# Flood Risk Assessment

of Variation 5 to the Kilkenny City and County Development Plan 2021: Castlecomer Settlement Plan

Appendix A to SEA Screening Report

Forward Planning
Kilkenny County Council
March 2026

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# 1 Introduction

The *Planning System and Flood Risk Management – Guidelines for Planning Authorities*[1] were published in November 2009 (the Guidelines). These Guidelines were issued under Section 28 of the Planning and Development Act 2000 as amended, and require Planning Authorities to introduce flood risk assessment as an integral and leading element of their development planning functions. This is achieved by ensuring that the various steps in the process of making a development plan, together with the associated Strategic Environmental Assessment (SEA), are supported by an appropriate Strategic Flood Risk Assessment (SFRA).

This SFRA forms Appendix 1 to the Strategic Environmental Assessment Screening Report for Variation 5 to the Kilkenny City & County Development Plan (CCDP) and should be read in conjunction with that report. The purpose of this SFRA is to inform the Strategic Environmental Assessment (SEA) of the plan, and in this way inform the policies and objectives of the plan.

## *1.1 Variation 5: Castlecomer Settlement Plan*

As set out in the Strategic Environmental Assessment Screening Report, Variation No. 5 to the Kilkenny City and County Development Plan (KCCDP) proposes:

- To incorporate a Settlement Plan for Castlecomer into the KCCDP, as part of a new Volume 3, Settlement Plans,
- To make associated changes to Volume 1 to reflect this, and
- To align the City and County Development Plan with the Specific Planning Policy Requirements (SPPRs) of the *Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024)* as relevant.

The Variation is strategic in nature. This SFRA assesses the development framework for Castlecomer.

## *1.2 Disclaimer*

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 variations.

Accordingly, all information in relation to flood risk is provided for general policy guidance only. It may be substantially altered in light of future data and analysis. As a result, all landowners and developers are advised that Kilkenny County Council and its agents can accept no responsibility for losses or damages arising due to assessments of the vulnerability to flooding of lands, uses and developments. Owners, users and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands in which they have an interest prior to making planning or development decisions.

## *1.3 Structure of this report*

Section 2 gives an overview of the principles of the Guidelines. Section 3 provides a review of data collection, flood history and predicted flood extent (including climate change impacts) in Castlecomer. Section 4 discusses how the sources are used in the generation of flood zones and assesses the development frameworks proposed under this Plan. Section 5 provides policy guidance, summarising how this SFRA is incorporated into the Variation.

[1] Department of Environment, *The Planning System and Flood Risk Management – Guidelines for Planning Authorities*, 2009

## 1.4 Purpose of Strategic Flood Risk Assessment

In line with the Guidelines, the purpose of this SFRA is to integrate an assessment of flood risk into the planning process, specifically to:

- Provide for an improved understanding of flood risk issues within Variation 5,
- Identify whether flood risk is an issue in Castlecomer.

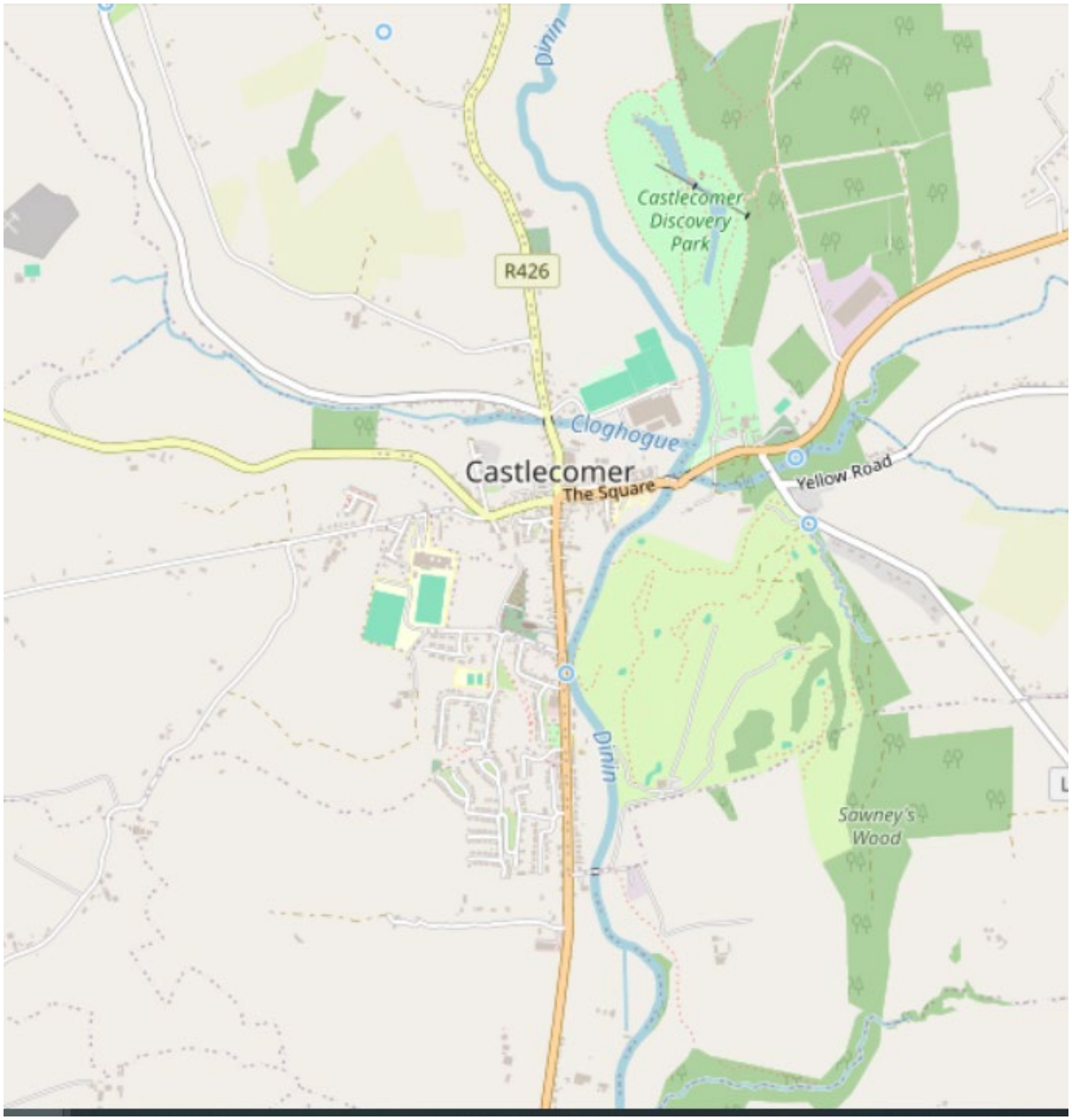
More specifically the SFRA will complete the following tasks;

