Meath County Development Plan 2013–2019

Volume 5

Written Statement & Development Objectives for Urban Centres

Appendix I

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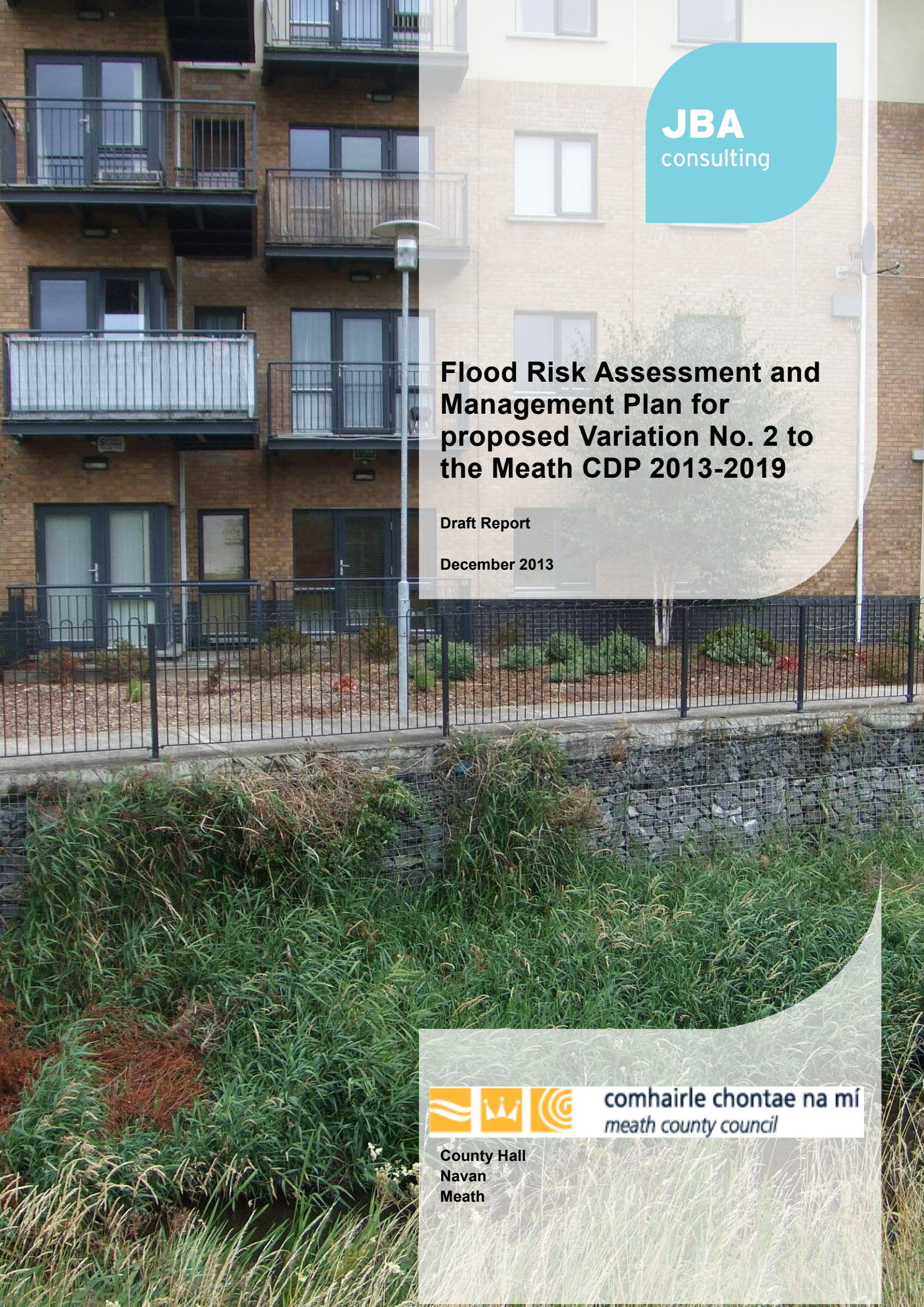

JBA consulting

Flood Risk Assessment and Management Plan for proposed Variation No. 2 to the Meath CDP 2013-2019

Draft Report

December 2013

comhairle chontae na mí
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Draft v1.2 October 2013	Additional settlement reviews	Meath County Council
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Contract

This report describes work commissioned by Meath County Council, by a letter and signed agreement dated 16 May 2013. Ross Bryant, Deirdre McDonnell and David Forde of JBA Consulting carried out this work.

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Purpose

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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
FEM FRAMS	Fingal East Meath Flood Risk Assessment and Management Study
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
LA	Local Authority
MCC	Meath County Council
MPW	Medium Priority Watercourse
MRFS	Medium Range Future Scenario
OPW	Office of Public Works
OSi	Ordnance Survey Ireland
PFRA	Preliminary Flood Risk Assessment
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SPR	Standard percentage runoff
Tp	Time to Peak

1 Introduction

JBA Consulting was commissioned by Meath County Council (MCC) to incorporate the provisions of the Meath County Development Plan 2013-2019 and the Core Strategy, into the suite of Local Area Plans (LAPs) which are in place for the towns and villages of the county. This process will culminate in two variations to the County Development Plan noting that Variation No. 1 to the Meath County Development Plan 2013-2019 (MCDP) was made in November of this year. Variation No. 2 will subsume the majority of the existing LAPs into the Development Plan as Volume 5 and also include bringing the land use zoning objectives of the remaining 5 no. LAPs into the MCDP.

1.1 Scope of the Study

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".*

The MCDP is the key document for setting out a vision for the development of Meath during the plan period. The provision for subsuming the former LAPs into the MCDP will consolidate and simplify the overall planning and development process for the county. The remaining LAPs and Development Plans (DPs), with populations exceeding 5,000 during the last census, will also be amended in line with the MCDP 2013-2019 and core strategy therein. The process will include a full review and risk assessment of the proposed zoning objectives with regards to the potential impacts of flooding, as set out in the Planning System and Flood Risk Management guidelines.

1.1.1 Aims and Tasks

In order to ensure that flood risk is integrated into the each of the areas for the county, MCC has issued a brief to consultants for the provision of a Flood Risk Assessment. As laid out in the tender documents, the main requirements are:

1. Develop the proposed variations to the Meath County Development plan 2013-2019 to subsume 29 Local Area Plans and also to include for 5 LAPs.
2. Develop proposed amendments to the Local Area Plan for Dunboyne/Clonee/Pace, Ashbourne, Rathoath, Dunshaughlin and the Southern Environs of Drogheda.

It was subsequently decided to firstly bring the land use zoning objectives maps including an order orf priority for the release of lands into the MCDP as part of this Variation.

This requires the following tasks to be completed/updated for each settlement:

1. Undertake a flood risk assessment for the settlements,
2. Undertake/review flood mapping (fluvial and tidal),
3. Assist MCC in the review of land use zoning objectives and the application of the sequential approach and justification test;
4. Prepare a flood risk management plan;
5. Provide associated documents and plans;
6. Consult with MCC;
7. Report on submissions resulting from the public consultation;
8. Make presentations to the MCC and the Elected Members;
9. Submit GIS mapping (flood mapping) in the agreed GIS format.

1.1.2 Variation Settlements

This study concerns includes the following 29 settlements that will be subsumed into the MCDP 2013-2019:

Athboy	Gibbstown	Maynooth Environs
Ballivor	Gormanston	Moynalty
Carlanstown	Julianstown	Nobber
Carnaross	Kentstown	Oldcastle
Clonard	Kilbride	Rathcairn
Crossakeel	Kilcock	Rathmolyon
Donore	Kildalkey	Slane
Drumconrath	Kilmainhamwood	Stamullen
Duleek	Kilmessan	Summerhill
Enfield	Longwood	

In addition it also includes the following five LAPs:

Ashbourne	Dunshaughlin
Drogheda Southern Environs	Ratoath
Dunboyne Clonee Pace	

1.1.3 Variation and the adopted SFRA for MCDP 2013-1019

The SFRA will be included as an appendix to Volume 5 of the MCDP 2013-2019. As such, the operative development plan already contains the county SFRA (Appendix 6 of Volume 2) which considers the broader settlement strategy of the Greater Dublin Regional Planning Guidelines and countywide policies and objectives. It presents a wide variety of information on flooding and flood risk management including:

- Information on background environmental and population statistics;
- An overview of the Planning Guidelines for Flood Risk Management;
- A collection of key historic and predictive flood risk information from various sources;
- Best available Flood Zone mapping for all 42 settlements within County Meath;
- Information on existing flood management assets;
- Details of the scale of flood impacts on each settlement;
- Flood risk management plan and policy and objective recommendations.

Many of the items included in the bullet list above remain relevant and will not need to be significantly altered or reproduced in the variation SFRA. The most important tasks (as outlined in Section 1.1.1) will be the review of the Flood Zone mapping, the review of the land use zoning objectives and the management of the adoption of the variation through liaison with MCC, the Elected Members and the review of the submissions from the Public Consultation.

1.2 Report Structure

As outlined above, the variation SFRA forms part of the adopted MCDP 2013-2019 and it is intended to be read in conjunction with the existing SFRA contained within Appendix 6 of Volume 2. This report is intended to minimise repetition and focus on the tasks of ensuring the flood mapping is appropriate and presenting a clear review of flood risk and land use zoning objectives.

Section 2 of this report, provides an introduction to the Planning System and Flood Risk Management, it is replicated from the adopted MCDP SFRA but covers important information on the philosophy and approach of the guidelines.

Section 3 provides a review of data collection, flood history and predicted flood extent (including climate change impacts) in each of the settlements, included under the variation.

Section 4, provides guidance and suggested approaches to managing flood risk and development; the contents of this section will be of particular use in informing the policies and objectives within the development plan.

Section 5 discusses development zoning and the Justification Test as well as, triggers for the ongoing monitoring and future review of the SFRA.

2 The Planning System and Flood Risk Management Guidelines

This section is repeated from the MCDP 2013-2019 SFRA document, it is fundamental to understanding the SFRA process.

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 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.

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

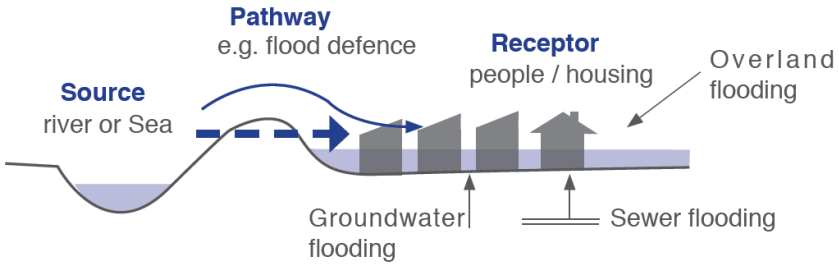


Fig. A1: Sources, pathways and receptors of flooding

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.

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.

2.3.1 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.

2.4 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 2-2.

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 2-2 Definition of Flood Zones

Zone	Description
Zone A 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 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 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).

2.5 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:

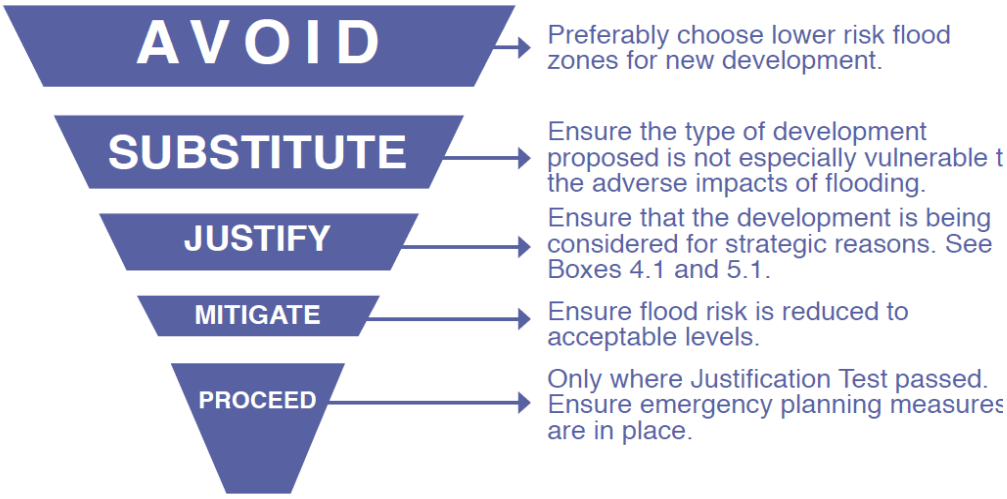
- Adopting a staged and hierarchical approach to the assessment of flood risk;
- Adopting a sequential approach to the management of flood risk, based on the frequency of flooding (identified through Flood Zones) and the vulnerability of the proposed land use.

2.6 The Sequential Approach and Justification Test

Each stage of the 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 2-2 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 and cities 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 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.

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 versus Flood Zone

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

Source: Table 3.2 of The Planning System and Flood Risk Management

The application of the Justification Test in the context of specific development sites within the variation settlements is discussed in Section 5.

2.7 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 are shown in Table 2-4 and comprise:

- **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.

Table 2-4 Flood risk stages required per scale of study undertaken

Scale of Assessment	Flood Risk Identification	Initial Flood Risk Assessment	Detailed Flood Risk Assessment
Regional Flood Risk Appraisal	✓	U	U
Strategic Flood Risk Assessment - County	✓	P	U
Strategic Flood Risk Assessment - City / town	✓	✓	P
Site Specific Flood Risk Assessment	✓	✓	✓
Key: P = Probably needed to meet the requirements of the Justification Test U = Unlikely to be needed ✓ = Required to be undertaken			
Source: The Planning System and Flood Risk Management (Table A3)			

2.8 SFRA and SEA

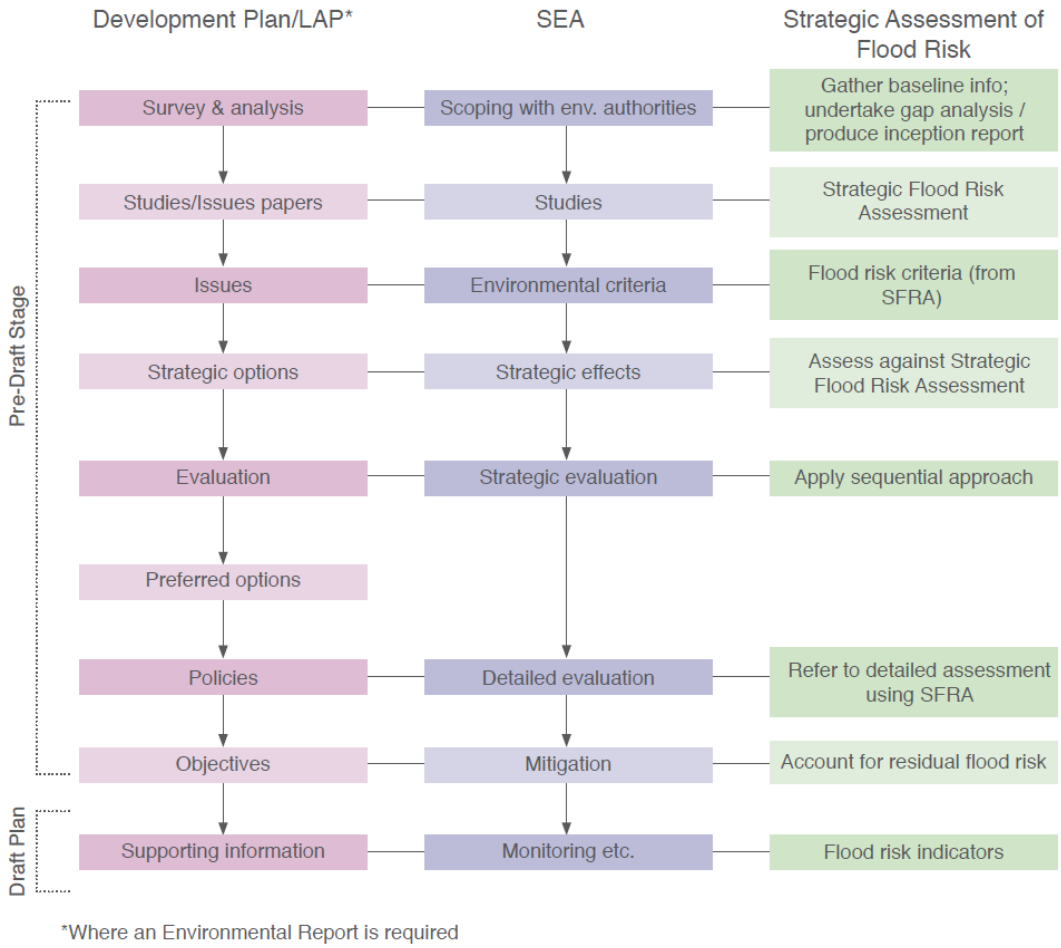
As detailed in the Planning System and Flood Risk Management guidelines, the steps in the development plan process and its Strategic Environmental Assessment (SEA) need to be supported by appropriate analysis of flood risk. The SEA process addresses any likely significant effects on the environment and their amelioration, from the implementation of development plans through all stages of the plan-making process.

The SEA report will consider the environmental effects of the Development Plan, including flood management policies and recommendations. These will be assessed against environmental criteria for the plan area and the SEA will detail mitigation measures and future monitoring requirements.

A summary of the likely effects of the plan on the environment, through exposing new development and their occupants to potential flood risks and any adverse impacts as a result, will be addressed in the SEA process and summarised in the environmental report element of

the overall development plan. The integration of the SFRA with the SEA and wider Development Plan process is shown in Figure 2-3 below.

Figure 2-3 Development Plan Preparation where flood risk is scoped as an issue

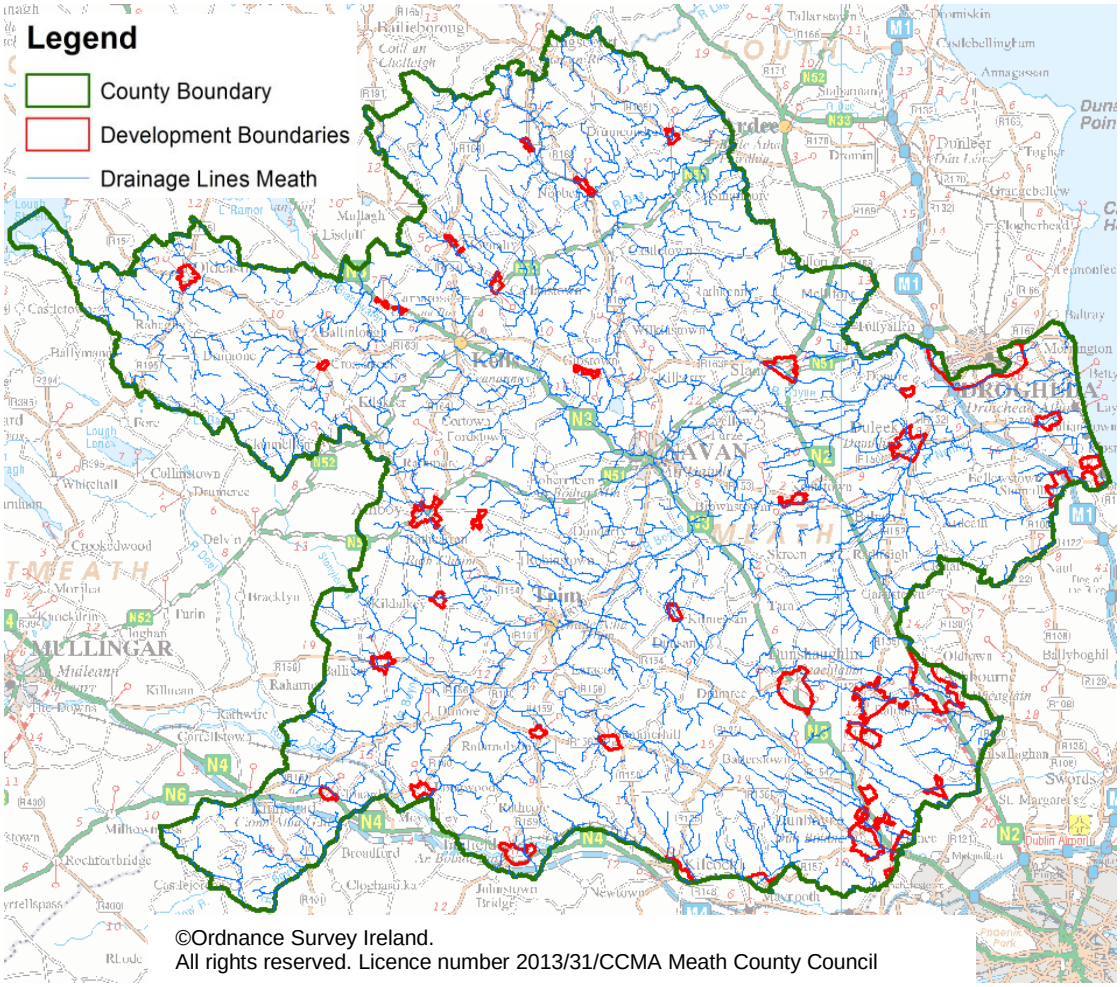


Source: Fig 4.2 of the Planning Guidelines and Flood Risk Management

3 Settlements & Flooding

This section reviews the data collection and flood history for the 29 settlements and 5 centres retaining their LAPs within the variation so that any additional information on flooding can be included for within this SFRA. It will confirm the extent of extreme flooding (through the Flood Zone mapping) key sources of flood risk and discuss the potential impacts of climate change.

Figure 3-1 Variation Settlement Map



3.1 Data Collection Review

There are a number of valuable sources of flood data for County Meath, including major projects such as the Fingal East Meath FRAMS and broadscale flood mapping such as the national PFRA study. Local studies have also been completed for the River Tolka in Dunboyne/Clonee/Pace and the River Rye Water in Kilcock. Table 3-1 and Table 3-2 over list the datasets used to compile the flood mapping for the settlements and LAPs and give an assessment of the data quality and the confidence in its accuracy. The sources of information presented in the MCDP 2013-2019 SFRA have been reviewed and relevant updates included.

Table 3-1 Model Data Available

Description	Coverage	Quality	Confidence	Used
FEM FRAMS Flood Outlines	Fingal East Meath	High	High	Yes
Tolka River Flooding Study	Tolka - Dunboyne, Clonee, Pace	High	High	Yes
Flood Risk Assessment and Management Study for the River Rye Water - Kilcock	Kilcock	High	High	Yes
1D hydraulic model using ISIS software, OPW CFRAM channel survey, OPW LiDAR and revised FSU flow estimates	Ballivor & Longwood	High/Moderate	High/Moderate	Yes
National PFRA Study Flood Outlines	Countywide	Moderate	Moderate	Yes
JFLOW® Flood Mapping	Countywide	Moderate	Moderate	Yes
Eastern CFRAM FRR and North West Neagh Bann CFRAM FRR (Verified PFRA)	Countywide (but only for specific FRR sites)	Moderate	Moderate	Yes

Table 3-2 Other Data Available

Description	Coverage	Quality	Confidence	Used
Regional Flood Risk Appraisal	Midlands and South East Region	Moderate (but broadscale)	Low	Reviewed
Alluvial Soil Maps	Full Study Area	Moderate	Low	Used in the RFRA to provide initial assessment
Groundwater vulnerability maps	Broadscale, County wide	Moderate	Low	Initial assessment of groundwater vulnerability.
Historic Flood Records including photos, aerial photos and reports.	Broad, spot coverage	Various	Various	Yes indirectly to validate Flood Zones & identify other flood sources
Historic Flood Outlines	Tolka River	Unknown	Unknown	Yes indirectly to validate Flood Zones
Benefiting Land Maps and Drainage Districts	Whole county	Low	Low	Indirectly to validate modelled outlines.
Walkover Survey	Selected locations	Moderate	Low	Yes to validate outlines at key settlements

A description of the main modelling datasets is given in the following sections. This data has been reviewed and combined in order to form Flood Zone mapping for the 34 settlements contained within the variation. In some settlements this has revised the Flood Zone mapping presented in the SFRA under Appendix 6 Volume 2 of the MCDP 2013-2019. More information on how the Flood Zone mapping is compiled is given in Section 3.2.

3.1.1 FEM FRAMS Flood Outlines

Fingal County Council, along with project partners MCC and the Office of Public Works (OPW), commissioned the Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS) in 2008 to investigate the high levels of flood risk in the Fingal East Meath area. The study included detailed hydraulic modelling of 23 rivers and streams, 3 estuaries and the Fingal and Meath coastline. The watercourses are defined as High Priority Watercourses (HPW) or Medium Priority Watercourses (MPW) and modelled in according detail. The FEM FRAMS models developed consist of 1D river models, 1D-2D linked models and 2D coastal models. The model results were used to map flood outlines for a range of scenarios, including the current and future, defended and undefended scenarios.

3.1.2 Tolka River Flooding Study

The Tolka study was commissioned by Dublin City Council, in association with Fingal County Council, Meath County Council and the Office of Public Works (OPW) in 2002. The recommendations for the flood relief scheme have now been constructed and protect a significant area in and around the Dunboyne, Clonee, Pace settlement. Based on the outcome of this study, the current 1% AEP flood extent has been used in compiling the flood map. An indication of the areas that are protected by the defences is also provided.

3.1.3 Flood Risk Assessment and Management Study for the River Rye Water, Kilcock

The River Rye Water study was commissioned by a consortium of landowners in Kilcock. The study assesses existing and future flood risk in the area and proposed a flood relief scheme which, when constructed, will consist of walls, embankments and storage areas. The modelled flood extent for the existing scenario was reviewed and used in the compilation of the County Meath flood map. An indication of the areas that will be protected by the scheme, once it has been constructed, is also provided. The scheme has been approved by OPW, Kildare County Council and Meath County Council and has been granted planning permission by An Bord Pleanála. It is proposed that the scheme will be implemented under a phased approach and will therefore only be fully functional once all phases are complete.

3.1.4 ISIS 1D Hydraulic Modelling

The settlements of Ballivor and Longwood are included within the Eastern CFRAM as areas that will be subject to more detailed hydraulic modelling and flood mapping, which will be published in 2014. Given the low confidence in the PFRA/JFlow flood mapping for the sites the decision was taken to re-model the sites using a 1 dimensional (1D) hydraulic model (ISIS), based on channel survey and LiDAR DTM height model procured by OPW for the CFRAM. Flows were estimated using the OPW's Flood Studies Update (FSU) methodology. The resulting analysis provided flood levels for the 1 in 100 year and 1 in 1000 year return period flow events (Flood Zone A and B). The levels were then used to create Flood Zone outlines using the LiDAR DTM. The analysis represents an increase in the confidence of the Flood Zones compared to OPW PFRA or JFlow outlines, which do not represent in channel flow dynamics or structures such as culverts and bridges. However, the results are not as detailed as the 1D/2D linked modelling that will be undertaken as part of the CFRAMS programme; once published, those outputs will supersede the JBA modelling for Ballivor and Longwood.

3.1.5 National PFRA Study Fluvial Flood Outlines

The Preliminary Flood Risk Assessment (PFRA) is a national screening exercise that was undertaken to identify areas at potential flood risk. The PFRA is a requirement of the EU Floods Directive and the publication of this work has led to, and has informed, more detailed assessment, which is being undertaken as part of the Catchment Flood Risk Assessment and Management (CFRAM) studies. The PFRA study considered flooding from a number of

sources, including fluvial, tidal, pluvial and groundwater, and resulted in a suite of broadscale flood maps.

For the preparation of the PFRA fluvial flood maps, flood flow estimates were calculated at nodes every 500m intervals along the entire river network. (The river network is the EPA 'blue-line' network, which, for the most part, matches the rivers mapped at the 1:50,000 scale Discovery Series OS mapping). This flow estimation was based on the OPW Flood Studies Update research programme. An assumption was made that the in-channel flow equates to the mean annual flood and so the out of bank flow for a particular AEP event was determined by deducting the mean annual flood from the flood flow estimate for that probability event.

