: Sequential Approach Principles in Flood Risk Management**

Source: The Planning System and Flood Risk Management (Figure 3.1)

Where rezoning is not possible, exceptions to the development restrictions are provided for through the application of the Justification Test. Many towns have central areas that are affected by flood risk and have been targeted for growth. To allow the sustainable and compact development of these urban centres, development in areas of flood risk may be considered necessary. For development in such areas to be allowed, the Justification Test must be passed.

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of such developments. The test is comprised of two processes; the Plan-making Justification Test, and the Development Management Justification Test. The latter is used at the planning application stage where it is intended to develop land that is at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be considered inappropriate for that land.

Table 3-3 shows which types of development, based on vulnerability to flood risk, are appropriate land uses for each of the Flood Zones. The aim of the SFRA is to guide development zonings to those which are 'appropriate' and thereby avoid the need to apply the Justification Test.



**Table 3-3: Matrix of Vulnerability versus Flood Zone**

	Flood Zone A High Probability	Flood Zone B Moderate Probability	Flood Zone C Low Probability
<b>Highly Vulnerable Development (Including essential infrastructure)</b>	Justification Test	Justification Test	Appropriate
<b>Less Vulnerable Development</b>	Justification Test	Appropriate	Appropriate
<b>Water-Compatible Development</b>	Appropriate	Appropriate	Appropriate

### 3.8 Scales and Stages of Flood Risk Assessment

Within the hierarchy of regional, strategic and site-specific flood-risk assessments, a tiered approach ensures that the level of information is appropriate to the scale and nature of the flood-risk issues and the location and type of development proposed, avoiding expensive flood modelling and development of mitigation measures where it is not necessary. The stages and scales of flood risk assessment comprise of:

- **Regional Flood Risk Appraisal (RFRA)** – a broad overview of flood risk issues across a region to influence spatial allocations for growth in housing and employment and to identify where flood risk management measures may be required at a regional level to support the proposed growth. This should be based on readily derivable information and undertaken to inform the Regional Planning Guidelines.
- **Strategic Flood Risk Assessment (SFRA)** – an assessment of all types of flood risk informing land use planning decisions. This will enable the Planning Authority to allocate appropriate sites for development, whilst identifying opportunities for reducing flood risk. This SFRA will revisit and develop the flood risk identification undertaken in the RFRA and give consideration to a range of potential sources of flooding. An initial flood risk assessment, based on the identification of Flood Zones, will also be carried out for those areas zoned for development. Where the initial flood risk assessment highlights the potential for a significant level of flood risk, or there is conflict with the proposed vulnerability of development, then a site-specific FRA will be recommended, which will necessitate a detailed flood risk assessment.
- **Site Specific Flood Risk Assessment (FRA)** – site or project specific flood risk assessment to consider all types of flood risk associated with the site and propose appropriate site management and mitigation measures to reduce flood risk to and from the site to an acceptable level. If the previous tiers of study have been undertaken to appropriate levels of detail, it is highly likely that the site-specific FRA will require detailed channel and site survey, and hydraulic modelling.

## 4 Data Collection and Review

This section reviews the data collection and the flood history for the settlements so that any additional information on flooding can be included within this SFRA. It will confirm the extent of extreme flooding (through the Flood Zone mapping) and key sources of flood risk.

**Table 4-1: Available Flood Risk Data**

Description	Coverage	Robustness	Comments on usefulness
South Eastern CFRAM Study	Areas for further assessment (AFAs), or settlements falling along modelled lengths, in County Laois are: Mountmellick Mountrath Portarlinton Portlaoise Rathdowney	Flood Zones and flood extents for current and future scenarios provided by OPW.  Modelling is 'best available' and outputs will allow informed decisions on zoning objectives. Design water levels will inform decisions relating to raising land and setting finished floor levels.	Very useful but undertaken at a catchment level. In general, CFRAM provides all information needed to apply the Justification Test (JT) for Plan Making under the SFRA.  Site specific FRAs will still be required for planning applications, but information on water levels can form the basis of decision in relation to finished floor levels. However, it is important to note that CFRAM outputs should not be relied upon without review and consideration of appropriateness to the site in question, particularly for Medium Priority Watercourses (MPW).
Site Specific Flood Risk Assessments	Individual sites (for Development Management purposes)	Low to high	Very useful in areas where we have lower quality indicative flood mapping and the site specific FRA undertook more detailed assessment
JBA Indicative Flood Mapping	County wide indicative fluvial flood mapping dataset based on 2D hydraulic modelling.	Moderate/Low	Covers all catchments over the 10km <sup>2</sup> threshold. The maps have been verified by site visits and used where they are the best available, in some cases PFRA data is substituted for JBA where necessary.
OPW Preliminary Flood Risk Assessment (PFRA) flood maps	The PFRA was a national screening exercise that was undertaken by OPW to identify areas at potential risk of flooding. Fluvial, coastal, pluvial and groundwater risks were identified at an indicative scale.	Moderate/Low	Covers nearly all rivers (including non-CFRAM). For purposes of SFRA and at Development Management level these cannot be used without validation through site visit. Further investigation may be needed to provide greater confidence in the outlines.
Historical event outlines and point observations and reports	Various, taken from <a href="http://www.floodmaps.ie">www.floodmaps.ie</a>	Indicative	Used indirectly to validate flood zones and identify non-fluvial flooding in the SFRA. Useful background information for site specific FRAs, but note the database is

			not exhaustive, absence of a record does not necessarily mean absence of flood risk.
Flood relief schemes	There are no completed OPW Flood Relief Schemes that are in place within County Laois. Mountmellick Flood Relief Scheme in under design.	n/a	n/a
Site Specific FRAs	Settlement or sub-settlement.	Moderate	Helpful for additional verification of PFRA and/or Benefitting Lands mapping.
Site Visits	Settlements	Moderate	Site visits used to verify flood extents where there were potential conflicts with predicted flood extent and undeveloped land uses with highly or less vulnerable land use zoning objectives.

**Table 4-2: Other Available Data**

Description	Coverage	Robustness	Comment on usefulness
Alluvial Soil Maps	Full Study Area	Low	Used in the Regional FRA Report to provide initial assessment of risks. Not used in SFRA and little or no value to FRA.
Groundwater vulnerability maps	Broadscale, County wide	Moderate	Initial assessment of groundwater vulnerability. Provides a screening tool for use in FRA.
Historic Flood Records including photos, aerial photos and reports.	Broad, spot coverage	Various	Yes, indirectly to validate Flood Zones & identify other flood sources.  Review of such sources will be required for all site specific FRAs.

## 4.1 Flood Zone Development

As set out in the RSES Regional Flood Risk Appraisal Report, and under the Planning Guidelines, the Flood Zone mapping for the County is principally derived from the CFRAM where possible. However, a number of settlements in the LCDP are not covered by the CFRAM and in this case a range of other datasets, as shown in Table 4-1, were used as supplementary information to inform this SFRA.

Due to recent guidance from OPW regarding the use of the first generation PFRA mapping and the indicative nature of the flood extents, the approach used under the Laois SFRA has been precautionary. All sources of available flood mapping were reviewed in cases where proposed undeveloped lands are zoned for highly or less vulnerable use (where CFRAM was not available). A single dataset of County Flood Zones has been prepared on the basis that the best available dataset is used within each settlement.

Specific guidance is provided for each settlement based on the data review and where appropriate the site visit is used to confirm the most appropriate dataset and flood extents to define the Flood Zones. During the site visit the flood mapping was appraised on site by an experienced flood risk manager and professional opinion and judgement has been used to develop the recommendations within the Settlement Review of Section 8.

The review of the suite of flood risk data has been developed as a spatial planning tool to guide LCC in making land-use zoning and development management decisions. The data sets have been deemed appropriate for the planning decisions being made at this stage of the plan making process and where flood risk is identified the following approach has been undertaken;

- Application of the Justification Test and/or;
- Further detailed analysis, or;
- Rezoning to a less vulnerable use, or;
- Further assessment at Development Management stage in limited circumstances where it has been determined that development should be possible in principle, taking into account a site specific opinion.

When the National Indicative Flood Mapping (NIFM) is issued to Local Authorities the data will be used in conjunction with the other available datasets and site visits to provide a countywide Flood Zone dataset, subject to further verification.

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

## 5 Sources of Flooding

This SFRA has reviewed flood risk from fluvial, pluvial and groundwater sources. Flooding events have become more pronounced in Ireland, and County Laois, in recent years. Climate change risks also need to be considered at a strategic and site-specific scale. Climate change is discussed in Section 7 in relation to incorporation of climate change into the flood risk assessment. A comment on the likely impacts of climate change, on a settlement basis, has been provided in Section 8.

### 5.1 Fluvial Flooding

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

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

### 5.2 Arterial Drainage Schemes

A third form of fluvial regime is related to rivers that have been subject to an OPW Arterial Drainage Scheme (ADS). The OPW carried out a number of Arterial Drainage Schemes on catchments under the Arterial Drainage Act, 1945. The main purpose of the ADSs was to improve land drainage and reduce the frequency and extent of overland flooding. ADSs can involve embankment construction, river straightening, lake storage development, and, most commonly, the deepening and widening of river channels. Through the implementation of ADSs the hydraulic conveyance efficiency of a catchment is increased, thereby leading to a reduction in overland flood storage. Although it has been found that ADS generally achieve their main objectives, this increase in discharge-carrying capacity leads to an acceleration of the response to rainfall with flood peaks of increased intensity and more rapid recessions.

The Brosna Arterial Drainage Scheme was completed in 1947, The Brosna Arterial Drainage Scheme, extends into the north of County Laois.

### 5.3 Drainage Districts

Historically, 12 drainage boards operated within County Laois. The drainage districts were established under the Arterial Drainage Act, 1945, and subsequent Amendment Act, 1995. The Act deals with the improvement of lands by drainage and preventing or substantially reducing the flooding of lands. The Act set up the process of Arterial Drainage Schemes and provides for the maintenance of these works. It also implements a number of drainage and flood reduction related measures such as approval procedures for bridges and weirs and iterates reporting requirements for Drainage Districts.

Currently, none of the drainage districts are active in County Laois, with the Barrow Drainage District being the most recently disbanded in 2014.

### 5.4 Fluvial Summary

The form of the floodplain, either natural, semi-natural (drained) or urbanised, can influence flooding along watercourses. The location of buildings and roads can significantly influence flood depths and velocities by altering flow directions and

reducing the volume of storage within the floodplain. Critical structures such as bridge and culverts can also significantly reduce capacity creating pinch points within the floodplain. These structures are also vulnerable to blockage by natural debris within the channel or by fly tipping and waste.

Rivers are the primary cause of flooding in Laois; historically, some 80% of events are attributed to fluvial sources ranging from the major rivers, including the Barrow and Nore, to the smaller tributaries and drains.

Flood risk to specific settlements is discussed in Section 8 and has been used to inform the zoning objectives for the Development Plan.

## 5.5 Flooding from Defence Overtopping or Breach

Laois County Council are currently advancing plans for a flood relief scheme in Mountmellick. Flood protection measures are yet to be determined.

There are a number of drainage district embankments noted along the Barrow Drainage District and the Douglas Laois Drainage District. In addition to these embankments there will also be a number of walls and other structures which, whilst not designed to act as flood defences, provide a level of protection against flood water.

Existing development clearly benefits from the construction of defences, and new defences will be considered as one means of facilitating the redevelopment of the settlements. However, it is against sustainability objectives, and the general approach of the OPW, to construct defences with the intention of releasing green field land for development. It is also not appropriate to consider the benefits of schemes which have not been constructed or which may only be at pre-feasibility or design stage.

Residual risk is the risk that remains after measures to control flood risk have been carried out. Residual risk can arise from overtopping of flood defences and / or from the breach from structural failure of the defences

The concept of residual risk is explained in 'The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009' as follows:

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

Overtopping of flood defences will occur during flood events greater than the design level of the defences. Overtopping is likely to cause lower levels of inundation of the floodplain than if defences had not been built, but the impact will depend on the duration, severity and volume of floodwater. However, and more critically, overtopping can destabilise a flood defence, cause erosion and make it more susceptible to breach or fail. Recovery time and drainage of overtopping quantities should also be considered. Overtopping may become more likely in future years due to the impacts of climate change and it is important that any assessment of defences includes an appraisal of climate change risks.

Breach or structural failure of flood defences is hard to predict and is largely related to the structural condition and type of flood defence. 'Hard' flood defences such as solid concrete walls are less likely to breach than 'soft' defence such as earth embankments. Breach will usually result in sudden flooding with little or no warning



and presents a significant hazard and danger to life. There is likely to be deeper flooding in the event of a breach than due to overtopping.

Whilst it is important that residual risks are recognised and appropriate management measures put in place, it is also important to acknowledge the benefits that a flood relief scheme provides to those living and working behind it. In this regard, although 'The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009' requires flood zones to be undefended, consideration should be given to the benefit provided by flood defences, but only once the Justification Test has been applied and passed.

## **5.6 Pluvial Flooding**

Flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. The resulting water follows along natural valley lines, creating flow paths along roads and through and around developments and ponding in low spots, which often coincide with fluvial floodplains. Any areas at risk from fluvial flooding will almost certainly be at risk from surface water flooding.

The PFRA study considered pluvial flood risk and produced a national set of pluvial flood maps. This dataset was reviewed and used to identify development areas at particular risk of surface water and pluvial flooding. However, the level of detail contained in the PFRA map, and the widespread distribution of areas at risk did not allow a commentary relating to pluvial flood risk to be developed, or for particularly high-risk areas to be identified. Instead, an overall strategy for the management of pluvial risk is presented and should be implemented across all development proposals. This, and recommendations for the assessment of surface water risks, are provided in the Flood Risk Management Policy section.

## **5.7 Flooding from Drainage Systems**

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

Flooding in urban areas can also be attributed to sewers. Sewers have a finite capacity which, during certain load conditions, will be exceeded. In addition, design standards vary and changes within the catchment areas draining to the system, in particular planned growth and urban creep, will reduce the level of service provided by the asset. Sewer flooding problems will often be associated with regularly occurring storm events during which sewers and associated infrastructure can become blocked or fail. This problem is exacerbated in areas with under-capacity systems. In the larger events that are less frequent but have a higher consequence, surface water will exceed the sewer system and flow across the surface of the land, often following the same flow paths and ponding in the same areas as overland flow.

Foul sewers and surface water drainage systems are spread extensively across the urban areas with various interconnected systems discharging to treatment works and into local watercourses.

## 5.8 Groundwater Flooding

Groundwater flooding is caused by the emergence of water originating from underground and is particularly common in karst landscapes. This can emerge from either point or diffuse locations. The occurrence of groundwater flooding is usually very local and unlike flooding from rivers and the sea, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas and pose further risks to the environment and ground stability. Groundwater flooding is not considered to be a significant risk in Laois and was screened out by the Regional Flood Risk Appraisal Report.

## 6 Flood Risk Management Policy

The implementation of the Planning Guidelines throughout the county is achieved through the application of the policies and objectives contained within Chapter 10 of the LCDP 2021-2027.

The use and application of the policies and guidelines constitutes the formal plan for flood risk management in County Laois. This approach has been achieved in the development plan making process in the settlements contained within the plan and covered in this SFRA.

The specific management of risk is discussed for each settlement in Section 8.

### 6.1 Flood Risk Policy LCC 2021-2027

The policies contained within Chapter 10 of the LCDP 2021-2027 are as follows:

<b>Flood Risk Management Policy Objectives</b>	
<b>FRM 1</b>	Ensure that flood risk management is incorporated into the preparation of all local area plans through the preparation in accordance with the requirements of the Planning System and Flood Risk Management-Guidelines for Planning Authorities (DoEHLG 2009)
<b>FRM 2</b>	Ensure that all development proposals comply with the requirements of the Planning System and Flood Risk Management-Guidelines for Planning Authorities' (DEHLG 2009) and to ensure that the Justification Test for Development Management is applied to required development proposals and in accordance with methodology set out in the guidelines and new development does not increase flood risk elsewhere, including that which may arise from surface water runoff.
<b>FRM 3</b>	Support the implementation of recommendations in the CFRAM Programme to ensure that flood risk management policies and infrastructure are progressively implemented.
<b>FRM 4</b>	Support the implementation of recommendations in the Flood Risk Management Plans (FRMP's), including planned investment measures for managing and reducing flood risk.
<b>FRM 5</b>	Consult with the OPW in relation to proposed developments in the vicinity of 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.
<b>FRM 6</b>	Assist the OPW in developing catchment-based Flood Risk Management Plans for rivers in County Laois and have regard to their provisions/recommendations.
<b>FRM 7</b>	Protect and enhance the County's floodplains and wetlands as 'green infrastructure' which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defenses in the future, subject to normal planning and environmental criteria.
<b>FRM 8</b>	Protect the integrity of any formal (OPW or Laois County Council) flood risk management infrastructure, thereby ensuring that any new development does not negatively impact any existing defense infrastructure or compromise any proposed new infrastructure.

<b>FRM 9</b>	Ensure that where flood risk management works take place that the natural and cultural heritage, rivers, streams and watercourses are protected and enhanced.
<b>FRM 10</b>	Ensure each flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation as set out in the OPW Climate Change Sectoral Adaptation Plan Flood Risk Management applicable at the time.
<b>FRM 11</b>	Consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the provision of flood alleviation measures in the County.
<b>FRM 12</b>	Prioritise plans for flood defence works in the towns as indicated in the Strategic Flood Risk Assessment in order to mitigate against potential flood risk.
<b>FRM 13</b>	Ensure new development does not increase flood risk elsewhere, including that which may arise from surface water runoff.
<b>FRM 14</b>	Protect water sinks because of their flood management function, as well as their biodiversity and amenity value and encourage the restoration or creation of water sinks as flood defence mechanisms, where appropriate.

## 6.2 Surface water Policy

The management of surface and storm water is important so as to avoid increased flood or pollution risk in the storm water network, rivers and streams in the county's towns, villages and rural areas. The Council will require compliance with best practice guidance for the collection, reuse, treatment and disposal of surface waters for all future development proposals.

Traditionally, rain falling on impervious surfaces was directed into a receiving watercourse through surface water drainage systems. While such drainage systems are effective at transferring surface water quickly, they provide only limited attenuation causing the volume of water in the receiving watercourse to increase more rapidly, thereby increasing flood risk.

Sustainable Drainage Systems, commonly known as SuDS is an approach that seeks to manage the water as close as possible to its origin by various engineering solutions that replicate natural drainage processes, before it enters the watercourse. The incorporation of SuDS techniques allows surface water to be either infiltrated or conveyed more slowly to water courses using porous surface treatments, ponds, swales, filter drains or other installations.

SuDS provide an integrated approach which addresses water quantity, water quality, amenity and habitat. The Council will require the application of SuDS in development proposals, for example through reducing the extent of hard surfacing, and using permeable pavements. The following stormwater management policies have been included in the LCDP 2021-2027.