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

## 1.5 Waterbodies in the Plan area

The plan area contains three main water features: the River Dinin running north to south, the Castlecomer stream (Cloghogue River) in the west, and the Ardra/Brokagh River in the east, see below:

Source: EPA Maps website


Dinin
Castlecomer
Discovery
Park
R426
Cloghogue
Castlecomer
The Square
Yellow Road
Dinin
Sawney's
Wood

# 2 Flood Risk Principles

## 2.1 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 Guidelines in a consistent manner. The Guidelines describe flooding as a natural process that can occur at any time and in a wide variety of locations. Flooding can often be beneficial, and many habitats rely on periodic inundation. However, when flooding interacts with human development, it can threaten people, their property and the environment.

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 Guidelines and the management of flood risk in the planning system will follow.

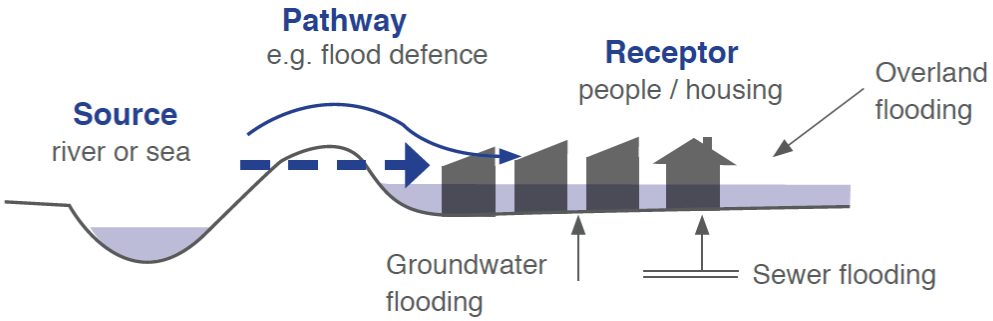
## 2.2 Definition of Flood Risk

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:

Flood Risk = Probability of Flooding x 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 2.1, illustrates this and is a widely used environmental model to assess and inform the management of risk.

Figure 2.1 Source Pathway Receptor Model (Fig. 2.2 of the Guidelines)




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.

## 2.3 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 2.1.

Table 2.1 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.

## 2.4 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 Guidelines have categorised land uses into three vulnerability classes and have also specified which vulnerability class would be appropriate in each flood zone, or where the Justification Test would be required.

The table of vulnerability classes (Table 3.1 of the Guidelines) is as follows:

| Table 2.2: Classification of vulnerability of different types of development | |
|---|---|
| **Vulnerability Class** | Land uses and types of development which include*: |
| **Highly vulnerable development (including essential infrastructure)** | Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools;<br>Dwelling houses, student halls of residence and hostels;<br>Residential institutions such as residential care homes, children's homes and social services homes;<br>Caravans and mobile home parks;<br>Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and<br>Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding. |
| **Less vulnerable development** | Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;<br>Land and buildings used for agriculture and forestry;<br>Waste treatment (except landfill and hazardous waste);<br>Mineral working and processing; and<br>Local transport infrastructure. |
| **Water-compatible development** | Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;<br>Water-based recreation and tourism (excluding sleeping accommodation);<br>Lifeguard and coastguard stations;<br>Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and<br>Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan). |
| *Uses not listed here should be considered on their own merits<br>Source: Table 3.1 of the Flooding Guidelines | |

## *2.5 Definition of Flood zones*

In the 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.

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.

There are three types of flood zones defined:

| | |
|---|---|
| **Zone A**<br>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). |
| **Zone B**<br>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). |
| **Zone C**<br>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). Flood Zone C covers all areas of the plan which are not in zones A or B. |

## *2.6 The Sequential Approach*

The sequential approach in terms of flood risk management is based on the following principles: AVOID - SUBSTITUTE - JUSTIFY - MITIGATE – PROCEED.

The primary objective of the sequential approach is that development is primarily directed towards land that is at low risk of flooding (Avoid). The next stage, and only where avoidance is not possible, is to ensure that the type of development proposed is not especially vulnerable to the adverse impacts of flooding (Substitution).

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.

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, such as Kilkenny city. 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 asses 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, and where the Plan Making Justification Test has already been applied and passed as part of this SFRA process.

Table 2.3 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 2.3: Matrix of vulnerability classes and flood zones**

| **Development** | Flood Zone A | Flood Zone B | Flood Zone C |
|---|---|---|---|
| **Highly vulnerable** | Justification Test | Justification Test | Appropriate |
| **Less vulnerable** | Justification Test | Appropriate | Appropriate |
| **Water-compatible** | Appropriate | Appropriate | Appropriate |

**Source: Table 3.2 of the Flooding Guidelines**

## *2.7 Plan Making Justification Test*

Only the Plan-Making Justification Test is relevant to a Strategic Flood Risk Assessment for a Plan, and this is described as follows.

**Justification Test for Development Plans (See p.37 of the Guidelines)**

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

1) The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act 2000, as amended.
2) The zoning or designation of the lands for the particular use or development type is required to achieve the proper and sustainable planning of the urban settlement and in particular:

a. Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement
b. Comprises significant previously developed and/or under-utilised lands;
c. Is within or adjoining the core of an established or designated urban settlement;
d. Will be essential in achieving compact or sustainable urban growth;
e. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.