Using the OPW's 5m national digital terrain model (DTM) a cross section was determined at 100m spacings. The Manning's equation, a hydraulic equation for normal flow was used to calculate a flood level which was then extrapolated across the DTM to determine the flood extent. This exercise was completed for all river catchments greater than 1km^2.

This methodology does not take into account defences, channel structures or channel works. Potential sources of error in the mapping include local errors in the DTM or changes to the watercourse flow route due to an error in mapping or new development.

The PFRA mapping was completed as part of a desk based study and was put on display for public consultation and comment. A site based review of the PFRA, at selected sites, was undertaken at the early stages of the National CFRAM programme through the Flood Risk Review (FRR). In County Meath at selected Flood Risk Review Sites, the PFRA outlines have been reviewed and verified by RPS Consulting as part of the Flood Risk Review stage of the Eastern CFRAM and by JBA Consulting as part of the Flood Risk Review for the North-West and Neagh-Bann CFRAM. The verification process involved site walkover and review of historical flood data, and in some case resulted in refinements being made to the 'raw' PFRA outlines.

3.1.6 JFLOW® Flood Mapping

JBA developed software, known as JFLOW®[1] to undertake multi-scale two dimensional hydraulic fluvial and tidal flood modelling. As with the PFRA method, the fluvial flood mapping process involved two stages; hydrology and hydraulic modelling. JBA developed in-house software tools to interpolate catchment descriptors from a number of environmental datasets and produced an automated method for calculating design flows. The method used to calculate flows was based on the Flood Estimate Handbook (FEH)[2] Statistical Method and is in line with the methods of the Flood Studies Update (FSU) which is currently under development. Index flows were generated at 300m intervals along the entire river network. Annual Maximum flow data from the OPW Hydrodata[3] website were used to adjust the index flows by allocating 'donor' gauges, whereby local gauges are used to compare and adjust index flows for a given catchment. Pooled data was used to generate growth curves and determine flood flows for different return periods.

Cross sections were generated at each inflow point to define the extent of the area over which to route the flow. Flow was routed over a digital terrain model based on the OSi national 10m height model, with updated height data in over 30 urban areas. This process was undertaken for all river catchments greater than 10km^2 and in some urban areas, including Drogheda and Dunboyne in Co. Meath, greater than 3km^2.

JFLOW® results were subject to several iterations of manual checking and model re-runs. However, the accuracy of the flood mapping is directly correlated to the DTM and individual flow structures such as bridges, culverts, weirs and sluices are not explicitly modelled.

For the settlements of Clonard and Kilmessan JFlow was run using improved quality OPW DTM and flow estimates derived using the OPW FSU methodology. The increased data quality increases the confidence in the Flood Zone mapping compared to other sites represented by JFlow derived Flood Zone mapping. The confidence in the mapped results is still moderate.

[1] JFLOW® is a registered UK trade mark in the name of Jeremy Benn Associates Limited

[2] Flood Estimation Handbook, Institute of Hydrology, 1999

[3] www.opw.ie/hydro

3.1.7 National CFRAM Programme

Following on from the PFRA study, the OPW commenced appointment of consultants to carry out a more detailed flood risk assessment on key flood risk areas. This work will be undertaken under the national CFRAM programme across seven river basin districts in Ireland. The CFRAM programme commenced with three pilot studies covering the River Lee, Fingal East Meath area and the River Dodder. A further 6 studies are currently underway in the East, South-East, South-West, West and the combined North-West and Neagh-Bann regions.

County Meath mainly falls within the Eastern CFRAM (E CFRAM) area, with parts also within the study areas of the Fingal East Meath (FEM FRAMS), the North West and Neagh Bann CFRAM (NWNB CFRAM) and the Shannon CFRAM. The FEM FRAMS was a pilot study that has been completed and detailed model output and flood maps are available for this area (see section 3.1.1 above). The initial Flood Risk Review (FRR) stage of the Eastern and North-West Neagh-Bann CFRAM has been completed and this included a site based review of the PFRA flood outlines at a number of settlements. Following this review, any sites recommended as an Area for Further Assessment (AFA) will be included in the subsequent detailed assessment stage of each CFRAM study. Detailed flood risk and hazard maps will be produced for all AFAs and under the EU Floods Directive, will be available by the end of 2013 with Management Plans by the end of 2015.

3.2 Flood Zone Mapping

As discussed in Section 3.1, various sources of data are available and were used to update the countywide flood map originally presented in the SFRA under Appendix 6 Volume 2 of the MCDP 2013-2019. Updates to the Flood Zone map were only undertaken where there have been significant changes in the base information. The revised flood mapping is presented in Section 5.

3.2.1 Map Compilation

Table 3-3 (on page 16) lists the settlements within the variation, identifies the source of modelled data available within each settlement, indicates where a site walkover was carried out and comments on the data used to define the Flood Zones for the purposes of this SFRA.

For the settlements within the variation, the following hierarchy was adopted for selection of mapping:

- FEM FRAMS, Tolka Flood Study and the Kilcock FRAMS flood mapping information is of the highest quality and takes precedence over other modelled data.
- ISIS 1d modelling using FSU hydrology, OPW CFRAMS channel survey and LiDAR DTM was completed by JBA for Ballivor and Longwood. The confidence in results is less than the CFRAM standard methodologies above and greater than the PFRA and JFlow methodologies.
- Revised JFlow modelling was completed for Clonard and Kilmessan. Quality of the DTM and hydrology was increased and this approach has greater confidence than PFRA or base JFlow methodologies.
- A number of settlements in County Meath were subject to a Flood Risk Review (FRR) under the initial stages of the National CFRAM studies. The findings of this FRR were considered and unless otherwise stated; the PFRA output, verified at these settlements, was adopted in the preparation of the SFRA Flood Zones.
- JFLOW and/or PFRA model outlines were considered where there was no FEM FRAMS or FRR verification of the PFRA outlines, in this instance JBA visited the settlement and completed an on-site validation of the flood mapping.

3.2.2 Comment on Accuracy and Detail of Assessment

The flood mapping was created using best available data, has been verified on site either by JBA or a third party and is fit for purpose.

Following the 2004 Report of the Flood Policy Review Group, national policy in relation to the management of flood risk adopted a more risk based approach. As the lead agency for flood

risk management the OPW were tasked with implementing the EU Floods Directive which has led directly the PFRA and CFRAM programme. These studies concentrate the highest level of flood risk investigation to areas at the greatest risk of flooding. Whilst areas like Kentstown, Dunshaughlin, Ratoath (and others) have received more detailed studies under the FEM FRAMS/CFRAM Programme this is a reflection of the underlying risk in the area. Other areas such as Carlanstown and Carnaross have a limited history of property flooding because development historically avoided areas at higher probability of flooding, or there is limited flooding in the settlement to begin with. It is therefore pragmatic and justifiable that appropriately detailed flood risk investigations are tailored to locations based on the scale and nature of existing flood risk.

This approach is clearly stated within the Planning System and Flood Risk Management Guidelines and all settlements within the variation have subject to an appropriately detailed analysis. Of key importance is that verified Flood Zone mapping is in place that can support the application of the sequential approach, and if necessary the Justification Test.

Within the variation, Athboy, Ballivor, Kilcock, Kilmessan, Longwood, Maynooth Environs, Slane, Drogheda Southern Environs and Dunboyne Clonee Pace have been identified as Areas for Further Assessment (AFA) under the Eastern CFRAM Study (E CFRAM). As such they will be subject to detailed flood probability and risk mapping that will be available during 2014. Until this information is available the best available data currently available for these settlements will be used during the application of the sequential approach and, where necessary, the Justification Test.

Table 3-3 Model Data used in the Preparation of SFRA Flood Zone Maps

LOCATION	FEM	OTHER MODEL	CFRAM	PFRA	JFLOW	SITE VISIT	SOURCE OF SFRA FLOOD ZONE MAPPING	COMMENT ON FLOOD HISTORY	SUMMARY OF MAIN FLOOD SOURCE(S)
Athboy			Y	Y	Y	Y	Verified PFRA from E CFRAM FRR and adjusted after JBA site visit. Athboy is being studied under E CFRAM - detailed mapping available in 2014.	Minor surface water issue on N51, flooding noted in Castletown (outside settlement boundary) Aug 2008. Athboy River subject to OPW arterial drainage scheme and FRR notes channel capacity may be as high as 1% AEP (1 in 100 years).	FLUVIAL & SURFACE WATER
Ballivor		Y	Y	Y	Y	Y	Revised Flood Zone mapping using hydraulic modelling derived from OPW CFRAM survey, LiDAR DTM and FSU hydrology, site visit to assist verification.	No flooding within urban area but a record of flooding to the southeast in Clonycavan occurred after prolonged rainfall in the Boyne Catchment.	FLUVIAL
Carlanstown				Y	Y	Y	Based on site walkover, PFRA outlines used in mapping	No historic records of flooding were found.	FLUVIAL
Carnaross							No significant fluvial flood risk identified.	No historic records of flooding were found.	
Clonard				Y	Y	Y	Revised Flood Zone mapping using JFlow with improved DTM and FSU hydrology, site visit to assist verification.	No historic records of flooding were found.	FLUVIAL
Crossakiel							No significant fluvial flood risk identified.	No historic records of flooding were found.	
Donore							No significant fluvial flood risk identified.	No flood history within the settlement boundary.	FLUVIAL
Drumconrath				Y	Y	Y	Map adjusted based on flood history and JFLOW outlines	Flooding reported in 1993, 2008 and 2011. Four private houses and a community centre flooded.	FLUVIAL
Duleek	Y			Y	Y		FEM FRAMS and OPW PFRA	Flood event recorded in October 1993 from the River Nanny. Flood relief scheme carried out.	FLUVIAL
Enfield							No significant fluvial flood risk identified.	Flooding after heavy rainfall recurs.	SURFACE WATER
Gibbstown					Y		No significant fluvial flood risk identified.	No historic records of flooding were found.	
Gormanstown	Y			Y	Y		FEM FRAMS	History of recurring flood event at Martin's Road. Cause of flooding sites as flat land	FLUVIAL & SURFACE WATER

LOCATION	FEM	OTHER MODEL	CFRAM	PFRA	JFLOW	SITE VISIT	SOURCE OF SFRA FLOOD ZONE MAPPING	COMMENT ON FLOOD HISTORY	SUMMARY OF MAIN FLOOD SOURCE(S)
								with no drainage and therefore liable to flooding after prolonged rainfall.	
Julianstown	Y			Y	Y	Y	FEM FRAMS	Reports of recurring flooding in the reach between Julianstown and Beaumont. Flood waters from the River Nanny over onto floodplain 2-3 times per year.	FLUVIAL
Kentstown	Y			Y	Y		FEM FRAMS	Reports of historic flooding from the River Nanny (impacting roads not houses). Recurring road flooding related to minor local drainage issue.	FLUVIAL & SURFACE WATER
Kilbride				Y	Y		Eastern CFRAM Flood Risk Review (PFRA)	No historic records of flooding were found.	FLUVIAL
Kilcock		Y	Y	Y	Y	Y	Flood Risk Assessment & Management (FRAM) Study for River Rye Water and Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.	Recurring flooding from the River Rye Water is noted, along with events in November 2000 and August 2008.	FLUVIAL
Kildalkey				Y	Y		Eastern CFRAM Flood Risk Review (PFRA)	No historic records of flooding were found.	FLUVIAL
Kilmainhamwood-wood				Y	Y		Verified PFRA from NWNB CFRAM FRR - Not subject to further CFRAM modelling.	Four residential properties recently flooded and remedial work (dredging) has been carried out on the watercourse by OPW. Local pluvial flooding noted near to football pitch.	FLUVIAL & SURFACE WATER
Kilmessan			Y	Y	Y	Y	Revised Flood Zone mapping using JFlow with improved DTM and FSU hydrology, site visit to assist verification.	Reports of recurring flood event from a stream to the north. Record states this occurs annually. Flood event in 2008 affected 1 property.	FLUVIAL
Longwood		Y	Y	Y	Y	Y	Revised Flood Zone mapping using hydraulic modelling derived from OPW CFRAM survey, LiDAR DTM and FSU hydrology, site visit to assist verification.	No history of flooding with the urban area of Longwood but a record of flooding recurring in Moyvalley.	FLUVIAL
Maynooth Environs			Y	Y	Y	Y	Eastern CFRAM Flood Risk Review (PFRA) and JBA site visit.	A record of a flood event in November 2000 is noted. The source is the floodwater is the River Rye Water.	FLUVIAL
Moynalty				Y	Y	Y	Based on site walkover, JFLOW	Historic flooding from the Moynalty River is	FLUVIAL

LOCATION	FEM	OTHER MODEL	CFRAM	PFRA	JFLOW	SITE VISIT	SOURCE OF SFRA FLOOD ZONE MAPPING	COMMENT ON FLOOD HISTORY	SUMMARY OF MAIN FLOOD SOURCE(S)
							modified and used in mapping	noted in 2009 and recurring.	
Nobber				Y	Y	Y	Based on site walkover, JFLOW outlines used in mapping with additional PFRA watercourses included	The River Dee is noted as causing flooding, as is the tributary entering the River Dee from the north east.	FLUVIAL
Oldcastle							No significant fluvial flood risk identified.	Recurring surface water flooding on Store Road.	SURFACE WATER
Rathcairn							No significant fluvial flood risk identified.	No historic records of flooding were found.	
Rathmolyon							No significant fluvial flood risk identified.	Recurring flood event on the R156 road to Cherryvalley.	SURFACE WATER
Slane			Y	Y	Y		Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.	History of flood events in February 1990, November 2000 and November 2002. Also there is a recurring flood event at St. Patricks Terrace due to inadequate drainage.	FLUVIAL & SURFACE WATER
Stamullen	Y			Y	Y		FEM FRAMS	The River Delvin is recorded as overflowing its banks 2-3 times per year after heavy flooding. The road is also liable to flooding	FLUVIAL
Summerhill						Y	No significant fluvial flood risk identified.	Reports of a flooding event in August 2008. The source is this event was the River Moynalvy.	FLUVIAL
LAPs									
Ashbourne	Y			Y	Y	Y	FEM FRAMS, OPW PFRA and JBA site visit.	Flooding occurred in August 1986 and November 2002. Gauge data for the events are available.	FLUVIAL
Dunshaughlin	Y			Y	Y	Y	FEM FRAMS, OPW PFRA and JBA site visit.	Flooding event occurred in November 2000 from a tributary to the River Boyne.	FLUVIAL
Drogheda Southern Environs			Y	Y	Y	Y	Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.	History of recurring flooding at Elmwood/McEoys road, the R152, the Dublin Road and at Colp West.	FLUVIAL
Dunboyne Clonee Pace		Y	Y	Y	Y	Y	Tolka Flood Study, Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.	Flooding from the River Tolka in November 2000 and November 2002.	FLUVIAL
Ratoath	Y			Y	Y	Y	FEM FRAMS, OPW PFRA and JBA site visit.	No records of flooding were found.	FLUVIAL

3.3 Sources of Flooding

Table 3-3 on the previous page has identified the main sources of flood risk to the settlements contained within the variation. Fluvial flooding is the greatest source of flood risk and alongside this there is evidence to suggest that pluvial, or surface water, flooding is also an issue in many of the settlements. None of the settlements are close enough to the coastline or tidally influenced watercourses for this to be a source of flood risk. There is also little evidence to suggest that groundwater flooding is an issue.

3.3.1 Fluvial

Fluvial flooding is associated with the exceedance of river channel capacity during higher flows. The process of flooding on watercourses depends on a number of characteristics associated with the catchment including; geographical location and variation in rainfall, steepness of the channel and surrounding floodplain and infiltration and runoff rates associated with urban and rural catchments.

3.3.2 Surface Water/Pluvial

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

3.3.3 Summary

More information on the sources of flooding can be found in the SFRA for the MCDP 2013-2019 in Section 5 (Appendix 6, Volume 2 of the MCDP). Ways in which the impacts of flooding are managed within each settlement are defined by the policy and objectives of the MCDP and also within Section 5 of this report where flood risk and land use zoning are considered in more detail.

3.4 Climate Change

The Planning System and Flood Risk Management guidelines recommends that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects.

Specific advice on the expected impacts of climate change and the allowances to be provided for future flood risk management in Ireland is given in the OPW draft guidance[4]. 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 Table 3-4 below.

Table 3-4 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		

[4] OPW Assessment of Potential Future Scenarios, Flood Risk Management Draft Guidance, 2009

3.4.1 Climate Change and Flood Risk Assessment

The Flood Zones are determined based on readily available information and their purpose is to be used as a tool to avoid inappropriate development in areas of flood risk. Where development is proposed within an area of potential flood risk (Flood Zone A or B), a flood risk assessment of appropriate scale will be required and this assessment must take into account climate change and associated impacts. Under the National CFRAM programme, the detailed modelling and assessment stage of each study will include for climate change effects. For the eastern area of County Meath, detailed modelling, with consideration of climate change, has been completed under the FEM FRAMS pilot CFRAM study, within the variation this applies to Duleek, Gormanston, Julianstown, Kentstown, Stamullen, Ashbourne, Dunshaughlin and Ratoath.

Consideration of climate change is particularly important where flood alleviation measures are proposed as the design standard of the proposal may reduce significantly in future years due to increased rainfall, river flows and sea levels. As recommended by the planning guidelines, a precautionary approach should be adopted.

Climate change may result in increased flood extents and therefore caution should be taken when zoning lands in transitional areas. In general, Flood Zone B, which represents the 0.1% AEP extent, can be taken as an indication of the extent of the 1% AEP flood event with climate change. In steep valleys an increase in water level will relate to a very small increase in extent, however in flatter low-lying basins a small increase in water level can result in a significant increase in flood extent.

In the design of flood alleviation measures, climate change should be taken into account and design levels of structures, such as flood walls or embankments, must be sufficient to cope with the effects of climate change over the lifetime of the structure or where circumstances permit, be capable of adaptation.

Further consideration to the potential future impacts of climate change will be given for each settlement within Section 5.

4 Flood Risk Management

The Planning Guidelines recommend a sequential approach to spatial planning, promoting avoidance rather than justification and subsequent mitigation of risk. The implementation of the Planning Guidelines on a settlement basis is achieved through the application of the policies and objectives contained within Section 7.15 'Flood Risk Management' of Volume 1 of the MCDP 2013-2019. Those policies and objectives were specifically recommended by Section 9 of the SFRA contained within Appendix 6, Volume 2 of the MCDP.

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

The specific management of risk is discussed for each settlement in Section 5.2 to 5.35.

4.1 Flood Risk Policies and Objectives

The policies contained within Volume 1, Section 7.15 of the MCDP 2013-2019 are as follows:

WS POL 29	To have regard to the "Planning System and Flood Risk Management – Guidelines for Planning Authorities" (DoEHLG/OPW, 2009) through the use of the sequential approach and application of the Justification Tests for Development Management and Development Plans, during the period of this Plan.
WS POL 30	To have regard to the findings and recommendations of the current Strategic Flood Risk Assessment prepared as part of the County Development Plan review. See Appendix 6.
WS POL 31	To ensure that all developments have regard to the surface water management policies in the Greater Dublin Strategic Drainage Study (GDSDS). Compliance with the recommendations contained in Technical Guidance Document, Volume 2, Chapter 4 of the Greater Dublin Strategic Drainage Study shall be required in all instances.
WS POL 32	To ensure that a flood risk assessment is carried out for any development proposal, where flood risk may be an issue in accordance with the "Planning System and Flood Risk Management – Guidelines for Planning Authorities" (DoECLG/OPW, 2009). This assessment shall be appropriate to the scale and nature of risk to the potential development.
WS POL 33	To consult with the Office of Public Works in relation to proposed developments in the vicinity of drainage channels and rivers for which the OPW are responsible, and the Council will, retain a strip of 10 metres on either side of such channel where required, to facilitate access thereto.
WS POL 34	To consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the construction of flood alleviation measures in County Meath.
WS POL 35	To ensure that flood risk management is incorporated into the preparation of Local Area Plans and Town Development Plans in accordance with 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities (2009)'.
WS POL 36	To have regard to the recommendations of the Fingal East Meath Flood Risk Assessment and Management Study, the Eastern, North West and Neagh Bann Catchment Flood Risk Assessment and Management Study when finalised and approved.

The objectives contained within Volume 1, Section 7.15 of the MCDP 2013-2019 are as follows:

WS OBJ 11	To undertake a review of the 'Strategic Flood Risk Assessment for County Meath' following the publication of the flood mapping which is being produced as part of the Catchment Flood Risk Assessment and Management (CFRAM) Studies.
WS OBJ 12	To design flood relief measures to ensure appropriate protection for alluvial woodland (i.e. a qualifying interest) along the Boyne.
WS OBJ 13	To design flood relief measures to protect the conservation objectives of Natura 2000 sites and to avoid indirect impacts of conflict with other qualifying interests or Natura 2000 sites.
WS OBJ 14	To promote positive flood relief measures that can enhance habitats in the Boyne floodplain such as swales, constructed wetland basins etc.
WS OBJ 15	To seek to ensure that construction works are designed so as not to result in surface water runoff into cSAC or SPAs either directly or indirectly via a watercourse.

Additional objectives in relation to Sustainable Drainage Systems (SuDS) are included within Section 7.16 of the MCDP 2013-2019:

WS OBJ 16	To design flood relief measures to protect the conservation objectives of Natura 2000 sites and to avoid indirect impacts of conflict with other qualifying interests or Natura 2000 sites.
WS OBJ 17	To promote positive flood relief measures that can enhance habitats in the Boyne floodplain such as swales, constructed wetland basins etc.
WS OBJ 18	To seek to ensure that construction works are designed so as not to result in surface water runoff into cSAC or SPAs either directly or indirectly via a watercourse.

Specific objectives and policies are taken on in the written statement for each settlement.

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

4.2 FEM FRAMS Recommendations

As stated within Section 9 of the FEM FRAMS Draft Flood Risk Management Plan[5]; *The final objective of the FEM FRAMS is to prepare a strategic Flood Risk Management Plan (FRMP), and associated Strategic Environmental Assessment (SEA), that sets out the measures and policies that should be pursued by Fingal County Council (FCC), Meath County Council (MCC) and the Office of Public Works (OPW) to achieve the most cost effective and sustainable management of flood risk within the Fingal East Meath study area in the short, medium and long-term.*

The purpose of the FRMP is to;

- *Identify the measures and flood risk management options that have been shown to be viable in flood risk management terms by the analyses undertaken;*
- *Set the prioritisation/phasing in terms of development of these options;*
- *Indicate the further studies and work needed to move forward to implementation of the options; and*
- *Identify the requirements for future monitoring and review of the FRMP.*

A flood risk management strategy may incorporate non-structural (flood forecasting, warning and preparedness) and structural measures (formal flood defence structures). These are specified for the County Meath FEM FRAMS settlements of; Duleek, Gormanston, Julianstown, Kentstown, Stamullen, Ashbourne, Dunshaughlin and Ratoath and are summarised in Table 4-1, over page.

The findings and recommendations for the FEM FRAMS will be considered in a national context and assigned an order of priority at that level, subject to time-scale and budget considerations.

[5] FEM FRAMS Draft Flood Risk Management Plan, http://www.cfram.ie/fem-fram-pilot-study-website/

Many of these measures are yet to be implemented, but it remains a key objective for Meath County Council to assist in the implementation of these measures.

Table 4-1 Review of FEM FRAMS management report recommendations

Area	Settlement / LAP Area	Summary of Flood Risk Management Plan
Duleek ASPR	Duleek	The option to raise the existing flood defences to the 0.1% AEP standard in Duleek has a positive benefit cost ratio. While the standard of protection is the 1% AEP the FEM FRAMS has identified a high level of residual risk in Duleek when looking at the 0.1% AEP. Based on this it is considered that there may be some economic benefit in giving increased protection to Duleek. The option for increasing protection to properties in Duleek shall not be considered for implementation in the short term but shall be monitored and reviewed in the next cycle of the CFRAM process in 2015. The responsibility for this shall be with the OPW.
Nanny & Devlin AU	Julianstown	Flood forecasting and warning system was recommended for the Nanny River & Delvin River, with a positive benefit cost ratio, this would assist all of the listed Meath County Council settlements.
	Kentstown	
	Gormanstown	
	Stamullen	
Broadmeadow & Ward AU	Ashbourne	Recommendations included: Determine defence asset monitoring and maintenance programme. Proactive maintenance of existing defence assets in Ashbourne. Flood forecasting and warning system was recommended for the Broadmeadow River with a positive benefit cost ratio.
	Dunshaughlin	As for Ashbourne; flood forecasting and warning system was recommended for the Broadmeadow River with a positive benefit cost ratio.
Rathoath ASPR	Ratoath	FEM FRAMS identified issues with two structures and investigated improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and replacing a culvert on a tributary of the Broadmeadow River. Neither of these measures were able to attract a positive benefit cost ratio and further work to determine if a positive benefit cost ratio could be achieved was recommended. Proactive maintenance of existing defence assets in Ratoath was also recommended.

5 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:

1. Consider the land use zoning objectives utilised within County Meath as a whole and assess their potential vulnerability to flooding.
2. Based on the associated vulnerability of the particular use, a clarification on the requirement of the application of the Justification Test is provided.
3. The consideration of the specific draft land use zoning objectives and flood risk will be presented for each individual settlement. 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.

5.1 Land Use Zoning Objectives

The zoning objectives can be related to the vulnerability classifications in the 'Planning System and Flood Risk Management'; highly vulnerable, less vulnerable and water compatible. As discussed in Section 2, the preference for the allocation of zoning objectives within areas at potential risk of flooding is that of avoidance (the sequential approach). Where avoidance or substitution of land use is not possible the specific vulnerability of the land use, coupled with the Flood Zone in which it lies, guides the need for application of the Justification Test. This is set out in detail within Table 5-1 below.

Table 5-1 Land Zoning Objectives and Vulnerabilities

Objective/Use	Vulnerability*	Justification Test Required
A1 - Existing Residential	High	For development in Flood Zone A or B
A2 - New Residential	High	For development in Flood Zones A or B
B1 - Commercial/Town or Village Centre	High / Less	For highly vulnerable development in Flood Zone A or B For less vulnerable development in Flood Zone A
B2 - Retail Warehouse	Less	For development in Flood Zone A
C1 - Mixed Use	High / Less	For highly vulnerable development in Flood Zone A or B For less vulnerable development in Flood Zone A
D1 - Tourism	High / Less / Water Compatible	For highly vulnerable development in Flood Zone A or B For less vulnerable development in Flood Zone A Or appropriate - if water compatible
E1 - High Technology	Less	For development in Flood Zone A
E2 - General Enterprise & Employment	High / Less	For highly vulnerable development in Flood Zone A or B For less vulnerable development in Flood Zone A
E3 - Warehousing & Distribution	Less	For development in Flood Zone A
F1 - Open Space	Water Compatible	Development is generally appropriate
G1 - Community Infrastructure	High / Less	For highly vulnerable development in Flood Zone A or B For less vulnerable development in Flood Zone A
H1 - High Amenity	Less / Water Compatible	For less vulnerable development in Flood Zone A or appropriate - if water compatible
WL - White Lands	n/a	not applicable

* Land Use Vulnerability is expressed in relation to Table 3.1 (p25) of the Planning System and Flood Risk Management Guidelines for Planning Authorities. Some Zoning Objectives include a mix of different vulnerabilities of land use and are therefore presented as such in the table above.

It is important to note that Table 5-1 is provided as a general guide and the specific development types within the zoning objective must be considered individually, and with reference to Table 3-1 of the 'Planning System and Flood Risk Management'.