## Surface Water and Drainage Policy Objectives

<b>SWD 1</b>	Support in conjunction with Irish Water the improvement of storm water infrastructure to improve sustainable drainage and reduce the risk of flooding in urban environments.
<b>SWD 2</b>	Implement policies contained in the Greater Dublin Strategic Drainage Study (GSDSDS) in relation to SUDS and climate change.
<b>SWD 3</b>	Ensure new development is adequately serviced with surface water drainage infrastructure which meets the requirements of the Water Framework Directive, associated River Basin Management Plans and CFRAM Management Plans.
<b>SWD 4</b>	Require that planning applications are accompanied by a comprehensive SUDS assessment that addresses run-off quantity, run-off quality and its impact on the existing habitat and water quality.
<b>SWD 5</b>	Ensure that in public and private developments in urban areas, both within developments and within the public realm, 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 flooding risks.
<b>SWD 6</b>	Ensure appropriate maintenance of surface water drainage infrastructure to avoid flood risk.
<b>SWD 7</b>	Ensure that all storm water generated in a new development is disposed of on-site or is attenuated and treated prior to discharge to an approved storm water system;
<b>SWD 8</b>	Promote storm water retention facilities for new developments and to incorporate design solutions that provide for collection and recycling of surface water in accordance with Sustainable Urban Drainage Systems as recommended in the Planning System and Flood Risk Management: Guidelines for Planning Authorities (DoEHLG, 2009) and Laois County Council's Roads and Drainage Standards, or as amended.

For proposed development outside a settlement boundary (not subject to zoning) the Policies and Objectives of the LCDP still apply.

### 6.3 CFRAM Recommendations

Following the publication of the final Flood Risk Management Plans for the CFRAM Study in May 2018 a 10 year €1billion programme of works (for 118 schemes) was announced by the OPW.

Viable schemes in Laois were identified as Mountmellick, Rathdowney, Clonaslee and Portarlinton. Mountrath and Portlaoise were investigated as Areas for Further Assessment (AFA) but no economically viable schemes were identified. It was therefore recommended by the CFRAM that the proposed measure for Portlaoise and Mountrath be progressed to include a detailed assessment of the costs to determine if an economically viable measure may exist that could justify the progression to full project-level assessment. As of October 2020, only the Moutmellick Flood Relief Scheme has progressed towards the appointment of a consultant and investigation of options.





## 7 Development Management and Flood Risk

In order to guide both applicants and relevant council staff through the process of planning for and mitigating flood risk, the key features of a range of development scenarios have been identified (relating the flood zone, development vulnerability and presence or absence of defences). For each scenario, a number of considerations relating to the suitability of the development are summarised below.

It should be noted that this section of the SFRA begins from the point that all land zoned for development has passed the Justification Test for Development Plans, and therefore passes Part 1 of the Justification Test for Development Management – which states that the land has in the first instance been zoned accordingly in a development plan (that underwent an SFRA). In addition to the general recommendations in the following sections, Section 8 should be reviewed for specific recommendations for individual settlements, including details of the application of the Justification Test. In areas where there are no formal land use zoning objectives, the Justification Test cannot pass for any sites within Flood Zone A/B. It would be down to a site-specific FRA to confirm (in appropriate detail) the extent of Flood Zone A/B.

In order to determine the appropriate design standards for a development it may be necessary to undertake a site-specific flood risk assessment. This may be a qualitative appraisal of risks, including drainage design. Alternatively, the findings of the CFRAM, or other detailed study, may be drawn upon to inform finished floor levels. In other circumstances a detailed modelling study and flood risk assessment may need to be undertaken. Further details of each of these scenarios, including considerations for the flood risk assessment are provided in the following sections.

### 7.1 Requirements for a Flood Risk Assessment

Assessment of flood risk is required in support of any planning application where flood risk may be an issue, and this may include sites in Flood Zone C (low probability of flooding) where a watercourse or field drain exists nearby. The level of detail will vary depending on the risks identified and the proposed land use. As a minimum, all proposed development, including that in Flood Zone C, must consider the impact of surface water flood risks on drainage design. In addition, flood risk from sources other than fluvial should be reviewed.

For sites within Flood Zone A or B (high/moderate probability of flooding), a site specific "Stage 2 - Initial FRA" will be required and may need to be developed into a "Stage 3 - Detailed FRA". The extents of Flood Zone A and B are delineated through this SFRA. However, future studies may refine the extents (either to reduce or enlarge them) so a comprehensive review of available data should be undertaken once an FRA has been triggered.

Within the FRA the impacts of climate change and residual risk (including culvert/structure blockage) should be considered and remodelled where necessary, using an appropriate level of detail, in the design of finished floor levels. Further information on the required content of the FRA is provided in the Planning System and Flood Risk Management Guidelines.

Any proposal that is considered acceptable in principle shall demonstrate the use of the sequential approach in terms of the site layout and design and, in satisfying the Justification Test (where required), the proposal will demonstrate that appropriate mitigation and management measures are put in place.

### 7.2 Drainage Design

All proposed development, whether in Flood Zone A, B or C, must consider the impact of surface water flood risks on drainage design as specified by the surface water management policies in the Greater Dublin Strategic Drainage Study (GSDSDS) and this will be considered in the planning process. This may be 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.

Areas vulnerable to ponding are indicated on the OPW's PFRA mapping. 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 a minimum be 300mm 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.

In addition, 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.

### **7.3 Development Proposals in Flood Zone C**

Where a site is within Flood Zone C, but adjoining or in close proximity to Flood Zone A or B there could be a risk of flooding associated with factors such as future scenarios (climate change) or in the event of failure of a defence, blocking of a bridge or culvert. Risk from sources other than fluvial must also be addressed for all development in Flood Zone C. As a minimum in such a scenario, a flood risk assessment should be undertaken which will screen out possible indirect sources of flood risk and where they cannot be screened out, it should present mitigation measures. The most likely mitigation measure will involve setting finished floor levels to a height that is above the 1 in 100-year fluvial flood level, with an allowance for climate change and freeboard, or to ensure a step up from road level to prevent surface water ingress. Design elements such as channel maintenance or trash screens may also be required. Evacuation routes in the event of inundation of surrounding land should also be detailed.

The impacts of climate change should be considered for all proposed developments. A development which is currently in Flood Zone C may be shown to be at risk when 0.5m is added to the extreme (1 in 200 year) tide. Details of the approach to incorporating climate change impacts into the assessment and design are provided in Section 7.6.

### **7.4 Applications for Developments in Flood Zone A and B**

#### **7.4.1 Minor Developments**

Section 5.28 of the Planning Guidelines on Flood Risk Management identifies certain types of development as being 'minor works' and therefore exempt from the Justification Test. Such development relates to works associated with existing developments, such as extensions, renovations and rebuilding of the existing development, small scale infill and changes of use.

Despite the 'Sequential Approach' and 'Justification Test' not applying, as they relate to existing buildings, an assessment of the risks of flooding should accompany such applications. This must demonstrate that the development would not increase flood risks, by introducing significant numbers of additional people into the flood plain and/or putting additional pressure on emergency services or existing flood management infrastructure. The development must not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities. Where possible, the design of built elements in these applications should demonstrate principles of flood resilient design (See 'The Planning System and Flood Risk Management Guidelines for Planning Authorities Technical Appendices, 2009', Section 4 - Designing for Residual Flood Risk).

Generally, the approach to deal with flood protection would involve raising the ground floor levels above the level of extreme river levels. If this leads to floor levels being much higher than adjacent streets it could create a hostile streetscape for pedestrians. This would cause problems for infill development sites if floor levels were required to be significantly higher than those of neighbouring properties. In this regard, it has been recognised that some flexibility could be allowed, in limited circumstances, on a site by site basis, for commercial and business developments. In these cases, the detailed design of the development should reflect the vulnerability of the site in terms of materials, fixtures and fittings and internal layout. For high risk areas, less vulnerable uses are encouraged at ground floor levels. A site-specific FRA will inform appropriate uses and detailed design and layout.

It should be noted that for residential buildings within Flood Zone A or B, bedroom accommodation is more appropriate at upper floor levels.

For commercial operations, business continuity must be considered, and steps taken to ensure operability during and recovery after a flood event for both residential and commercial developments. Emergency access must be considered as in many cases flood resilience will not be easily achieved in the existing built environment.

The requirement for providing compensatory storage for minor developments has been reviewed and can generally be relaxed, even where finished floor levels have been raised. This is because the development concerns land which has previously been developed and would already have limited capacity to mitigate flooding. However, a commentary to this effect must be substantiated in the site-specific FRA.

#### **7.4.2 Highly Vulnerable Development in Flood Zone A or B**

Development which is highly vulnerable to flooding, as defined in The Planning System and Flood Risk Management, includes (but is not limited to) dwelling houses, schools, hospitals, emergency services and caravan parks.

##### **New Development**

It is not appropriate for new, highly vulnerable development to be located on greenfield land in Flood Zones A or B, particularly outside the core of a settlement and where there are no flood defences. Such proposals do not pass the Justification Test. Instead, a less vulnerable use should be considered.

For extant permissions in Flood Zone A/B if the site remains unconstructed and the planning application lapses, any future planning applications on the site should be subject to an appropriately detailed FRA specific to the new site layout and it may be found that the site cannot be developed as planned. As part of any future variation to the Development Plan or the preparation of a Local Area Plan (as applicable to the relevant settlement) lands with no extant permission should be considered in line with the sequential approach and Justification Test for Plan Making.

##### **Existing Developed Areas**

The Planning Circular (PL02/2014) states that *"notwithstanding the need for future development to avoid areas at risk of flooding, it is recognised that the existing urban structure of the country contains many well established cities and urban centres which will continue to be at risk of flooding. In addition, development plans have identified various strategically important urban centres whose continued consolidation, growth, development or generation, including for residential use, is being encouraged to bring about compact and sustainable growth."*

Minor/small scale infill housing, extensions or changes of use is discussed previously and, subject to site specific flood risk assessment, can generally be considered appropriate.

In cases where development has been justified, the outline requirements for a flood risk assessment and flood management measures have been detailed in this SFRA in

the following sections and also the settlement review in Section 8. Of prime importance is the requirement to manage risk to the development site and not to increase flood risk elsewhere. This should give due consideration to safe evacuation routes and access for emergency services during a flood event.

### **7.4.3 Less Vulnerable Development in Flood Zone A or B**

Less vulnerable development includes retail, leisure, warehousing, technology, enterprise and buildings used for agriculture and forestry a comprehensive categorisation of land uses and vulnerability is provided in Table 3-3.

The design and assessment of less vulnerable development should generally begin with 1% AEP fluvial event as standard, with climate change and a suitable freeboard included in the setting of finished floor levels. The site-specific FRA should ensure that the risks are defined, understood, and accepted. Operability and emergency response should also be clearly defined. In a limited number of cases this may allow construction as low as the 1% AEP level to be adopted, provided the risks of climate change are included in the development through adaptable designs or resilience measures.

### **7.5 Key points for FRA for all types of developments**

- Finished floor levels to be set above the 1% AEP fluvial (0.5% AEP tide) level, with an allowance for climate change plus a freeboard of at least 300mm. The freeboard allowance should be assessed, and the choice justified.
- Flow paths through the site and areas of surface water storage should be managed to maintain their function and without causing increased flood risk elsewhere.
- Compensatory storage is to be provided to balance floodplain loss as a result of raising ground levels within Flood Zone A. The storage should be provided within the flood cell and on a level for level basis up to the 1% level.
- In a defended site, compensatory storage is not required, but the impact of removing the net reduction in floodplain storage should be assessed, and any impacts to existing development mitigated for the 0.1% event or a breach of these defences.
- A site is considered to be defended if the standard of protection is 1% AEP, within which a freeboard of at least 300mm is included. The FFL of the proposed development needs to take into account the impacts of climate change and other residual risks, including the 0.1% event, unless this has also been incorporated into the defence design. This may be assessed through breach analysis, overtopping analysis or projection of levels from the channel inland.
- For less vulnerable development, it may be that a finished floor level as low as the 1% AEP level could be adopted, provided the risks of climate change are included in the development through adaptable designs or resilience measures. This approach should reflect emergency planning and business continuity to be provided within the development. It may reflect the design life of the development, the proposed use, the vulnerability of items to be kept in the premises, the occupants and users, emergency plan and inclusion of flood resilience and recovery measures.

### **7.6 Incorporating Climate Change into Development Design**

In all developments, climate change should be considered when assessing flood risk and in particular residual flood risk. Climate change may result in increased flood extents and therefore caution should be taken when zoning lands in transitional areas (i.e. on the edge of the floodplain). Consideration of climate change is particularly important where flood alleviation measures are proposed, as the design standard of



the proposal may reduce significantly in future years due to increased rainfall and river flows (sea levels are not a pertinent consideration in Laois).

The 'Planning System and Flood Risk Management' recommends that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects. A significant amount of research into climate change has been undertaken on both a national and international front, and updates are ongoing.

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. 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 are given in the table below. 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.

**Table 7-1: Allowances for Future Scenarios (100-year Time Horizon)**

Criteria	MRFS	HEFS
Extreme Rainfall Depths	+20%	+30%
Flood Flows	+20%	+30%
Mean Sea Level Rise	+500mm	+1000mm
Land Movement	-0.5mm / year*	-0.5mm / year*
Urbanisation	No General Allowance - Review on Case by Case Basis	No General Allowance - Review on Case by Case Basis
Forestation	-1/6 Tp**	-1/3 Tp**+10% SPR***
Notes:		
* Applicable to the southern part of the country only (Dublin - Galway and south of this)		
** Reduce the time to peak (Tp) by a third; this allows for potential accelerated runoff that may arise as a result of drainage of afforested land		
*** Add 10% to the Standard Percentage Runoff (SPR) rate; this allows for increased runoff rates that may arise following felling of forestry		

Through the CFRAM Studies, both MRFS and HEFS model runs have been completed on all study watercourses, providing flood extent and depth maps. This information can be used to support flood risk assessments where the current CFRAM scenario has been deemed appropriate to the location.

For watercourses that are not part of the CFRAM programme, fluvial flood extents can be qualitatively assessed by using the Flood Zone B outline as a surrogate for 'Flood Zone A with allowance for the possible impacts of climate change', as suggested in the 'Planning System and Flood Risk Management'. Quantitative assessment of risks may require an additional model run to fully understand risks.

For most development, including residential, nursing homes, shops and offices, the medium-range future scenario (20% increase in flows) is an appropriate consideration. This should be applied in all areas that are at risk of flooding (i.e. within Flood Zone A and B) and should be considered for sites which are in Flood

Zone C but are adjacent to Flood Zone A or B. This is because land which is currently not at risk may become vulnerable to flooding when climate change is taken into account.

Where the risk associated with inundation of a development is low and the design life of the development is short (typically less than 30 years) the allowance provided for climate change may be less than the 20% / 0.5m level. However, the reasoning and impacts of such an approach should be provided in the site-specific FRA.

Conversely, there may be development which requires a higher-level response to climate change. This could include major facilities which are extremely difficult to relocate, such as hospitals, airports, Seveso sites or power stations, and those which represent a high-economic and long-term investment within the scale of development across the county. In such situations it would be reasonable to expect the high-end future scenario (30% increase in flow) to be investigated in the site-specific FRA and used as the design standard.

In general, climate change will be accounted for the setting of finished floor levels to a height which includes an allowance for climate change. However, climate change may also reveal additional flow paths which need to be protected or give rise to flows which exceed culvert capacity or overtop defences. These outcomes will need to be specifically investigated for each site, and an appropriate response provided.

Further consideration to the potential future impacts of climate change is given for each settlement in Section 8.

## **7.7 Flood Mitigation Measures at Site Design**

For any development proposal in an area at moderate or high risk of flooding that is considered acceptable in principle (i.e. has passed the Plan Making Justification Test), the site specific FRA must demonstrate that appropriate mitigation measures can be put in place and that residual risks can be managed to acceptable levels. This may include the use of flood-resistant construction measures that are aimed at preventing water from entering a building and that mitigate the damage floodwater causes to buildings. Alternatively, designs for flood resilient construction may be adopted where it can be demonstrated that entry of floodwater into buildings is preferable to limit damage caused by floodwater and allow relatively quick recovery.

Various mitigation measures are outlined below and further detail on flood resilience and flood resistance are included in the Technical Appendices of the Planning Guidelines, The Planning System and Flood Risk Management.

### **7.7.1 Site Layout and Design**

To address flood risk in the design of new development, a risk-based approach should be adopted to locate more vulnerable land use to higher ground while water compatible development i.e. car parking (with appropriate flood management plan) and recreational space can be located in higher flood risk areas.

The site layout should identify and protect land required for current and future flood risk management. Waterside areas or areas along known flow routes can be used for recreation, amenity and environmental purposes to allow preservation of flow routes and flood storage, while at the same time providing valuable social and environmental benefits.

### **7.7.2 Ground Levels, Floor Levels and Building Use**

Modifying ground levels to raise land above the design flood level is a very effective way of reducing flood risk to the site. However, in most areas of fluvial flood risk, conveyance or flood storage would be reduced locally and could increase flood risk off site. There are a number of criteria which must all be met before this is considered a valid approach:



- Development at the site must have been justified through this SFRA based on the existing (unmodified) ground levels.
- The FRA should establish the function provided by the floodplain. Where conveyance is a prime function then a hydraulic model will be required to show the impact of its alteration.
- The land being given over to storage must be land which does not flood in the 1% AEP fluvial event (i.e. Flood Zone B or C).
- Compensatory storage should be provided on a level for level basis to balance the total area that will be lost through infilling where the floodplain provides static storage.
- The provision of the compensatory storage should be in close proximity to the area that storage is being lost from (i.e. within the same flood cell).
- The land proposed to provide the compensatory storage area must be within the ownership / control of the developer.
- The compensatory storage area should be constructed before land is raised to facilitate development.
- Compensatory storage is generally not required for loss of floodplain in locations behind defences.

In some sites it is possible that ground levels can be re-landscaped to provide a sufficiently large development footprint. However, it is likely that in other potential development locations there is insufficient land available to fully compensate for the loss of floodplain. In such cases it will be necessary to reconsider the layout or reduce the scale of development or propose an alternative and less vulnerable type of development. In other cases, it is possible that the lack of availability of suitable areas of compensatory storage mean the target site cannot be developed and should remain open space.

Raising finished floor levels within a development is an effective way of avoiding damage to the interior of buildings (i.e. furniture and fittings) in times of flood. Alternatively, assigning a water compatible use (i.e. garage / car parking) or less vulnerable use to the ground floor level, along with suitable flood resilient construction, is an effective way of raising vulnerable living space above design flood levels. It can however have an impact on the streetscape. Safe access and egress is a critical consideration in allocating ground floor uses.

Depending on the scale of residual risk, resilient and resistance measures may be an appropriate response, but this will mostly apply to less vulnerable development.

### **7.7.3 Raised Defences**

Construction of raised defences (i.e. flood walls and embankments) has traditionally been the response to flood risk. However, this is not a preferred option on an ad-hoc basis where the defences to protect the development are not part of a strategically led flood relief scheme. Where a defence scheme is proposed as the means of providing flood defence, the impact of the scheme on flood risk up and downstream must be assessed and appropriate compensatory storage must be provided.

### **7.8 Green Corridor**

It is recommended that, where possible, and particularly where there is greenfield land adjacent to the river, a 'green corridor', is retained on all rivers and streams. This will have a number of benefits, including:

- Retention of all, or some, of the natural floodplain;
- Potential opportunities for amenity, including riverside walks and public open spaces;

- Maintenance of the connectivity between the river and its floodplain, encouraging the development of a full range of habitats;
- Natural attenuation of flows will help ensure no increase in flood risk downstream;
- Allows access to the river for maintenance works;
- Retention of clearly demarcated areas where development is not appropriate on flood risk grounds, and in accordance with the Planning System and Flood Risk Management.

The width of this corridor should be determined by the available land, and topographically constraints, such as raised land and flood defences, but would ideally span the fully width of the floodplain (i.e. all of Flood Zone A).