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

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

MITIGATION is the process where the flood risk is reduced to acceptable levels by means of land use strategies or by means of detailed proposals for the management of flood risk and surface water, all as addressed in the Flood Risk Assessment. The decision to PROCEED should only be taken after the Justification Test has been passed.

## *2.8 Stages of a Flood Risk Assessment (FRA)*

The Guidelines recommend that a staged approach is adopted when undertaking a Flood Risk Assessment (FRA). The recommended stages are briefly described below:

• Stage 1 ~ Flood Risk Identification
To identify whether there may be any flooding or surface water management issues that will require further investigation. This stage comprised a comprehensive desk study of available information to

establish whether a flood risk issue exists or whether one may exist in the future. The sources consulted are described in detail in Section 3.

• Stage 2 ~ Initial Flood Risk Assessment
If a flood risk issue is deemed to exist arising from the Stage 1 Flood Risk Identification process, the assessment proceeds to Stage 2 which confirms the sources of flooding, appraises the adequacy of existing information and determines the extent of additional surveys and the degree of modelling that will be required. Stage 2 must be sufficiently detailed to allow the application of the sequential approach (as described in Section 2.6) within the flood risk zone. For the purposes of this SFRA, Stage 2 was carried out, and is detailed in Section 4 and 5.

• Stage 3 ~ Detailed Flood Risk Assessment
A detailed FRA is carried out where necessary to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk. In this case, the information available was considered sufficient to enable the carrying out of the plan-making Justification Test, See Section 4.

## *2.9 Scales of Flood Risk Assessments*

Flood Risk Assessments are undertaken at different scales by different organisations for many different purposes. The scales are as follows:

• Regional Flood Risk Appraisal (RFRA): A Regional Flood Risk Appraisal provides a broad overview of the source and significance of all types of flood risk across a region and highlights areas where more detailed study will be required. These appraisals are undertaken by regional authorities.

• Strategic Flood Risk Assessment (SFRA): A Strategic Flood Risk Assessment provides a broad (area-wide or county-wide) assessment of all types of flood risk to inform strategic land use planning decisions. The SFRA allows the Planning Authority to undertake the sequential approach (described below) and identify how flood risk can be reduced as part of the development plan process.

• Site Flood Risk Assessment (Site FRA): A Site FRA is undertaken to assess all types of flood risk for a new development. This requires identification of the sources of flood risk, the effects of climate change on the flood risk, the impact of the proposed development, the effectiveness of flood mitigation and management measures and the residual risks that then remain.

This assessment is for a Variation to a Development Plan and therefore is at SFRA scale.

# 3 Data Collection and Review

The Strategic Flood Risk Assessment for the plan area is based on two stages:

- Stage 1 Flood Risk Identification
- Stage 2 Initial Flood Risk Assessment

This chapter sets out the process involved in Stage 1.

## *3.1 Stage 1 Flood Risk Identification*

This purpose of this stage is to identify whether there are any flooding or surface water management issues relating to the plan area that may warrant further investigation.

This section reviews the data collection and the flood history for Castlecomer 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.

There are a number of valuable sources of flood data for the county, including major projects such as the Suir and SouthEastern CFRAMs, and broadscale flood mapping such as the National Indicative Fluvial Maps. The sources of information from the previous iterations of the SFRAs have been reviewed.

### 3.1.1 Regional Flood Risk Appraisal

A Regional FRA (RFRA) was carried out and published as part of the Strategic Environmental Assessment of the *Southern Region's Regional Spatial and Economic Strategy*[2]. This document provided guidance on the issues to be addressed in any SFRA.

Section 6.1 of the RFRA relates to Development Plans and states that the CFRAM (Catchment Flood Risk Assessment and Management Studies) FRMPs have the most up to date flood risk information available to help develop FRAs. Flood maps and the proposed flood risk management measures identified in the FRMPs should be reviewed for all development plans. They further state that "*Local Authorities should ensure that any FRAs they undertake or are assessing have considered flood zones as described in* ***Section 3.7*** *and climate change scenarios as described in* ***Section 3.8****. The CFRAM FRMP have developed climate change scenario mapping that can be used for such assessments*".

### 3.1.2 OPW Publications

Various iterations of flood mapping carried out by the OPW, and these are set out below chronologically.

To comply with the 'Floods' Directive[3], the OPW commenced a CFRAM (Catchment Flood Risk Assessment and Management) programme in Ireland in 2011.

[2] Southern Regional Authority, Southern Regional Spatial and Economic Strategy, 2020

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

The first cycle of the CFRAM Programme comprised three phases:

1. The Preliminary Flood Risk Assessment (PFRA): 2011
2. The CFRAM Studies and parallel activities: 2011-2015
3. Implementation and Review: 2016 onwards

#### 3.1.2.1 **Catchment Based Management Plans**

Phase 2 of the CFRAM programme was the production of CFRAM studies. The OPW in co-operation with various Local Authorities produced Catchment Flood Risk Assessment and Management Studies. These CFRAMS aim to map out current and possible future flood risk areas and develop risk assessment plans. They also identified possible structural and non-structural measures to improve the flood risk of the area.

The OPW are now into cycle two of the CFRAM, which includes detailed design of specific flood relief schemes in various towns and cities. The settlements earmarked for flood relief schemes in Kilkenny are: Ballyhale, Freshford, Graiguenamanagh, Inistioge, Piltown and Thomastown.

The CFRAM mapping did not cover Castlecomer.

#### 3.1.2.2 **Preliminary Flood Risk Management**

The 'Floods' Directive[4] required Member States to undertake a national preliminary flood risk assessment by 2011 to identify areas where significant flood risk existed or might be considered likely to occur. In August 2011, the OPW published the National Preliminary Flood Risk Assessment, Draft for Public Consultation[5] which comprised a Report and a set of broadscale maps.