Whilst the Justification Test has been applied to land use zoning objectives in determining their applicability, there is some degree of variance in the vulnerability of the land uses under certain

objectives in Table 5-1. For example the B1, C1, D1, E2 and G1 zonings can include for high or less vulnerable development. This results in a varying requirement for the application of the Justification Test and potential suitability of the development. Where such conditions exist the draft zoning objectives include a clarification of the suitability of land use vulnerability within individual land zonings.

Table 5-2 Summary Table of Settlements and Flood Risk

Settlement	Comment on Flood Risk	Justification Test Required?
Athboy	Existing development (B1 & A1) within the core town centre is at potential risk of flooding. New development site passes Justification Test. Manage flooding in line with approved policies and objectives.	Yes
Ballivor	Minimal risk from OPW arterial drainage scheme channels that flow through the settlement. Any new development or extensions to existing development that is situated on lands adjacent to any of the watercourses should, in line with the policies (WS POL 29 to 36) of the MCDP, still be subject to an appropriately detailed FRA.	No
Carlanstown	Some existing A1 and F1 lands at risk of flooding. Phased E2 and G1 undeveloped lands on margin of flood risk. Manage in line with policies and objectives. E2 and G1 lands must avoid development within Flood Zones A and B.	No
Carnaross	No mapped or historic flood risk - manage development in line with approved policies and objectives.	No
Clonard	Extensive A2 and F1 lands are at high risk of flooding. The A2 lands are understood to be subject to extant permissions and a further assessment of risk may be required.	No
Crossakeel	No mapped or historic flood risk - manage development in line with approved policies and objectives.	No
Donore	No mapped or historic flood risk - manage development in line with approved policies and objectives.	No
Drumconrath	Manage flooding in line with approved policies and objectives and apply sequential approach within existing zoned development lands at potential risk of flooding.	No
Duleek	Duleek is at significant risk from the River Nanny and existing development is now protected by the Duleek Flood Relief Scheme. Manage flood risk and development in line with approved policies and objectives. Apply the sequential approach within G1 lands to the north west of the settlement and ensure appropriately detailed FRA is provided for any new or existing zoned development lands at potential risk of flooding. As recommended by FEM FRAMS; the option for increasing protection to properties in Duleek shall be monitored and reviewed in the next cycle of the CFRAM process in 2015. The responsibility for this shall be with the OPW.	No
Enfield	No mapped or historic flood risk - manage development in line with approved policies and objectives.	No
Gibbstown	No mapped or historic flood risk - manage development in line with approved policies and objectives.	No
Gormanston	The Delvin River flows along the settlement boundary, flood risk from the Delvin is limited to open spaces within existing development sites. Manage flood risk and development in line with approved policies and objectives. Apply the sequential approach within G1 lands and ensure appropriately detailed FRA is provided for any new development lands at potential risk of flooding.	No
Julianstown	The River Nanny flows through Julianstown but the majority of existing development is within Flood Zone C. The exception is the existing development (B1 zoning) at the junction of the R132 and R150. Any future planning applications on this site must be subject to an appropriately detailed FRA at development management stage. The FEM FRAMS recommended a flood forecasting and warning system for the River Nanny.	No
Kentstown	Development risk from River Nanny has been avoided through the application of the sequential approach. Manage flood risk and	No

Settlement	Comment on Flood Risk	Justification Test Required?
	development in line with approved policies and objectives, Note FEM FRAMS recommendation for proactive maintenance of the Kentstown Bridge R153 as well as a flood forecasting and warning system.	
Kilbride	The Ward River flows through Kilbride and passes along the boundary of Kilbride National School. Any extension to the Kilbride National School would require an appropriately detailed FRA which includes for detailed modelling of the Ward River. Manage flood risk and development in line with approved policies and objectives, application of the sequential approach and associated detailed FRA is required for any new development within Flood Zone A/B or adjacent to a field drain.	No
Kilcock	Manage flood risk and development in line with approved policies and objectives, appropriately detailed FRA is required for any new E2, A2 or G1 development in this settlement which must demonstrate that FFLs and ground levels are maintained above the 100yr flood level plus climate change and freeboard. Justification test has been passed; ensure that the distributor road has appropriate site specific FRA and OPW Section 50 consent. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.	Yes
Kildalkey	Existing B1, G1 and A1 development at potential risk of flooding, manage flood risk in line with approved policies and objectives. A2 lands are within Flood Zone A and B but are subject to an extant planning permission so the Justification Test does not apply.	No
Kilmainhamwood	Existing A1, B1 & G1 development at potential risk of flooding and should be managed in line with approved policies and objectives. Apply sequential approach within existing zoned development lands at potential risk of flooding.	No
Kilmessan	The River Skane flows through Kilmessan, there is a clearly defined floodplain associated with the River and existing development has avoided high risk areas. Manage flood risk and development in line with approved policies and objectives. Active maintenance of the river at Kilmessan Bridge is recommended to reduce the probability of structure blockage. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans (available in the period 2014-2016).	No
Longwood	The River Blackwater flows adjacent to the eastern border of the settlement. A large field drain passes through the G1 and E2 lands. Flood Zone A is retained largely within bank, Flood Zone B extends across some zoned land (under less vulnerable use). Manage flood risk and development in line with approved policies and objectives. Monitor the impacts of climate change at the next development plan review.	No
Maynooth	The River Rye Water flows adjacent to the southern and eastern border of the settlement, and a further tributary flows through the settlement from a north easterly direction. The floodplain of both watercourses is appropriately zoned as F1 or H1. Manage flood risk and development in line with approved policies and objectives. Justification test has been passed; ensure that the distributor road has appropriate site specific FRA and OPW Section 50 consent.	Yes
Moynalty	Existing development in the core of the village (B1 & G1) is at potential risk and should be managed in line with approved policies and objectives. Apply sequential approach within existing zoned development lands at potential risk of flooding.	No
Nobber	The extents of the Flood Zones are limited to F1, H1 and A1 land uses. Development should be managed in line with approved policies and objectives. Apply sequential approach within existing zoned development lands at potential risk of flooding.	No
Oldcastle	Low risk settlement with no historic flood risk - manage development in line with approved policies and objectives.	No

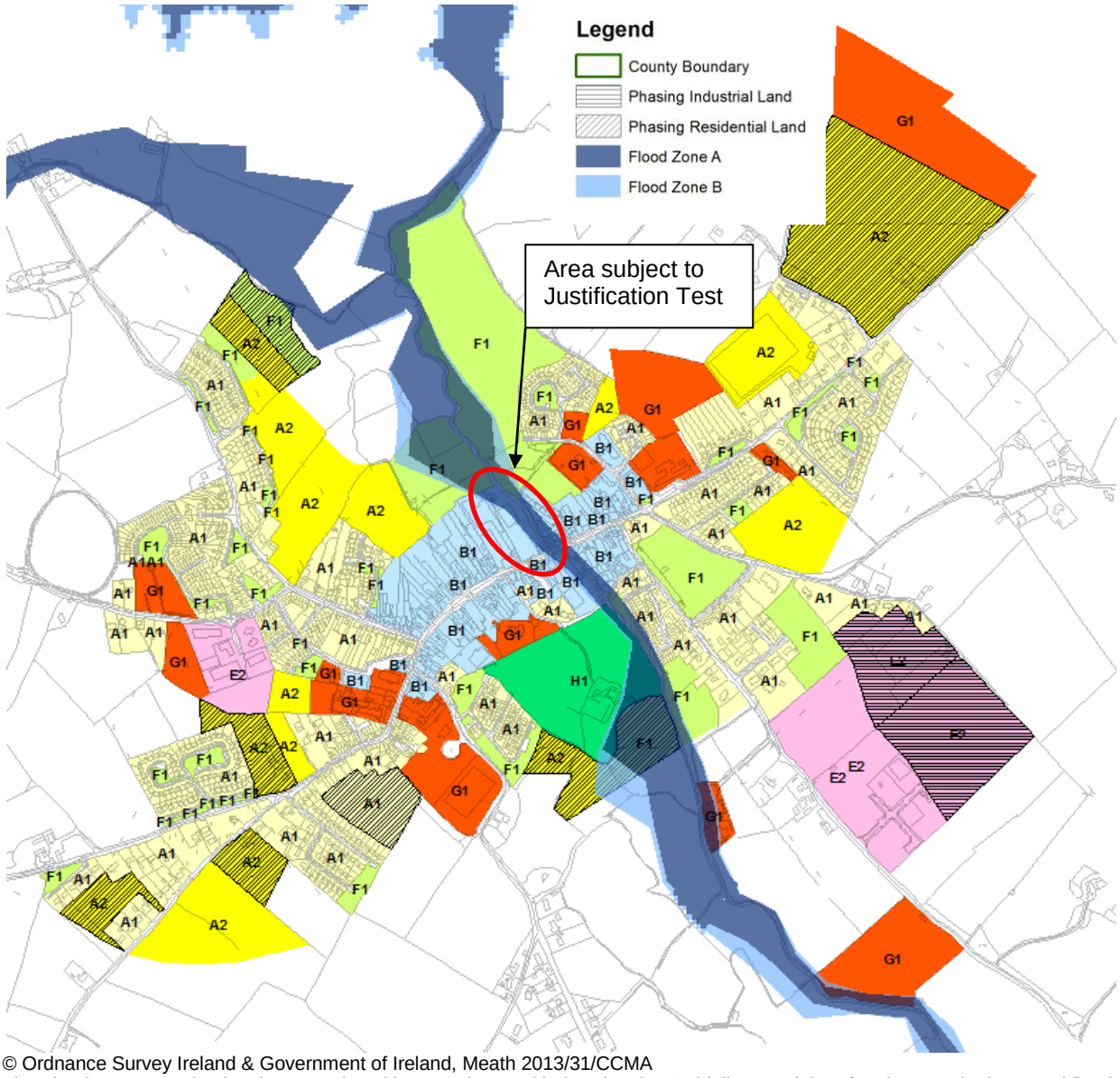
Settlement	Comment on Flood Risk	Justification Test Required?
Rathcairn	Low risk settlement with no historic flood risk - manage development in line with approved policies and objectives.	No
Rathmolyon	No mapped or historic flood risk - manage development in line with approved policies and objectives.	No
Slane	Slane is situated adjacent to the River Boyne and existing development is located almost exclusively within Flood Zone C. The grounds of Slane Castle are located adjacent to the watercourse and the H1 land use zoning is appropriate. The mill situated at the eastern extent of the settlement is zoned D1 and any extensions or new development within the zoning should be subject to an appropriately detailed FRA at development management stage.	No
Stamullen	Flood extent from the River Delvin is largely confined to undeveloped areas that are appropriately zoned. Manage flood risk and development in line with approved policies and objectives. At development management stage any FRAs should include consideration of culvert blockage when assessing risk and recommending design details.	No
Summerhill	No mapped or historic flood risk - manage development in line with approved policies and objectives.	No
LAPs		
Ashbourne	Areas of A1, A2, B1, E2 and F1 are within Flood Zone A and B. Flood defences are in place through the Brookville housing estate and are designed to the 100 year standard (Flood Zone A). Significant extant permissions for A2 and G1 lands (within Flood Zone A/B) are in place and are not subject to the Justification Test. Indicative analysis suggests some sites could be at significant risk of flooding as a result of low ground/FFLs. Manage flood risk and development in line with the policies (WS POL 29 to 36) of the MCDP. Development should be subject to an appropriately detailed FRA at development management stage. This will ensure that FFLs and ground levels are set appropriately and that the risk of surface water flooding is managed. Justification Test may be required for G1 lands. Maintenance and monitoring of culverts and flood defence assets as well as a flood warning system is recommended.	No
Dunshaughlin	There is limited predicted flood risk in Dunshaughlin and land use zoning is generally appropriate. Manage flood risk and development in line with approved policies and objectives. Consider the management of surface water flood risk carefully in this urban area and apply WS POL 31 from the MCDP to ensure any new development or redevelopment appropriately manages the risk of surface water flooding.	No
Drogheda Southern Environs	Drogheda Southern Environs is at risk from the Stameen Stream that outfalls into the Rover Boyne in Mornington. The north eastern corner of the settlement is bounded by the tidal River Boyne which also presents fluvial and tidal flood risk. Manage flood risk and development in line with approved policies and objectives. Manage flood risk and development in line with the policies (WS POL 29 to 36) of the MCDP. Development should be subject to an appropriately detailed FRA at development management stage. This will ensure that FFLs and ground levels are set appropriately and that the risk of surface water flooding is correctly managed. Justification test has been passed; ensure that the distributor road has appropriate site specific FRA and OPW Section 50 consent. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.	Yes
Dunboyne Clonee Pace	Dunboyne Clonee and Pace are three settlements in the south east corner of County Meath. The settlements are situated at the confluence of the Tolka River with a tributary that flows through Dunboyne itself. The Tolka and its tributaries are a source of significant flood history and risk in the area. Manage flood risk and development in line with the policies (WS	Yes

Settlement	Comment on Flood Risk	Justification Test Required?
	POL 29 to 36) of the MCDP. All development should be subject to an appropriately detailed FRA at development management stage. This will ensure that FFLs and ground levels are set appropriately and that the risk of surface water flooding is correctly managed. Justification test has been passed; ensure that the distributor road has appropriate site specific FRA and OPW Section 50 consent. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.	
Ratoath	Ratoath is exposed to fluvial flooding from the Broadmeadow River. Flood Zone A mainly affects agricultural lands and a small number of properties on the eastern side of Ratoath in the Moulden Bridge Area. Defences in the Somerville Estate in Ratoath provide protection up to the 1% AEP event (Flood Zone A). Manage flood risk and development in line with approved policies and objectives. At development management stage any FRAs should include consideration of culvert blockage when assessing risk and recommending design details. Pedestrian walkways may require FRA during planning application stage but the Justification Test is not required.	No

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

5.2 Athboy

Hierarchy	SMALL TOWN
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



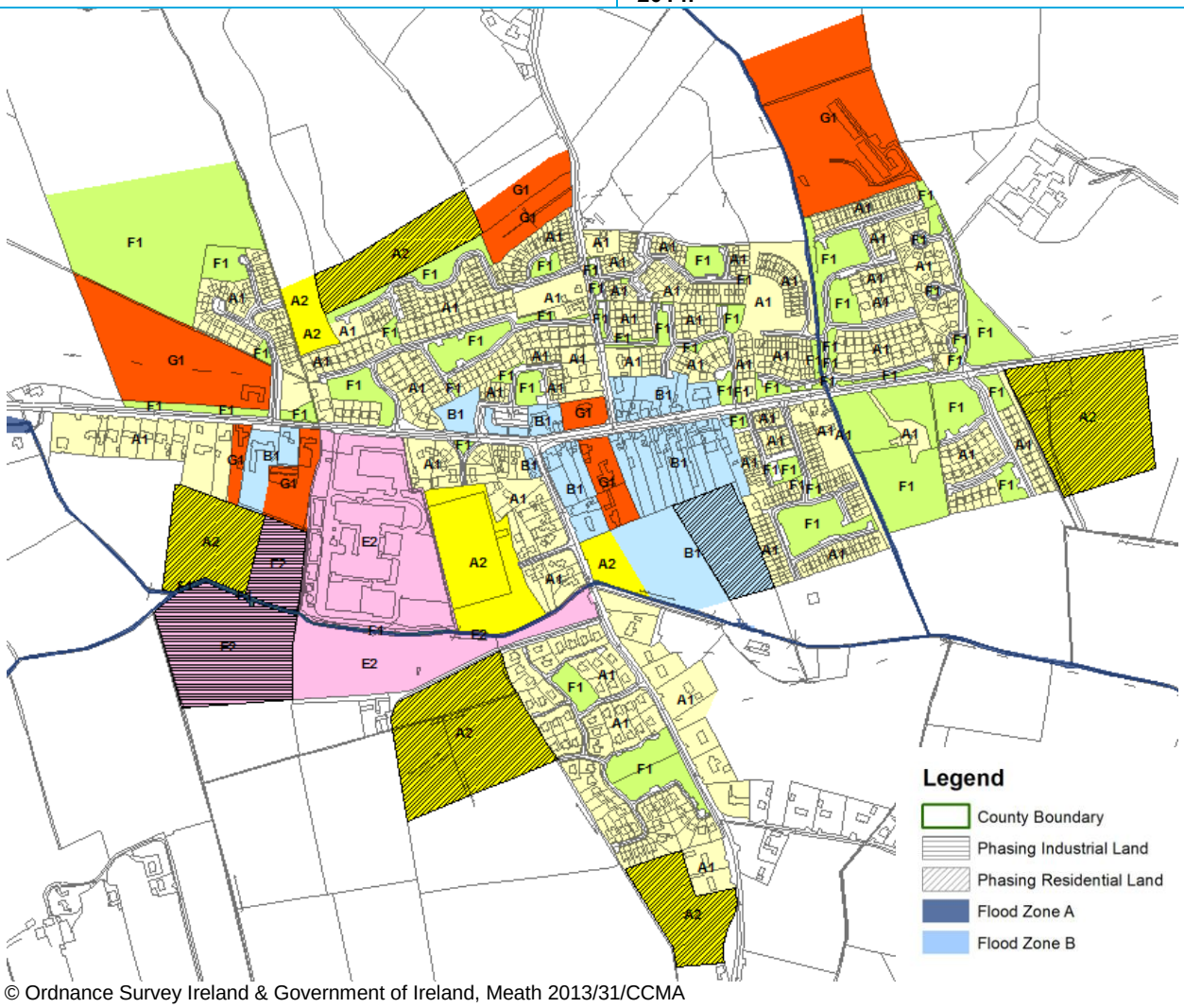
The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Eastern CFRAM Flood Risk Review (PFRA) and JBA site review.
Historic Flooding	Minor surface water issue on N51, flooding noted in Castletown (outside settlement boundary) Aug 2008. Athboy River subject to OPW arterial drainage scheme and FRR notes channel capacity may be as high as 1% AEP (1 in 100 years).
Comment	The Athboy River runs through the centre of the settlement and development has established on both sides of the watercourse. Existing development (B1 & A1) within the core town centre is at potential risk of flooding and in line with the policies (WS POL 29 to 36) of the MCDP, any extensions/change of use/reconstruction should be subject to an appropriately detailed FRA. The area to the north of Upper Bridge Street/Main Street is referred to as the backland area and is intended to facilitate the orderly expansion of the town centre

	through the B1 zoning. Some of the lands are within Flood Zone A and B; a proportion of the area contains a commercial building construction business which is considered to represent a non conforming use within the B1 zoned lands. The site therefore represents a significant potential redevelopment area and Parts 1 and 2 of the Justification Test have been applied and passed, this is outlined in Appendix A.1. The following paragraph provides background to Part 3 of the Justification Test. Current information suggests that developing within Flood Zones A or B could have negative impacts on flood risk elsewhere, both through obstructing flow paths and reducing floodplain capacity. However, given that a significant percentage of the site is within Flood Zone C, it is anticipated that sustainable flood risk mitigation measures could be designed to allow development of the wider subject site. This must be undertaken through an appropriately detailed Flood Risk Assessment, which would form part of the planning application. The FRA should consider the Sequential Approach within the subject site which would involve allocating water compatible development within Flood Zones A and some/all of Zone B. Where necessary, compensatory storage should be provided. Further details on compensatory storage are provided in Appendix B of the Planning System and Flood Risk Management. Buildings should be sited at an appropriate FFL, which should be above the 1 in 100 year flood level, with an allowance for freeboard and climate change. With regard to all development within Athboy; particular consideration should be given to the management of surface water (WS POL 31). Other land use objectives at potential risk include open space and high amenity (F1 and H1), these are generally appropriate and any less vulnerable development within H1 should be directed to Flood Zone C in preference. The waste water treatment plant is potentially at risk of flooding. Proposed distributor roads are identified by transport objectives for this settlement but alignments are not yet confirmed. During the environmental assessment stage for the road scheme, the Justification Test will need to be applied if alignments intersect with Flood Zone A/B. FRA will be required to manage the risk and to demonstrate there will be no impact on adjacent lands. OPW Section 50 consent for all watercourse crossings will be required. The Eastern CFRAM flood mapping (available in 2014) and management plan (available 2015/16) will provide additional clarity to flood mapping and risk management measures and should be consulted when published.
Climate Change	Initial assessment using PFRA mapping suggests only marginal increase in severity through the core of the town. Increasing impact further outside of this area. Eastern CFRAM will provide greater clarity on climate change impacts when available.
Conclusion	Manage flood risk and development in line with approved policies and objectives. Development proposals within the redevelopment area in the backlands must consider the sequential approach and allocate water compatible development within Flood Zones A and some/all of Zone B where possible. Planning applications within this area must be accompanied by an appropriately detailed FRA, setting out the above approach that clearly assesses flood risks, management measures and demonstrates compliance with the Planning Guidelines. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.3 Ballivor

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	JBA 1D hydraulic model using Eastern CFRAM survey data and JBA site visit.
Historic Flooding	No flooding within urban area but a record of flooding occurred to the southeast in Clonycavan after prolonged rainfall in the Boyne Catchment.

Comment:

There are two watercourses that flow through Ballivor, the main watercourse flows from east to west south of the R156. The second and more minor watercourse flows in from the north. Both watercourses have been subject to updated hydraulic modelling to estimate the potential flood extents. Survey information provided by the OPW confirms that the watercourses have been subject to the Boyne Arterial Drainage scheme and as a result the risk of flooding from these watercourses is extremely low, with high flows contained to the channel through town.

Any new development or extensions to existing development that is situated on lands adjacent to any of the watercourses should, in line with the policies (WS POL 29 to 36) of the MCDP, still be subject to an appropriately detailed FRA.

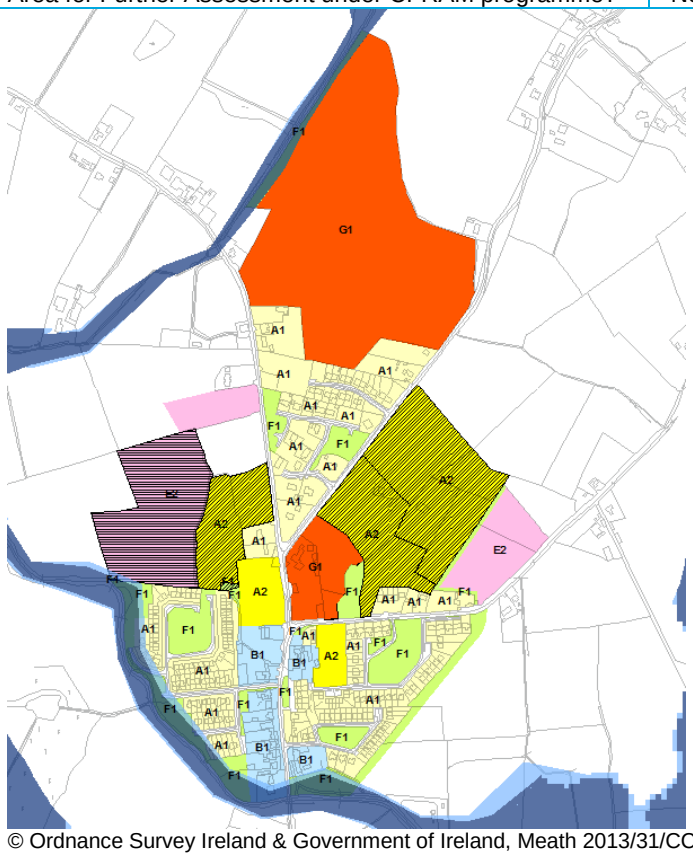
Proposed distributor roads are identified by transport objectives for this settlement but alignments are not yet confirmed. During the environmental assessment stage of the road scheme, the Justification Test will need to be applied if alignments intersect with Flood Zone A/B. FRA will be required to manage the risk and to demonstrate there will be no impact on adjacent lands. OPW Section 50 consent for all watercourse crossings will be required.

The Eastern CFRAM flood mapping (available 2014) and management plan (available 2015/16) will provide

additional clarity to flood mapping and risk management measures and should be consulted when available.	
Climate Change	Initial assessment using the Flood Zone mapping suggests negligible increase in severity through the settlement. Eastern CFRAM will provide greater clarity of climate change impacts when available.
Conclusion	Manage flood risk and development in line with approved policies and objectives. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.4 Carlanstown

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	PFRA and JBA site visit.
Historic Flooding	No historic records of flooding were found.

Comment:

The Moynalty River flows along the south west boundary of the settlement, potentially impacting some existing residential zoning (A1) and open space (F1) as well as a small proportion of the phased E2 lands. A tributary of the Moynalty impacts the fringe of the undeveloped Community Infrastructure (G1).

Existing residential development (A1) should be managed in line with the policies (WS POL 29 to 36) of the MCDP.

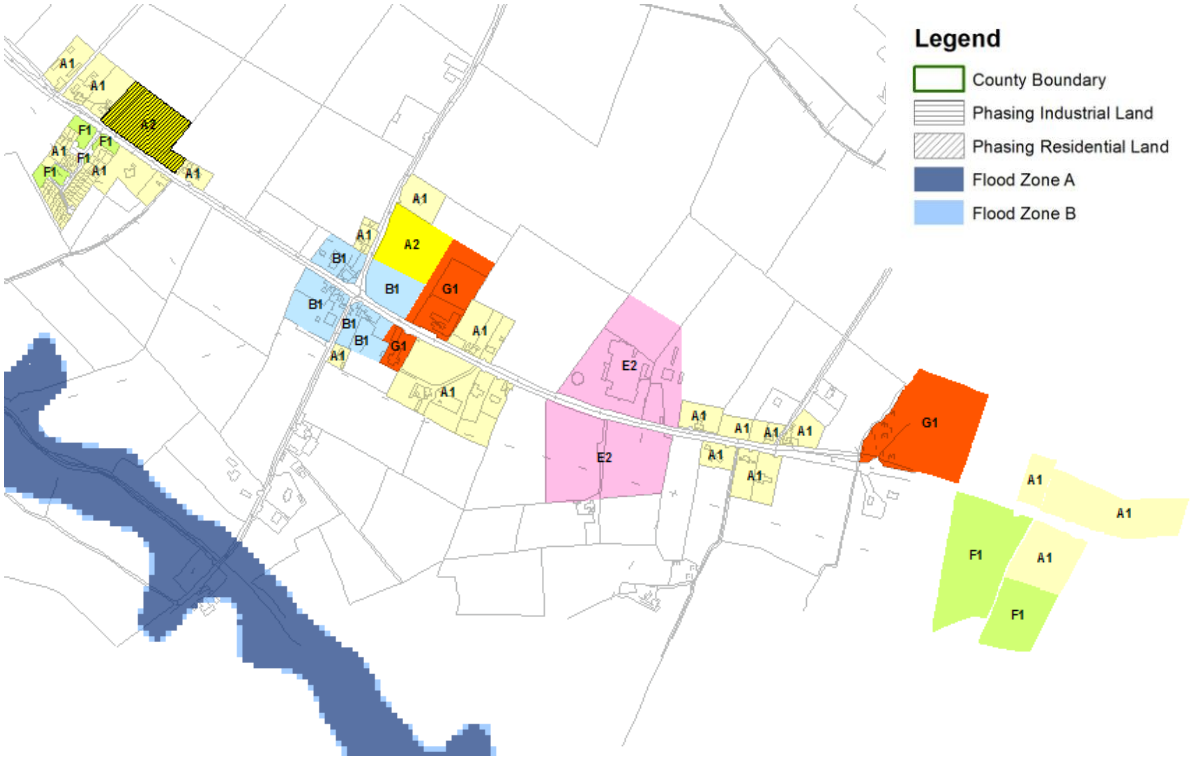
New development under the proposed G1 land use zoning bordering the tributary of the Moynalty River is appropriate as long as risk is managed by adopting a sequential approach to the site layout and locates the more vulnerable development in the parts of the site that are in Flood Zone C and retaining water compatible land uses for the areas within Flood Zone A. Future development at this site will require an FRA and application of the Justification Test where appropriate, to ensure that the development fully considers and manages flood risk to itself and surrounding lands. E2 lands adjacent to the Moynalty River are phased and will not be developed during the lifetime of the proposed plan; therefore they do not require the Justification Test to be passed. Risk on the E2 lands is limited and could be managed by the application of the sequential approach and detailed FRA.