## 8 Settlement Zoning Review

The purpose of land use zoning objectives is to indicate to property owners and members of the public the types of development the Planning Authority considers most appropriate in each land use category. Zoning is designed to reduce conflicting uses within areas, to protect resources and, in association with phasing, to ensure that land suitable for development is used to the best advantage of the community as a whole.

This section of the SFRA will:

- Outline the strategic approach to flood risk management.
- Consider the land use zoning objectives utilised within the LCDP settlements and assess their potential vulnerability to flooding.
- Based on the associated vulnerability of the particular use, a clarification on the requirement of the application of the Justification Test is provided.
- The consideration of the specific land use zoning objectives and flood risk will be presented for the settlements. Comment will be provided on the use of the sequential approach and justification test. Conclusions will be drawn on how flood risk is proposed to be managed in the settlement.

### 8.1 A Strategic Approach to Flood Risk Management

A strategic approach to the management of flood risk is important in County Laois as the risks are varied and disparate, with scales of risk and scales of existing and proposed development varying greatly across the county.

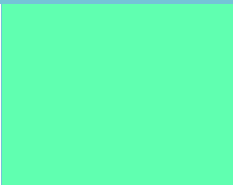

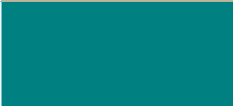

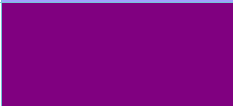






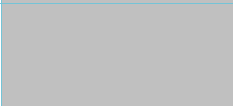

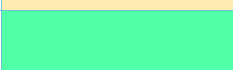
Following the Planning Guidelines, development should always be located in areas of lowest flood risk first, and only when it has been established that there are no suitable alternative options should development (of the lowest vulnerability) proceed. Consideration may then be given to factors which moderate risks, such as defences, and finally consideration of suitable flood risk mitigation and site management measures is necessary.

It is important to note that whilst it may be technically feasible to mitigate or manage flood risk at site level, strategically it may not be a sustainable approach.

A summary of flood risks associated with each of the zoning objectives has been provided in the following settlement reviews. The Flood Risk commentary indicates whether a certain land zoning, in Flood Zone A or B, will need to have the Plan Making Justification Test (JT) applied and passed.

When carrying out a site specific FRA, or when planning applications are being considered, it is important to remember that not all uses will be appropriate on flood risk grounds, hence the need to work through the Justification Test for Development Management on a site by site basis and with reference to Table 8-1. For example, a Mixed Use Town / Village Centre zoning objective is "to include for an integrated mix of residential, commercial, community and social uses" which have varying vulnerabilities and would not be equally permissible within Flood Zone A and B.

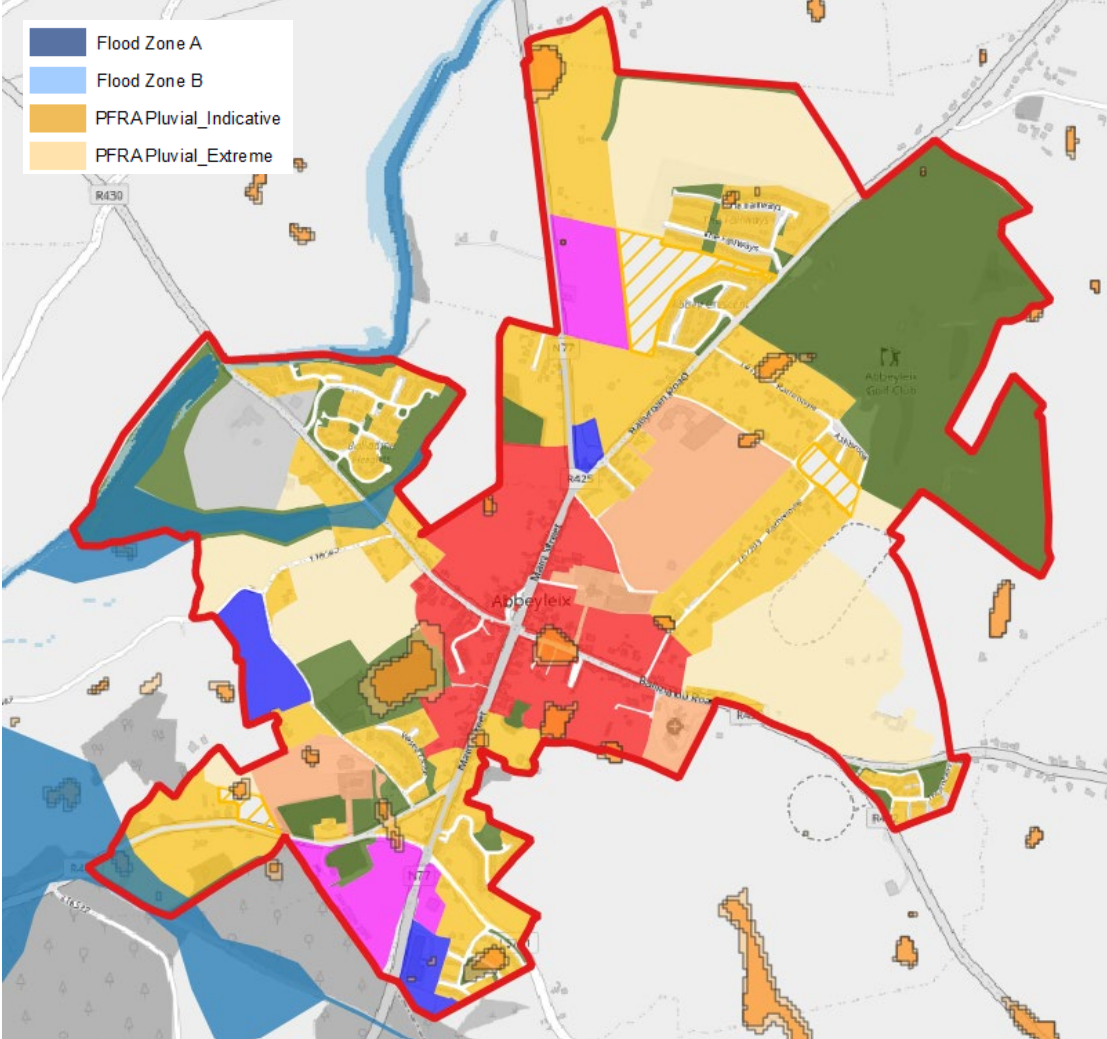
**Table 8-1: Zoning Objective Vulnerability**

Zoning Objective	Map Legend	Indicative Primary Vulnerability	Flood Risk Commentary
Business & Innovation		Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Community/Educational/Institutional		Less / highly vulnerable	Consideration to be given to flood risks and sequential use of land to ensure highly vulnerable uses are located within areas at lowest risk of flooding.
District Centre		Less vulnerable	Appropriate use in Flood Zone B, but JT will be needed in Flood Zone A.
General Business		Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Retail Warehousing		Less vulnerable	Appropriate use in Flood Zone B, but JT will be needed in Flood Zone A.
Enterprise & Employment		Less vulnerable	Appropriate use in Flood Zone B, but JT will be needed in Flood Zone A.
Neighbourhood Centre		Less vulnerable	Appropriate use in Flood Zone B, but JT will be needed in Flood Zone A.
Residential 1 (established)		Highly Vulnerable	JT required for within Flood Zone A and B.
Residential 2 (new)		Highly Vulnerable	JT required for within Flood Zone A and B.
Horticulture		Less Vulnerable	Appropriate use in Flood Zone B, but JT will be needed in Flood Zone A.
Industrial		Less vulnerable	Appropriate use in Flood Zone B, but JT will be needed in Flood Zone A.
Industrial and Warehousing		Less vulnerable	Appropriate use in Flood Zone B, but JT will be needed in Flood Zone A.
Strategic Reserve		Less / highly vulnerable	Lands cannot be developed within the lifetime of the plan and the JT does not apply.
Mixed Use		Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B.

			B. For less vulnerable development in Flood Zone A.
Open Space and Amenity		Water compatible	JT not needed. Land use appropriate and should be retained.
Tourism		Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B.
Tourism and Leisure		Less / highly vulnerable	For highly vulnerable development in Flood Zone A or B.
Transport and Utilities		Less / Highly Vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Town Centre		Less / Highly Vulnerable	For highly vulnerable development in Flood Zone A or B. For less vulnerable development in Flood Zone A.
Town/Village Centre		Less / Highly Vulnerable	For highly vulnerable development in Flood Zone A or B.

The following sections review the land use zoning objectives for each settlement within the plan and provide a comprehensive summary of flood risk and justification where necessary.

## 8.2 Abbeyleix

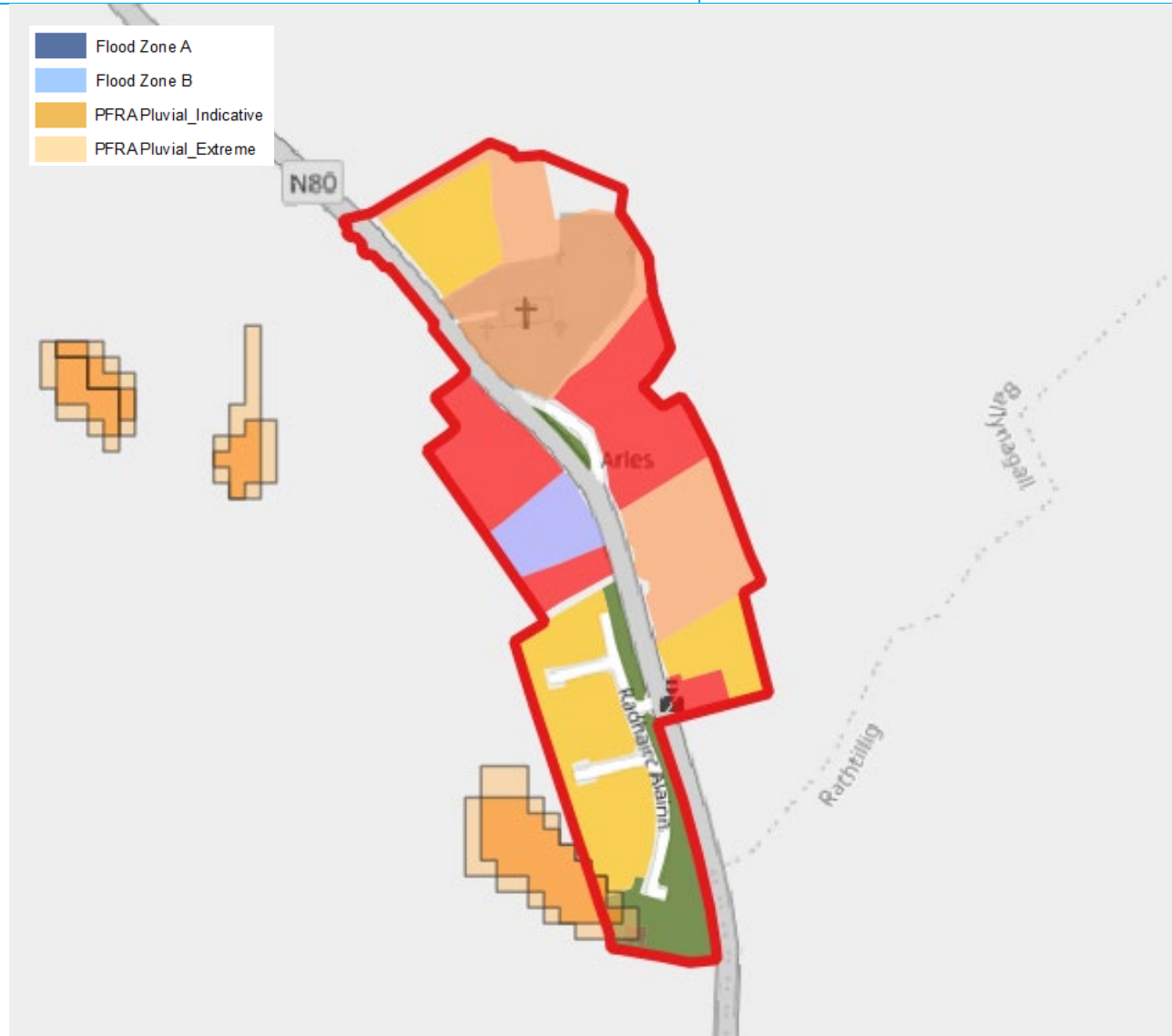
<b>Hierarchy/Tier</b>	Tier 3
<b>Area for Further Assessment under CFRAM programme?</b>	No
	
<p>© OpenStreetMap contributors, CC-BY-SA,</p>	
<p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	CFRAM and PFRA (verified and adjusted by a site visit)
<b>Historic Flooding</b>	Recurring surface water flooding in field at Rathmoyle from open drain after heavy rainfall, this corresponds with the PFRA pluvial outline. There are records of Abbeyleix flooding in 1924 and 1965; no details of flood extents, depth or source.
<b>Comment</b>	<p>The Ballyroan River flows along the northern fringe of the settlement and is covered by the CFRAM flood mapping. Two other watercourses are represented by the PFRA dataset and have been verified on site.</p> <p>The Ballyroan River passes adjacent to the Industry/Warehouse zoning, but the zoning is located within Flood Zone C.</p> <p>An area of existing residential development (Balladine Heights) is located to the west of the tributary of the Ballyroan River. The watercourse was investigated under a site visit and all housing is suitably raised and remote from the Flood Zone, which has been</p>



	<p>amended to reflect the findings of the site visit.</p> <p>PFRA extents in the south west of the settlement impact existing residential zoning only, the outlines are likely to be overestimating flood extent but no further amendments have been made.</p>
<b>Climate Change</b>	Localised and moderate sensitivity to climate change impacts.
<b>Conclusion</b>	<p>Risk is limited to existing development. An FRA would be required for any future renovation, extension, re-development within the areas of existing development that are within or adjacent to the Flood Zone extents.</p> <p>Risk can be managed in line with approved LCDP Policy and the guidance provided within Section 7 of this SFRA.</p>

### 8.3 Arles

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA Pluvial only
<b>Historic Flooding</b>	None found
<b>Comment</b>	Settlement is at low risk of fluvial flooding. Some minor areas potentially susceptible to surface water ponding.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Risk is low and can be managed in line with approved LCDP Policy and the guidance provided within Section 7 of this SFRA.

## 8.4 Ballacolla

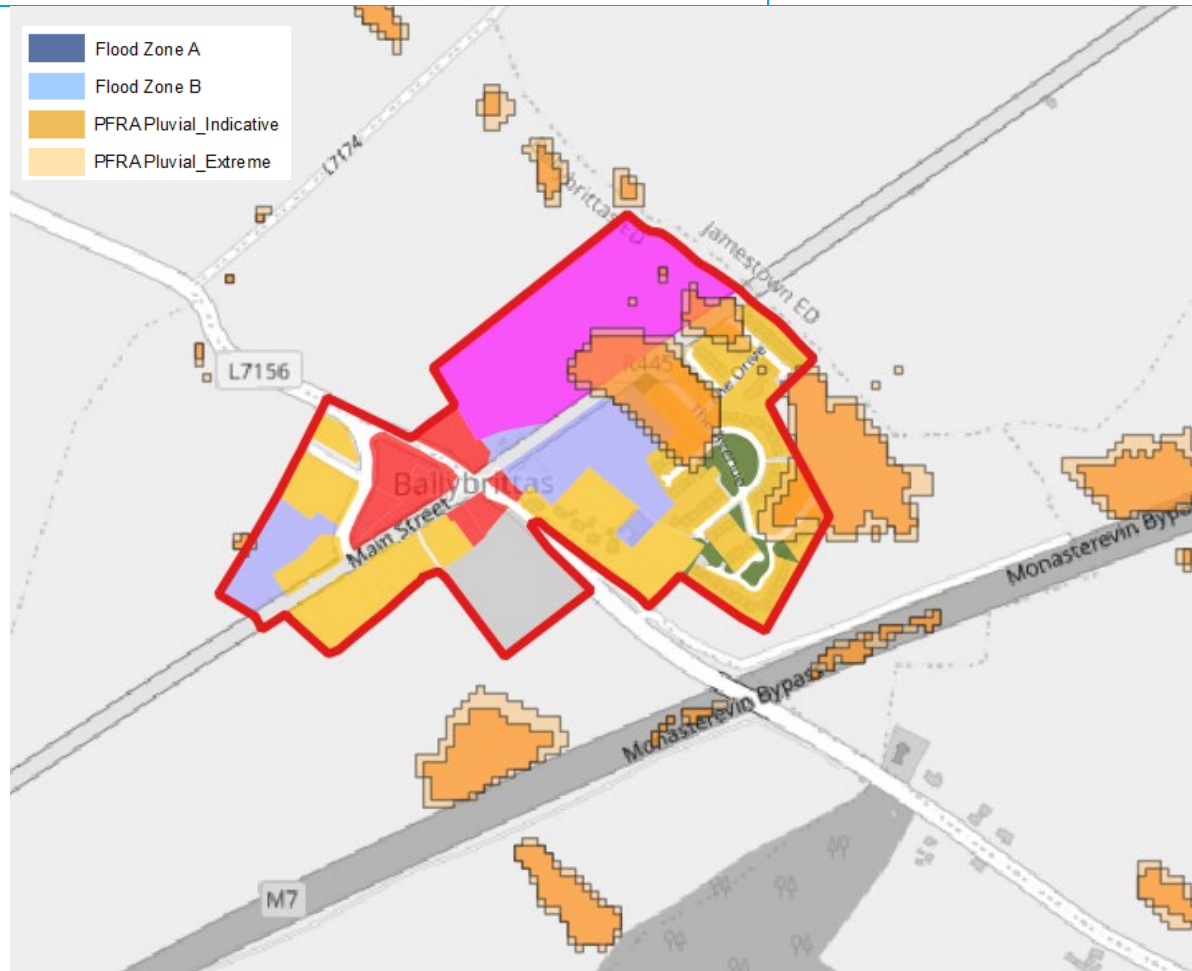
<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No
© OpenStreetMap contributors, CC-BY-SA,	
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.	
<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history. Some areas of surface water ponding is predicted.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff
<b>Conclusion</b>	Manage surface water flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

## 8.5 Ballinakill

<b>Hierarchy/Tier</b>	Tier 5
<b>Area for Further Assessment under CFRAM programme?</b>	No
<p>© OpenStreetMap contributors, CC-BY-SA,</p> <p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	JBA Indicative Mapping (to east of settlement)
<b>Historic Flooding</b>	None found.
<b>Comment</b>	No fluvial flood risk identified and no flood history. Some isolated areas of pluvial flooding. The watercourse to the south west of the settlement does not pose a risk to the nearby existing Enterprise & Employment lands.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff
<b>Conclusion</b>	Manage surface water flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