This national screening exercise identified where there may be a significant risk associated with flooding, based on available and easily derivable information. The objective of the PFRA was to identify Areas for Further Assessment (AFAs) and this further assessment took place through Catchment Flood Risk Assessment and Management Studies (CFRAMS).

#### 3.1.2.3 **National Indicative Fluvial Mapping**

An update to the PFRA mapping, known as the National Indicative Fluvial Maps, or NIFM, was published in 2020. Indicative flood maps have been produced for all watercourses that are on the EPA watercourse layers, that have a catchment area greater than 5km$^2$, and for which flood maps were not produced under the National CFRAM Programme.

The NIFM is available for Castlecomer, and is the primary dataset. According to the OPW, these maps may be used in the Stage I Flood Risk Assessment (Flood Risk Identification) to identify areas where further assessment would be required if development is being considered within or adjacent to the flood extents shown on the maps.

These maps are 'predictive' flood maps showing indicative areas predicted to be inundated during a theoretical fluvial flood event with an estimated probability of occurrence. They indicate flood extents

[4] Directive 2007/ 60/ EC of the European Parliament and of the Council of 23rd October 2007 on the assessment and management of flood risk: Official Journal L288/ 27-34.
[5] http://www.cfram.ie/pfra/

for the 20 year event, the 100 year event and the extreme event, or 1 in 1000 year event. These maps are for fluvial risk only, and do not indicate coastal, pluvial and groundwater flood extents.
The three streams described in Section 1 have been modelled; the River Dinin, the Castlecomer stream and the Ardra River.

The NIFM developed flood maps for the current scenario, and also for two potential future scenarios; the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS), taking into account the potential impacts of climate change. Both the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS), were examined and are mapped in Figure

### 3.1.3 Alternative available sources

The data listed below is available for the county and provides information on the historical occurrence of flooding. Flooding and surface water issues in Castlecomer were also identified through consultation with the Area Engineer and from any other relevant sources. This information is summarised in Table 3.1 below.

i) OPW Flood Events Mapping

As part of the National Flood Risk Management Policy, the OPW developed the www.floodmaps.ie web-based data set (now replaced by www.floodinfo.ie), which contained information concerning historical flood data, displays related mapped information and provides tools to search for and display information about selected flood events.

ii) OPW Benefitting Lands mapping

These maps were prepared to identify areas that would benefit from land drainage schemes, and typically indicate low-lying land near rivers and streams that might be expected to be prone to flooding.

It should be noted that some of this data is historically derived, not prescriptive in relation to flood return periods and not yet predictive or inclusive for climate change analysis. Many of these maps were based on survey work carried out from 1833-1844 with many updated in the 1930s and 1940s. Therefore, they do not show or take account of recent changes in surface drainage, such as development in floodplains, road realignments or drainage works for forestry or agriculture. Thus, there is significant potential that flood risk in some areas may have changed since they were prepared.

#### 3.1.3.1 **Flood Studies, Reports and Flood Relief Schemes**

Flood reports have been completed for a number of areas within the county, however none have been prepared to date for Castlecomer.

## *3.2 Dataset summary*

A summary of the datasets reviewed, and their usefulness to the study, are detailed in the following table.

**Table 3.1 Summary of available datasets**

| Dataset | Description / coverage | Robustness | Comment on usefulness |
|---|---|---|---|
| Suir CFRAM study | Does not cover Castlecomer | N/A | N/A |
| South Eastern CFRAM Study | Does not cover Castlecomer | | |
| County Development Plan Flood Map (2021-2027) | Did not cover Castlecomer | N/A | N/A |
| Castlecomer Local Area Plan flood map (2018) | Based on the PFRA and other sources | Low-Moderate | See Fluvial PFRA |
| National Indicative Fluvial Maps | The NIFM was a national screening exercise that was undertaken by OPW to identify areas at potential risk of flooding. | These maps indicate the estimated flood extents only from those river reaches that have been modelled. Flooding from sources other than fluvial has not been mapped. | Covers non-CFRAM rivers, so useful extent for Castlecomer. Cannot be used without validation through site visit, and where site visit is inconclusive modelling may be needed. |
| Historical event outlines and point observations and reports | Various, taken from www.floodinfo.ie | Indicative | Can be indirectly used to validate flood zones and identify non-fluvial and tidal flooding. 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. |
| Land Commission Benefiting land maps | Show land which would (or have) benefited from a drainage scheme. This is not based on a 'design flood' (i.e. the events do not have a return period), but indicate | Low | Superseded by the data sources listed above, although may be used to cross check Flood Zones. |

| | | | |
|---|---|---|---|
| | low-lying, poorly drained land. It is not the same as lands which are protected by a flood relief scheme | | |
| National Groundwater Flood Mapping | Show probabilistic and historic groundwater flooding | Low - these maps indicate the estimated flood extents only from groundwater. | |
| Flood relief scheme details, including locations and lengths, standard of protection and areas which are protected | None in Castlecomer | | |

## *3.3 Main causes of Flooding*

As can be seen in Table 3.1 above, the main source of flooding in Castlecomer is fluvial. Other sources are pluvial and groundwater flooding.

### 3.3.1 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.

An overall strategy for the management of pluvial risk, and recommendations for the assessment of surface water risks, are provided for in the City and County Development Plan, Volume 1, Section 10.2.7 Surface water drainage.

### 3.3.2 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.

The OPW PFRA carried out a national scale Groundwater Flooding Report which concludes that ground water flooding is largely confined to the West Coast of Ireland due to the hydrogeology of the area. A total of four locations were identified as being at risk of groundwater flooding in Kilkenny; at Loughmacask; between the railway line and the M9 south of Mullinavat; just north of the N24 between Piltown and Carrick on Suir, and in northwest Kilkenny, east of Urlingford[6].