Proposed distributor roads are identified by transport objectives for this settlement but alignments are not yet confirmed. During the environmental assessment stage of the road scheme, the Justification Test will need to be applied if alignments intersect with Flood Zone A/B. FRA will be required to manage the risk and to demonstrate there will be no impact on adjacent lands. OPW Section 50 consent for all watercourse crossings will be required.

Climate Change	A review of the PFRA Flood Zone A and B outlines suggests that there is only a marginal increase in fluvial flood extent for an increase in severity - low impact from climate change in this settlement. Potential increase in runoff from pluvial events.
Conclusion	Manage flood risk and development in line with approved policies and objectives, apply sequential approach within G1 lands at potential risk of flooding to avoid development within Flood Zone A & B.

5.5 Carnaross

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No

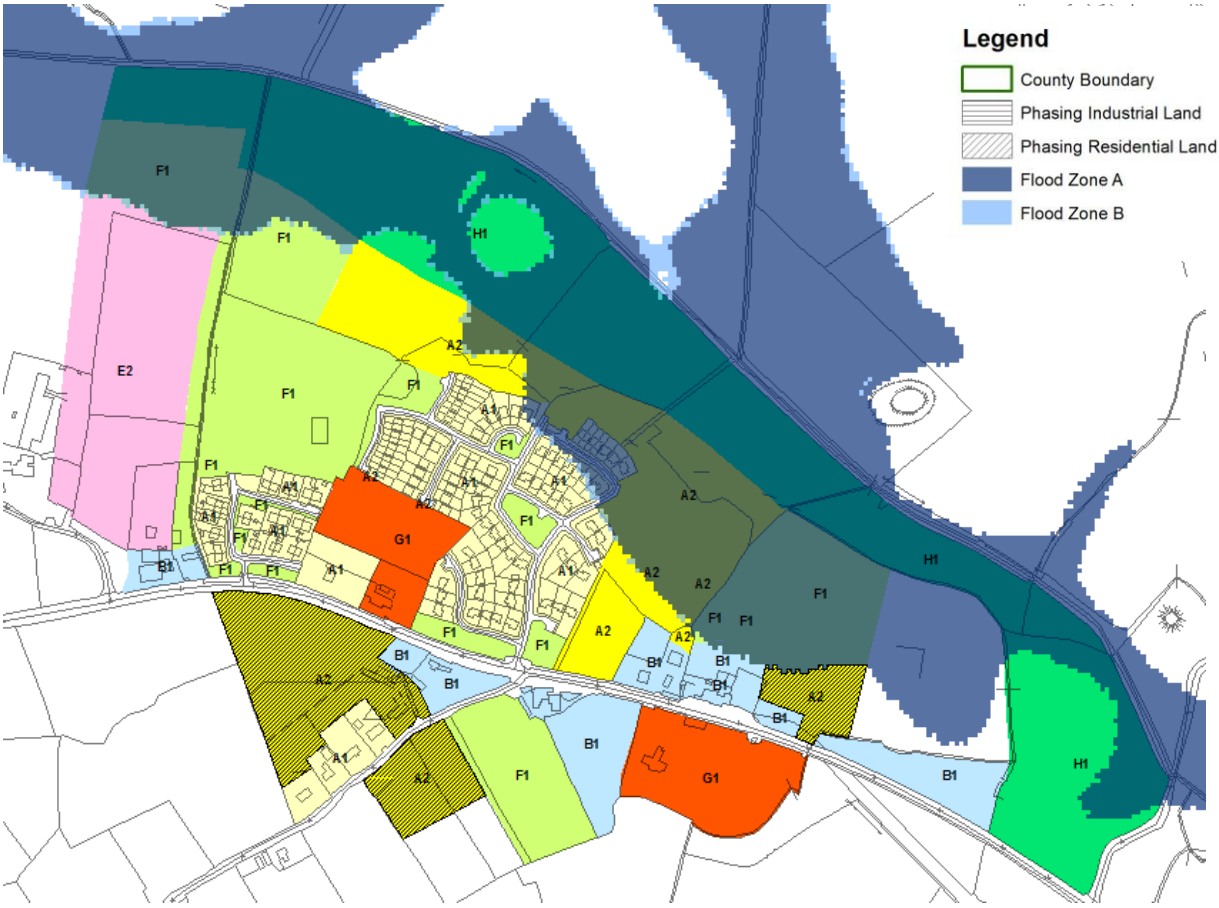


The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	n/a
Historic Flooding	None recorded
Comment	No fluvial flood risk identified and no flood history.
Climate Change	No fluvial impacts, potential increase in runoff.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

5.6 Clonard

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	JFLOW modified based on review of hydrology, LiDAR DTM and JBA site visit.
Historic Flooding	No historic records of flooding were found.

Comment:

The Kilwarden River has a significant floodplain; for the most part this is undeveloped, with the exception of one housing estate. Lands zoned New Residential (A2) are subject to significant flood risk and all of this land has an extant planning permission for residential development. In the case of an extant permission the Justification Test is not applied.

If the site remains unconstructed and the planning application lapses, any future planning applications on the A2 site should be subject to an appropriately detailed FRA specific to the new site layout at development management stage. Under the next variation or draft of the MCDP (if there is no extant permission in place) the lands and zoning should be considered in line with the sequential approach and Justification Test for Plan Making.

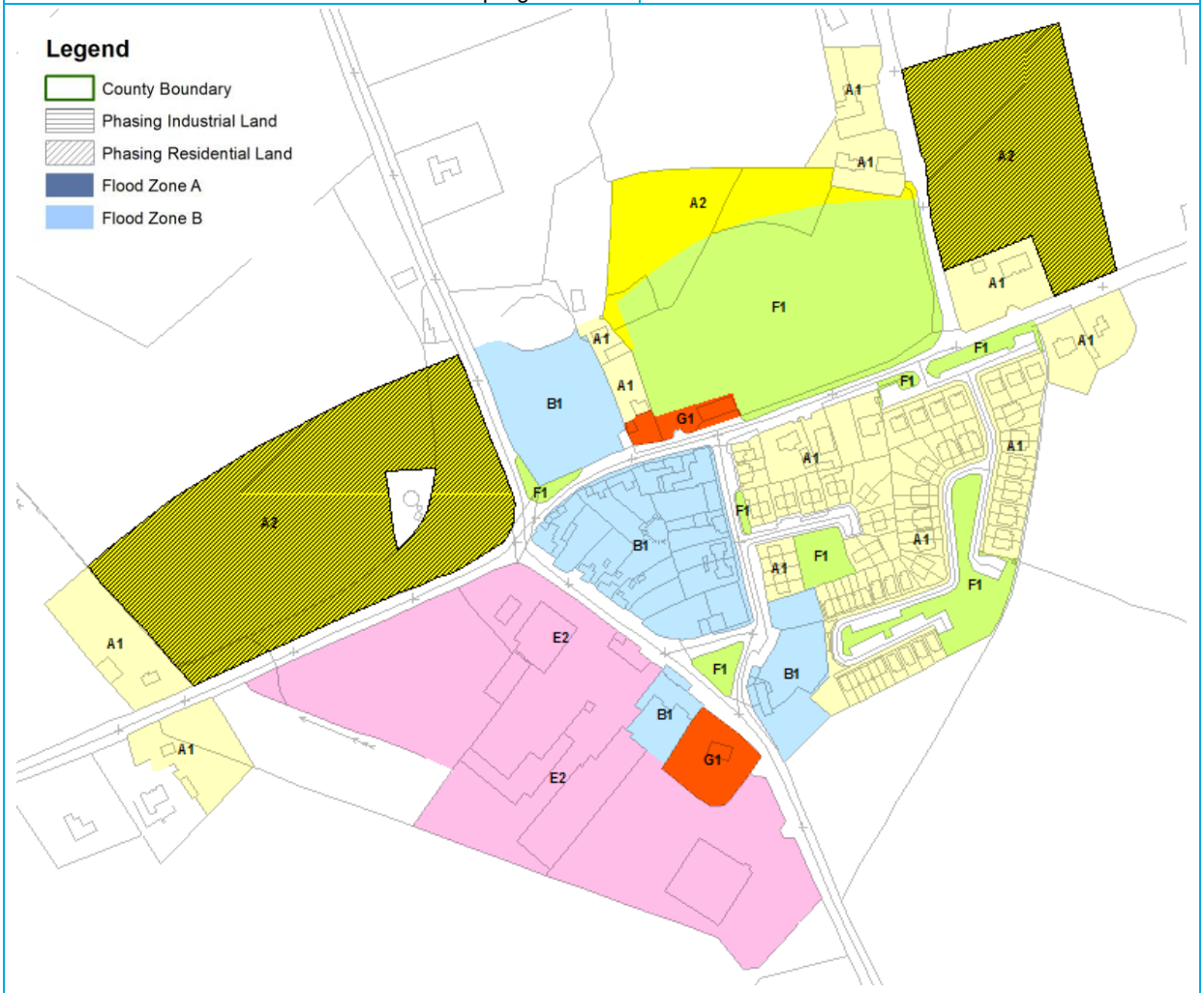
High Amenity (H1) and Open Space (F1) lands are also within Flood Zones A and B and the zoning objectives are consistent with the level of flood risk.

Existing residential development (A1) should be managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019.

Climate Change	Model outlines indicate minor impact from future climate change.
Conclusion	The issue of the extant planning permission for A2 lands within the Flood Zones requires further consideration. Manage existing flood risk and development in line with approved policies and objectives.

5.7 Crossakeel

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No

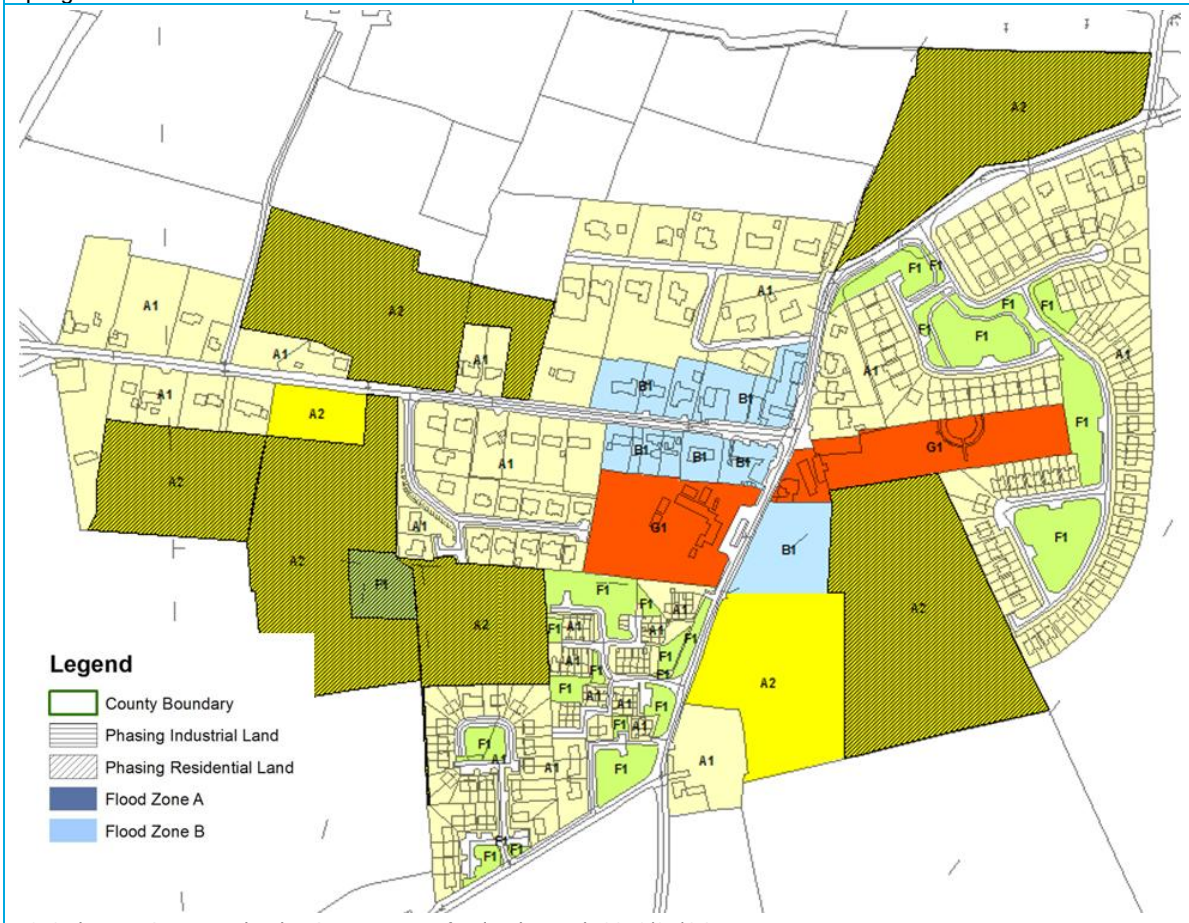


The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	n/a
Historic Flooding	No historic records of flooding were found.
Comment	No fluvial flood risk identified and no flood history.
Climate Change	No fluvial impacts, potential increase in runoff.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

5.8 Donore

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No

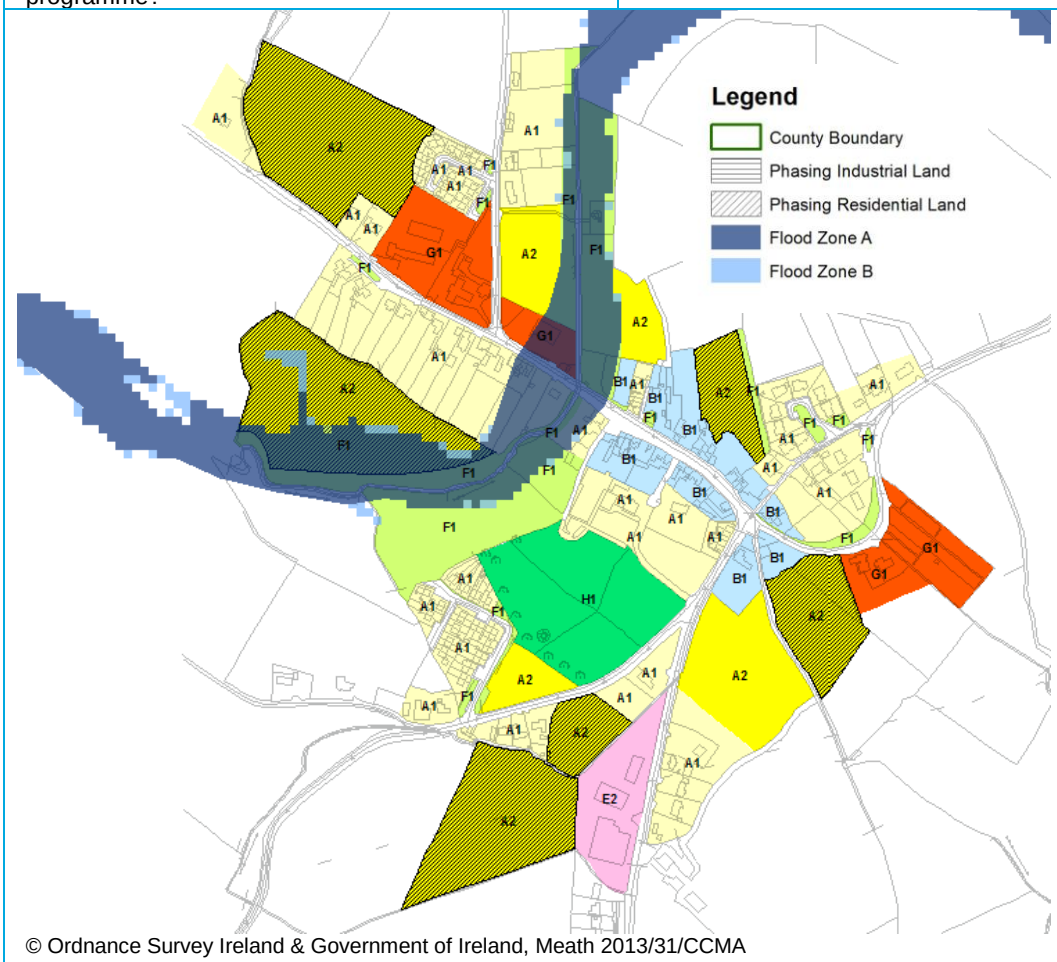


The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	n/a
Historic Flooding	No historic records of flooding were found.
Comment	None recorded
Climate Change	No fluvial flood risk identified and no flood history.
Conclusion	No fluvial impacts, potential increase in runoff.

5.9 Drumconrath

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	JFLOW and validation from historic flooding plus JBA site visit.
Historic Flooding	Flooding reported in 1993, 2008 and most recently 2011 when four private houses and a community centre flooded.

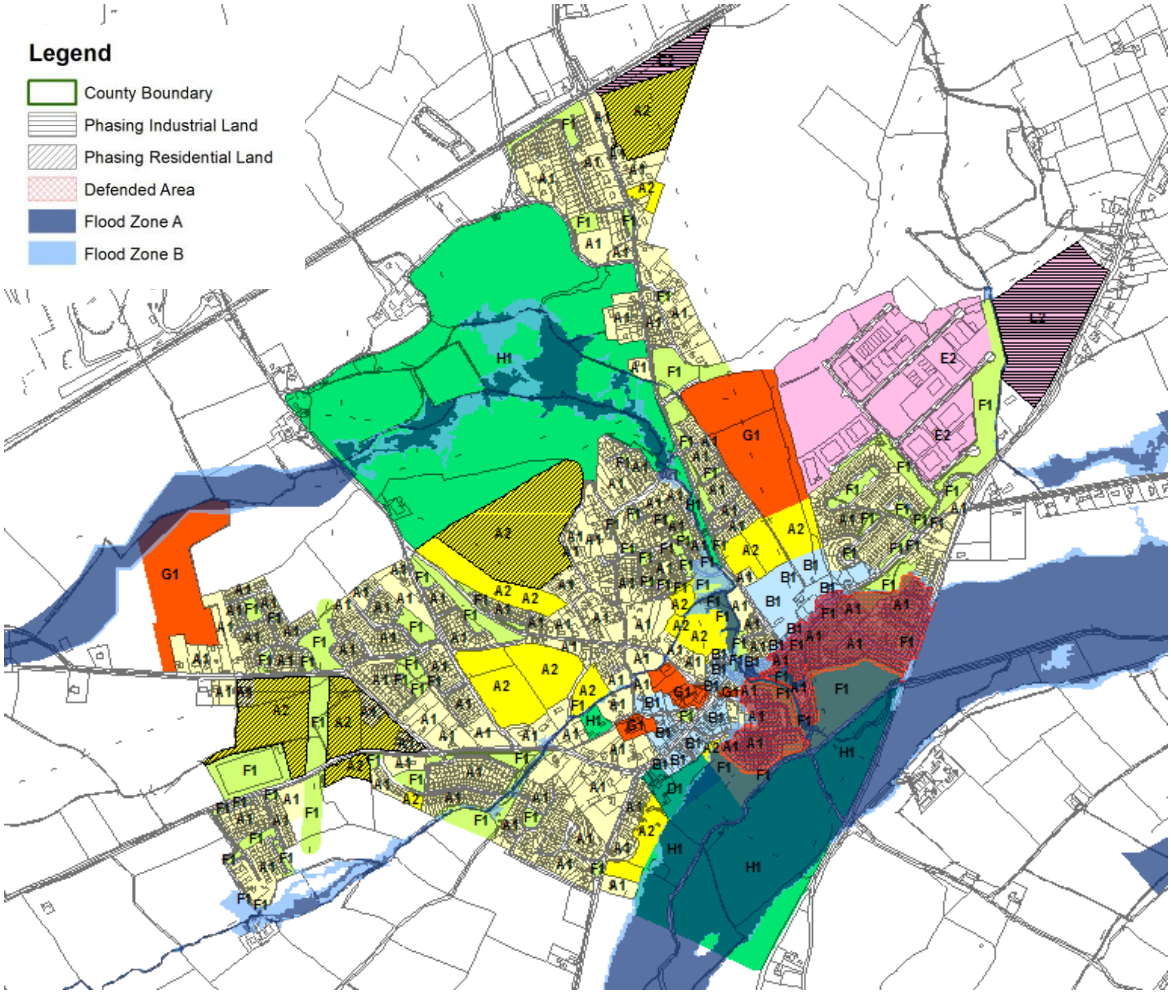
Comment:
Development is restricted by the river and the natural topography of the land. Recent flooding of properties highlighted flood risk in this area which extends to existing residential (A1) and Community Infrastructure (G1). New residential zoning is located outside of Flood Zone A & B and the flood zones have been zoned F1.

Within areas of existing development proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019. Maintenance of the watercourse and culvert is recommended to lower the risk of blockage and flooding relating to surcharging flows. Pedestrian walkways are appropriate within Flood Zone A/B but will require an appropriately detailed FRA at planning stage and should generally not increase ground level within these zones.

Climate Change	Marginal increase in fluvial impact; risk is predominantly linked to the culvert which has a limited capacity.
Conclusion	Manage flood risk and development in line with approved policies and objectives, apply sequential approach within existing zoned development lands at potential risk of flooding.

5.10 Duleek

Hierarchy	SMALL TOWN
Area for Further Assessment under CFRAM programme?	FEM FRAMS published 2011



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS and OPW PFRA
Historic Flooding	Flooding event recorded in October 1993 from the River Nanny. Flood relief scheme carried out.

Comment:

Duleek is at significant risk from the River Nanny and existing development is now protected by the Duleek Flood Relief Scheme. The River Nanny is joined by a watercourse that approaches from the north and flows into the Nanny in the centre of the settlement. Development behind the River Nanny flood defences should be limited to extensions and changes of use or redevelopment of existing sites. No new undeveloped lands are zoned behind the flood defences (other than for water compatible land uses).

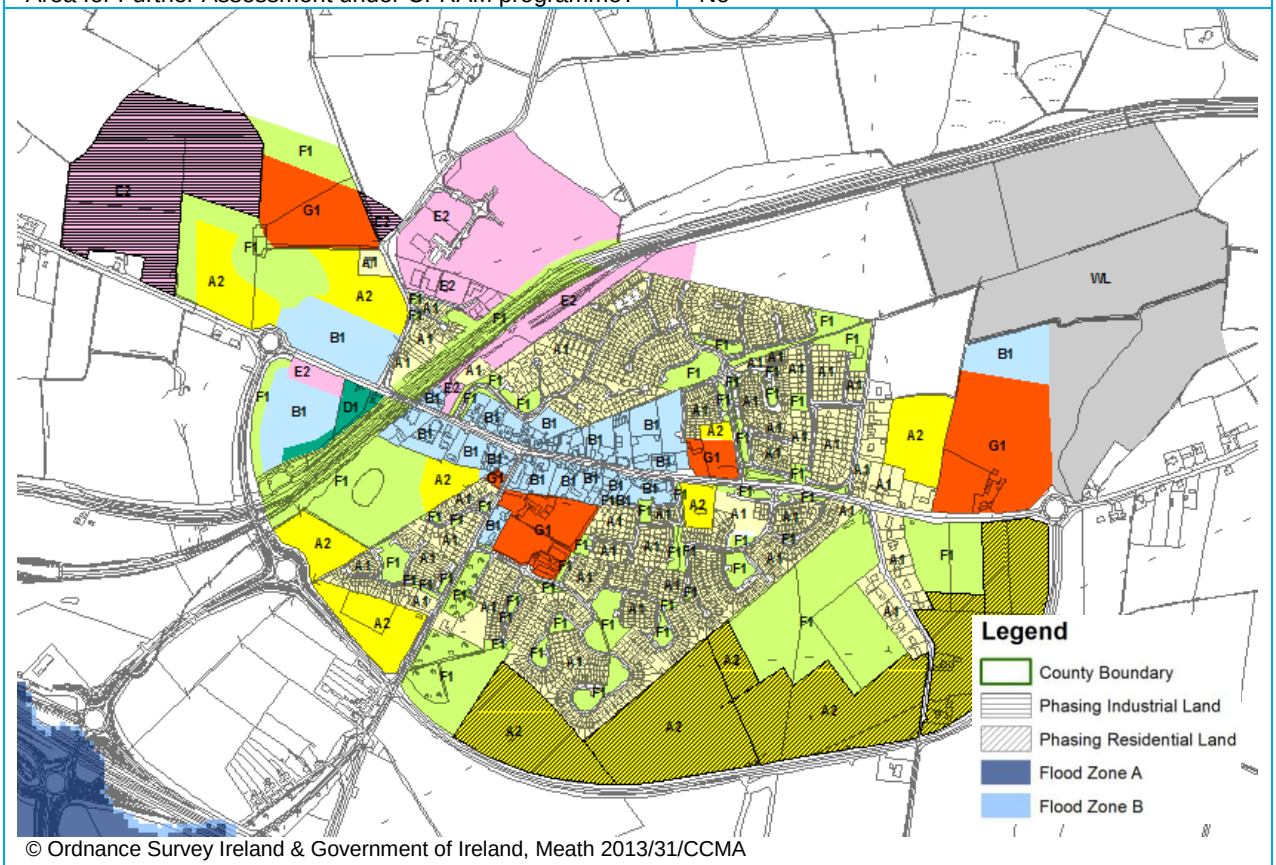
Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019 and an appropriately detailed FRA must be submitted at development management stage.

Undeveloped, zoned lands at risk of flooding include for G1 and H1 objectives on the north and north western fringe of the settlement. H1 is water compatible land use. However, G1 can include for a range of land use vulnerabilities from water compatible through to highly vulnerable. The G1 land use zoning objective is covered by a small margin of Flood Zone A and B and proposals to develop the lands should include for water compatible uses within Flood Zone A. Less vulnerable uses may be permitted in Flood

Zone B, but this is not preferred. Development will require an adequately detailed FRA at development management stage. The maintenance of the flood relief scheme is the responsibility of the OPW and is important to maintain the standard of protection through Duleek. The option for increasing protection to properties in Duleek should be monitored and reviewed in the next cycle of the CFRAM process in 2015. The responsibility for this shall be with the OPW.	
Climate Change	A review of the FEM FRAMS climate change outlines suggests that there is a marginal increase in fluvial flood extent through the core of the settlement. Climate change impacts should be reviewed in the future to ensure the Duleek Flood Relief Scheme is providing adequate protection.
Conclusion	Manage flood risk and development in line with approved policies and objectives, Apply the sequential approach within G1 lands to the north west of the settlement and ensure appropriately detailed FRA is provided for any new or existing zoned development lands at potential risk of flooding. The option for increasing protection to properties in Duleek shall be monitored and reviewed in the next cycle of the CFRAM process in 2015. The responsibility for this shall be with the OPW.