## 8.6 Ballybrittas

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

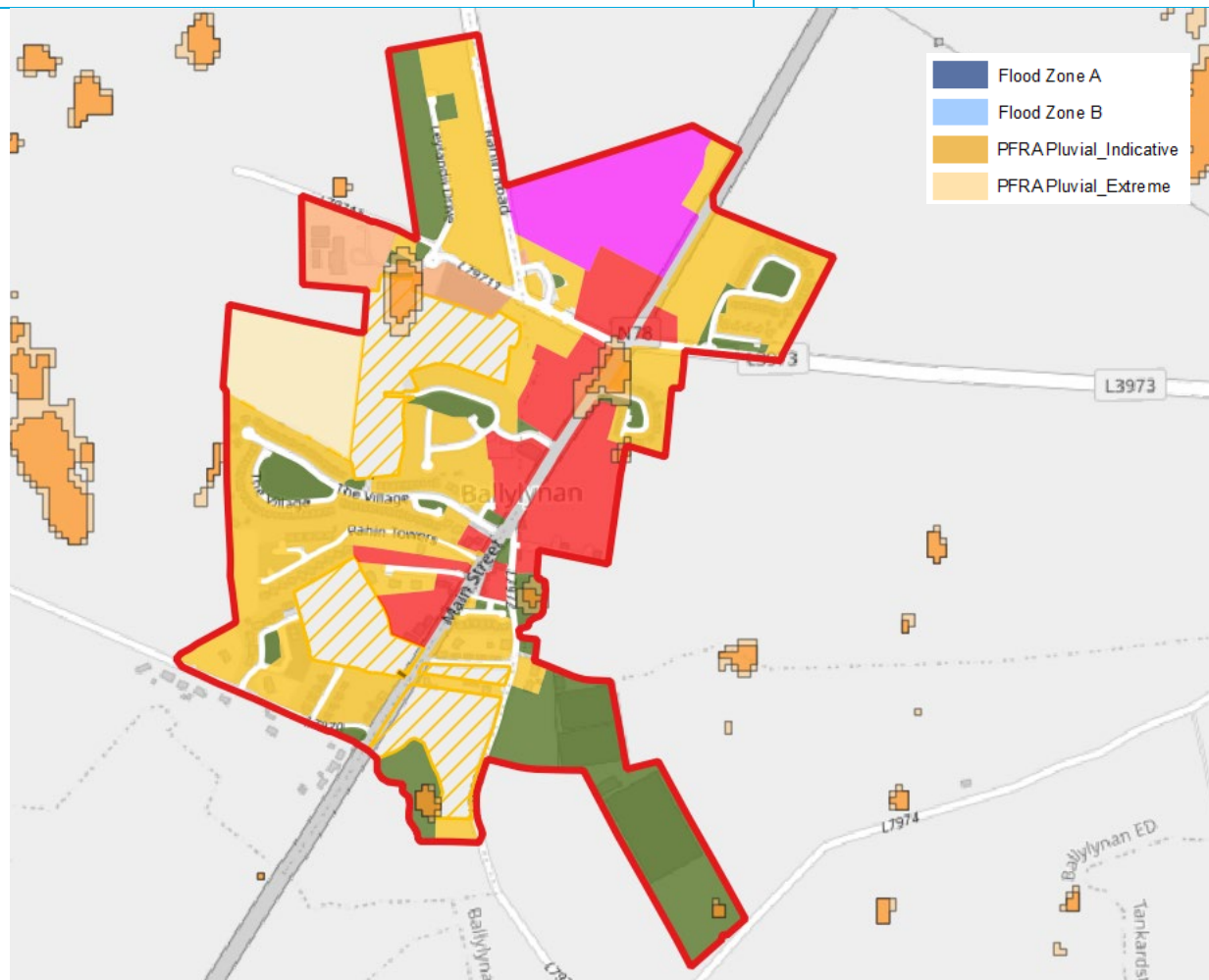
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history. Some predicted pluvial flooding from the PFRA mapping. This is likely to represent localised topographic depressions.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff
<b>Conclusion</b>	Manage pluvial flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.



## 8.7 Ballylynan

<b>Hierarchy/Tier</b>	Tier 5
<b>Area for Further Assessment under CFRAM programme?</b>	No



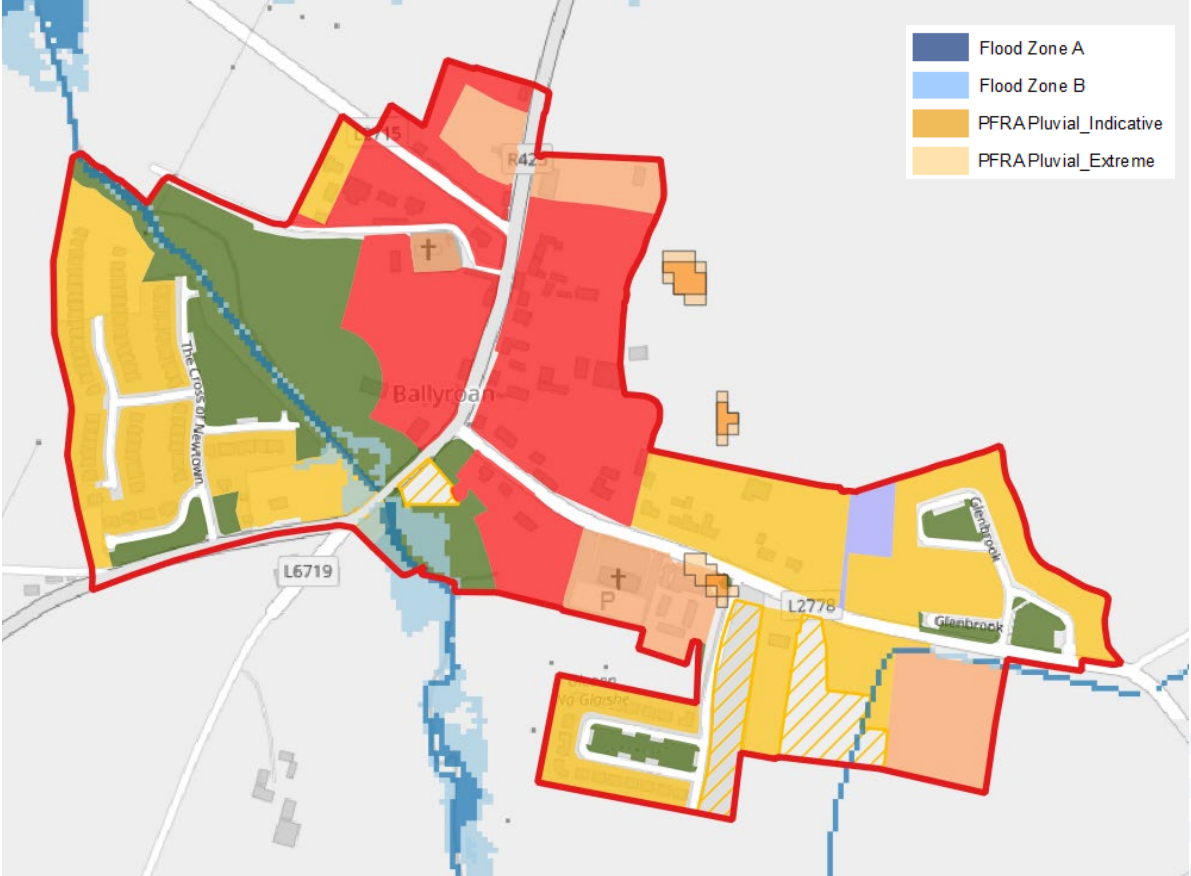
© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history, some isolated areas of pluvial flooding.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.



## 8.8 Ballyroan

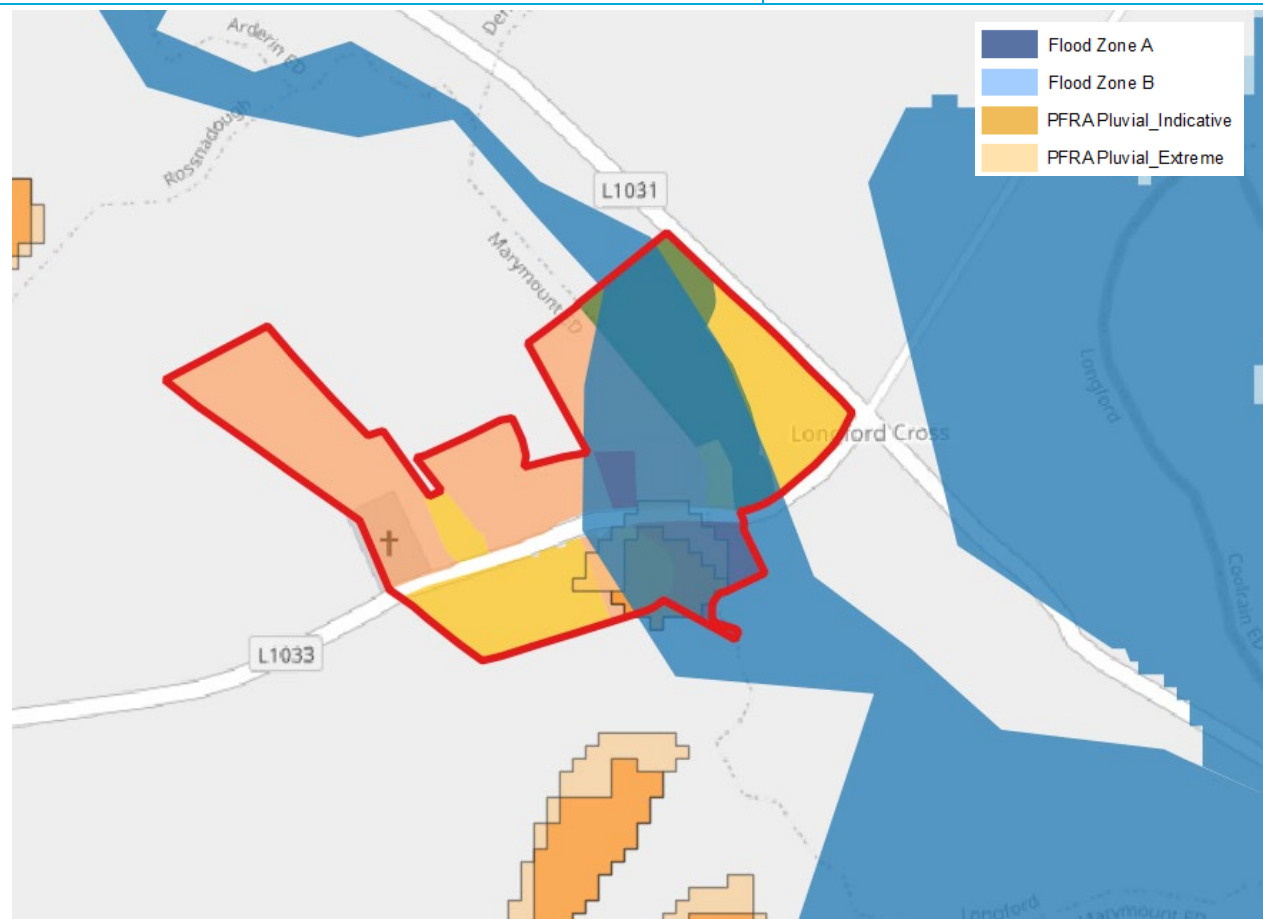
<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	Yes
	
<p>© OpenStreetMap contributors, CC-BY-SA,</p> <p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	Ballyroan Stream is noted to overflow its banks after heavy rainfall every year and results in the flooding of a number of buildings and low lying land. Flood water has been reported to flow down Chapel Road from east.
<b>Comment</b>	The risk from the Ballyroan Stream is limited and newer housing developments that border the stream in the eastern edge of the village have had site specific FRAs completed at Development Management Stage demonstrating that risk has been managed. Further downstream through the settlement Open Space & Amenity use ensures a generous riparian buffer. Some existing residential lands are within Flood Zone B, these have an active planning permission that was subject to a site specific FRA.
<b>Climate Change</b>	Moderate sensitivity
<b>Conclusion</b>	Any further residential development adjacent to the Flood Zones will require a detailed FRA at Development Management stage to ensure the appropriate application of the Sequential Approach. Manage risk in line with approved LCDP Policy and the guidance provided within Section 7 of this SFRA.

## 8.9 Borris in Ossory

<b>Hierarchy/Tier</b>	Tier 5
<b>Area for Further Assessment under CFRAM programme?</b>	No
<p>© OpenStreetMap contributors, CC-BY-SA,</p> <p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	CFRAM and PFRA
<b>Historic Flooding</b>	The River Nore overflows its banks following heavy rainfall every year. Significant land area flooded to the west of Borris-in-Ossory.
<b>Comment</b>	Based on the site visit assessment the PFRA outlines to the east of the settlement have been adjusted to match the step change in topographic levels to the east of the road that runs adjacent to the L1514 road. CFRAM FZB extends into undeveloped Industry/Warehousing in the west of the settlement, since the use is less vulnerable the Justification Test does not apply.
<b>Climate Change</b>	High sensitivity.
<b>Conclusion</b>	An appropriately detailed FRA at Development Management stage is required for any future development in the Industry lands on the western periphery of the settlement. For the Industry lands it would be preferable for the land within Flood Zone B to be kept as open space or car parking.  Manage risk in line with approved LCDP Policy and the guidance provided within Section 7 of this SFRA.

### 8.10 Camross

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	Yes



© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA and JBA Indicative Mapping
<b>Historic Flooding</b>	Delour River overflowed its banks in February 2020 as a result of Storm Ciara.
<b>Comment</b>	Based on a site visit the PFRA extents have been adopted as the best available dataset for the settlement. Existing residential development to the east of the watercourse is constructed on high ground and is at low risk. Parts of the existing village centre are adjacent to the watercourse and there is a potential flood risk, but it is likely to be overestimated by the PFRA outlines, this impacts Town Centre lands and Community/Education zonings.
<b>Climate Change</b>	Moderate sensitivity.
<b>Conclusion</b>	Any extensions/renovation/re-development to Town Centre or Community/Education lands (under existing development) should be supported by a suitably detailed FRA at Development Management Stage. Manage risk in line with approved LCDP Policy and the guidance provided within Section 7 of this SFRA.

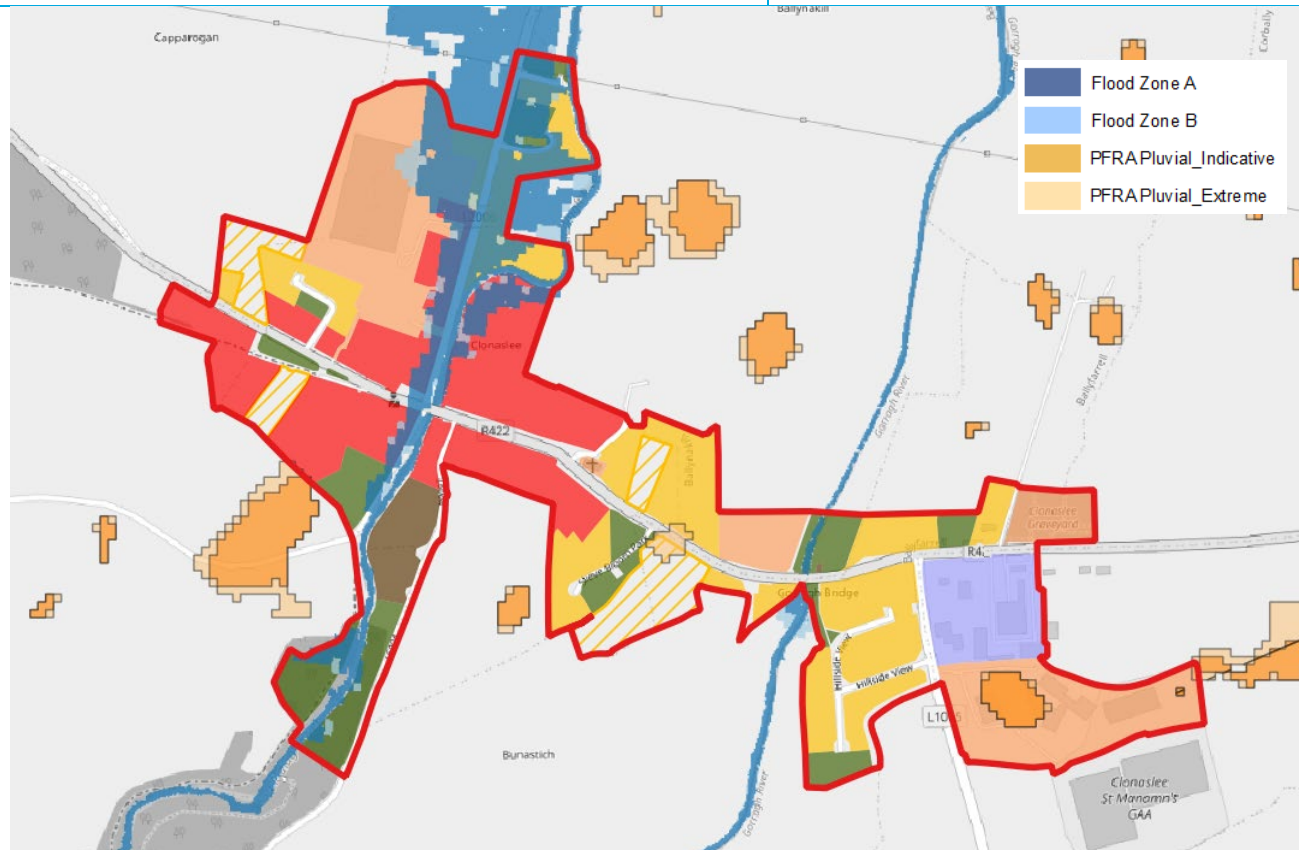
### 8.11 Castletown

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No
<p>© OpenStreetMap contributors, CC-BY-SA,</p> <p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	River Nore was noted to overflow its banks in February 2020 as a result of Storm Ciara.
<b>Comment</b>	Flood extents from the River Nore overlap with Open Space & Amenity lands and represent a generous riparian buffer between the mixed use and residential lands within the town.
<b>Climate Change</b>	Moderate to high sensitivity, but generous riparian buffer will manage impacts.
<b>Conclusion</b>	Manage risk in line with approved LCDP Policy and the guidance provided within Section 7 of this SFRA.



### 8.12 Clonaslee

<b>Hierarchy/Tier</b>	Tier 5
<b>Area for Further Assessment under CFRAM programme?</b>	No



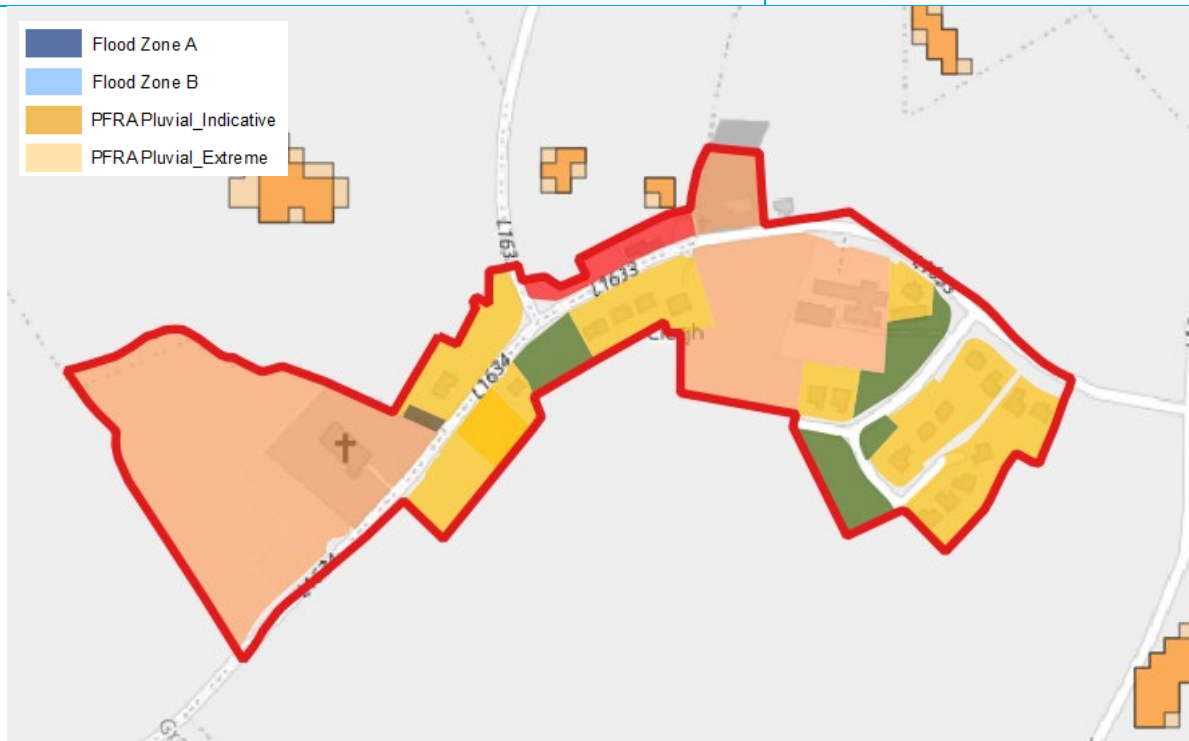
© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	River Clodiagh burst through damaged wall as a result of heavy rainfall in 2017. In November 2009 Clonaslee flooded as gravel deposits in the River Clodiagh blocked a bridge resulting in water flowing through the village centre.
<b>Comment</b>	Existing Town centre and Utilities in FZA/B. Community/Education/Institute in FZA but these are playing pitches. The mapped risk from the CFRAM study is significant in the northern section of the settlement.
<b>Climate Change</b>	Moderate sensitivity
<b>Conclusion</b>	Any extensions/renovation/re-development to Town Centre, existing Residential or Community/Education lands (under existing development) should be supported by a suitably detailed FRA at Development Management Stage. Care should be taken to fully assess the residual risk of culvert blockage.  Manage risk in line with approved LCDP Policy and the guidance provided within Section 7 of this SFRA.