[6] GSI Groundwater Flooding Viewer accessed on the 24/9/2020: https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=848f83c85799436b808652f9c735b1cc

National Groundwater Flood Mapping
Groundwater flood maps have been prepared by the Geological Survey of Ireland through the 2016-2019 GW Flood project. The Probability Maps show the probabilistic flood extent of groundwater flooding in limestone regions. The Historic Groundwater Flood Map shows the observed peak flood extents caused by groundwater in Ireland. No area is identified at for groundwater flooding in Castlecomer.

### 3.3.3 Flood Risk Indicators

Having regard to all of the information sources as outlined above, the occurrence of flood risk indicators for Castlecomer is identified in a Flood Risk Indicator Matrix.

As Castlecomer could be subject to a potential flood risk issue, the assessment proceeds to Stage 2.

**Table 3.2 Flood Risk Indicator Matrix for Castlecomer**

| | Available Data by source | | | | |
|---|---|---|---|---|---|
| **CFRAM (HPW or MPW)** | **NIFM** | **www.floodinfo.ie** | **Local Authority information** | **Benefitting lands** | **Flood relief scheme details** |
| Not mapped | Area of flood risk mapped along River Dinin, Castlecomer stream in the west, and the Ardra River in the east. | One flood incident recorded at Ballyhimmin in 2000 where the N78 was closed due to flooding. | Alluvial soils mapped along Dinin River in centre of town and also along two streams, one in west and one in east.<br><br>Flooding incident recorded at one residential property at the junction of Barrack Street and Love Lane in 2009. Flooding occurred when the main shore on Barrack Street got overwhelmed. A new crossing was put in place by the Area Engineer in 2014 and subsequently special funding was obtained to address the issue of drainage along regional road. The drains have been replaced and this has resolved the issue.<br><br>At Ballyhimmin, a new drain was laid across the N78 at the gate to O'Dwyer's Lane in 2014, and this solved the flooding issue there. | Benefitting lands mapped along Dinin River in centre of town | None |

# 4 Stage 2 Initial Flood Risk Assessment

This chapter sets out the process involved in Stage 2. The purpose of this stage is to ensure that all relevant flood risk issues are assessed in relation to the decisions to be made and potential conflicts between flood risk and development are addressed to the appropriate level of detail.

An iterative process of flood risk assessment has been undertaken. This has involved the refinement of the zoning objectives map, which was reviewed and amended according to the Flood Zones and the vulnerability of the uses proposed under each zone.

### 4.1.1 Flood zone mapping

Flood zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types of flood zones identified:

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

Using a combination of the NIFM, and the flood risk indicators as described earlier, the flood zones have been approximated. As CFRAM mapping is unavailable, it has been decided to utilise the flood extents from the NIFM, for both 1% AEP (1 in 100 year event) and 0.1% AEP (1 in 1000 year event) as Flood Zone A. (Note: In typical flood zone mapping, Flood Zone A would equate to any area where the probability of flooding from rivers is higher than 1 in 100, and Flood Zone B would equate to any area where the probability of flooding from rivers is between 1 in 100 and 1 in 1000. The precautionary principle is being utilised here in the absence of available alternative mapping.) For these areas, Flood Zone B is demarcated by the occurrence of other flooding indicators present.

### 4.1.2 Application of the Sequential Approach

Having identified the area of flood risk within the plan area the next step is to apply the sequential approach to land use planning. The areas of flood risk were overlaid on the current zoning for the area. This was taken from the Local Area Plan, 2018. This identified where flood risk management and future development may cause a conflict with the current zoning framework.

The Guidelines have categorised land uses into three vulnerability classes and have also specified which vulnerability class would be appropriate in each flood zone, or where the Justification Test would be required, see Tables 2.2 and 2.3.

Where zoned land is located within either Flood Zone A or B, the need for a further review of flood risk, and the specific zoning objectives, is required. If the proposed zoning was found to be water compatible and located within either Flood Zone A or B, there was no requirement to apply the Justification Test. If, however, less vulnerable uses were proposed for Flood Zone A, or highly vulnerable uses were proposed for Flood Zones A or B, the Justification Test was applied, and if necessary, the zoning objective revised. This process is detailed below.

### 4.1.3 Assessment of current Zoning (LAP, 2018)

The Flood Zones in the area were first overlain on the current Zoning Map, taken from the 2018 LAP, see Figure 2.2.

Under the LAP a total of ten zones governed land use in Castlecomer; Agriculture, Community Facilities, General business, Industrial, Low density residential, Mixed Use, New Residential, Open Space, Residential and Special Area of Conservation (SAC) Green Links/ Biodiversity/Conservation.

This Variation is proposing some refinements to the uses permitted within the zones. The proposed uses within each zone were examined in detail to ascertain in what circumstances the (plan level) Justification Test would be required. Three of the ten zones (Open Space, Agriculture and SAC) do not pose a conflict between flood risk and development, as detailed below:

**Open Space**

In the main, the uses permissible under the Open space zoning fall into either the 'Less Vulnerable development' category or the 'Water Compatible development' categories (of Table 3.1 of the Flooding Guidelines). Tourist accommodation, in the form of camping/glamping, which are 'Highly vulnerable developments' are also open for consideration within this zoning, however, a proviso will be included to state that such uses will not be permitted within Flood zone A or B. The Variation also includes a proviso that less vulnerable uses will not be permitted within Flood Zone A. Extensions to existing uses or structures will be permitted. Therefore Justification Tests at this plan-making stage are not required for this zoning.

**Agriculture**

For the most part, the uses permissible under the Agriculture zoning fall into either the 'Less Vulnerable development' category or the 'Water Compatible development' categories (of Table 3.1 of the Flooding Guidelines). Some 'Highly vulnerable developments' such as houses, nursing homes, halting sites and tourist accommodation, are open for consideration within the Agriculture zoning, however, a proviso will be included that they will not be permitted within flood zone A or B. The Plan also proposes to include a proviso that less vulnerable uses will not be permitted within the Agriculture zoning in Flood Zone A. Extensions to existing uses or structures will be permitted. Therefore Justification Tests at this plan-making stage are not required for Agriculture zoning.