5.11 Enfield

Hierarchy	SMALL TOWN
Area for Further Assessment under CFRAM programme?	No

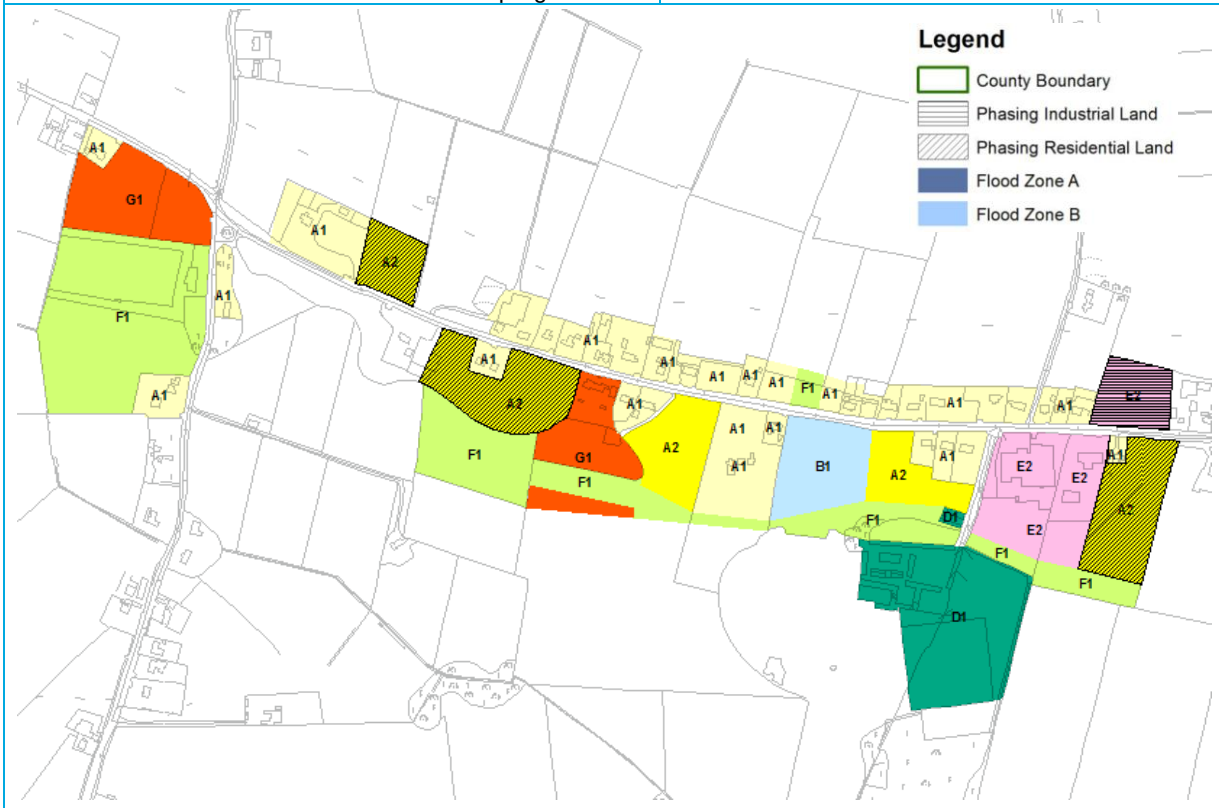


The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	n/a
Historic Flooding	Flooding after heavy rainfall recurs.
Comment	None recorded
Climate Change	No fluvial flood risk identified and no flood history.
Conclusion	No fluvial impacts, potential increase in runoff.

5.12 Gibbstown

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No

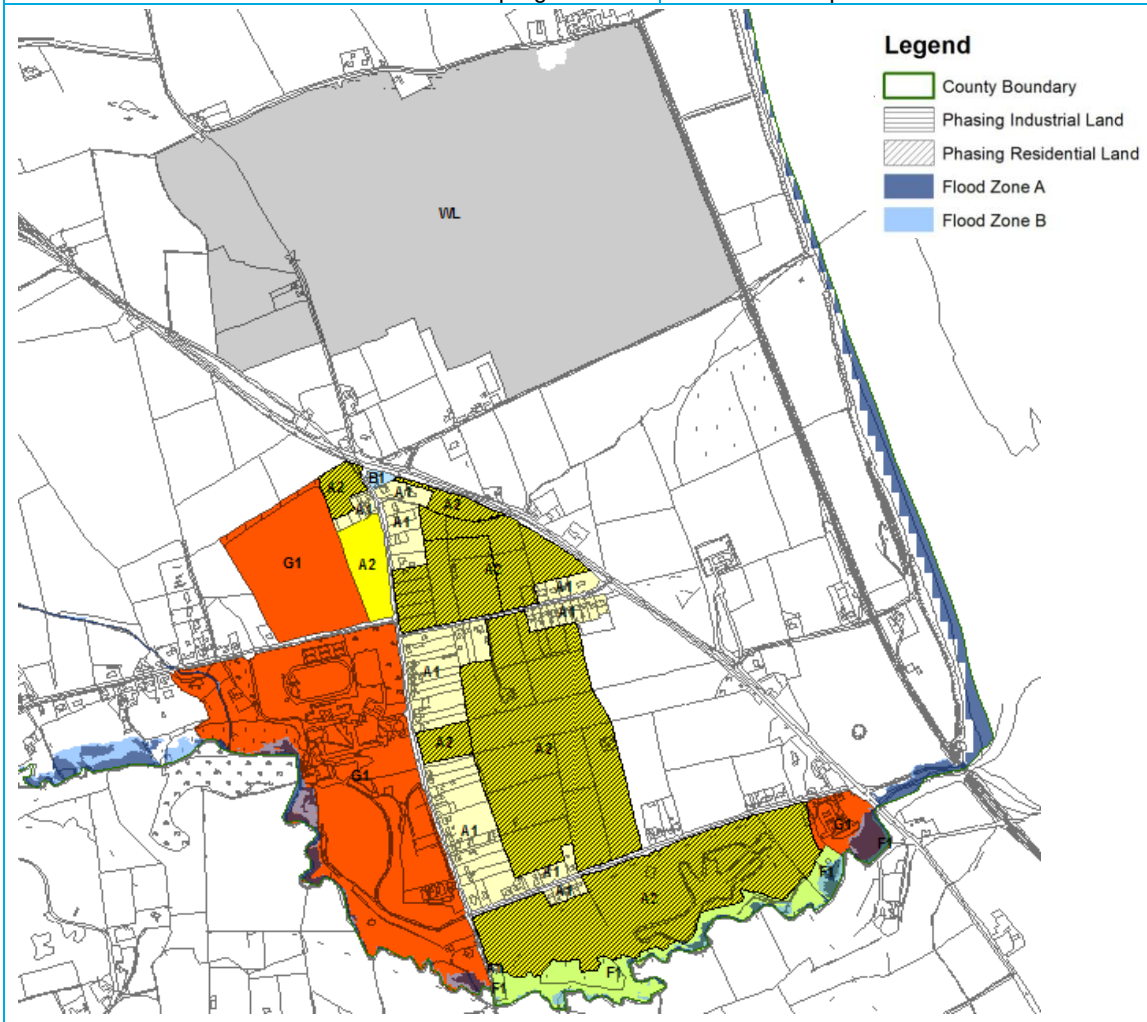


The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	n/a
Historic Flooding	No historic records of flooding were found.
Comment	No fluvial flood risk identified and no flood history.
Climate Change	No fluvial impacts, potential increase in runoff.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

5.13 Gormanston

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	FEM FRAMS published 2011



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS - note the Flood Extents are only shown for lands within the Meath county boundary.
Historic Flooding	History of recurring flood event at Martin's Road. Cause of flooding sites as flat land with no drainage and therefore liable to flooding after prolonged rainfall.

Comment:
The southern boundary of the settlement is created by the Delvin River, which has been assessed as part of the FEM FRAMS. Flood risk from the Delvin is limited to open spaces within existing development sites and also F1 zoning.

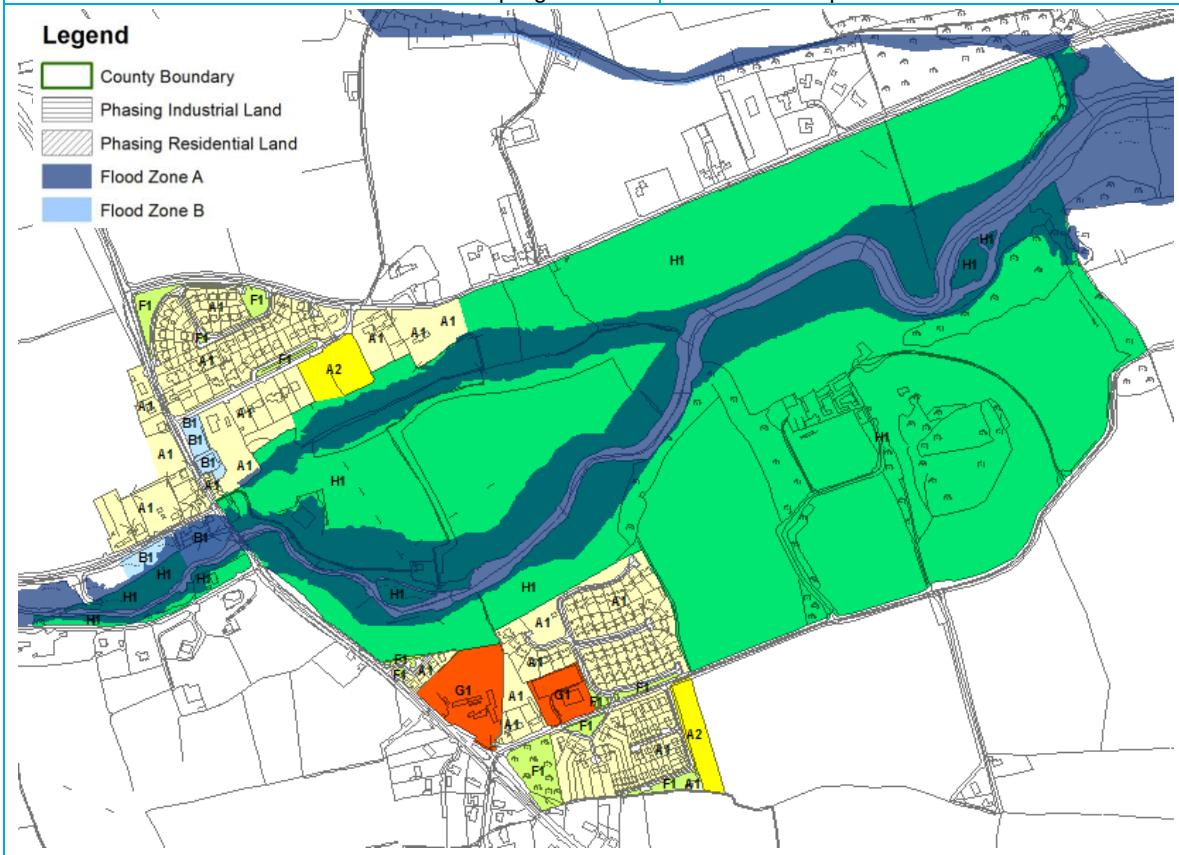
G1 can include for a range of land use vulnerabilities from water compatible through to highly vulnerable. As the existing sites under G1 zoning are at potential risk of flooding in some isolated areas, these pockets of flooding should be avoided. Development elsewhere is appropriate.

A flood forecasting and warning system was recommended for the Delvin River by the FEM FRAMS. In Gormanston there are no properties at direct risk but the measure would assist people who intend to access flooded areas.

Climate Change	A review of the FEM FRAMS climate change outlines suggests that there is a negligible increase in fluvial flood extent on the River Delvin.
Conclusion	Manage flood risk and development in line with approved policies and objectives, avoidance of development within Flood Zone A or B.

5.14 Julianstown

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	FEM FRAMS published 2011



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS and JBA site visit.
Historic Flooding	Reports of recurring flooding in the reach between Julianstown and Beaumont. Flood waters from the River Nanny over onto floodplain 2-3 times per year.

Comment:

The River Nanny flows through Julianstown but the majority of existing development is situated at levels far above that of the floodplain. The exception to this is the now unoccupied Old Mill Hotel which is within the B1 zoning at the junction of the R132 and R150. Any future planning applications on this site must be subject to an appropriately detailed FRA at development management stage.

An extant planning permission is located partly within A2 and H1 lands. The granted application includes for water compatible land use (pedestrian walkways/access to river) within Flood Zone A/B, highly vulnerable land uses remain within Flood Zone C and the Justification Test does not apply.

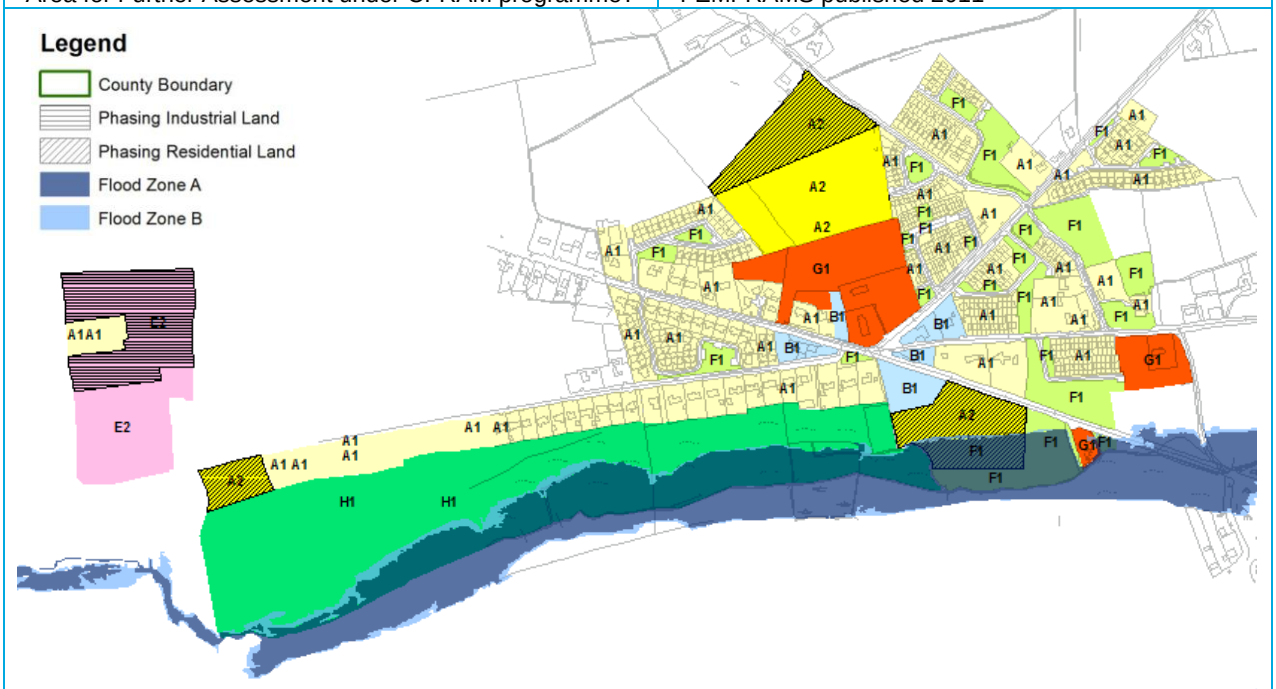
Pedestrian walkways are generally appropriate within Flood Zone A/B but will require an appropriately detailed FRA at planning stage (for any further extensions of these routes) and should generally not result in increased ground level within these zones.

A flood forecasting and warning system was recommended for the Nanny River by the FEM FRAMS as a non-structural measure designed to limit the impact of flooding for communities at risk from the Nanny River.

Climate Change	A review of the FEM FRAMS climate change outlines suggests that there is a negligible increase in fluvial flood extent on the River Nanny.
Conclusion	Manage flood risk and development in line with approved policies and objectives, A site specific FRA will be required for any redevelopment of the Old Mill Hotel site (B1 zoning). A flood forecasting and warning system was recommended for the Nanny River by the FEM FRAMS.

5.15 Kentstown

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	FEMFRAMS published 2011



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS
Historic Flooding	Reports of historic flooding from the River Nanny (impacting roads not houses). Recurring road flooding related to minor local drainage issue.

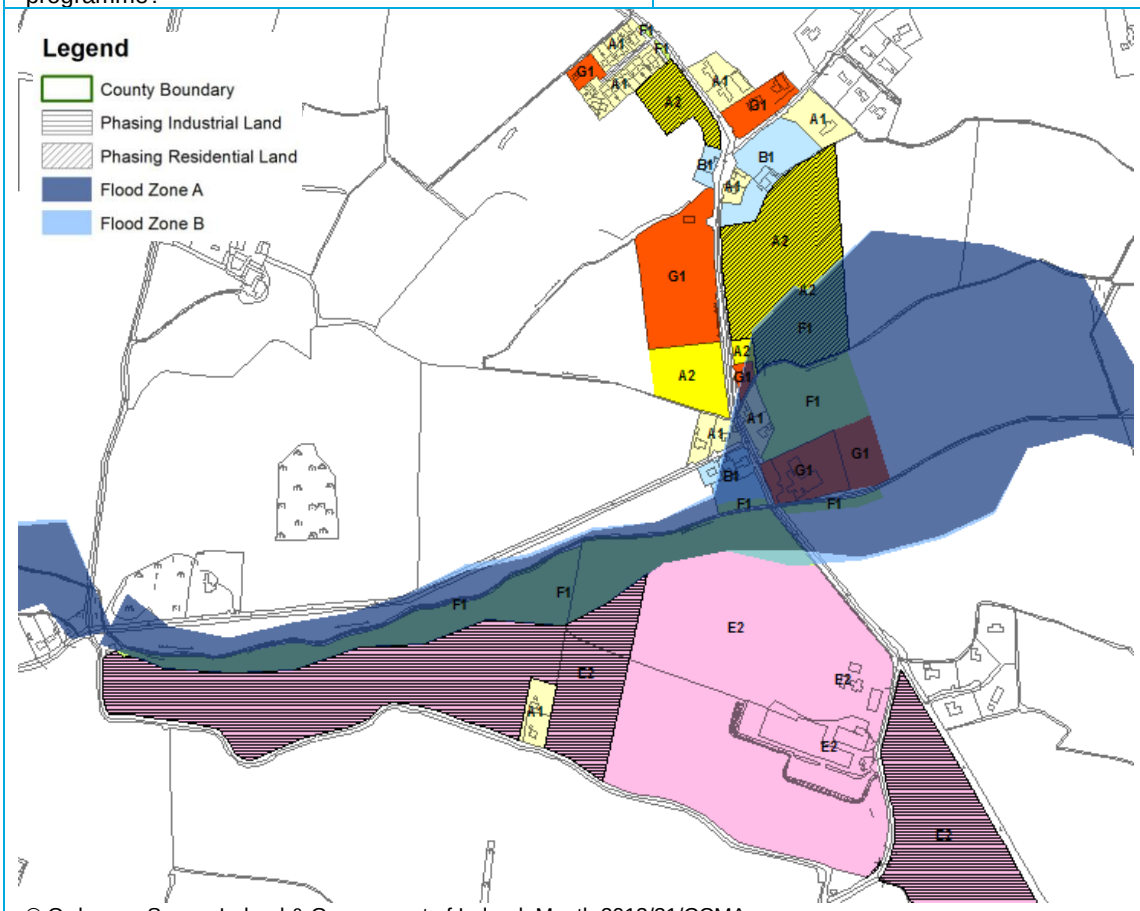
Comment:
FEM FRAMS report notes that "*The Kentstown area is exposed to fluvial flooding and the R153 road bridge overtops for the 2% AEP fluvial design event or greater. Fluvial flooding for the 10%, 1% and 0.1% AEP flood events affects agricultural lands on the left and right banks of the River Nanny.*"
The River Nanny restricts development to the south and lands subject to flood risk are appropriately zoned as open space (F1). The Flood Zones will not hinder future development for the majority of the settlement. A water treatment/pumping station zoned G1 is located adjacent to the River Nanny and has been raised/protected from the river. A site specific flood risk assessment would be required for any future development/upgrade here.
Flood risk can be managed by adopting the policies set out in the MCDP.

A flood forecasting and warning system was recommended for the Nanny River by the FEM FRAMS as a non-structural measure designed to limit the impact of flooding for communities at risk from the Nanny River.

Climate Change	A "Marginal" impact is predicted by the FEM FRAMS for both banks of the River Nanny.
Conclusion	Manage flood risk and development in line with approved policies and objectives. The FEM FRAMS recommendation for proactive maintenance of the Kentstown Bridge R153 should be followed. A flood forecasting and warning system was also recommended by the FEM FRAMS.

5.16 Kilbride

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Eastern CFRAM Flood Risk Review (PFRA)
Historic Flooding	Kilbride recurring flooding after heavy rain due to blocked drains - surface water flood problem.

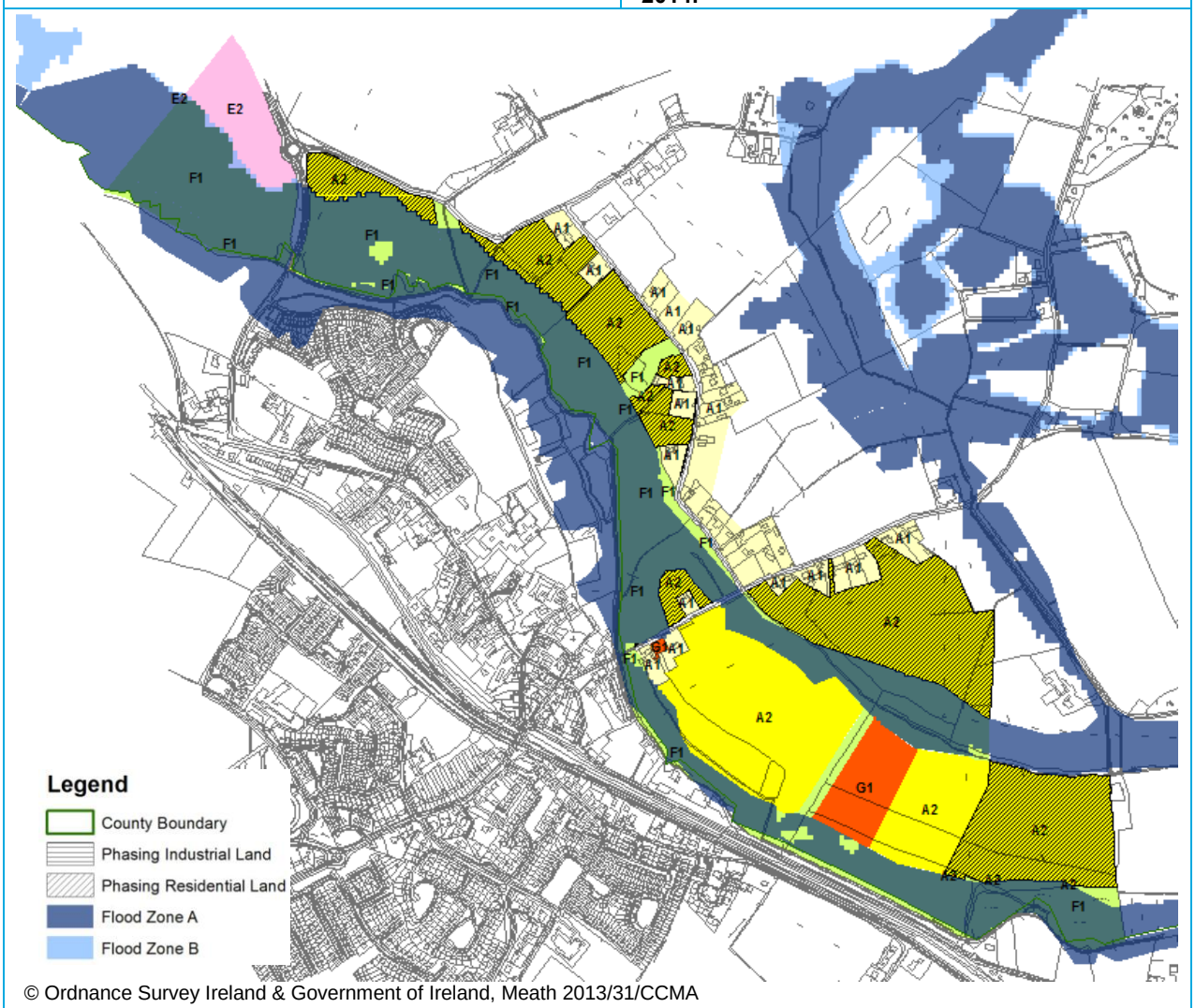
Comment:
The Ward River flows through Kilbride and passes along the boundary of Kilbride National School. There are no historic records that suggest the River Ward has flooded the school or other properties, however the OPW PFRA mapping includes for a significant area of flood extent. There are also some un-mapped field drains which could present a small degree of flood risk.
Town Centre (B1), Community Infrastructure (G1) and Open Space (F1) are at risk. Most of the land is under existing development and any additional development should be managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019.

Any extension to the Kilbride National School would require an appropriately detailed FRA which includes for detailed modelling of the Ward River. A2 lands that are adjacent to Flood Zone A/B will not be subject to development during the current development plan period. In addition, any new development adjacent to the minor field drains should conduct an appropriately detailed FRA to fully consider potential impacts from the watercourse.

Climate Change	A marginal increase in flood risk is suggested by the flood extents.
Conclusion	Manage flood risk and development in line with approved policies and objectives, application of the sequential approach and associated detailed FRA is required for any new development within Flood Zone A/B or adjacent to a field drain.

5.17 Kilcock Environs

Hierarchy	Moderate Sustainable Growth Town
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Flood Risk Assessment & Management (FRAM) Study for River Rye Water and Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.
Historic Flooding	Recurring flooding from the River Rye Water is noted along with events in August 2008 and November 2000.

Comment:

Kilcock Environs is situated on the county border with Kildare and is subject to significant flood risk from the River Rye Water. A FRAM study for the area was commissioned for a consortium of private developers and the existing (undefended) flood outlines were provided to MCC and have been used to represent the Flood Zones. A flood relief scheme designed as part of the FRAM study for the undeveloped lands has been granted permission by An Bord Pleanála, but is yet to be constructed.

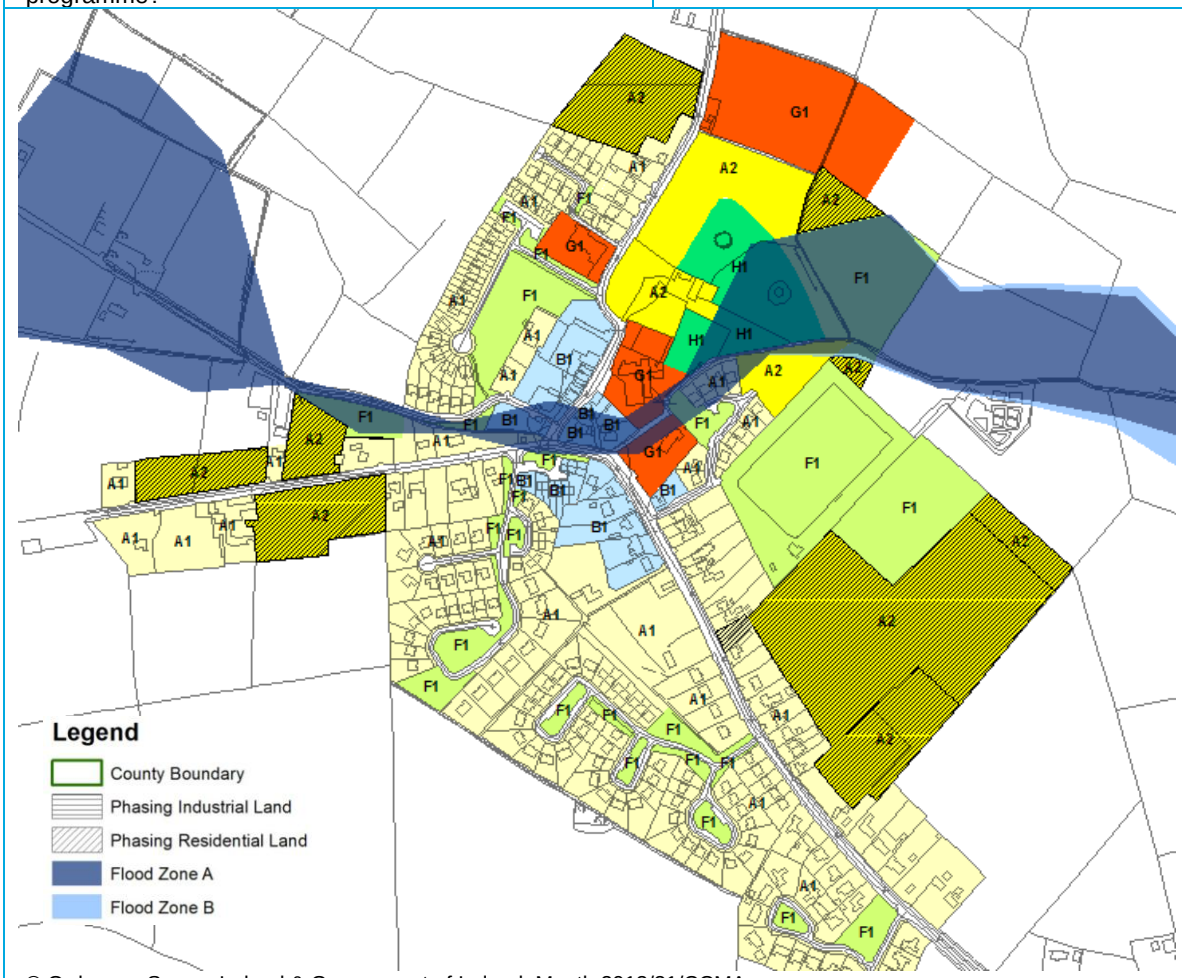
When zoning land, consideration must be given to the undefended scenario (as stated in the Planning System and Flood Risk Management Guidelines). Existing development has historically avoided areas at high risk of flooding from the River Rye Water. Undeveloped land use zoning objectives include for F1 within Flood Zone A/B and remaining Flood Zone C lands are appropriately zoned for A2 development.