### 8.13 Clough

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

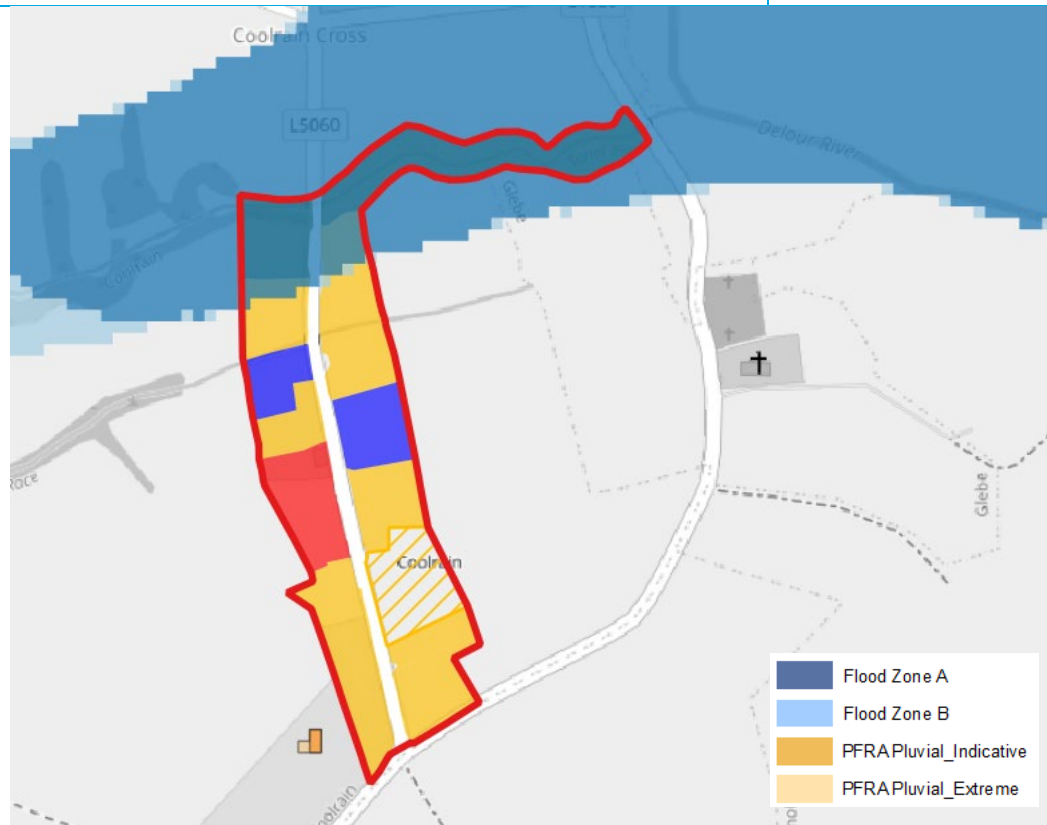
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history, no indicative pluvial risk within the settlement boundary.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.



### 8.14 Coolrain

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



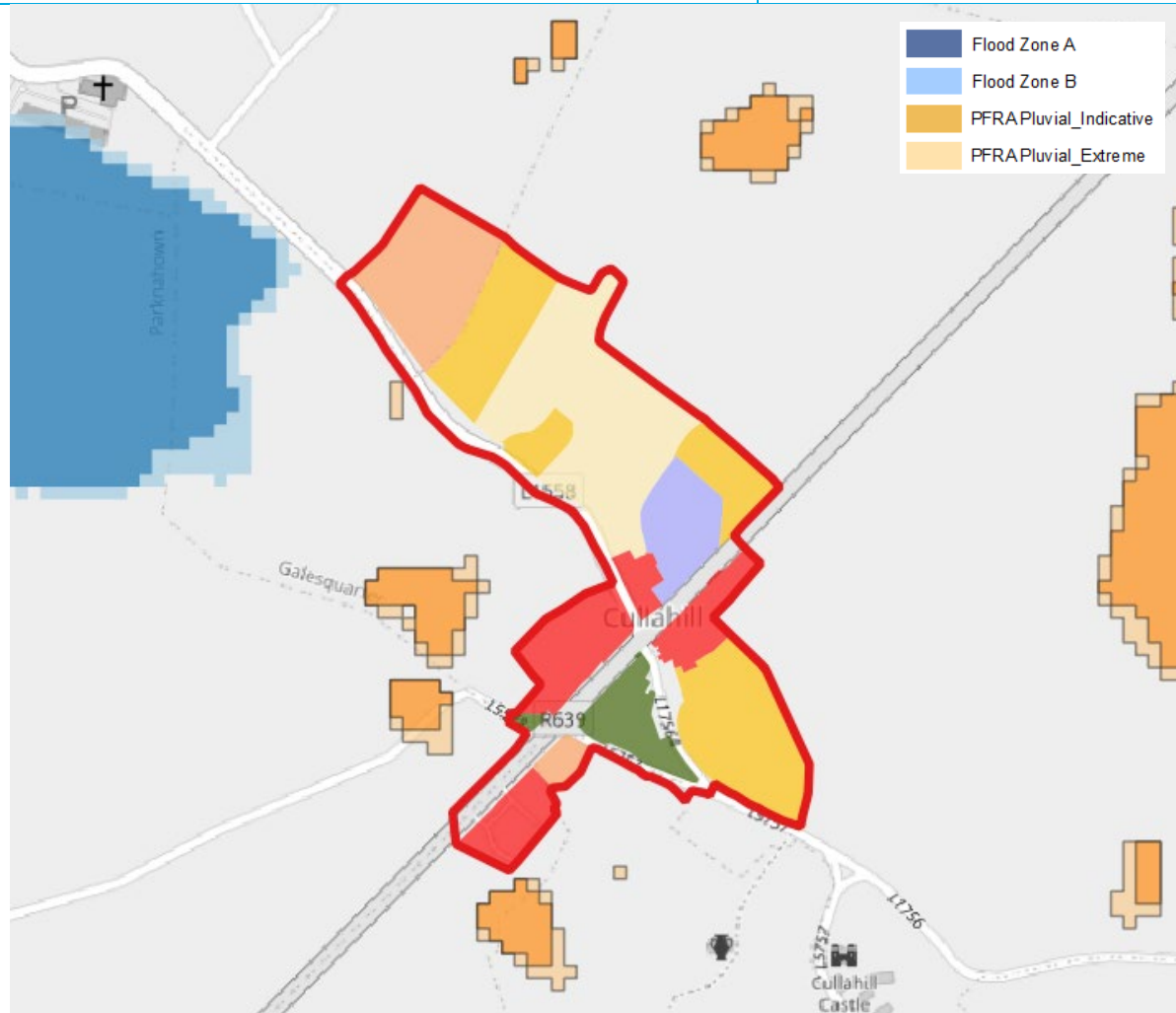
© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	JBA Indicative Mapping
<b>Historic Flooding</b>	The River Delour overflows its banks as a result of heavy rainfall every year in the vicinity of the Anatrim Bridge.
<b>Comment</b>	The predicted floodplain of the River Tonet overlaps with some existing developed lands within the residential zoning in the north of the settlement.
<b>Climate Change</b>	Low to moderate sensitivity.
<b>Conclusion</b>	Any further development adjacent to or within the Flood Zones (extensions, renovation, re-development) should conduct an appropriately detailed FRA at Development Management stage. Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

### 8.15 Cullahill

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



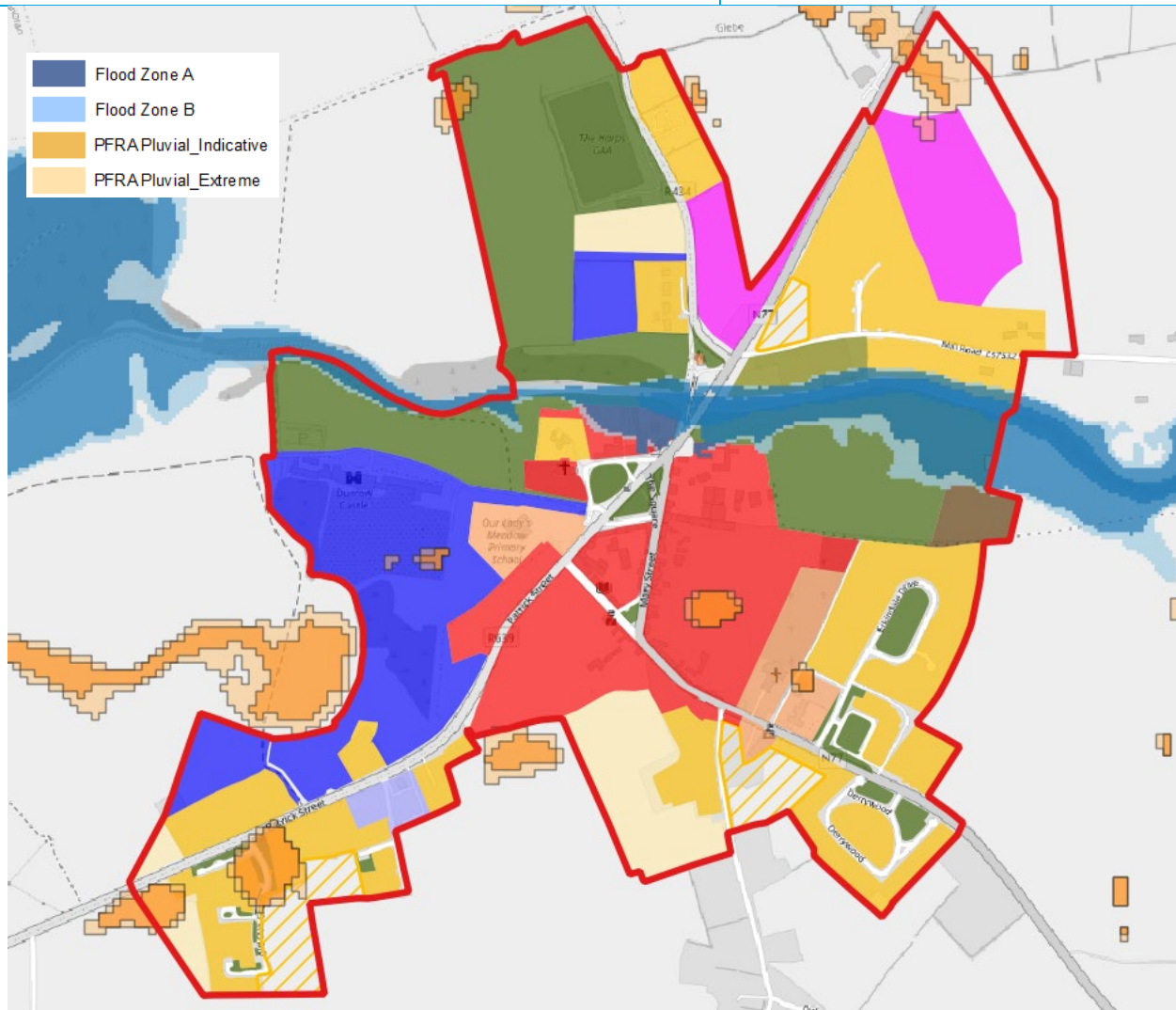
© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	JBA Indicative Mapping (to west of settlement boundary)
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

### 8.16 Durrow

<b>Hierarchy/Tier</b>	Tier 4
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

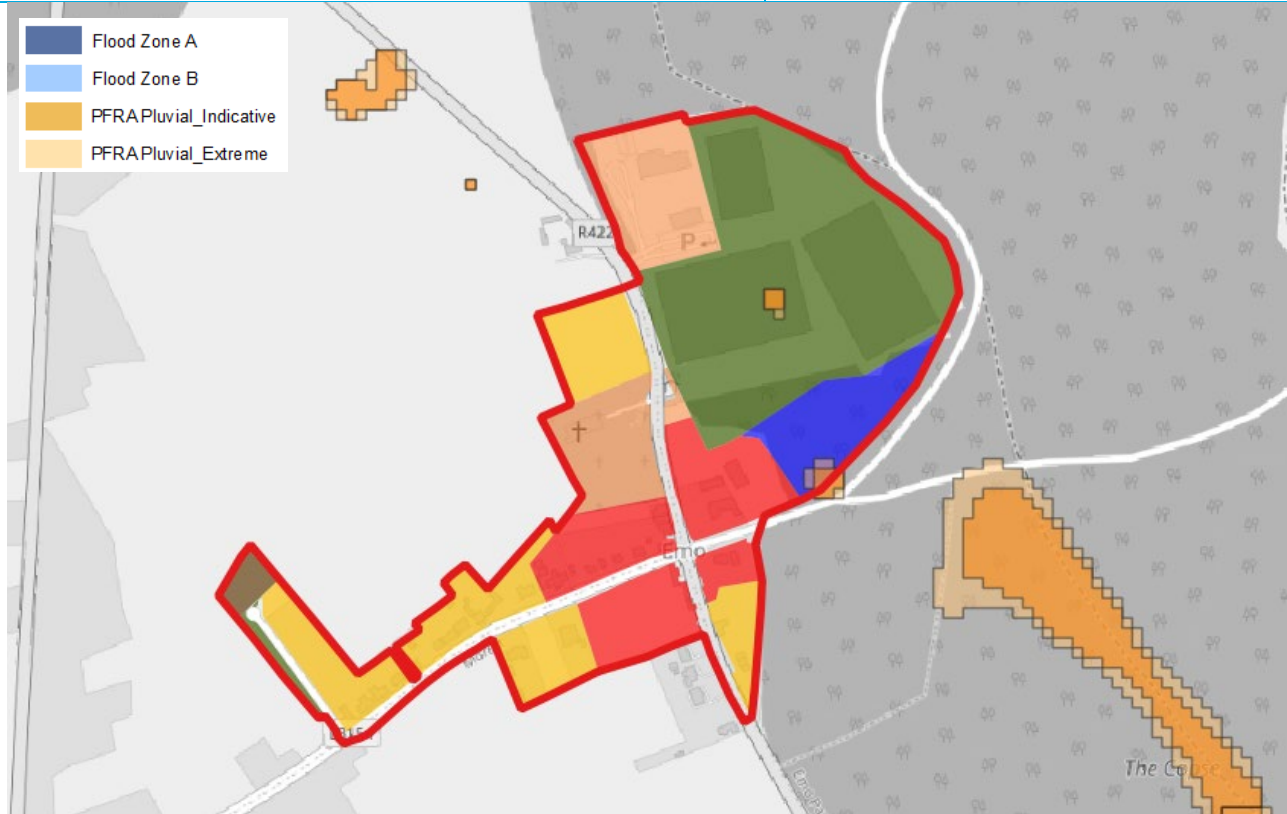
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	<p>In 1886, it was reported that "in the neighbourhood of Durrow, the Erken and Gully rose to a great height". More generally, the Erkina, Nore and Goul are reported to overflows there banks in various locations upstream of Durrow after heavy rainfall every year. Durrow is reported specifically as being affected by flooding in 1968 and 1995.</p> <p>Low lying land floods alongside the N77 on the outskirts of Durrow after heavy rainfall every year. The flooding has been exacerbated by recent development. The road (N77) is liable to flood and one property is affected. Water gushes into the property from the road</p> <p>The Tally-Ho bridge, downstream of Durrow, is also recorded to be a recurring flood location. Low lying land floods after heavy rainfall every year. It is noted that the flooding has been exacerbated by development.</p>

<b>Comment</b>	The floodplain is largely defined by Open Space and Amenity which affords a generous riparian boundary. Some existing town centre lands are at potential risk within Flood Zone A/B, as well as existing residential lands to the north of the channel.
<b>Climate Change</b>	Moderate sensitivity.
<b>Conclusion</b>	<p>Any extensions/renovations/re-development within the Town Centre and existing residential Flood Zone A/B should be subject to a suitably detailed FRA at Development Management stage.</p> <p>Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.</p>

### 8.17 Emo

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

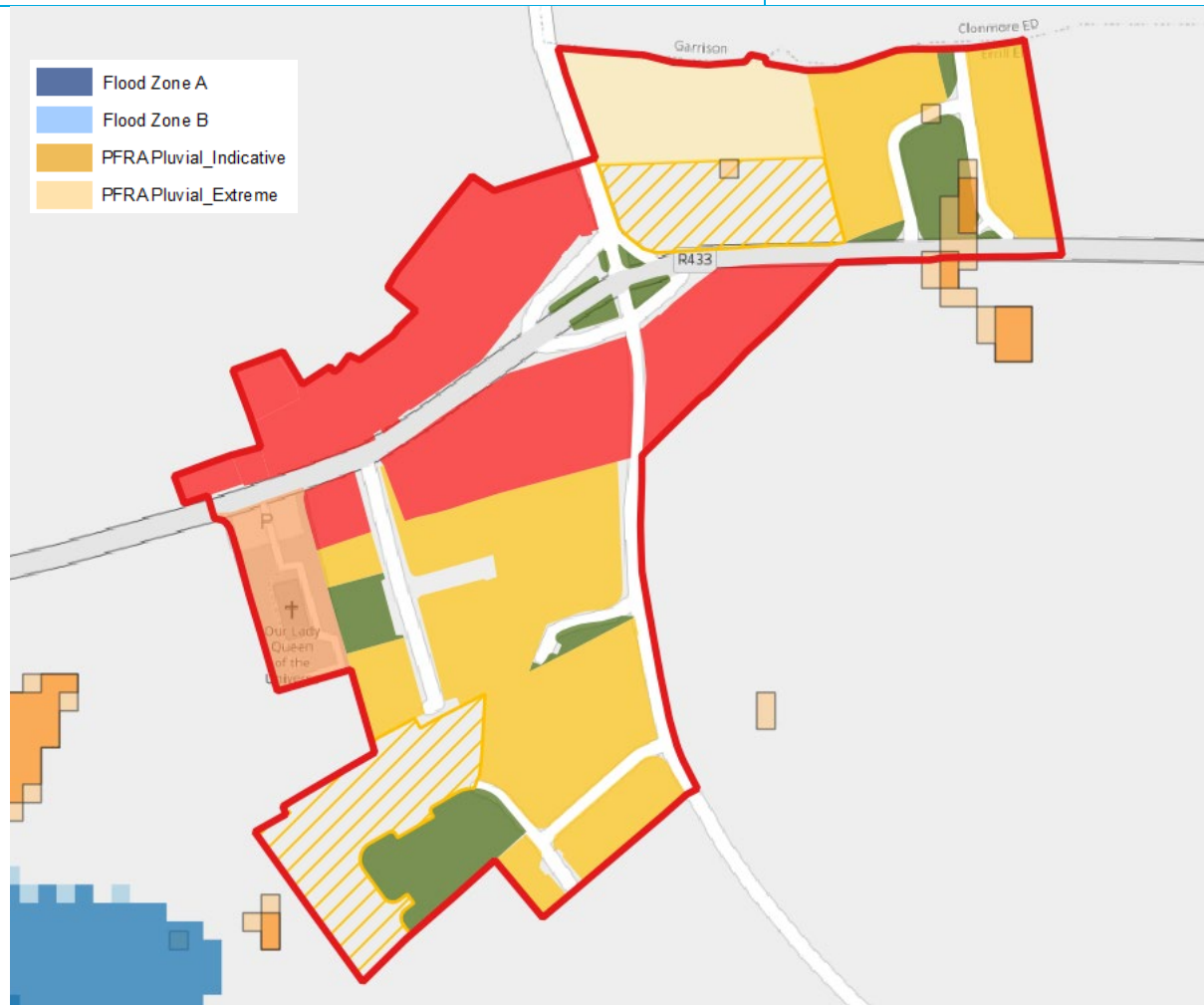
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.