**Special Area of Conservation (SAC) Green Links/ Biodiversity/Conservation**

There are very few uses permissible under the SAC zone, which is mainly to provide for biodiversity projects and works associated with the conservation and management of the Special Area of Conservation (the River Nore/River Barrow SAC). The Proposed Variation

states that "Links to span the SAC such as bridges" are Open for Consideration, however these are pedestrian bridges. Therefore all the permissible uses fall into the 'Water Compatible development' categories (of Table 3.1 of the Flooding Guidelines), and Justification Tests at this plan-making stage are not required for SAC zoning.

### 4.1.4 Areas of potential conflict between flood risk and development

A total of 11 areas of potential conflict have been identified in the current zoning map (2018 LAP). These will now be assessed individually, considering the zoning proposed under the Variation for each site. (Figure 2.3 shows the areas of flood risk superimposed on the proposed Variation zoning map.)

Area 1: Residential zoning to rear of houses along Kilkenny Street (east side)
This land was zoned for Residential in the 2018 LAP. Houses are highly vulnerable uses, therefore no additional housing should be provided at this location, and this will be added as a proviso within the Plan. Therefore a Justification Test at this plan-making stage is not required for this zoning.

Area 2: Castlecomer Enterprise Centre
This site, partially within Flood Zone A, was zoned for Industrial in the 2018 LAP. This site is now proposed for General Business under the Proposed Variation. This zoning allows for a wide variety of uses, some of which are highly vulnerable. A Justification Test at this plan-making stage is required for this zoning.

Area 3: Garda Station
This site, located partially within Flood Zone A, was zoned for Community Facilities in the 2018 LAP, and is now proposed for General Business under the Proposed Variation. This zoning allows for a wide variety of uses, some of which are highly vulnerable. A Justification Test at this plan-making stage is required for this zoning.

Area 4: Residential (Andorra)
This site, partially within Flood Zone A, was zoned for Residential in the 2018 LAP and is now proposed for General Business under the Proposed Variation. This zoning allows for a wide variety of uses, some of which are highly vulnerable. A Justification Test at this plan-making stage is required for this zoning.

Area 5: General Business southeast of Square
This land was zoned for General Business in the 2018 LAP, and this zoning is to be retained. This zoning allows for a wide variety of uses, some of which are highly vulnerable. The parcels comprise previously developed, brownfield and underutilised sites in the town centre, which are zoned for a mixture of uses. A Justification Test at this plan-making stage is required for this zoning.

Area 6: School site south of Square
This land was zoned for Community Facilities in the 2018 LAP, and this zoning is to be retained. Community Facilities allows for schools, nursing homes and hostels, which are 'Highly vulnerable developments'. A proviso will be included to state that such uses will not be permitted within Flood zone A or B. The Variation also includes a proviso that less vulnerable uses will not be permitted within Flood Zone A. Extensions to existing uses or structures will be permitted. Therefore a Justification Test at this plan-making stage is not required for this site.

Area 7: General Business north of Square, south of Castlecomer Stream
This land was zoned for General Business in the 2018 LAP, and this zoning is to be retained. This zoning allows for a wide variety of uses, some of which are highly vulnerable. The parcels comprise previously developed, brownfield and underutilised sites in the town centre, which are zoned for a mixture of uses. A Justification Test at this plan-making stage is required for this zoning.

Area 8: Residential north of the Square, north of Castlecomer stream
There are a number of residential properties located partially within Flood Zone A, north of Castlecomer stream along the Ballinakill Road and the road to Princes Ground. This area, partially within Flood Zone A, was zoned for Residential in the 2018 LAP, and this zoning is to be retained. Houses are highly vulnerable uses, therefore no additional housing or any highly vulnerable use should be provided at this location, and this will be added as a proviso within the Plan. Therefore a Justification Test at this plan-making stage is not required for this zoning.

Area 9: Mixed Use, north of Castlecomer Stream, west of River Dinin
This land was zoned for Mixed use in the 2018 LAP, and this zoning is to be retained. This zoning allows for a wide variety of uses, some of which are highly vulnerable. The site is presently occupied by an industrial/office building and the part of the site within flood zone A and B was historically used for ancillary parking of vehicles/trailers. A Justification Test at this plan-making stage is required for this zoning.

Area 10: Mixed Use, north and south of Castlecomer Stream
This land was zoned for Mixed use in the 2018 LAP and is now proposed for General Business under the Proposed Variation. This zoning allows for a wide variety of uses, some of which are highly vulnerable. A Justification Test at this plan-making stage is required for this zoning.

Area 11: Industrial north of Castlecomer Stream
This site, partially within Flood Zone A, was zoned for Industrial in the 2018 LAP, and is now proposed for General Business under the Proposed Variation. This zoning allows for a wide variety of uses, some of which are highly vulnerable. A Justification Test at this plan-making stage is required for this zoning (as part of the larger site of Area 10).

### 4.1.5 Assessment of Proposed Variation Zoning

A total of 11 sites of potential conflict between flood risk and development were identified under the 2018 zoning. Having examined the proposals under the Variation, eight of these sites may still be subject to a conflict. In addition, the flood zones have been overlain on the Proposed Variation (see Figure 2.3) to establish if there are any additional areas of potential conflict. No additional areas of conflict were identified.

### 4.1.6 Justification Tests

As outlined above, there are 8 areas outstanding with a potential conflict between development and flood risk. In the main, this land is built out and the opportunities for future development are limited. In accordance with the Guidelines, a Justification test will be carried out for this land. The criteria are set out in Section 2.7 and the test is set out below.

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

Castlecomer is identified as a District Town in the settlement hierarchy of the City and County Development Plan 2021. According to the Development Plan, the Council will ensure that the District Towns will in so far as practical be self-sufficient incorporating employment activities, sufficient retail services and social and community facilities.

Points 2 and 3 are addressed together for each area.

2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper and sustainable planning of the urban settlement and in particular:
   a. Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement
   b. Comprises significant previously developed and/or under-utilised lands;
   c. Is within or adjoining the core of an established or designated urban settlement;
   d. Will be essential in achieving compact or sustainable urban growth;
   e. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.