A2 and G1 land use zoning objectives exist within the area to the south east of the R125; where the River Rye Water bifurcates into two channels. This area is within Flood Zone C, but a strip of Flood Zone A bounds the northern and southern extent of the A2 and G1 objectives. Whilst highly vulnerable development is appropriate

within Flood Zone C, road access must be maintained in the event of flooding and roads objectives exist to ensure this is achieved. Since the proposed Local Distributor Road, extending from the R148 (Maynooth Road) to the existing R125 (Dunshaughlin Road), is crossing Flood Zone A/B the Justification Test has been applied and passed (see Appendix A.5). Any planning permissions for A2 or G1 must be subject to appropriately detailed FRA at development management stage. The FRA must include for the design of FFL/ground levels that are in excess of the 100 year flood level plus climate change and freeboard. The Local Distributor Road extending from the R148 (Maynooth Road) to the existing R125 (Dunshaughlin Road) must also undergo appropriately detailed FRA at development management stage. As the road alignment is within Flood Zone A/B adequate consideration should be given to the maintenance of floodplain storage and potential negative impacts of the road alignment on the neighbouring A2 and G1 sites. Section 50 consent will be required from the OPW for any watercourse crossings. An area of E2 zoning exists in the north west corner of the settlement; this is within Flood Zone C but bounds Flood Zone A/B. An appropriately detailed FRA is required at development management stage to ensure appropriate FFLs and ground levels are achieved. The Eastern CFRAM flood mapping (available in 2014) and management plan (available 2015/16) will provide additional clarity to flood mapping and risk management measures and should be consulted when published.	
Climate Change	A marginal increase in flood risk is expected on the River Rye Water.
Conclusion	Manage flood risk and development in line with approved policies and objectives, appropriately detailed FRA is required for any new E2, A2 or G1 development in this settlement which must demonstrate that FFLs and ground levels are maintained above the 100yr flood level plus climate change and freeboard. The Local Distributor Road must also undergo FRA at development management stage. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.18 Kildalkey

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Eastern CFRAM Flood Risk Review (PFRA)
Historic Flooding	No historic records of flooding were found

Comment:

Flood risk in Kildalkey is related to a single watercourse with no previous history of flooding. The village centre (B1, A1 and F1) lands are at potential risk and this area contains existing development.

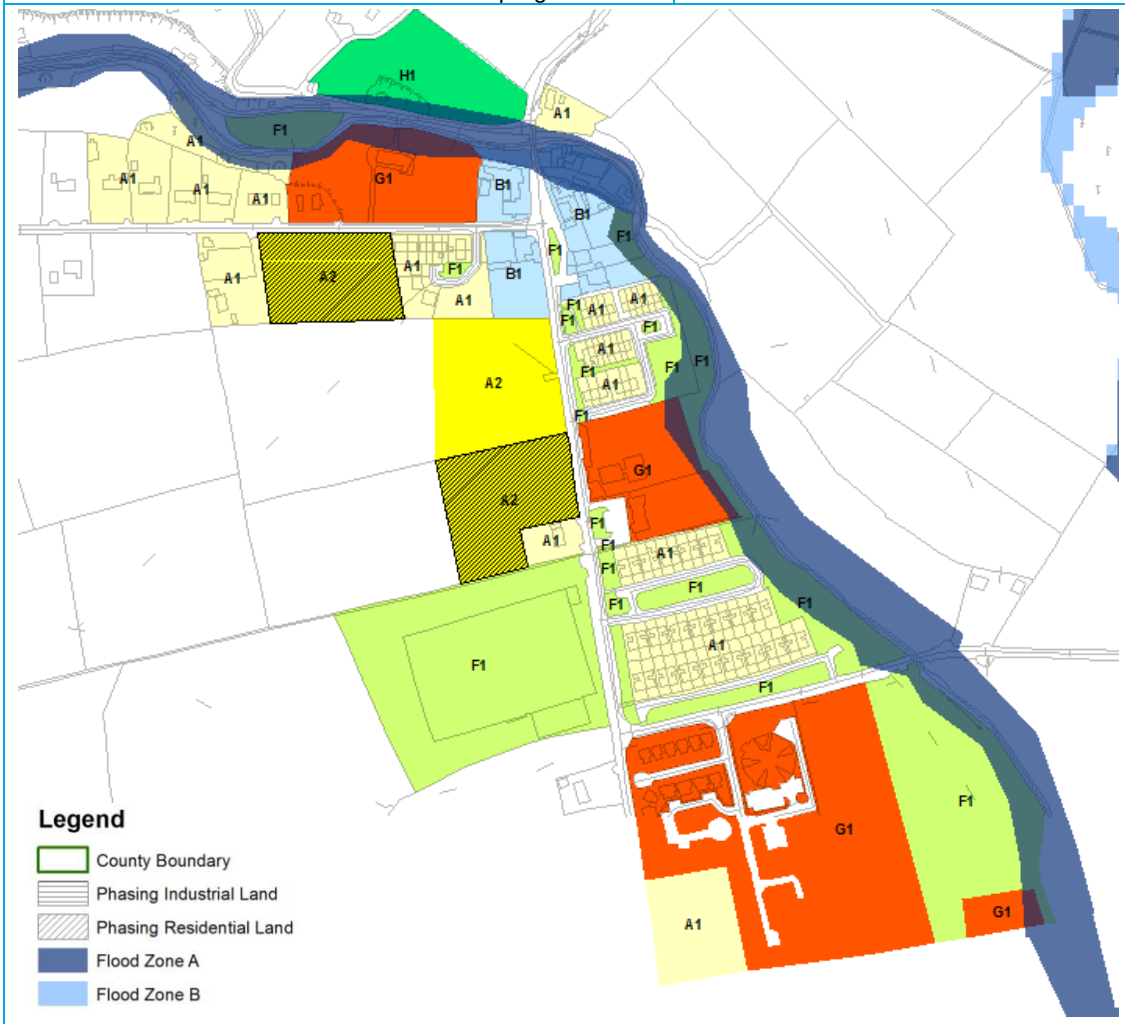
To the east of the village centre are undeveloped A2 lands with an extant permission. In the case of an extant permission, the Justification Test is not applied. If the site remains unconstructed and the planning application lapses, any future planning applications on the site should be subject to an appropriately detailed FRA specific to the new site layout at development management stage. Under the next variation or draft of the MCDP (if there is no extant permission in place) the lands and zoning should be considered in line with the sequential approach and Justification Test for Plan Making.

Existing residential development (A1 & B1) should be managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019.

Climate Change	Flood outlines suggest that the site is not particularly sensitive to the impacts of climate change.
Conclusion	Manage flood risk and development in line with approved policies and objectives, application of the sequential approach and associated detailed FRA is required for any new development within Flood Zone A/B

5.19 Kilmainhamwood

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

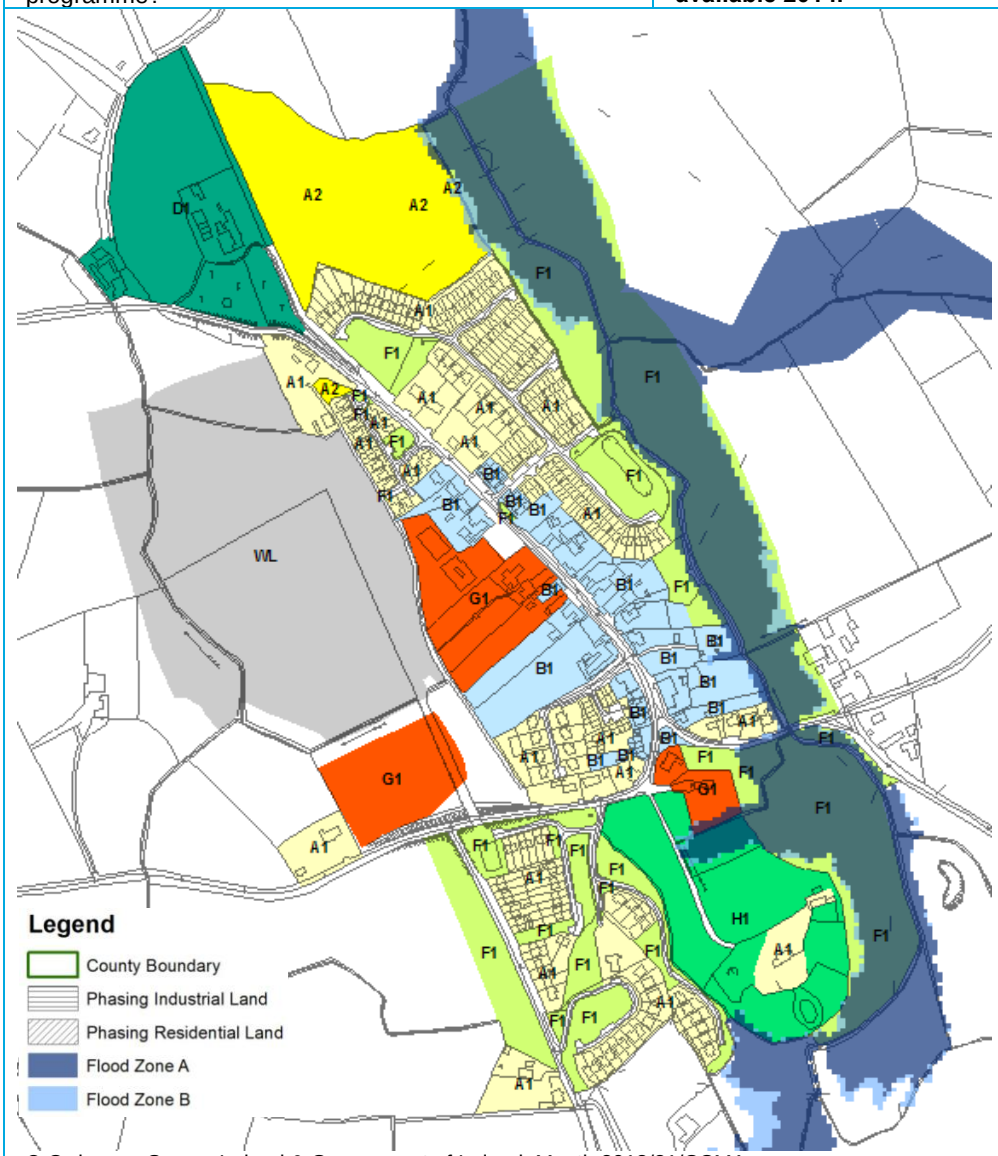
Flood Zone Data	North West Neagh-Bann CFRAM Flood Risk Review (PFRA) and JBA site visit.
Historic Flooding	Four residential properties recently flooded and remedial work (dredging) has been carried out on the watercourse by OPW. Local pluvial flooding noted near to football pitch.

Comment:
Development is constrained to the north and east by the Kilmainham River and to the west by elevated ground. The extent of land use zonings shown to be within areas at potential flood risk are all on existing developed sites and no new development is proposed within Flood Zone A or B.
Risk to existing residential, commercial centre and community infrastructure development (A1, B1 & G1) should be managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019. Maintenance of the watercourse (as already undertaken by OPW) is recommended to lower the risk of flooding. Pedestrian walkways within Flood Zone A or B are appropriate and will require an appropriately detailed FRA at planning stage and should generally not result in an increase in ground level within these zones.

Climate Change	A review of the PFRA Flood Zone A and B outlines suggests that there is only a marginal increase in fluvial flood extent for an increase in severity. Potential increase in runoff from pluvial events but overall low climate change impact.
Conclusion	Manage flood risk and development in line with approved policies and objectives, apply sequential approach within existing zoned development lands at potential risk of flooding.

5.20 Kilmessan

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	JFlow, Eastern CFRAM Flood Risk Review (PFRA) & and JBA site visit.
Historic Flooding	Reports of recurring flood event from a stream to the north. Record states this occurs annually. Flood event in 2008 affected 1 property.

Comment:

The River Skane flows through Kilmessan and the Flood Zone extent mapping has been re-modelled using revised flow estimates and improved DTM. There is a clearly defined floodplain associated with the river and existing development through Kilmessan has historically avoided high risk areas.

The principal of risk avoidance has been applied when considering undeveloped land use zoning objectives and areas within Flood Zone A and B are under H1 or F1 zoning to ensure water compatible uses are maintained.

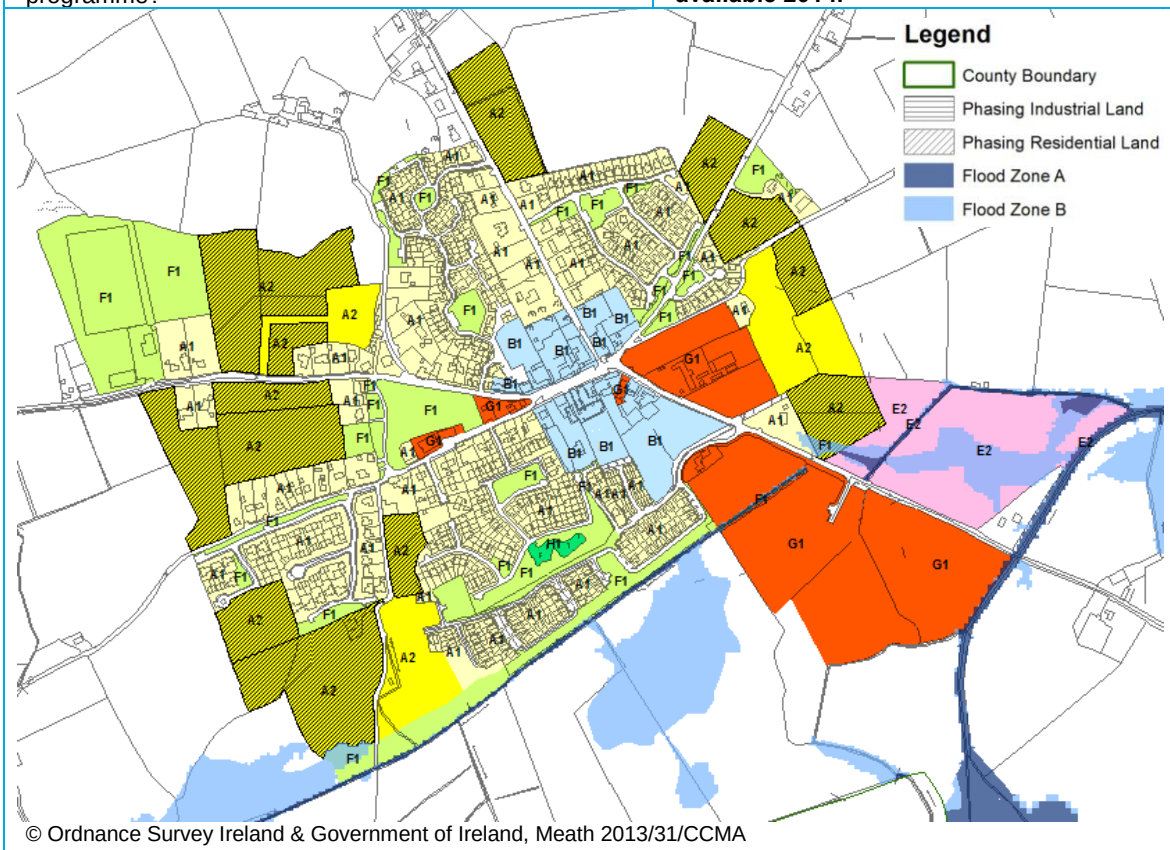
Kilmessan Bridge represents the largest risk to existing property as a result of the potential for structure blockage and residual flood risk from increased flood levels. An active maintenance programme on the watercourse would provide a suitable risk management measure.

The Eastern CFRAM flood mapping (available in 2014) and management plan (available 2015/16) will provide

additional clarity to flood mapping and risk management measures and should be consulted when published.	
Climate Change	JFLOW Flood Zone A and B outlines suggest that there is only a marginal increase in fluvial flood extent through the core of the village. The area most sensitive to the impacts of climate change is the area upstream of Kilmessan Bridge.
Conclusion	Manage flood risk and development in line with approved policies and objectives. Active maintenance of the river at Kilmessan Bridge is recommended to reduce the probability of structure blockage. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.21 Longwood

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	JBA 1D hydraulic model using Eastern CFRAM survey data and JBA site visit.
Historic Flooding	No history of flooding with the urban area of Longwood but a record of flooding recurring in the Moyvalley.

Comment:

The River Blackwater flows adjacent to the eastern border of the settlement, adjacent to G1 and E2 lands. A large field drain extends along the southern border of the settlement and flows into the River Blackwater passing through the G1 and E2 lands. The Flood Zone extent mapping has been re-modelled using revised flow estimates, OPW CFRAM survey data and improved DTM. The channel capacity of the field drain and the River Blackwater has been modified and largely contains the 1 in 100 year flows (Flood Zone A). Flows in excess of this standard lead to inundation of the surrounding land and this is demonstrated by the extent of Flood Zone B.

The G1 lands in the east of the settlement cater for an existing new school and an undeveloped adjacent site. The E2 lands are undeveloped.

Any new development within the G1 lands should be subject to an appropriately detailed FRA at development management stage to ensure that the FFL is set appropriately and the site can manage any potential risk. Within the E2 lands, Flood Zone A has been zoned as F1 (open space), the margin of impacted land is small. For the remainder of the site, which is partly impacted by Flood Zone B the less vulnerable E2 zoning is appropriate if proposed development provides for an adequately detailed FRA at application stage. The FRA must quantify flood levels and provide for adequate FFLs and mitigation of risk from the nearby watercourses and also surface water drainage.

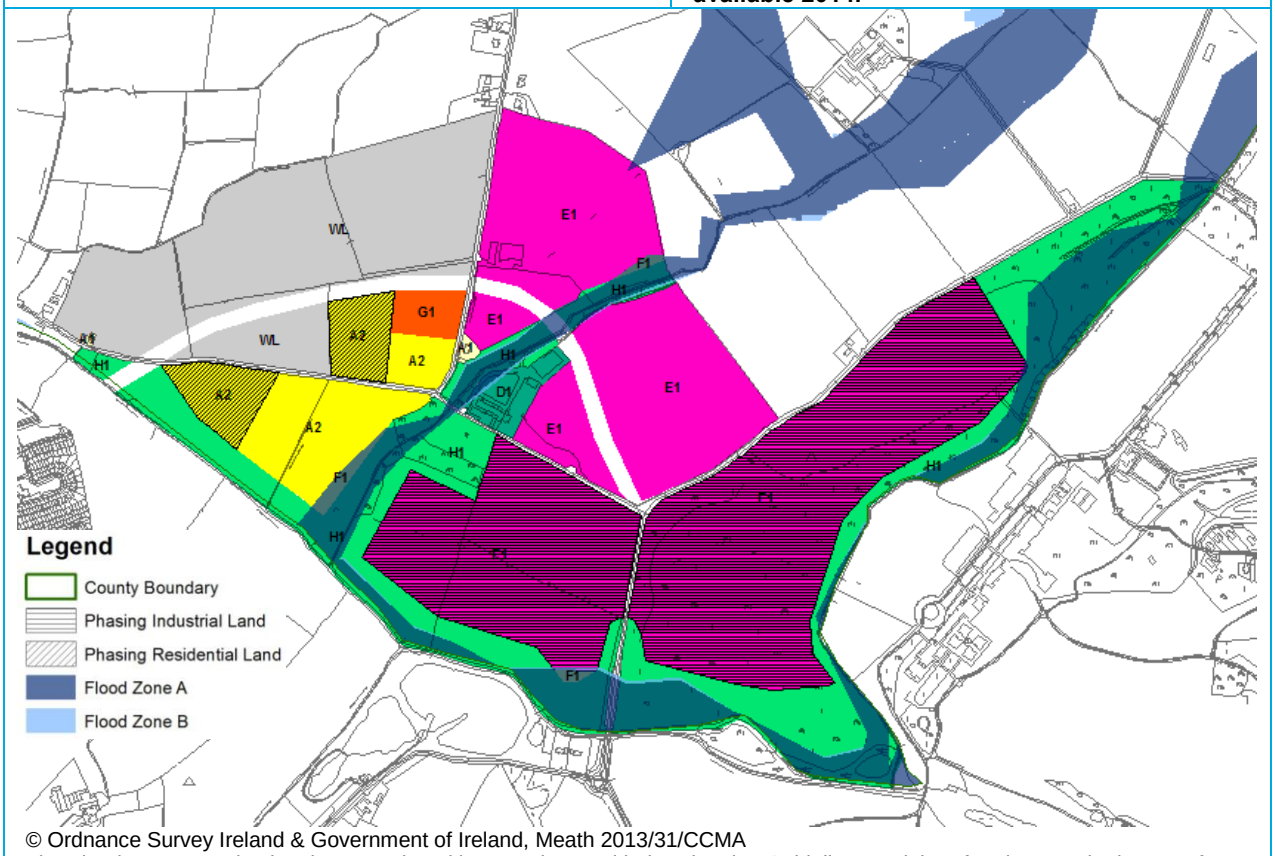
A small corner of phased residential (A2) land, adjacent to the E2 zoning, is within Flood Zone B. This land cannot be developed during the plan lifetime and does not require application of the Justification Test.

The potential for structure blockage and residual flood risk from increased flood levels should be managed by the appropriate maintenance of the large field drain that runs through the G1 and E2 lands. Previous flooding in the

area has resulted from the operation of a sluice on this watercourse. The Eastern CFRAM flood mapping (available in 2014) and management plan (available 2015/16) will provide additional clarity to flood mapping and risk management measures and should be consulted when published.	
Climate Change	Flood Zone A and B outlines suggest that there is a potential sensitivity to the impacts of climate change as the current channel capacities is closely aligned with the current 1 in 100 year event.
Conclusion	Manage flood risk and development in line with approved policies and objectives. Monitor the impacts of climate change at the next development plan review. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.22 Maynooth Environs

Hierarchy	LARGE GROWTH TOWN II
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Eastern CFRAM Flood Risk Review (PFRA) and JBA site visit
Historic Flooding	A record of a flood event in November 2000 is noted. The source is the floodwater is the River Rye Water.

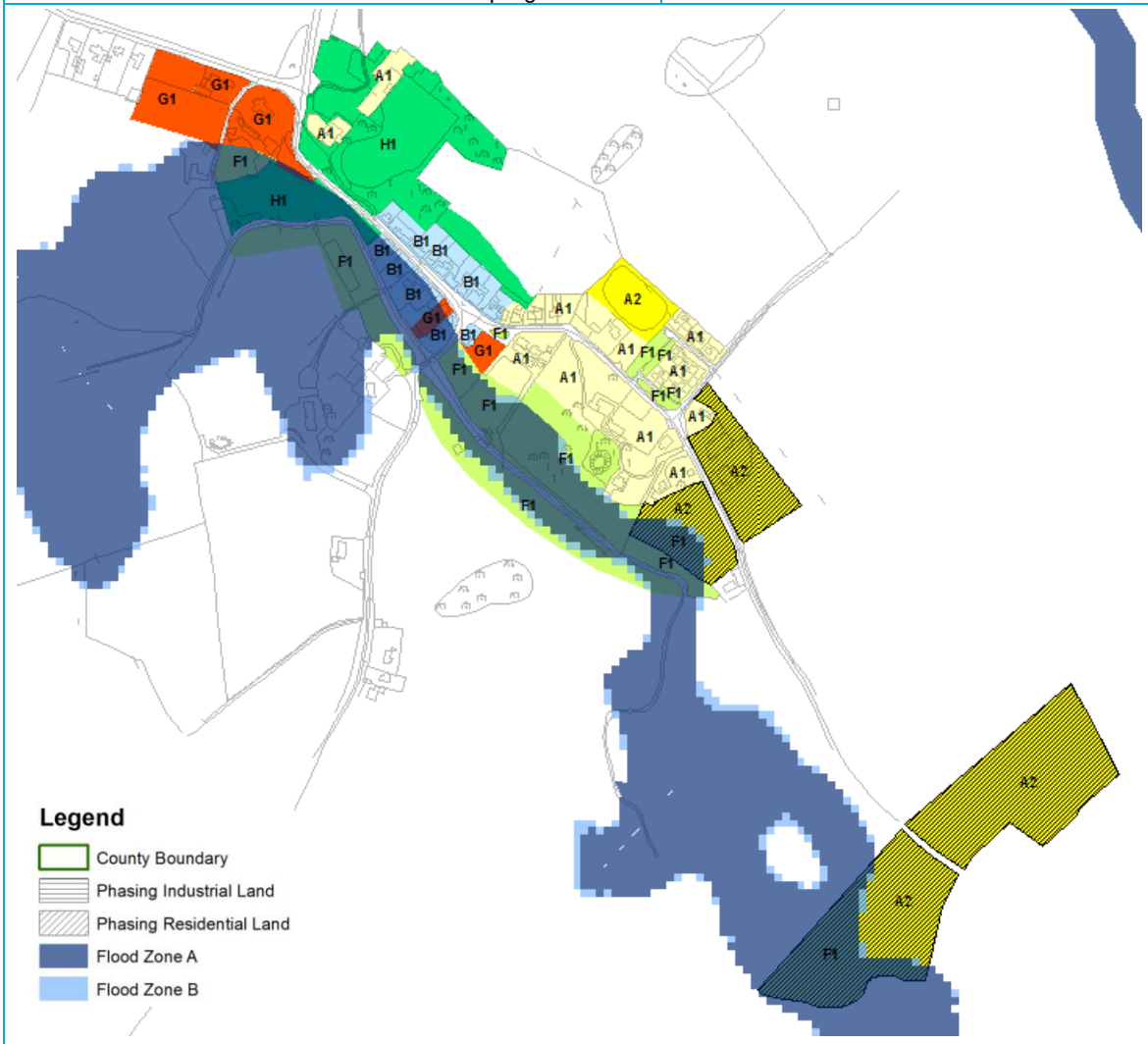
Comment:
The River Rye Water flows adjacent to the southern and eastern border of the settlement, and a further tributary flows through the settlement from a north easterly direction. The floodplain of both watercourses is appropriately zoned as F1 or H1. Existing development has largely avoided areas of high flood risk.