### 8.18 Errill

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

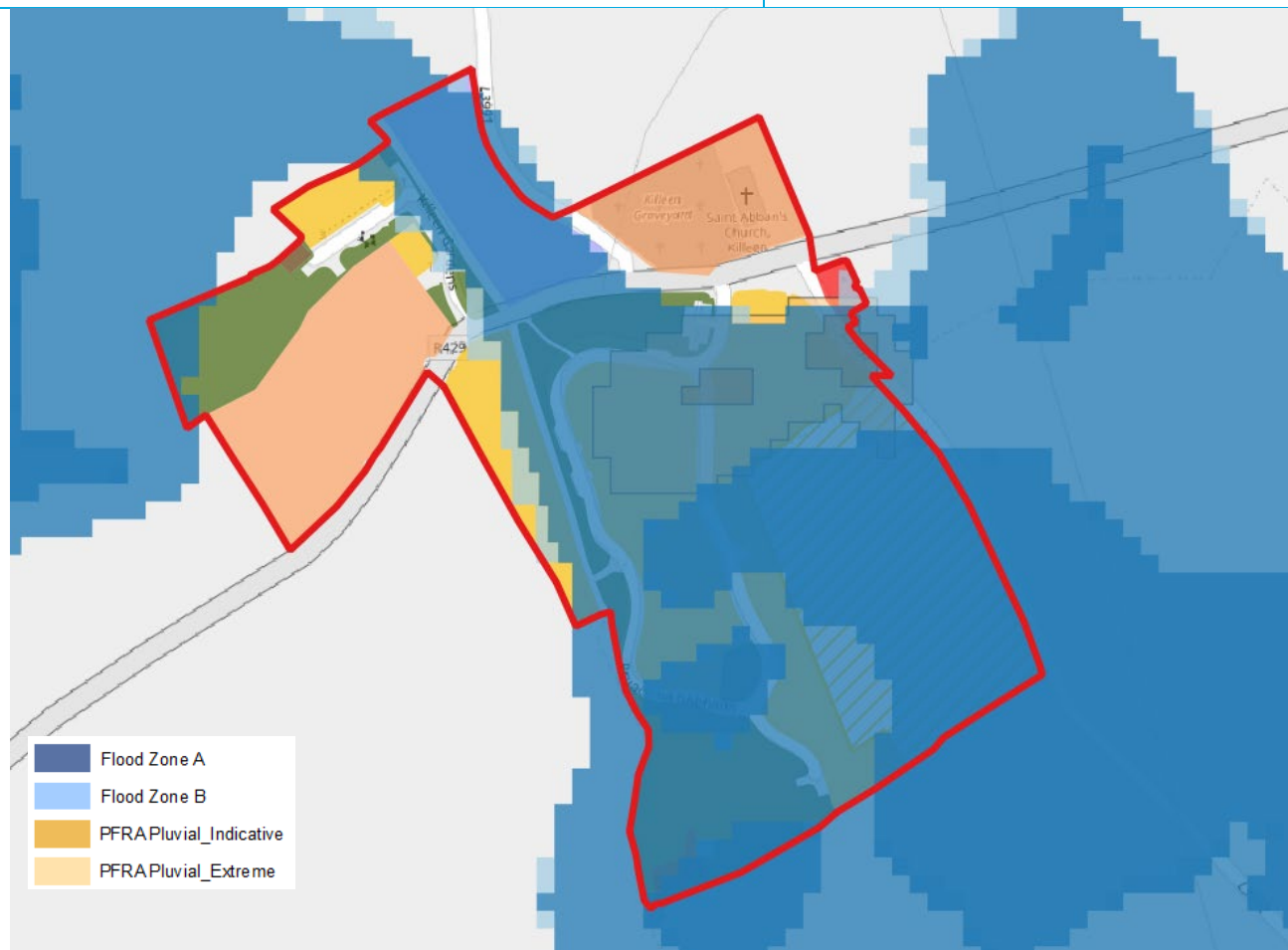
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	JBA Indicative Mapping (to west), PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history. Limited pluvial flooding.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Manage pluvial flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.



### 8.19 Killeen

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No

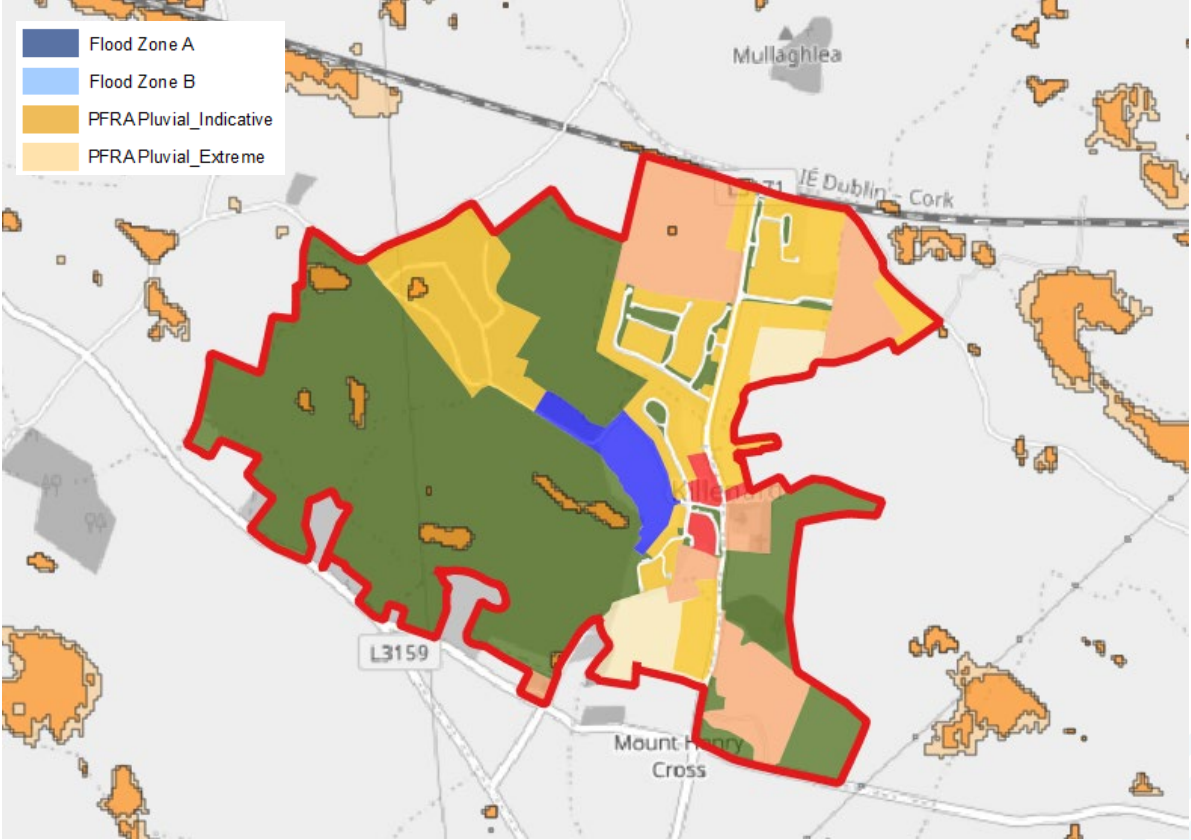


© OpenStreetMap contributors, CC-BY-SA,

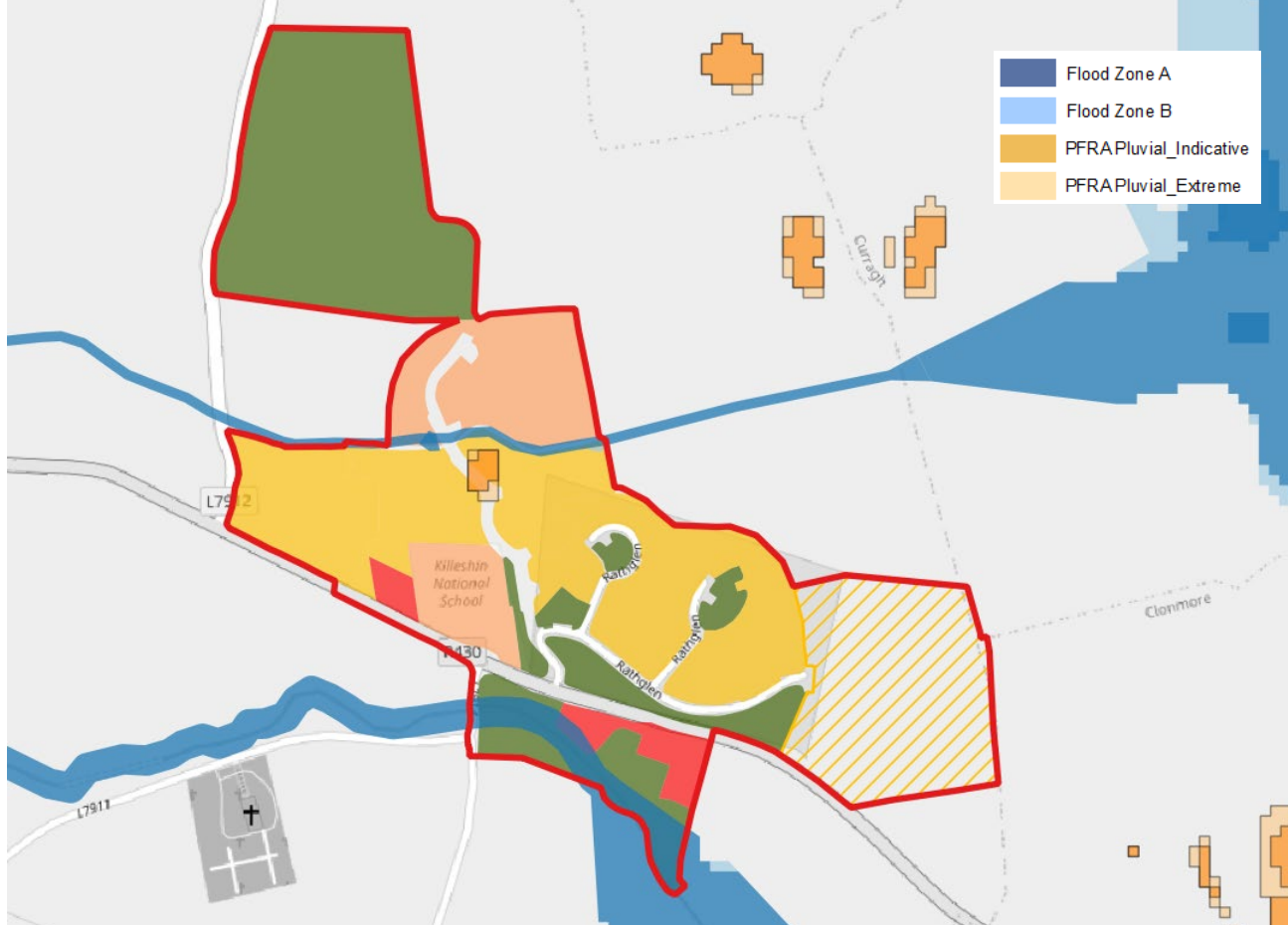
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	JBA Indicative Mapping
<b>Historic Flooding</b>	There are no reports of flooding in Killeen village. However, the Douglas River, into which the Cropaun flows, is reported to flood every year following heavy rain.
<b>Comment</b>	Extensive flooding is predicted through the village by PFRAs and the JBA mapping. The residential zoning in this village is now existing development and more recent planning permissions for development located buildings within Flood Zone C.
<b>Climate Change</b>	Moderate sensitivity
<b>Conclusion</b>	Any further development, which will be restricted to extensions/renovations/rebuilds, within the village should be subject to an appropriately detailed FRA at Development Management stage. Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

## 8.20 Killenard

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No
 <p>© OpenStreetMap contributors, CC-BY-SA,</p> <p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified and no flood history. Some isolated areas of pluvial flooding identified by the PFRA mapping.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

## 8.21 Killeshin

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No
	
<p>© OpenStreetMap contributors, CC-BY-SA,</p> <p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	Site specific Stage 3 Detailed FRA and JBA Indicative Mapping
<b>Historic Flooding</b>	No flooding has been recorded within the settlement but numerous flood locations are reported on the River Fushoge, some distance downstream of Killeshin, which also overflows its banks after heavy rain every year. The watercourse channels through Killeshin are deep, and likely to contain flood flows through the town.
<b>Comment</b>	<p>Killeshin has two watercourses, one flows along the northern part of the settlement and one along the southern boundary. Killeshin has had significant new housing and a new school constructed adjacent to the northern watercourse recently. Detailed FRAs are on file which include hydraulic modelling and have been used to update the Flood Zone mapping for the northern watercourse. A site visit was conducted to appraise the flood outlines.</p> <p>The southern watercourse was also assessed on site and the floodplain is subject to Open Space &amp; Amenity zoning. There is a small overlap with existing/developed Village Centre lands.</p>
<b>Climate Change</b>	Moderate sensitivity

**Conclusion**

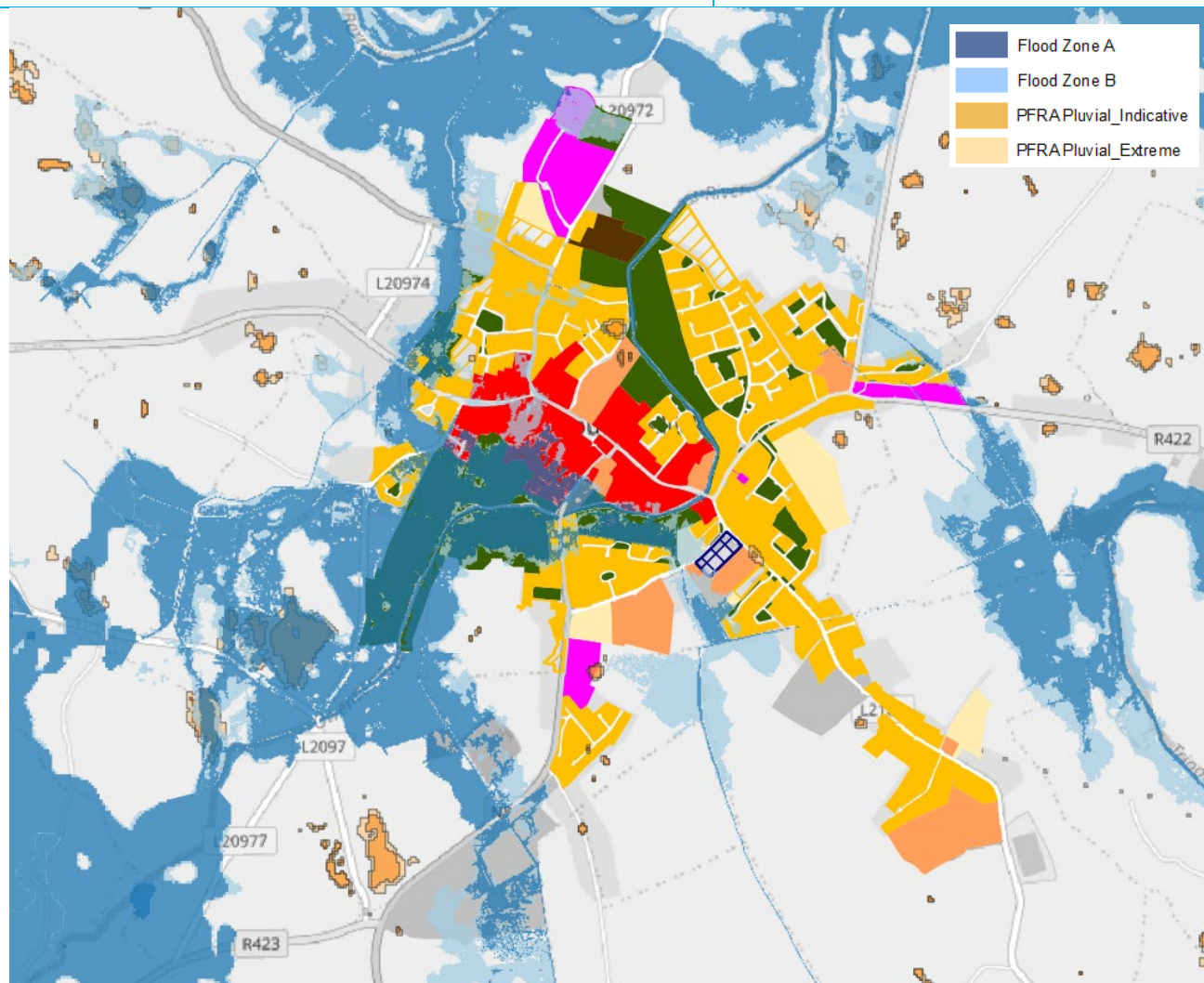
Any further development adjacent to either watercourse should be subject to an appropriately detailed FRA to demonstrate the appropriate mitigation of flood risk. As per FRM5 there must be a development free riparian strip adjacent to the watercourse and the OPW should be consulted in this regard, it is not appropriate for building footprints to be located within the agreed riparian margin. For the watercourse to the south the FRA must include a Stage 3 detailed assessment and all FRAs must work from a quantified flood level.

Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.