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

Area 2: Castlecomer Enterprise Centre
This site comprises significant previously developed land, and adjoins the core and is essential in achieving compact and sustainable urban growth. There are no suitable alternative lands in areas at lower risk of flooding within or adjoining the core.

In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

Area 3: Garda Station
This site is located adjacent to the Enterprise Centre, and comprises under-utilised lands. It adjoins the core, and offers potential for redevelopment, particularly for the Enterprise Centre, to assist in achieving compact urban growth. There are no suitable alternative lands in areas at lower risk of flooding within or adjoining the core. No highly vulnerable uses should be permitted in either Flood Zone A or B at this location.

In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development

proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

Area 4: Residential (Andorra)
This site comprises under-utilised lands. It adjoins the core, and offers potential for redevelopment, particularly for the Enterprise Centre, to assist in achieving compact urban growth. There are no suitable alternative lands in areas at lower risk of flooding within or adjoining the core. No highly vulnerable uses should be permitted in either Flood Zone A or B at this location.

In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

Area 5: General Business southeast of Square
The General Business lands to the rear of the Square adjoins the core and is essential in achieving compact and sustainable urban growth. There are no suitable alternative lands in areas at lower risk of flooding within or adjoining the core.

In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

Area 7: General Business north of Square, south of Castlecomer Stream
The zoning of the town centre area for General business is intended mainly to reflect the existing uses operating in the town. The continued zoning of the land will facilitate the regeneration and/or expansion of the centre. This area is in the core of Castlecomer. Its continued development is essential to achieving compact and sustainable urban growth. There are no suitable alternative lands in areas at lower risk of flooding within or adjoining the core.

In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

Area 9: Mixed Use, north of Castlecomer Stream, west of River Dinin
The zoning of this site for Mixed use will facilitate the regeneration and/or expansion of the centre. This area is in the core of Castlecomer. Its continued development is essential to achieving compact and sustainable urban growth. There are no suitable alternative lands in areas at lower risk of flooding within or adjoining the core.

In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

Area 10 and 11: General Business, north and south of Castlecomer Stream
The zoning of this site for General Business will facilitate the regeneration and/or expansion of the centre. This area is in the core of Castlecomer. Its continued development is essential to achieving compact and sustainable urban growth. There are no suitable alternative lands in areas at lower risk of flooding within or adjoining the core.

In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

**Summary**

In the main, this land is built out or brownfield, and the opportunities for future development are limited. In this context, this Flood Risk Assessment contains sufficient information appropriate to the scale and nature of the development potential. Mitigation measures are included in the Development Plan (See Vol. 1 Chapter 10, section 10.2.6), to state that any development proposal within the area identified will be subject to a site specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This mitigation measure will ensure that any development taking place will not exacerbate any flooding issue.

As no green field site, which is subject to flood risk, is now zoned for vulnerable uses (during the lifetime of this plan), and as mitigation measures are included to ensure any development taking place will not exacerbate any flooding issue, it is not considered necessary at this stage to proceed to Stage 3, Detailed Flood Risk Assessment.

# 5 Recommendations

## *5.1 Incorporation into Variation*

This SFRA has fully informed the zoning of the Variation, and site specific objectives have been included as set out under Section 4.1.4.

The CDP 2021, contains text and policies on flooding in Vol. 1, Section 10.2.6.

In addition to assessing flood risk, this Plan will be proactive in addressing flooding through the application of nature-based solutions, see Section 1.10.3 of the Variation text. The Variation includes some changes to Vol. 1 Section 10.2.7 Surface water drainage, in relation to the incorporation of nature-based solutions into development management.

## *5.2 Monitoring and Review*

This FRA is based on currently available data and in accordance with its status as a "living document" it will be subject to modification by these emerging datasets of maps and plans as they become available. In the interim any development proposal in the areas identified in this FRA shall be subject to detailed flood risk assessment.

Figure 2.2: Areas of potential conflict between development and flood risk, based on the 2018 LAP