A distributor road objective is in place that seeks to cross the tributary of the River Rye Water, in this case the Justification Test has been applied and passed (see Appendix A.6). A site specific FRA will be required to manage the risk and to demonstrate there will be no impact on adjacent lands. OPW Section 50 consent for all watercourse crossings will be required.

Climate Change	Flood Zone A and B outlines suggest that there is only marginal sensitivity to the impacts of climate change. The Eastern CFRAM flood mapping (available in 2014) and management plan (available 2015/16) will provide additional clarity to flood mapping and risk management measures and should be consulted when published.
Conclusion	Manage flood risk and development in line with approved policies and objectives. Ensure that the distributor road has appropriate site specific FRA and OPW Section 50 consent. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.23 Moynalty

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

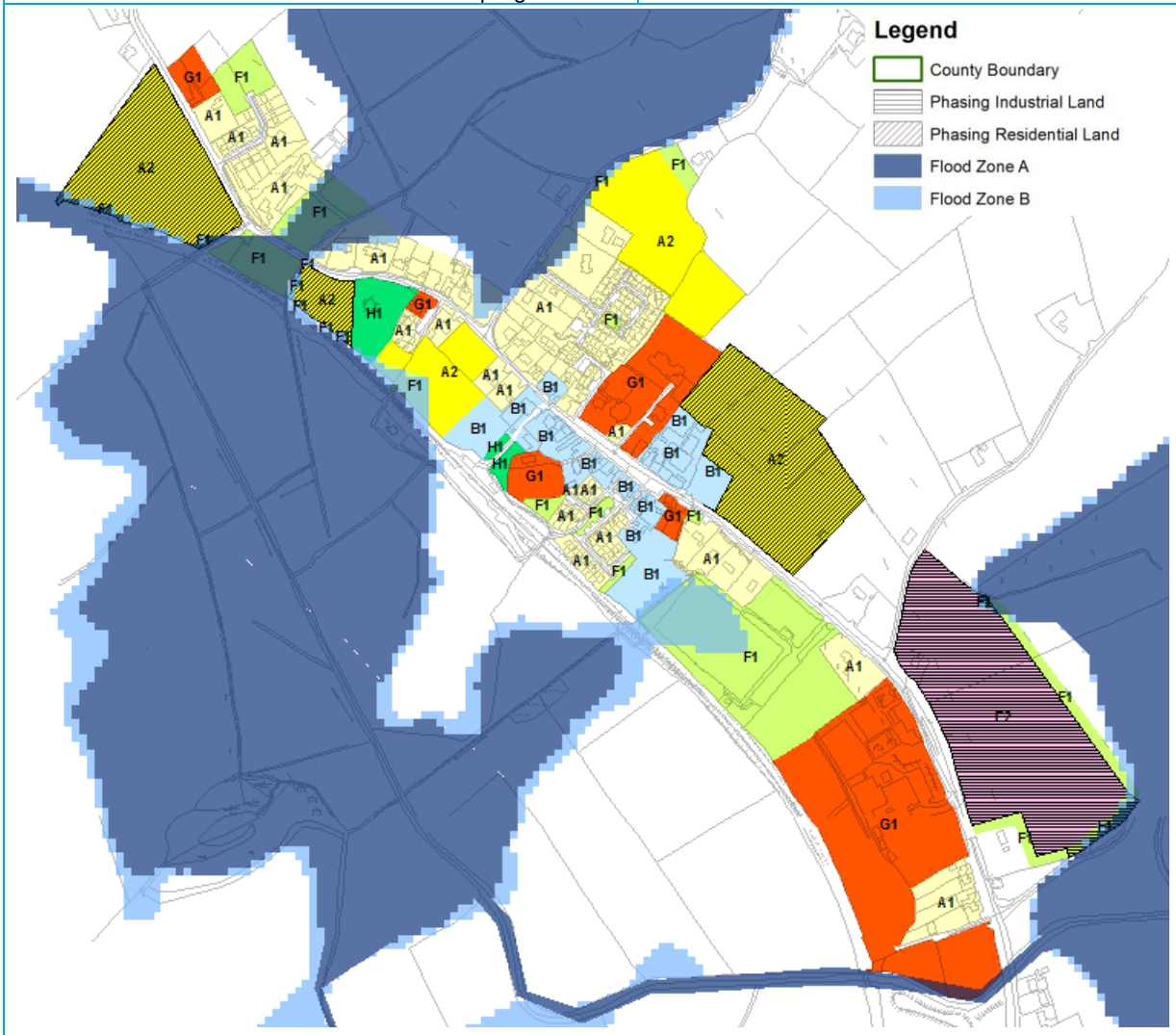
Flood Zone Data	JFLOW modified based on JBA site visit.
Historic Flooding	Historic flooding from the Moynalty River is noted in 2009 and recurring.

Comment:
The Moynalty River restricts new development in the south and west of the settlement and all undeveloped lands at risk of flooding are zoned in a water compatible manner. Existing development in the core of the village (B1 & G1) should be managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019. It is unlikely that any development would be appropriate that interferes with conveyance of flood flows. Pedestrian walkways within Flood Zone A or B will require an appropriately detailed FRA at planning stage and should generally not result in an increase in ground level within these zones.

Climate Change	JFLOW Flood Zone A and B outlines suggest that there is only a marginal increase in fluvial flood extent for an increase in severity. Potential increase in runoff from pluvial events but overall low climate change impact is anticipated.
Conclusion	Manage flood risk and development in line with approved policies and objectives; apply sequential approach within existing zoned development lands at potential risk of flooding.

5.24 Nobber

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

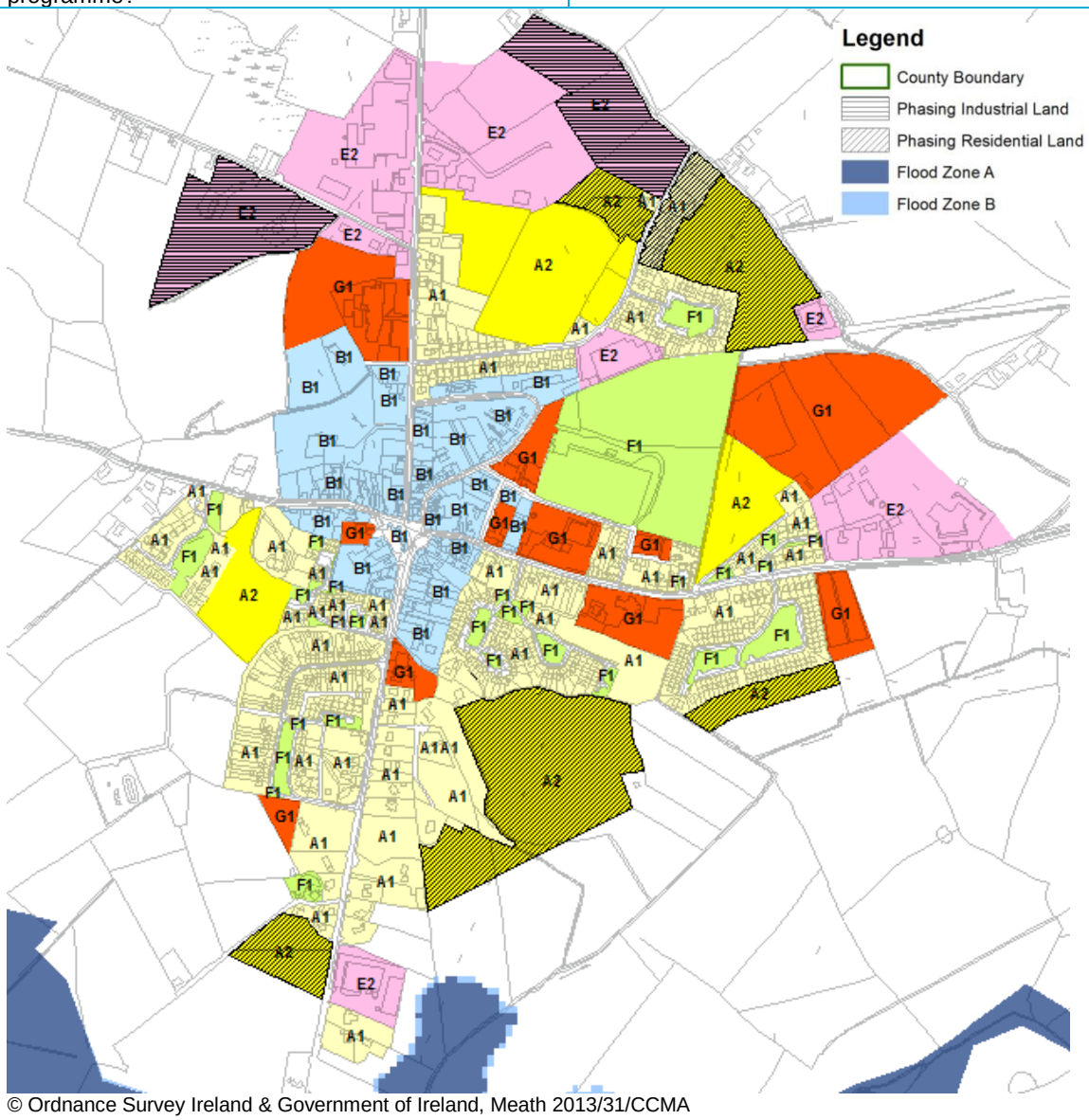
Flood Zone Data	JFLOW, PFRA, and JBA site visit.
Historic Flooding	The River Dee is noted as causing flooding as well as the tributary entering the River Dee from the north east.

Comment:
Development in Nobber is generally constrained by the natural (drumlin dominated) topography and development on lower lying land is also restricted by potential flooding. The extent of Flood Zones A and B are limited to water compatible or existing residential (F1, H1 & A1) land uses.
Development within the settlement should be managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019. Pedestrian walkways within Flood Zone A or B will require an appropriately detailed FRA at planning stage and should generally not result in increased ground level within these zones.

Climate Change	A review of the PFRA & JFLOW Flood Zone A and B outlines suggests that there is some sensitivity to climate change, most likely to be occur where Flood Zone B is significantly greater than Zone A - south west of village core in F1 zoning. Potential increase in runoff from pluvial events but overall low climate change impact.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

5.25 Oldcastle

Hierarchy	SMALL TOWN
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

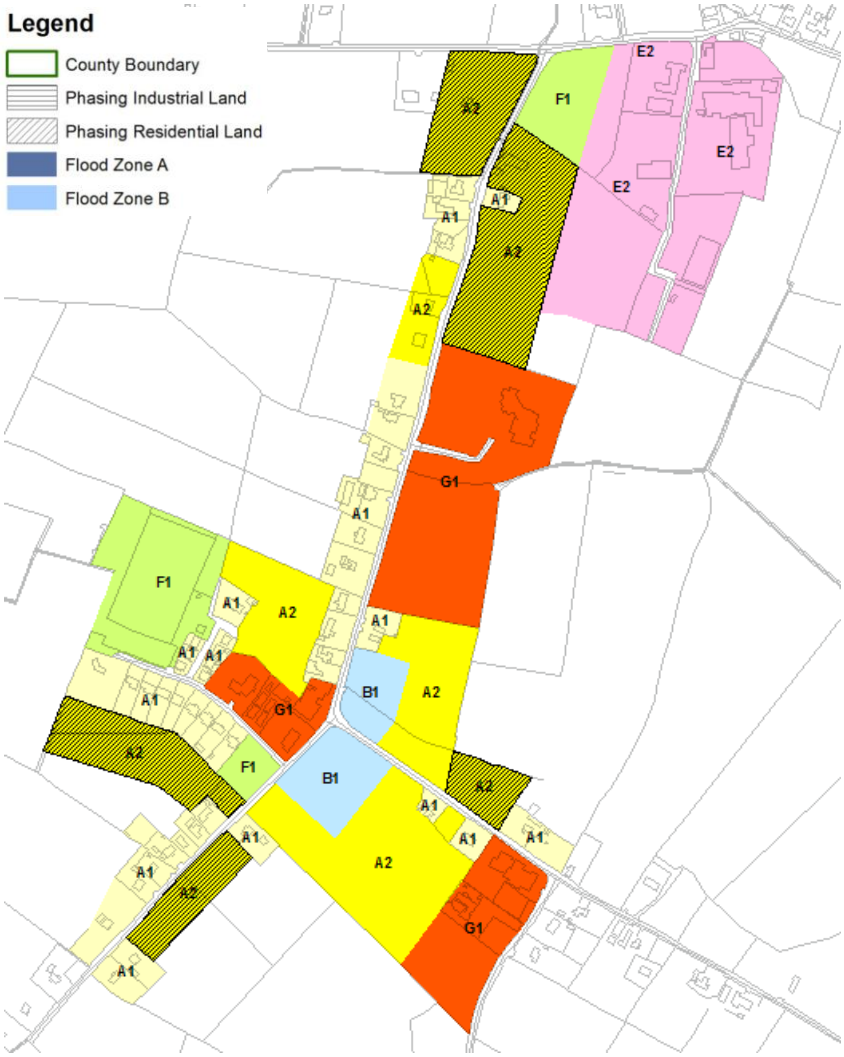
Flood Zone Data	n/a
Historic Flooding	Recurring surface water flooding on Store Road.

Comment:
No fluvial risk identified. OPW benefitting lands mapping indicates some coverage within previously developed general enterprise & employment (E2) zoned land and new residential (A2) in the north west fringe of the settlement. This is not verified by flood history or recent PFRA or JFLOW mapping. Development within the settlement should be managed in line with the policies (WS POL 29 to 36) of the MCDP and this will ensure adequate consideration of risk at development management stage.

Climate Change	Limited or no fluvial impacts, potential increase in runoff could exacerbate existing surface water flooding.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

5.26 Rathcairn

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

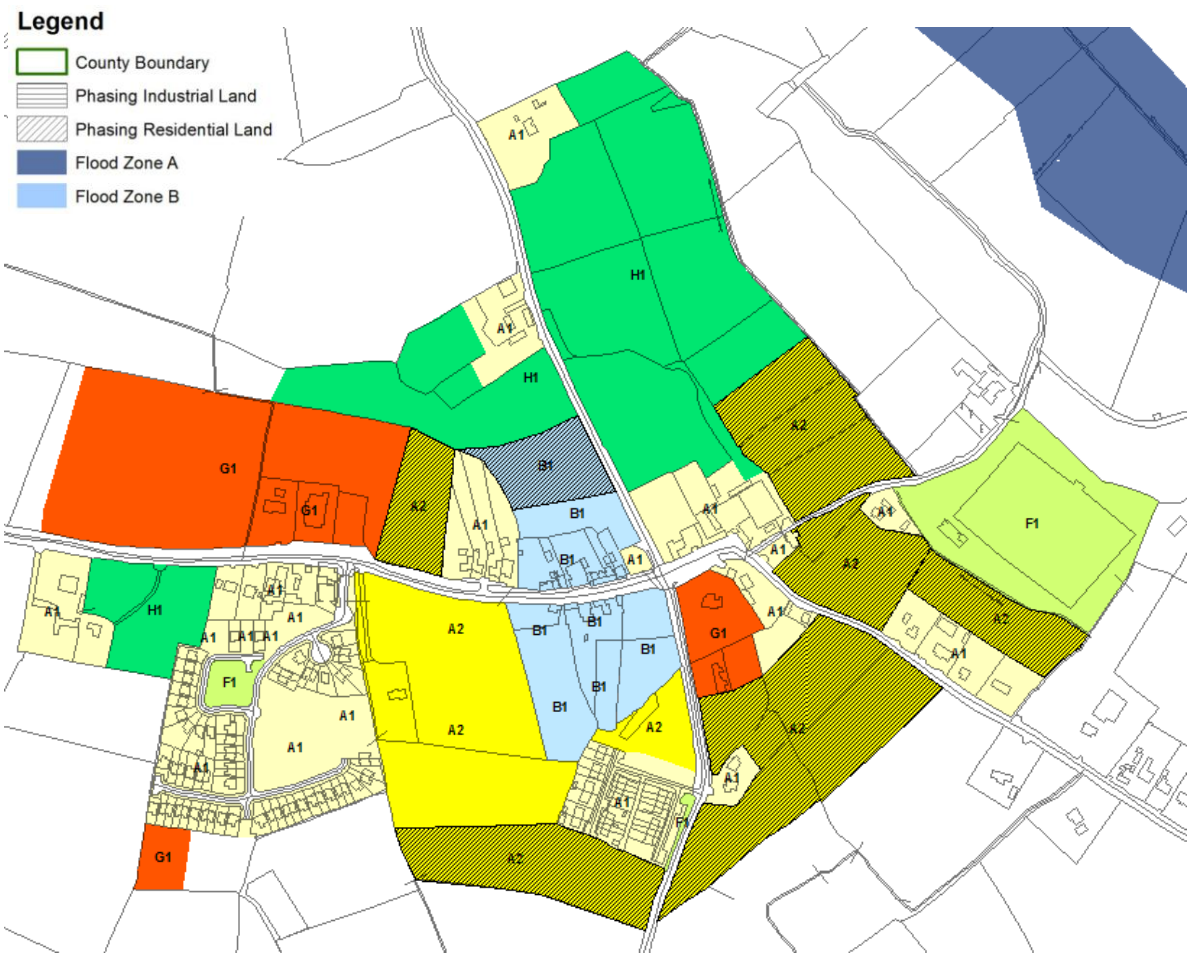
Flood Zone Data	n/a
Historic Flooding	No historic records of flooding were found.

Comment:
No fluvial risk identified. OPW benefitting lands mapping indicates some coverage within previously developed general enterprise & employment (E2) zoned land in the north eastern pocket of the settlement. This is not verified by flood history or recent PFRA or JFLOW mapping. Development within the settlement should be managed in line with the policies (WS POL 29 to 36) of the MCDP and this will ensure adequate consideration of risk at development management stage.

Climate Change	No fluvial impacts, potential increase in runoff.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

5.27 Rathmolyon

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No

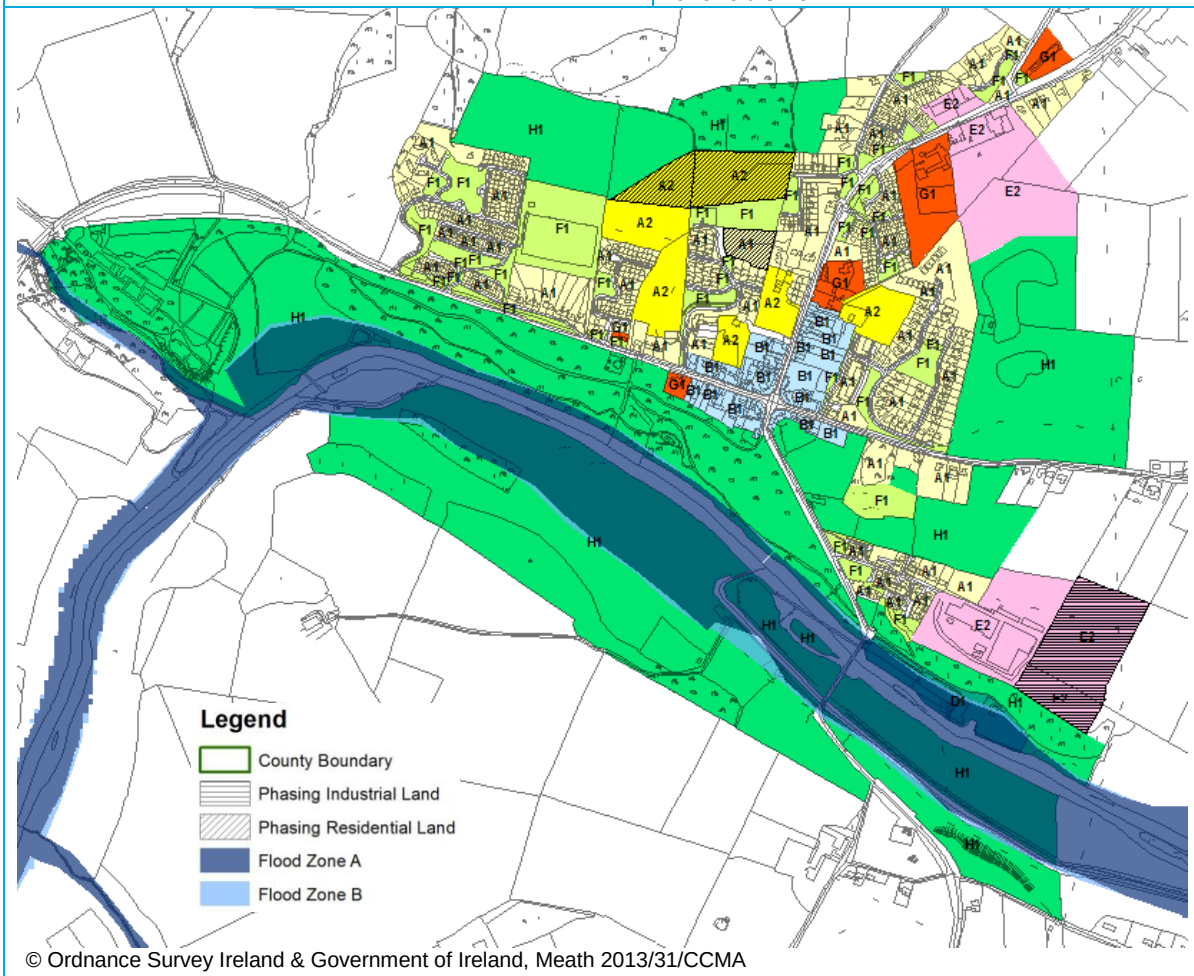


The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	n/a
Historic Flooding	Recurring flood event on the R156 road to Cherryvalley.
Comment	None recorded
Climate Change	No fluvial impacts, potential increase in runoff.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

5.28 Slane

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No, however River Boyne is being modelled by the Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.
Historic Flooding	History of flood events in February 1990, November 2000 and November 2002. There are recurring flood events at St. Patrick's terrace due to inadequate drainage.

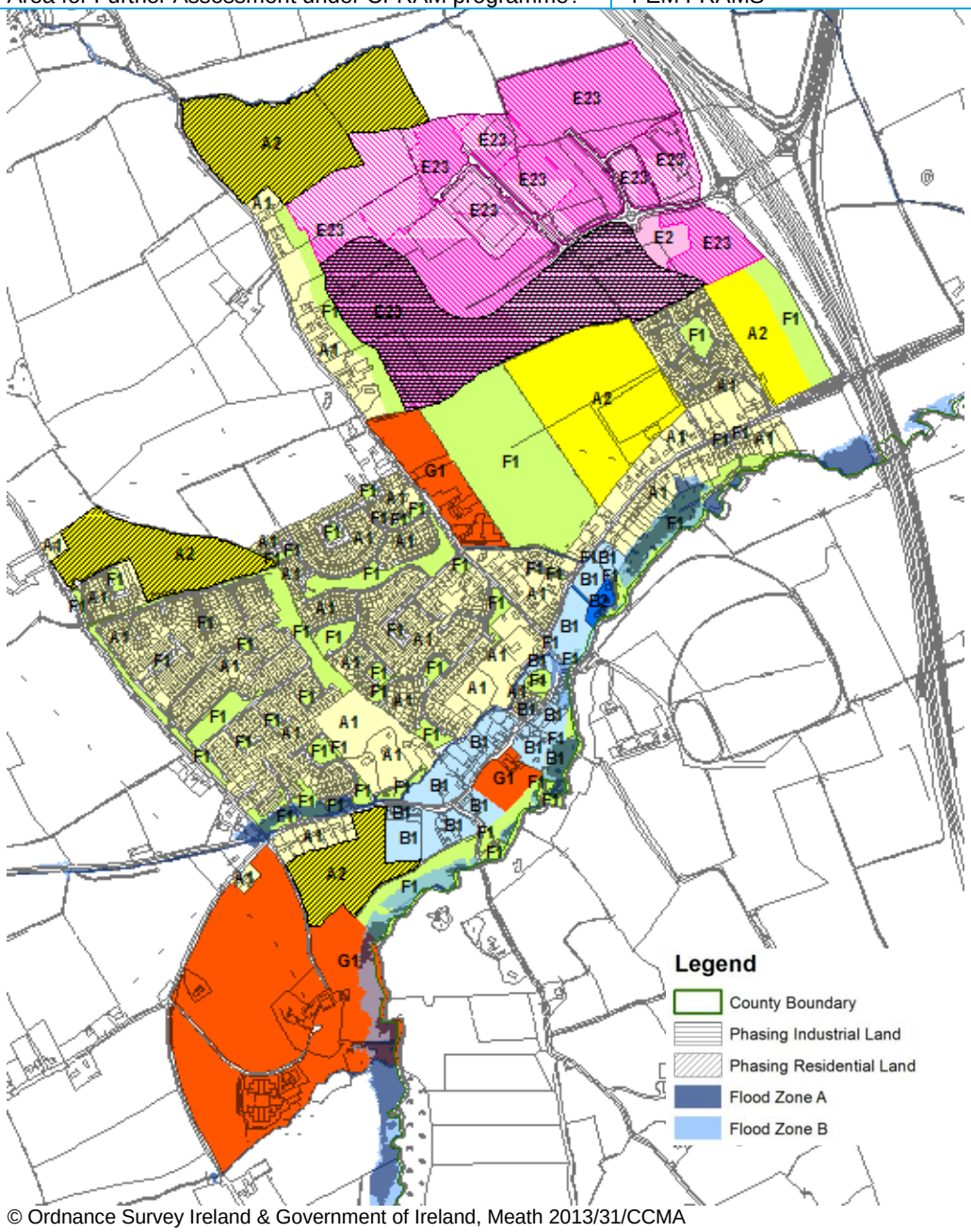
Comment:
Slane is situated adjacent to the River Boyne and existing development is located almost exclusively within Flood Zone C. The grounds of Slane Castle are located adjacent to the watercourse and the H1 land use zoning is appropriate. The mill situated at the eastern extent of the settlement is zoned D1 and any extensions or new development within the zoning should be subject to an appropriately detailed FRA at development management stage.

The Eastern CFRAM flood mapping (available in 2014) and management plan (available 2015/16) will provide additional clarity to flood mapping and risk management measures and should be consulted when published.

Climate Change	Flood Zone A and B outlines suggest that there is only marginal sensitivity to the impacts of climate change.
Conclusion	Manage flood risk and development in line with approved policies and objectives. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.29 Stamullen

Hierarchy	SAMLL TOWN
Area for Further Assessment under CFRAM programme?	FEM FRAMS



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS
Historic Flooding	The River Delvin is recorded as overflowing its banks 2-3 times per year after heavy rain. A local road is also liable to flooding.