## 8.22 Mountmellick

<b>Hierarchy/Tier</b>	Tier 3
<b>Area for Further Assessment under CFRAM programme?</b>	Yes



© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

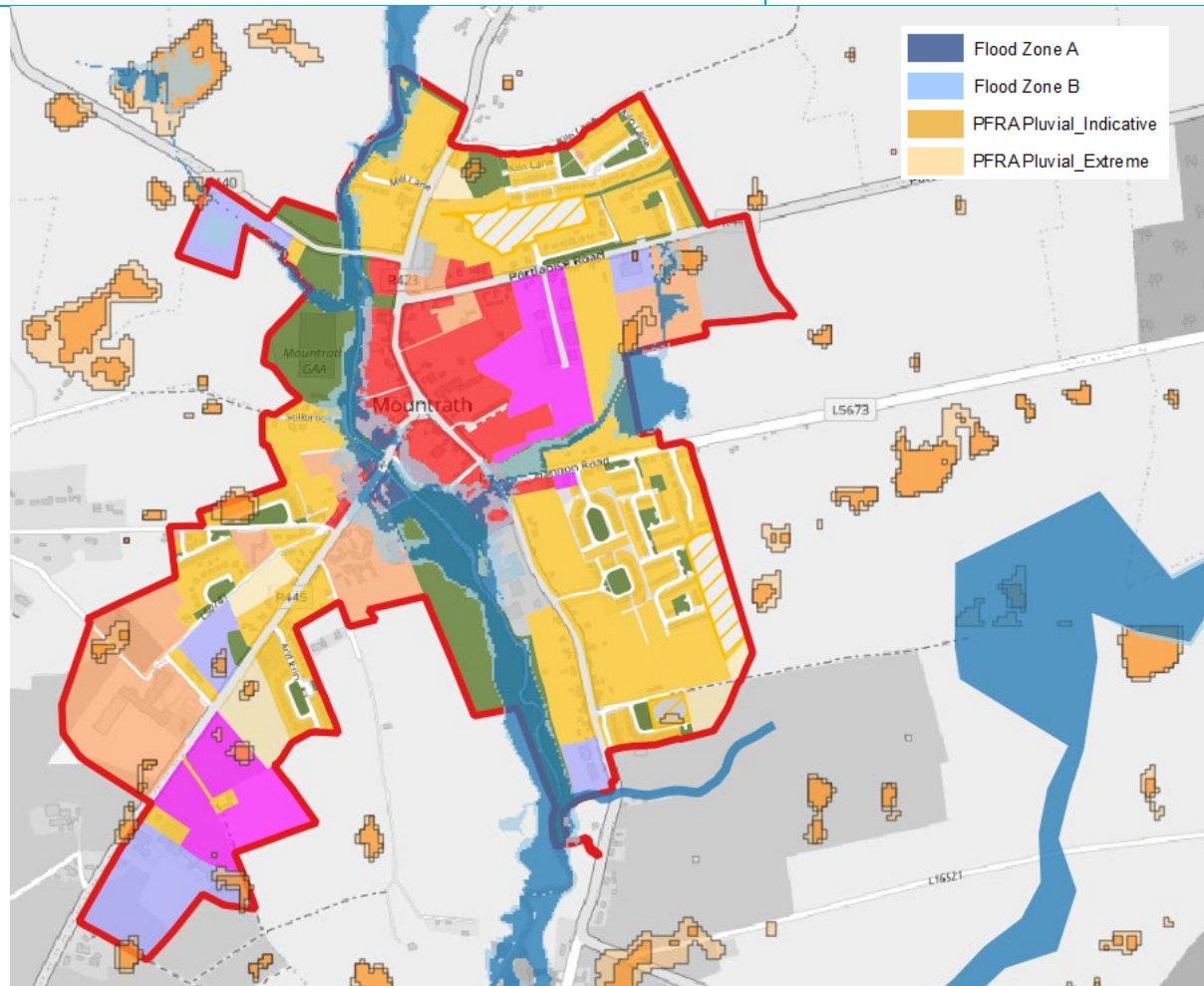
<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	Mountmellick has experienced recurring flooding for numerous years as a result of the Barrow and/or the Owenass and/or the Triogue overflowing their banks. Flooding has been recorded in October 1886, December 1924, October 1927, September 1931, November 1949, October 1954, January 1965, November 1965, December 1968, February 1990, January 1995, August 2008 and November 2017.
<b>Comment</b>	Mountmellick is now subject to an ongoing Flood Relief Scheme (FRS) which is in an early phase and no further information has been published (as of November 2020) regarding revised mapping or potential options. It is the case that zoning decisions on significant undeveloped zoned lands within the town that are adjacent to watercourses or within Flood Zone A/B will be premature pending further development of the FRS and flexibility will be required in this manner.



	Sections of community/education/institute in FZA/B but these sites are all existing and application of the sequential approach will be required at development management stage. Other land use zoning objectives on undeveloped land appropriately apply the sequential approach.
<b>Climate Change</b>	High sensitivity
<b>Conclusion</b>	<p>Proposed residential lands west of Pattisons estate and Twomey Gardens do avoid Flood Zone A/B but may infringe on areas required for the FRS and further confirmation is required from the developing FRS prior to making final decisions on the zoning type.</p> <p>Industrial &amp; Warehousing lands to the southspan Flood Zone A/B, but Open Space is used where overlaps the Zone A/B occur. It is still the case that wider development of the lands will not be appropriate given the FRS and re-zoning should be considered pending further information from the scheme.</p> <p>The emerging FRS should further inform land use zoning decisions in Mountmellick prior to plan adoption and adjustments will be required.</p> <p>The FRS and its published data, when available will provide a dataset and management plan that will be used to manage existing and proposed development, but a finished scheme is still several years away.</p> <p>In general any extensions/renovations/re-development within existing development should be subject to a suitably detailed FRA at Development Management stage.</p> <p>Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.</p>

### 8.23 Mountrath

<b>Hierarchy/Tier</b>	Tier 3
<b>Area for Further Assessment under CFRAM programme?</b>	Yes



© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	Mountrath has a reasonably well documented history of flooding, with specific incidents recorded by the OPW in 1968, 1990, 1995. The Mountrath River overflows its banks in the centre of Mountrath after very heavy rainfall, with two occurrences recorded for 2008. Floodwaters are reported to have been out of bank most of the way through the town, and to have inundated numerous properties.
<b>Comment</b>	Mapped flood extent from the CFRAM confirms the historic flooding through the core of the settlement, all of which is existing development. Undeveloped enterprise and employment land has been amended to be contained within Flood Zone C only. Community, Educational and Institutional lands at potential risk and undeveloped to the east of the settlement.
<b>Climate Change</b>	High sensitivity
<b>Conclusion</b>	Any extensions/renovations/re-development within the Town Centre and

existing residential Flood Zone A/B should be subject to a suitably detailed FRA at Development Management stage.

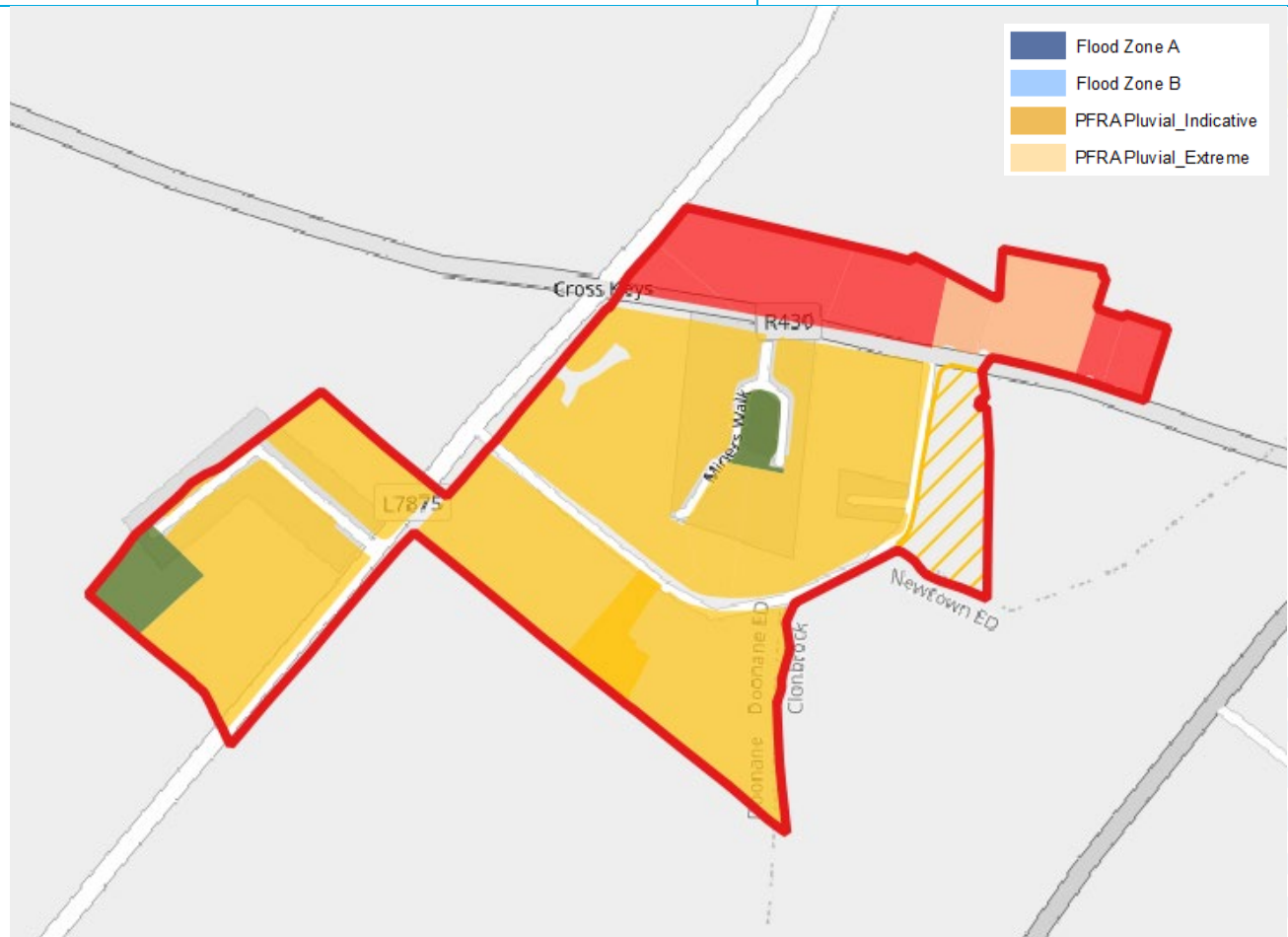
An FRA will be required for the undeveloped Enterprise & Employment lands to the east of the town centre, these are situated in Flood Zone C, but clarification of development levels and residual risk will be required.

The undeveloped Community, Educational and Institutional lands can only be used for water compatible development types, such as sports pitches and changing rooms, within Flood Zone A/B.

Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

### 8.24 Newtown Doonane

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

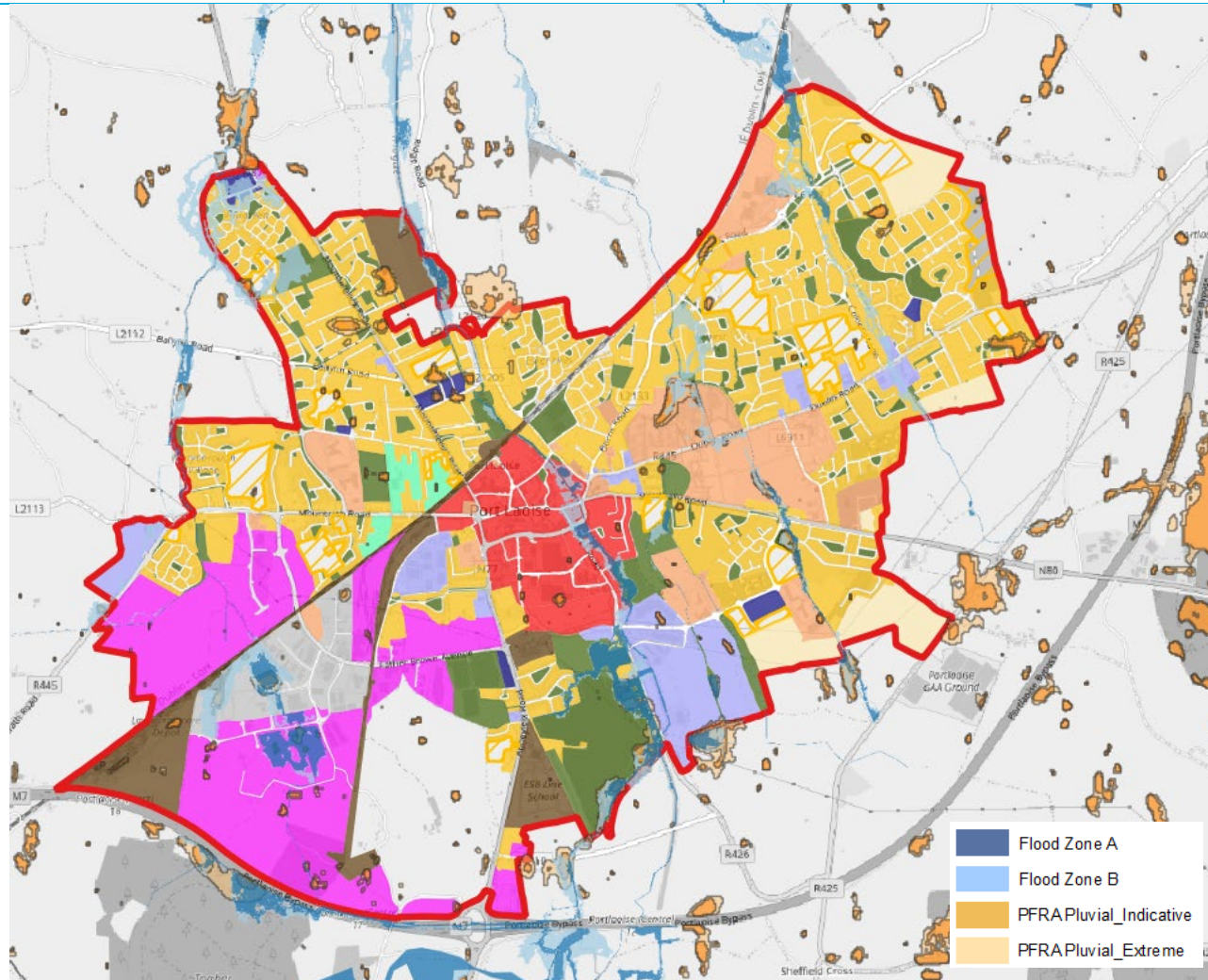
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	No fluvial flood risk identified by site visit and no flood history. Some isolated areas of pluvial flooding identified by the PFRA mapping.
<b>Climate Change</b>	No fluvial impacts, potential increase in runoff.
<b>Conclusion</b>	Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.



## 8.25 Portlaoise

<b>Hierarchy/Tier</b>	Tier 1
<b>Area for Further Assessment under CFRAM programme?</b>	Yes



© OpenStreetMap contributors, CC-BY-SA,

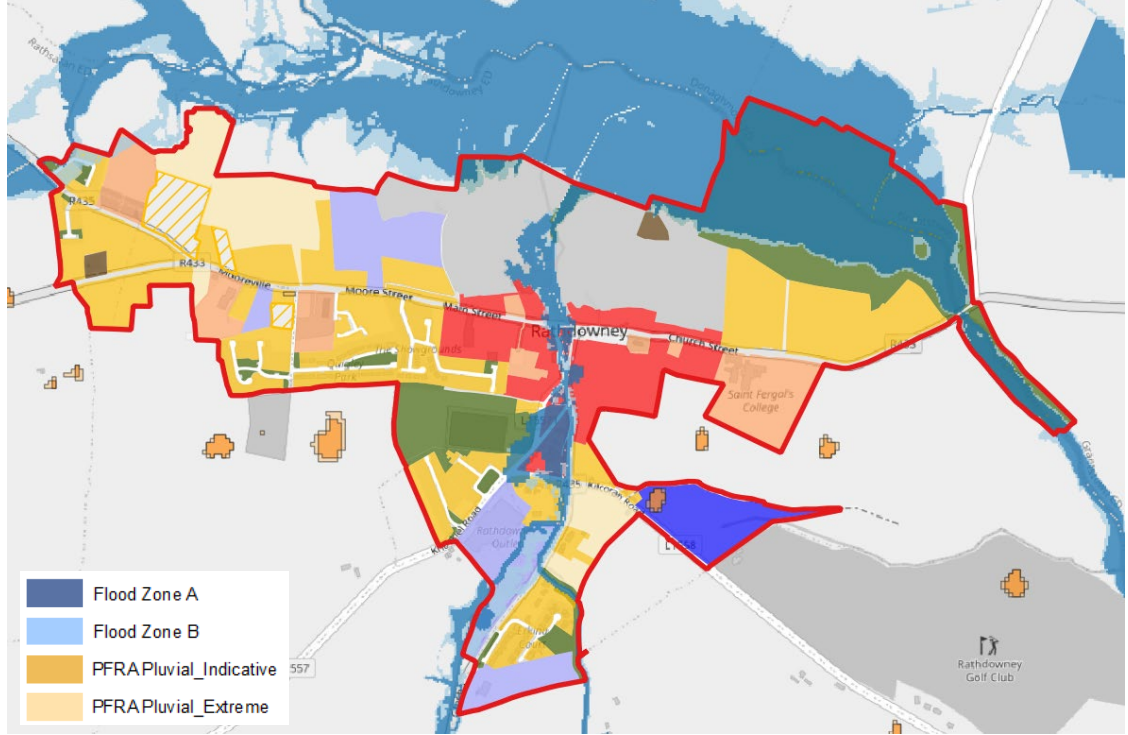
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	Flooding in Portlaoise was recorded in July 2003, January 1995, February 1990, December 1968, November 1965, January 1965, October 1960, October 1954, October 1949, September 1931, October 1927 and December 1924.
<b>Comment</b>	Portlaoise has CFRAM flood mapping coverage on all watercourses. Undeveloped General Business lands in the southern part of the settlement have created space for Flood Zone A/B. Similarly, CFRAM FZA/B runs through the large Enterprise and Employment lands in south west part of settlement, on review of the Togher Area Masterplan (Nov 2018) this confirms that the area in Flood Zone A/B is proposed for floodplain storage, and flood risk has been appropriately considered at a masterplanning level. Proposed Residential on the north of Woodgrove Estate is within Flood Zone B –however, the land is subject to a live