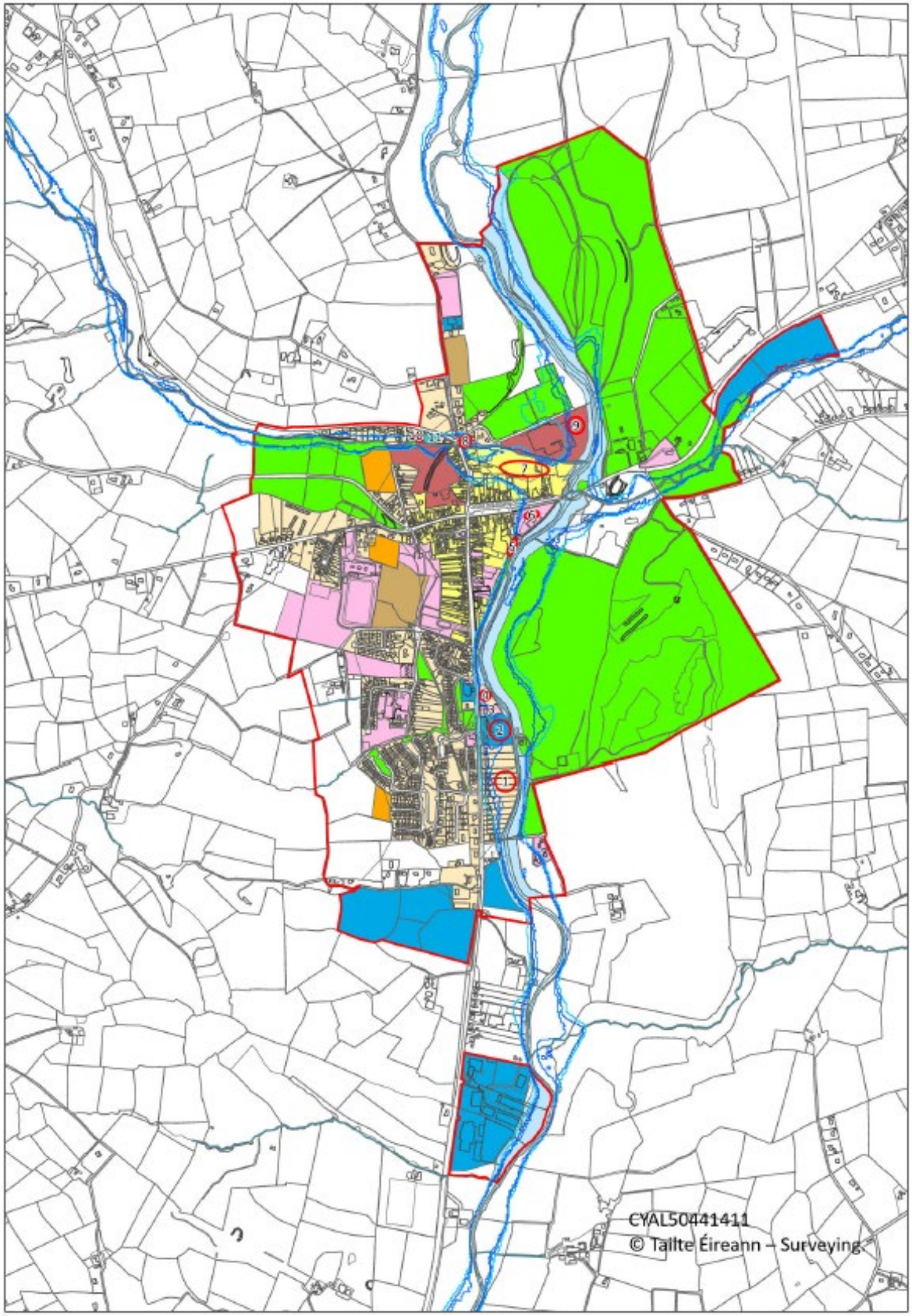


Figure 2.3: Areas of flood risk shown on the Adopted Zoning Map

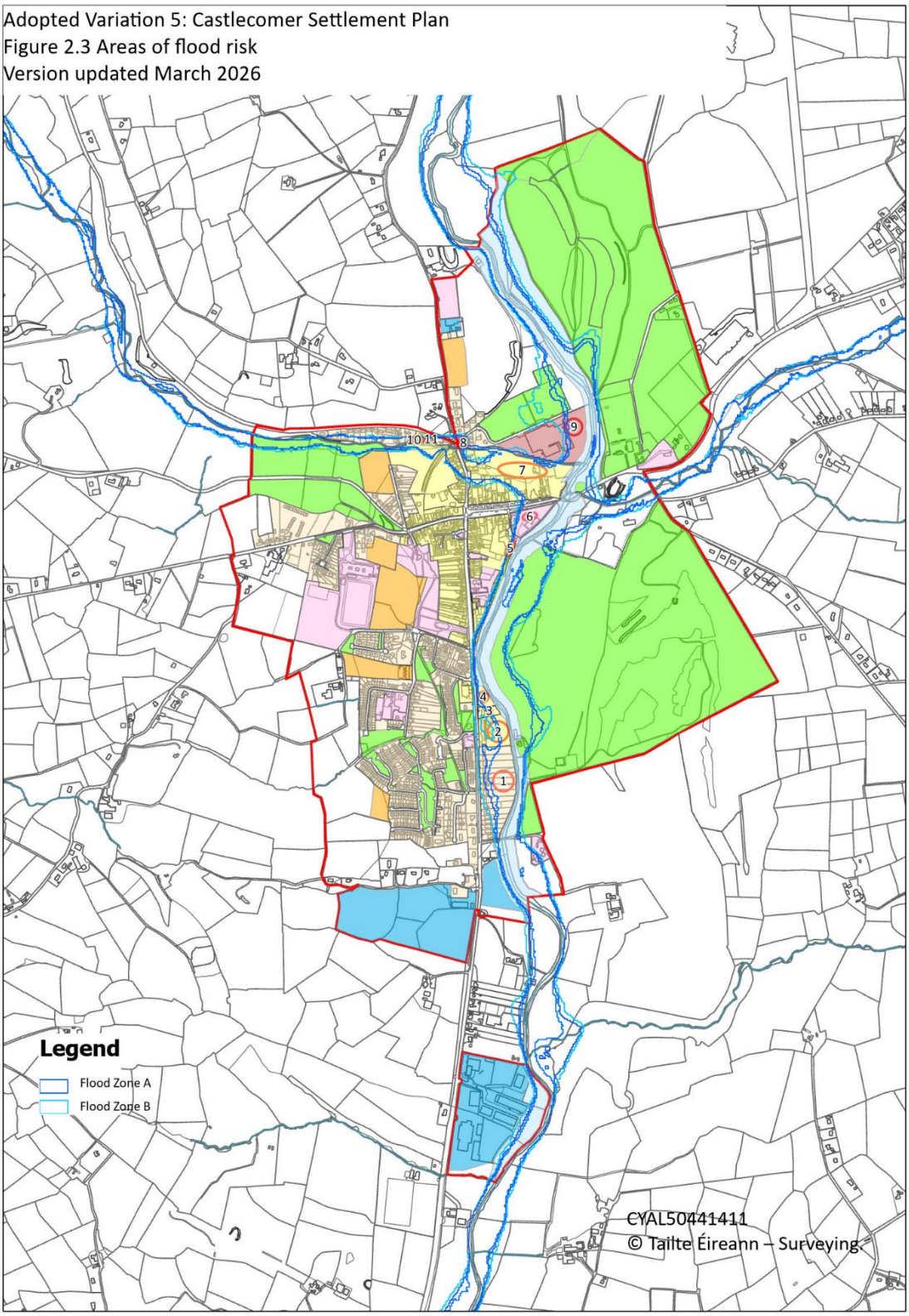


Figure 2.4: Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS) shown on the Adopted Variation zoning map