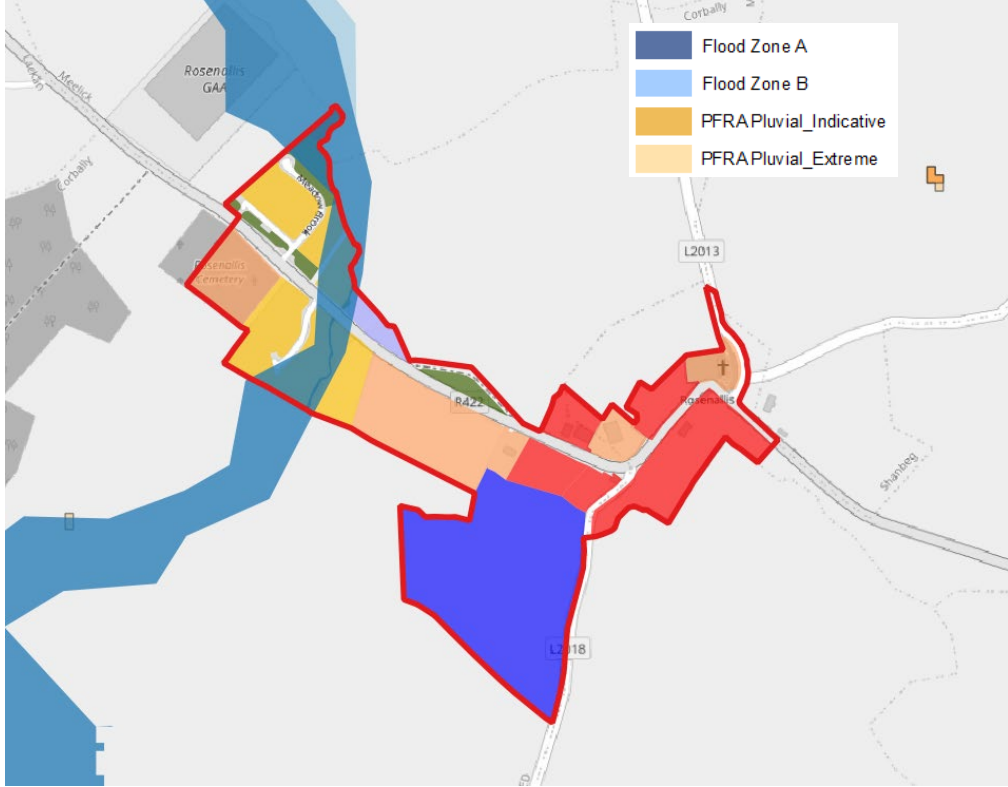
	<p>planning application and site works have begun.</p> <p>Proposed residential is located opposite Stradbrook Apartments on N80, watercourse on eastern boundary. Site visit confirms CFRAM mapping is fit for purpose and guidance on risk management is provided in the concluding statement below.</p> <p>Proposed Residential north and east of the Holy Family Schools in the east of the settlement is already under development and was subject to an FRA at development management stage.</p> <p>The area of undeveloped/underutilised Town Centre land to the west of St Peter &amp; St Paul’s church is low lying and at potential risk of flooding. This area provides important floodplain storage.</p>
<b>Climate Change</b>	High sensitivity
<b>Conclusion</b>	<p>All potential new development adjacent to Flood Zones / watercourses must be subject to an appropriately detailed FRA at development management stage. Residential lands opposite Stradbrook apartments must also ensure a water compatible buffer along the watercourse in line with Policy Objective FRM 5 and sufficient consideration of residual risk (culvert blockage).</p> <p>Any vacant/undeveloped Town Centre sites to the west of St Peter's &amp; St Paul's church that are intended for development should have the Plan Making Justification Test applied. It would be prudent to factor in open space to ensure floodplain storage is maintained, but the range of uses may suit water compatible development such as car parking/riverside amenity. Town Centre lands to east of the Railway Station also have overlap with Flood Zone A/B along the boundary and this zoning is recommended to be rezoned with a water compatible buffer along the watercourse in line with Policy Objective FRM 5.</p> <p>In general, flood risk and development should be managed in line with approved objectives and general practice as explained in Section 7 of this SFRA.</p>

## 8.26 Rathdowney

<b>Hierarchy/Tier</b>	Tier 4
<b>Area for Further Assessment under CFRAM programme?</b>	Yes
	
© OpenStreetMap contributors, CC-BY-SA,	
<p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	CFRAM
<b>Historic Flooding</b>	<p>The River Erkina and the Rathdowney drain, which joins the Erkina upstream of Rathdowney overflows its banks heavy rainfall every year overflow their banks after heavy rainfall every year. Significant land area flooded, which includes the land zoned as open space in Rathdowney. OPW records show the town to have been severely affected by flooding in 1968.</p>
<b>Comment</b>	<p>Flood risk through the settlement principally impacts existing development. The undeveloped industry/warehousing to north of the settlement is sited appropriately within Flood Zone C. There is a Flood Zone overlap with Strategic Reserve and some existing residential development in the west is located partly within Flood Zone C.</p>
<b>Climate Change</b>	Moderate sensitivity
<b>Conclusion</b>	<p>Any development on the Industrial lands should be subject to an FRA at development management stage. The Strategic Reserve lands cannot be developed within the lifetime of the plan and provision will need to be made for this in next plan to apply the sequential approach and Justification Test.</p> <p>Any extensions/renovations/re-development within the Town Centre and existing residential Flood Zone A/B should be subject to a suitably detailed FRA at Development Management stage.</p> <p>Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.</p>

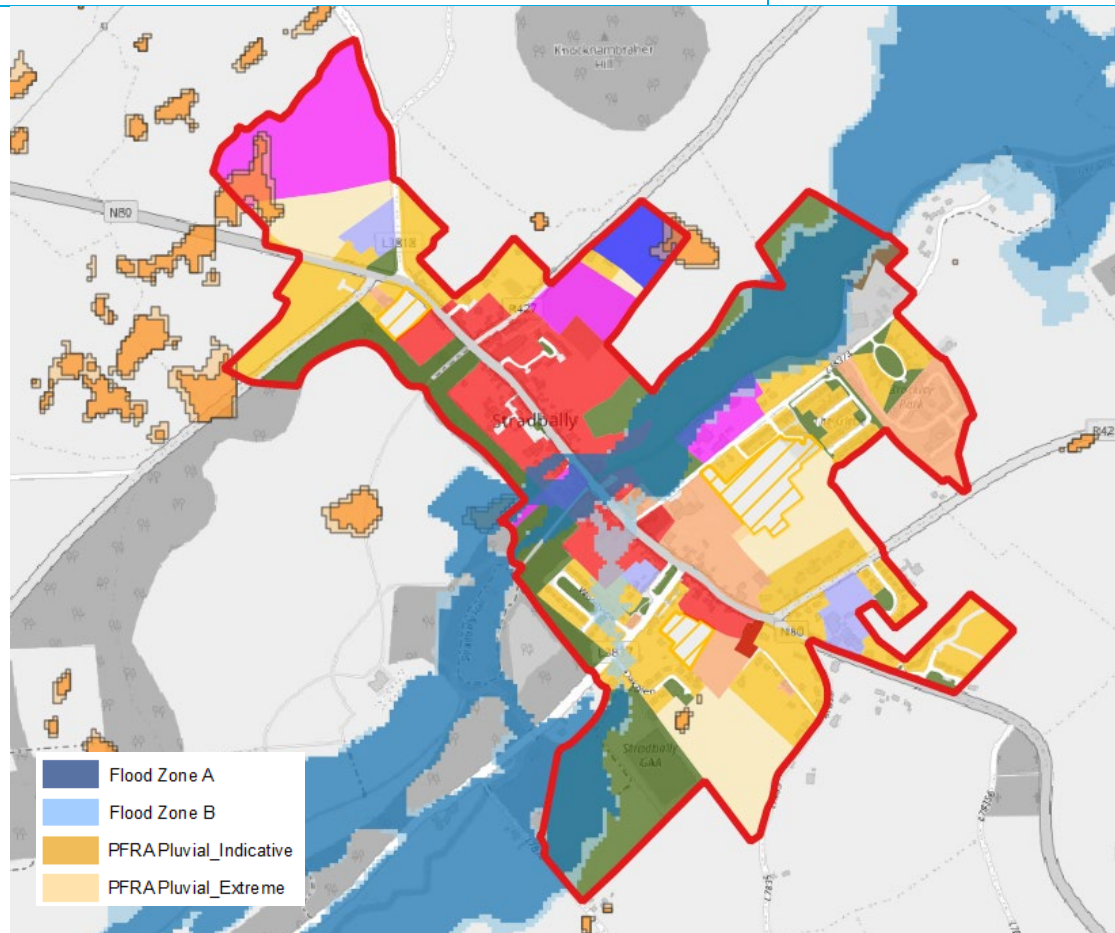


## 8.27 Rosenallis

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No
	
<p>© OpenStreetMap contributors, CC-BY-SA,</p> <p>The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.</p>	
<b>Flood Zone Data</b>	PFRA used in preference to JBA Indicative Flood Mapping on basis of site visit assessment.
<b>Historic Flooding</b>	Rosenallis was reported to have flooded in 1995; no details of flood depths or extents were found.
<b>Comment</b>	Minor overlap with PFRA extents and the undeveloped community/education/institute. The catchment is steeply sloping and the watercourse is contained. PFRA extents are still likely to be an overestimation. The watercourse flows under the road in a culvert and there is potential for blockage and a residual flood risk. This is potentially where the historic flooding occurred.
<b>Climate Change</b>	Low/moderate sensitivity
<b>Conclusion</b>	<p>The risk from the stream is lower than predicted by the PFRA mapping and there is an overlap with existing residential and undeveloped community/education/institute. The latter is a zoning that incorporates water compatible zoning and if the site is developed in the future a Stage 3 Detailed FRA will be required to delineate the Flood Zones and levels in more detail. The Sequential Approach must be applied and Flood Zone A/B kept as open space/riparian buffer. Any other re-development within or adjacent to the Flood Zones should also be subject to a Stage 3 Detailed FRA at Development Management stage.</p> <p>Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.</p>

## 8.28 Stradbally

<b>Hierarchy/Tier</b>	Tier 3
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	JBA Indicative Mapping
<b>Historic Flooding</b>	Stradbally was reported to have flooded in 1990 and 1995; no details of flood depths or extents were found.
<b>Comment</b>	Flood risk principally extends to existing development and there is little history of flooding. It is likely that the indicative flood mapping is conservative in nature. Significant green space is provided for the floodplain away from the town centre lands.
<b>Climate Change</b>	High sensitivity
<b>Conclusion</b>	Any extensions/renovations/re-development within the Town Centre and existing residential Flood Zone A/B should be subject to a suitably detailed FRA at Development Management stage. Given the indicative nature of the flood mapping it is likely that further assessment of risk will present a less conservative estimate of flood extent and therefore risk.  Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

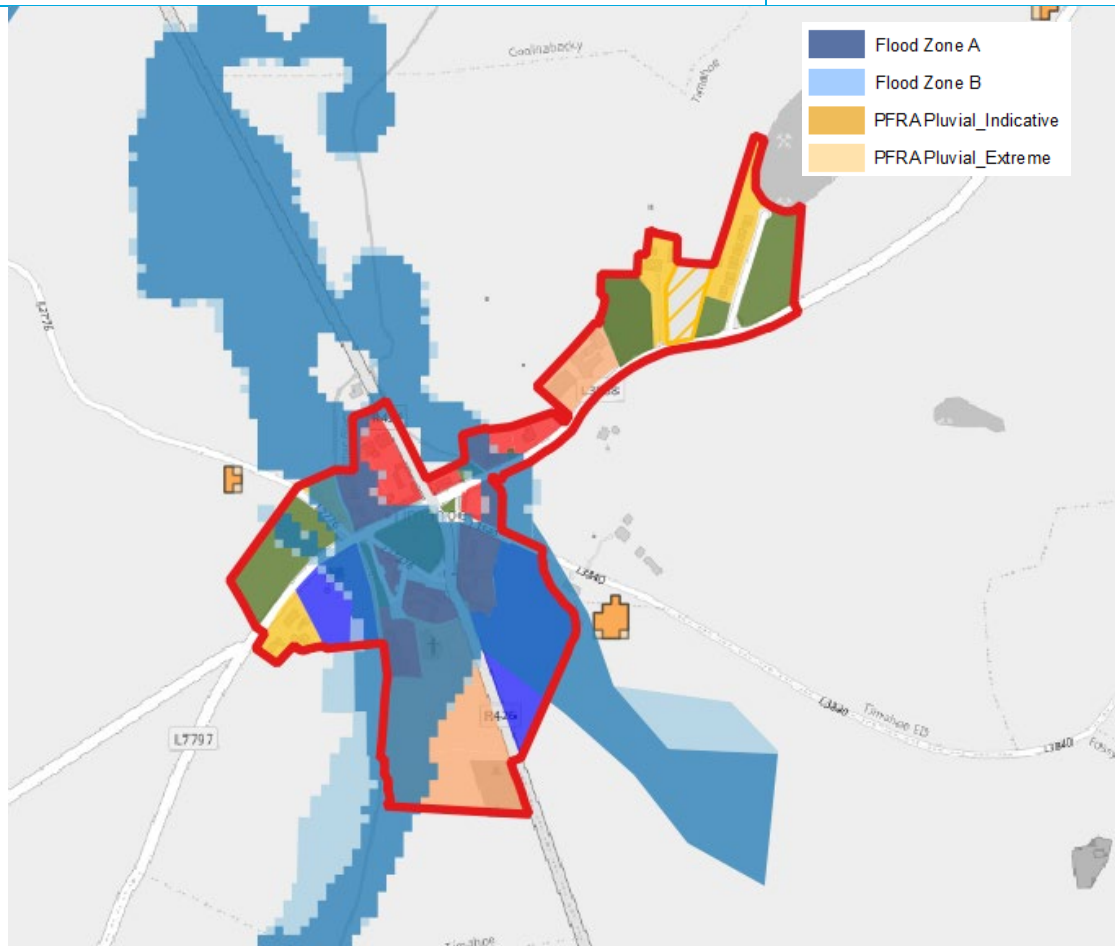


## 8.29 The Swan

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No
<p>The map displays the village of The Swan, bounded by a red line. It shows various flood zones and PFRA areas. Flood Zone A is dark blue, Flood Zone B is light blue, PFRA Pluvial Indicative is yellow, and PFRA Pluvial Extreme is orange. Key locations marked include 'The Swan' (watercourse), 'Start Lower' (two locations), 'L3858', 'Lagan Brick', 'R430', 'Village Centre', and another 'Start Lower' location. A legend in the top right corner defines the color coding for the flood zones and PFRA areas.</p>	
© OpenStreetMap contributors, CC-BY-SA,	
The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.	
<b>Flood Zone Data</b>	JBA Indicative Mapping
<b>Historic Flooding</b>	None found
<b>Comment</b>	A watercourse flows through the centre of the village in a westerly direction. Risk is overestimated by the Flood Zone mapping. Flood Zone A and B overlap with the existing Lagan brick Site - industry/warehousing. The developed residential lands adjacent to the Lagan site and Village Centre site to west of the R430 is also partly within Flood Zone A/B.
<b>Climate Change</b>	Moderate sensitivity
<b>Conclusion</b>	Should there be any proposed re-development/extensions/change of use applications to the existing development adjacent to the watercourse then a suitably detailed FRA should be completed at Development Management stage.  Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

### 8.30 Timahoe

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



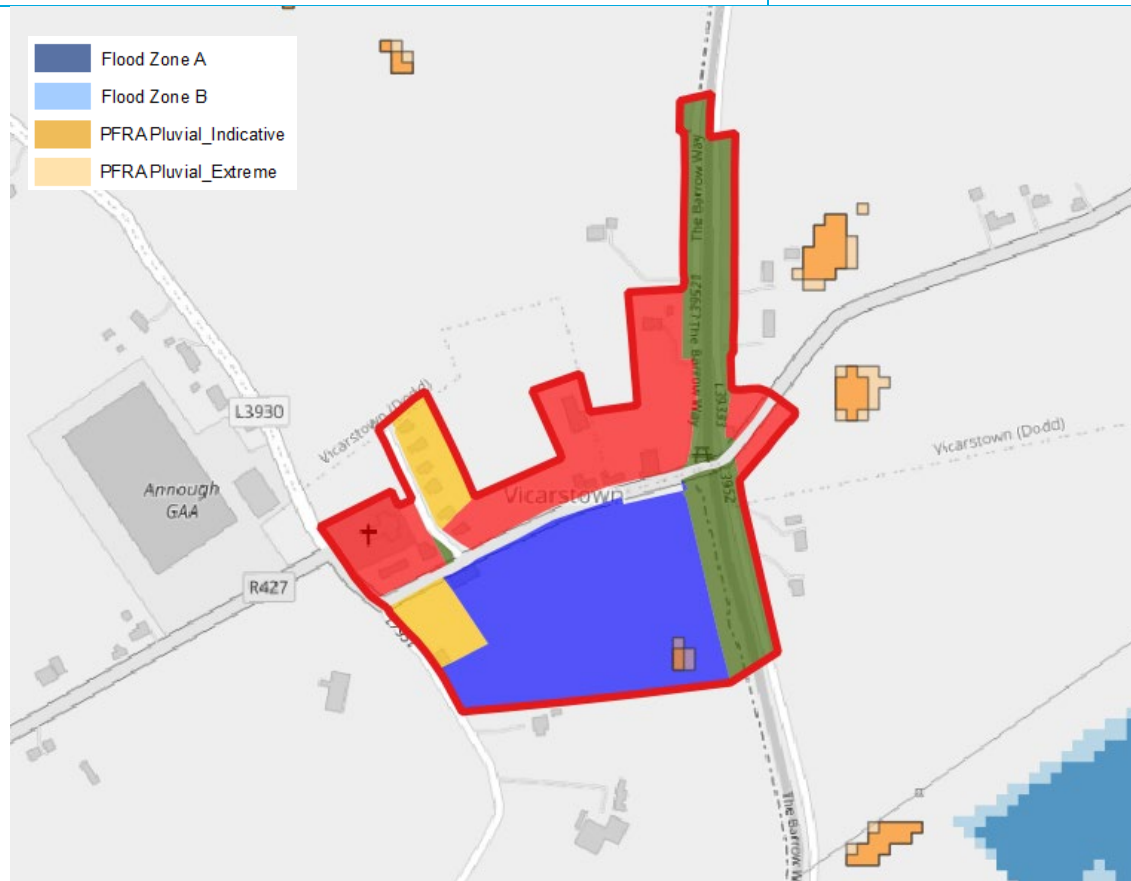
© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	JBA Indicative Mapping
<b>Historic Flooding</b>	Timahoe was reported to have flooded in 1995; no details of flood depths or extents were found.
<b>Comment</b>	Flood Zone mapping covers a significant amount of existing development. The only tracts of undeveloped zoned land include the Tourism lands and Community & Educational (graveyard) site on the southern periphery of the settlement.
<b>Climate Change</b>	Moderate to high sensitivity
<b>Conclusion</b>	Tourism lands must retain a water compatible use unless a Detailed Stage 3 FRA can confirm that the Flood Zones are less extensive than the current dataset. The graveyard use is water compatible but if extending towards the river it would be recommended to undertake a more detailed FRA to ensure that groundwater/floodwater does not impact the burial site.  Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this SFRA.

### 8.31 Vicarstown

<b>Hierarchy/Tier</b>	Tier 6
<b>Area for Further Assessment under CFRAM programme?</b>	No



© OpenStreetMap contributors, CC-BY-SA,

The flood mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately.

<b>Flood Zone Data</b>	PFRA Pluvial
<b>Historic Flooding</b>	None found
<b>Comment</b>	The Grand Canal Barrow Line flows through the town centre. Flood risk from the canal is low and the residual risk of overtopping is actively managed by Waterways Ireland. The canal is not located on an embankment through the settlement and there is no risk of rapid breach.
<b>Climate Change</b>	Low sensitivity
<b>Conclusion</b>	Any future development adjacent to the canal should be subject to an appropriately detailed FRA at Development Management stage that investigates the residual risk of canal overtopping.  Manage flood risk and development in line with approved objectives and general practice as explained in Section 7 of this document.

**JBA**  
consulting

Offices at

Dublin  
Limerick

Registered Office  
24 Grove Island  
Corbally  
Limerick  
Ireland

+353(0)61 345463  
info@jbaconsulting.ie  
www.jbaconsulting.ie  
Follow us:  

JBA Consulting Engineers and  
Scientists Limited

Registration number 444752

JBA Group Ltd is certified to:  
ISO 9001:2015  
ISO 14001:2015  
OHSAS 18001:2007