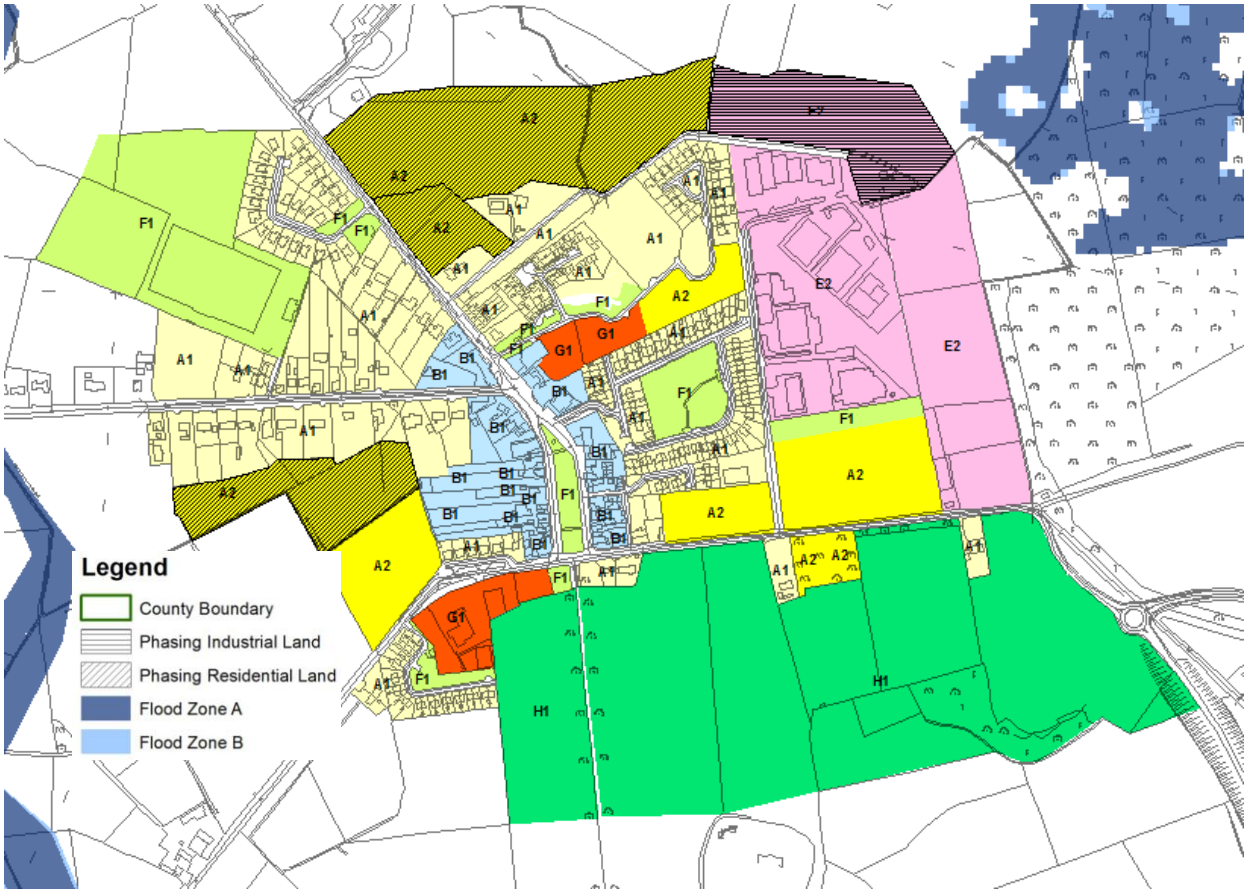
Comment:
Flood Zones A and B mainly affect farmland on the left and right banks of the channel south of Main Street. A recreational area in the Mountain View/Elvana Housing Estates is also at risk of flooding. The impact is therefore confined to Existing Residential (A1) although no actual dwellings appear to be within Flood Zone A or B. Community Infrastructure (G1) and Open Space (F1) are also within Flood Zone A/B.

Risks to existing residential development (A1) should be managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS

POL 29-36 of the MCDP 2013-2019. Any new development under the proposed G1 land use zoning bordering the River Delvin should be subject to appropriately detailed FRA at the development management stage in line with the MCDP policies. Alignments of the proposed distributor roads are identified by transport objectives for this settlement and shown on the land use zoning objectives map. The alignments do not intersect with Flood Zone A/B at any point and do not cross any existing water course. FEM FRAMS recommendations include for proactive maintenance of the channel and the setup of a flood forecasting and warning system for the River Devlin. The FEM FRAMS management plan highlights three culverts in Stamullen that could result in potential flooding if a blockage occurs.	
Climate Change	There are marginal increases in MRFS fluvial flood extents in this area. The areas affected are mainly agricultural lands on both banks of the Delvin River.
Conclusion	Manage flood risk and development in line with approved policies and objectives. At development management stage any FRAs should include consideration of culvert blockage when assessing risk and recommending design details. Flood forecasting and warning system was recommended by the FEM FRAMS.

5.30 Summerhill

Hierarchy	VILLAGE
Area for Further Assessment under CFRAM programme?	No



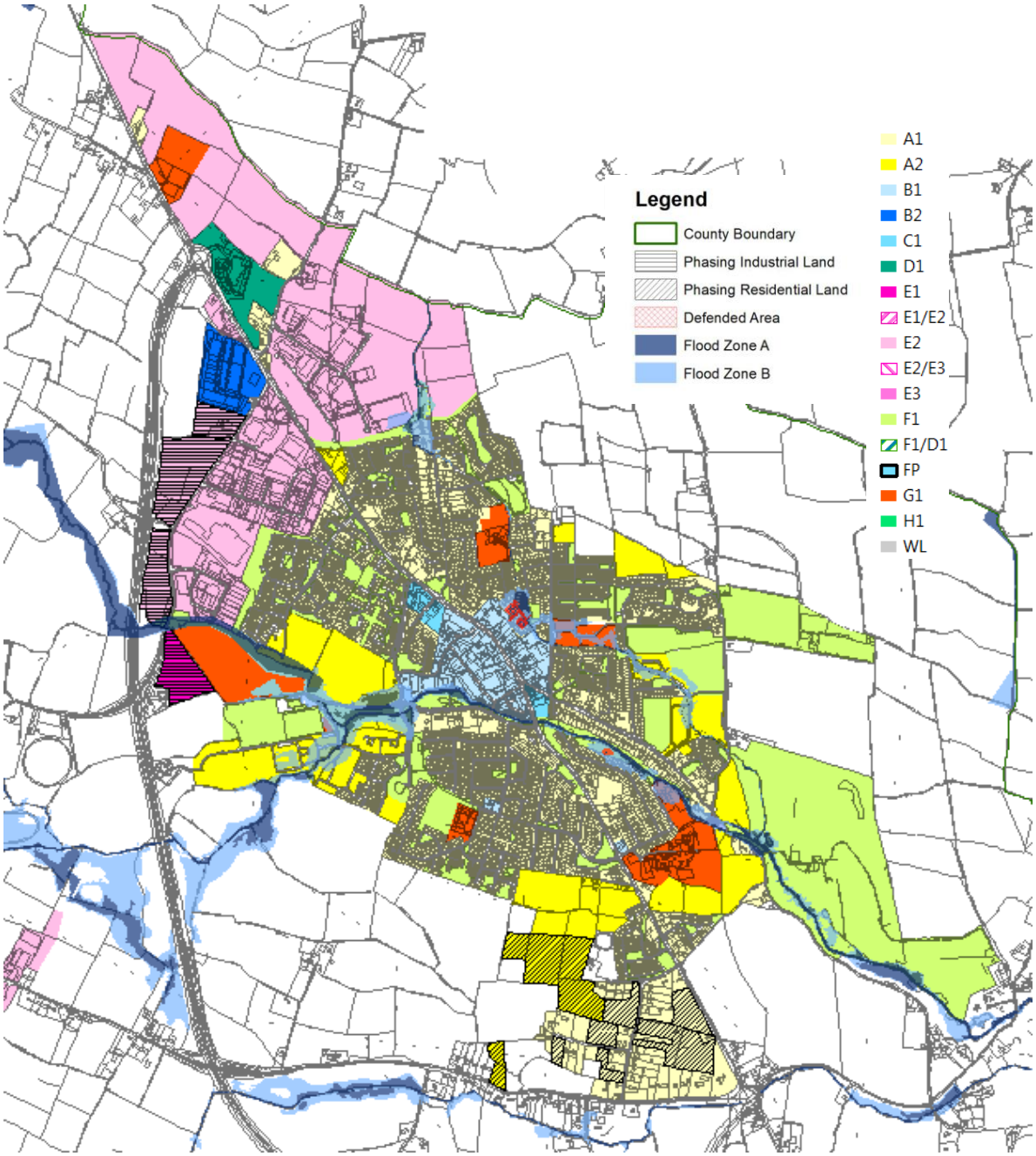
The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	n/a and verified by JBA site visit.
Historic Flooding	Reports of a flooding event in August 2008. The source is this event was the River Moynalvy which is outside the settlement boundary.
Comment	None recorded
Climate Change	No fluvial flood risk identified and no flood history.
Conclusion	Manage flood risk and development in line with approved policies and objectives.

LAP Reviews

5.31 Ashbourne

Hierarchy	MODERATE SUSTAINABLE GROWTH TOWN
Area for Further Assessment under CFRAM programme?	FEM FRAMS published 2011



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS, OPW PFRA and JBA site visit.
Historic Flooding	Historic flooding events occurred in August 1986 and November 2002. Gauge data for the events are available.

Comment:
The Broadmeadow River approaches Ashbourne from the south west and then joins a small tributary downstream of the GAA pitches before passing through the urban core in an easterly direction. Another

tributary approaches from the north and then flows parallel with the Broadmeadow before its confluence in the east of the settlement.

All watercourses pose flood risk to the settlement and this is represented by the FEM FRAMS and PFRA Flood Zone mapping which indicate areas of A1, B1, E2 existing development are within Flood Zones A and B. Some F1 land is also at risk, although the use is water compatible and appropriate. Flood defences are in place through the Brookville housing estate and are designed to the 100 year standard (Flood Zone A). Flows in excess of this standard still pose a risk to surrounding land, as indicated by the extent of Flood Zone B, and include for some undeveloped G1 lands.

Significant undeveloped/part developed A2 zoned lands within Ashbourne are subject to several extant permissions, so the Justification Test has not been applied. The A2 lands are concentrated primarily within the Killegland area to the west of the town centre. Proposed housing to the south of the GAA grounds in the Chruchfields estate is partly within Flood Zone B (moderate risk of flooding). Indicative analysis suggests that FFLs and surrounding ground levels are raised and may serve to reduce flood risk. Lands to the north and north east of the GAA pitches are similarly zoned A2 with some areas of the site located at less preferable levels (in terms of flood risk), based on an indicative analysis. Further extant permissions for A2 development are situated in the east of the settlement and flood risk to these sites (from the River Broadmeadow) mainly impacts the boundary of the sites. An additional A2 extant permission is in place for a proposed development on the northern tributary, to the north of the Hawthorns. Indicative analysis suggests that FFLs and general site levels mitigate the risk of flooding.

Undeveloped G1 lands with an extant permission for a residential care home exist to the east of the Brookville housing estate. These lands are impacted by Flood Zone B. Indicative analysis suggests that FFLs and surrounding ground levels may not be sufficient enough to mitigate the development from flood risk.

If the A2 and G1 sites remain unconstructed and the planning applications lapse any future planning applications on the sites should be subject to an appropriately detailed FRA specific to the new site layout at development management stage. Under the next variation or draft of the MCDP/LAP (if there is no extant permission in place) the lands and zoning should be considered in line with the sequential approach and Justification Test for Plan Making.

The only other undeveloped lands at risk of flooding have been zoned as F1, which is a water compatible land use.

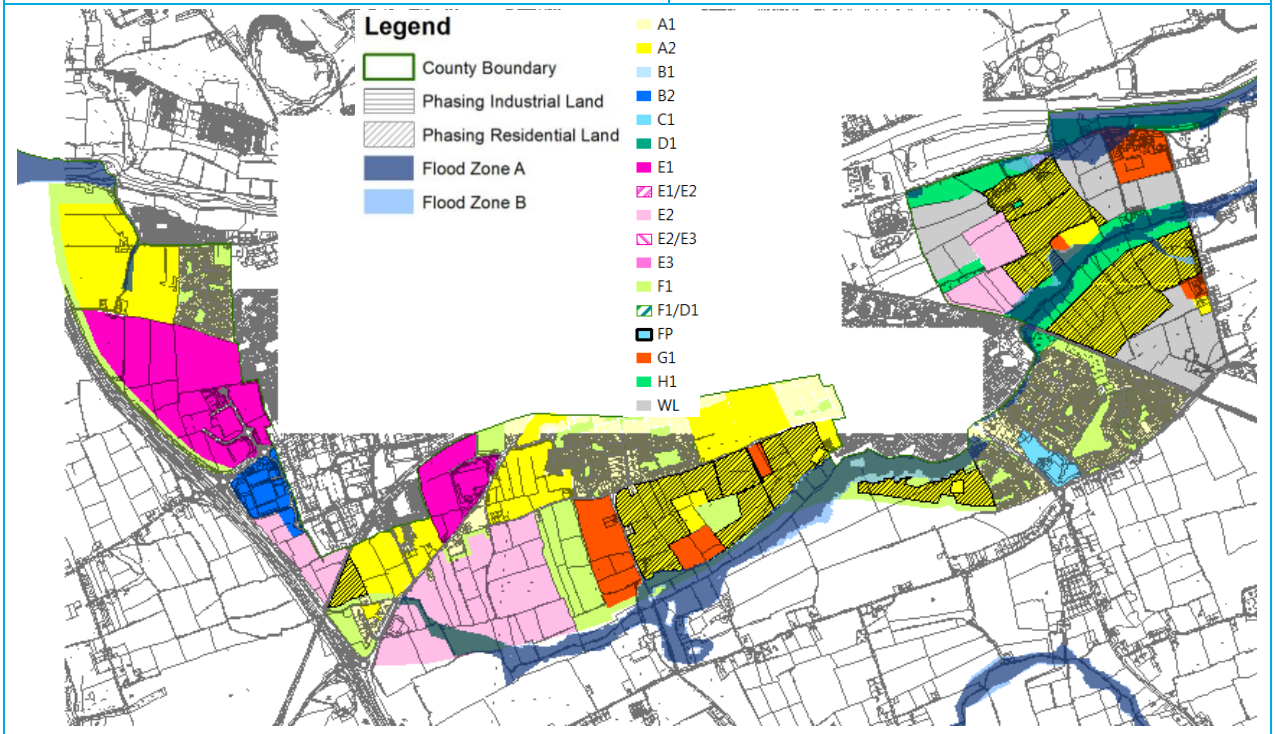
Within areas of existing development at potential risk of flooding, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019. Any highly vulnerable or less vulnerable land uses covered by Flood Zone A and B should employ the sequential approach when considering the site layout and an appropriately detailed FRA must be completed.

Residual risk from culvert blockage is significant for the many culverts within the settlement and inspection and maintenance would help to reduce risk. This was recommended by the FEM FRAMS management plan which includes for a defence asset monitoring and maintenance programme, proactive maintenance of existing defence assets and a flood forecasting and warning system for the Broadmeadow River.

Climate Change	FEM FRAMS climate change scenario modelling suggests that the settlement is highly sensitive to the impacts of climate change and efforts should be made
Conclusion	Areas of A1, A2, B1, E2 and F1 are within Flood Zone A and B. Flood defences are in place through the Brookville housing estate and are designed to the 100 year standard (Flood Zone A). Significant extant permissions for A2 and G1 lands (within Flood Zone A/B) are in place and are not subject to the Justification Test. Indicative analysis suggests some sites could be at significant risk of flooding as a result of low ground/FFLs. Manage flood risk and development in line with the policies (WS POL 29 to 36) of the MCDP. Development should be subject to an appropriately detailed FRA at development management stage. This will ensure that FFLs and ground levels are set appropriately and that the risk of surface water flooding is managed. Justification Test may be required for G1 lands. Maintenance and monitoring of culverts and flood defence assets as well as a flood warning system is recommended.

5.32 Drogheda Southern Environs

Hierarchy	LARGE GROWTH TOWN I
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.
Historic Flooding	History of recurring flooding at Elmwood/McEoys road, the R152, the Dublin Road and at Colp West.

Comment:
Drogheda Southern Environs is impacted by the Stameen Stream that outfalls into the Rover Boyne in Mornington. The north eastern corner of the settlement is bounded by the tidal River Boyne which also presents fluvial and tidal flood risk.

The majority of the lands within the settlement are zoned and undeveloped, reducing pressure on the sites within Flood Zones A and B. There is substantial existing residential development in the eastern side of the settlement adjacent to the southern boundary of the railway line.

There is flood risk to existing residential lands upstream of the railway line and any extensions to existing development within Flood Zone A or B should, in line with the policies (WS POL 29 to 36) of the MCDP, be subject to an appropriately detailed FRA. Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019.

There are undeveloped E2 lands in situated in the central west area of the settlement; through this area lands within Flood Zone A or B have been zoned open space in accordance with the sequential approach.

North of the railway line, additional undeveloped zoned land is situated within Flood Zone A and B. Land within the flood risk zones are appropriately zoned as F1 or H1. E2 and G1 lands are situated on the margin of flood risk, so too are some phased A2 zonings.

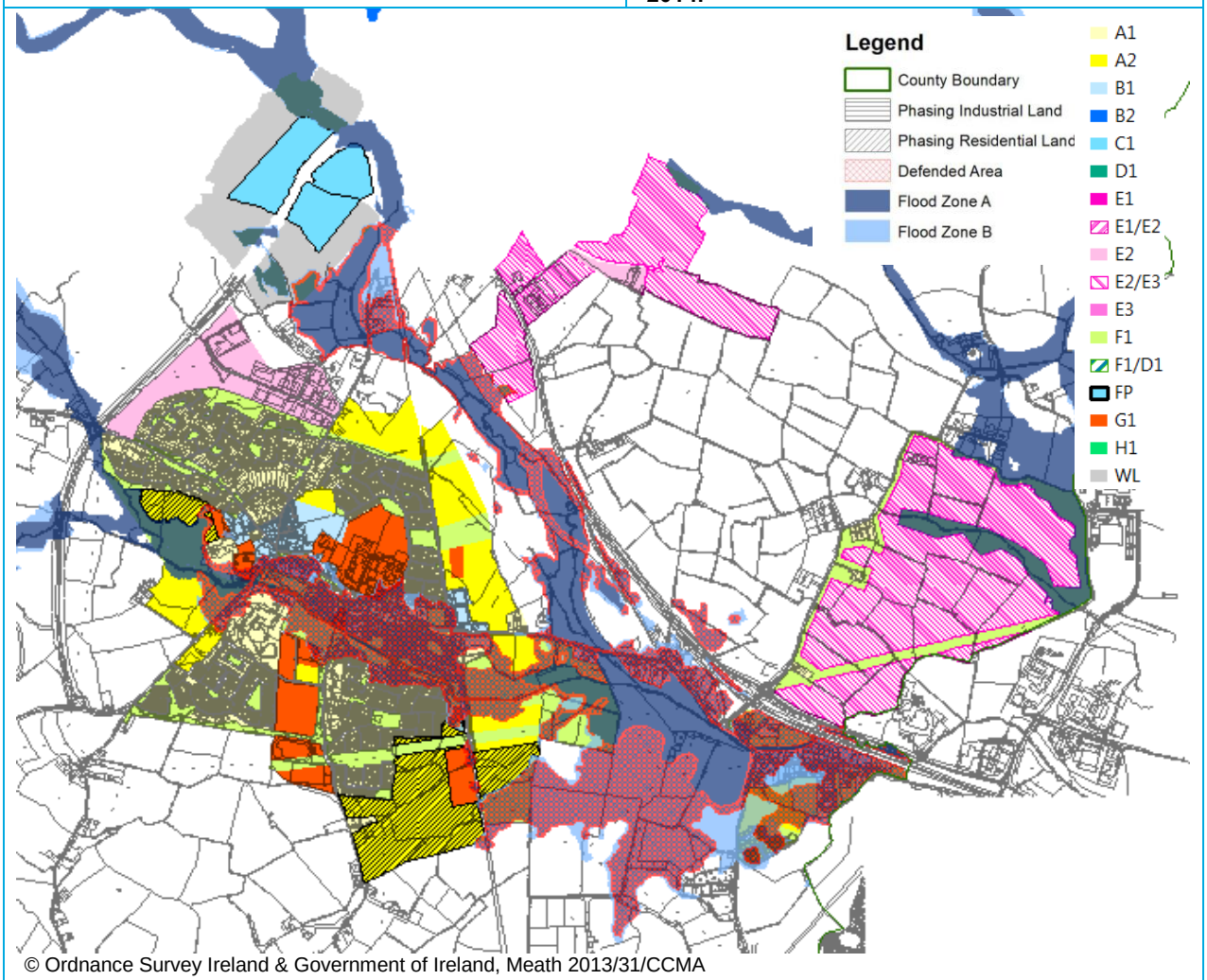
In line with the policies (WS POL 29 to 36) of the MCDP, development should be subject to an appropriately detailed FRA at development management stage. This will ensure that FFLs and ground level is set appropriately and that the risk of surface water flooding is correctly managed.

The proposed major distributor road follows the southern boundary of the settlement and passes through Flood Zone A and B. The Justification Test must therefore be applied and passed. A detailed FRA will be required to

manage the risk and to demonstrate there will be no impact on adjacent lands at planning stage. OPW Section 50 consent for all watercourse crossings will be required. There is another proposed distributor road to serve the Mill Road / Marsh Road area identified by transport objectives for this settlement but alignments are not yet confirmed. During the environmental assessment stage of the road scheme, the Justification Test will need to be applied if alignments intersect with Flood Zone A/B. FRA will be required to manage the risk and to demonstrate there will be no impact on adjacent lands. OPW Section 50 consent for all watercourse crossings will be required. The Eastern CFRAM flood mapping (available 2014) and management plan (available 2015/16) will provide additional clarity to flood mapping and risk management measures and should be consulted when available.	
Climate Change	The Flood Zone mapping suggests a negligible increase in flood extent for the majority of the settlement. Areas close to the River Boyne will be subject to the more severe effects of sea level rise and these areas should be monitored in future development plans.
Conclusion	Manage flood risk and development in line with the policies (WS POL 29 to 36) of the MCDP. Development should be subject to an appropriately detailed FRA at development management stage. This will ensure that FFLs and ground levels are set appropriately and that the risk of surface water flooding is correctly managed. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.33 Dunboyne Clonee Pace

Hierarchy	LARGE GROWTH TOWN II
Area for Further Assessment under CFRAM programme?	Eastern CFRAM Study - **revised mapping available 2014.**



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	Tolka Flood Study, Eastern CFRAM Flood Risk Review (PFRA), JFlow and JBA site visit.
Historic Flooding	Historic Flooding from the River Tolka in November 2000 and November 2002.

Comment:

Dunboyne, Clonee and Pace are three settlements in the south east corner of County Meath. The settlements are situated at the confluence of the Tolka River and a tributary that flows through Dunboyne itself. The Tolka and its tributaries are a source of significant flood history and risk in the area.

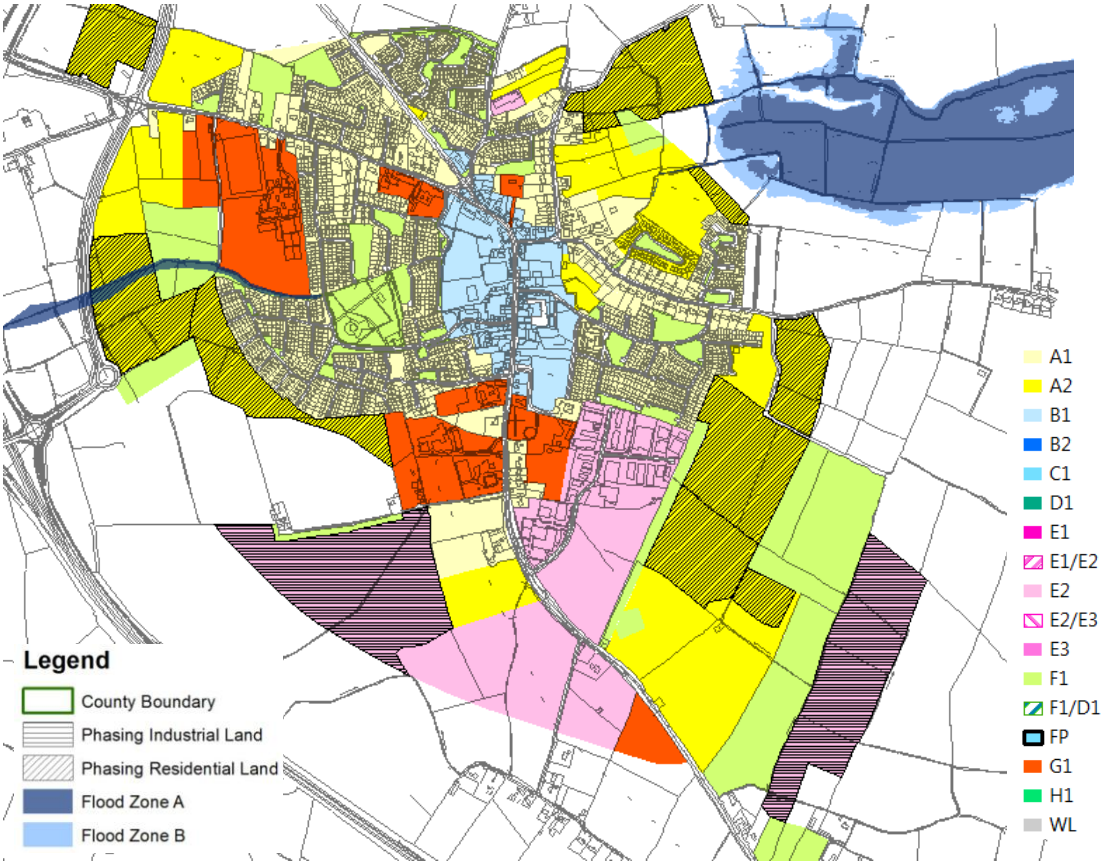
The Tolka flood study was commissioned by Dublin City Council in association with Fingal County Council, Meath County Council and the Office of Public Works (OPW) in 2002. The recommendations for the flood relief scheme have now been constructed and protect a significant area in and around the Dunboyne, Clonee, and Pace settlements. When zoning land, consideration must be given to the undefended scenario (as stated in the Planning System and Flood Risk Management Guidelines). As such, development behind the flood defences will be subject to the Justification Test and this will limit development activity to building extensions and changes of use or redevelopment of existing sites. No undeveloped lands have passed the Justification Test (see Appendix A.2) and in line with the Planning Guidelines, there are no undeveloped zoning objectives for highly vulnerable or less vulnerable uses within Flood Zone A or B (other than for extant permissions).

In Dunboyne there is a B1 site within Flood Zone B with an extant permission and in Clonee there is a significant partly constructed A2 development with an extant permission. Both sites are situated behind the Tolka defences and indicative analysis suggests that both have suitable FFLs included in the design. In the case of extant permissions the Justification Test is not applied. 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 at development management stage. Under the next variation or draft of the MCDP (if there is no extant permission in place) the lands and zoning should be considered in line with the sequential approach and Justification Test for Plan Making. Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019. Any highly vulnerable or less vulnerable land uses covered by Flood Zone A and B should employ the sequential approach when considering the site layout and an appropriately detailed FRA must be completed. The only other undeveloped lands at risk of flooding have been zoned as F1 or G1. While F1 is a water compatible land use, G1 can include for a range of land use vulnerabilities from water compatible through to highly vulnerable so the Sequential Approach should be used to allocate land uses appropriately within the site. A distributor road objective is in place that seeks to cross the River Tolka tributary in between the settlements of Dunboyne and Clonee, in this case the Justification Test has been applied and passed (see Appendix A.3). A site specific FRA will be required to manage the risk and to demonstrate there will be no impact on adjacent lands. OPW Section 50 consent for all watercourse crossings will be required. The maintenance of the flood relief scheme is the responsibility of the OPW and is important to maintain the standard of protection through Dunboyne, Clonee and Pace. The Eastern CFRAM flood mapping (available 2014) and management plan (available 2015/16) will provide additional clarity to flood mapping and risk management measures and should be consulted when available.	
Climate Change	The Flood Zone mapping suggests a significant increase in flood extent for Clonee. Other areas are not as significant, but remain a concern in relation to the future maintenance of the flood defence scheme.
Conclusion	Manage flood risk and development in line with the policies (WS POL 29 to 36) of the MCDP. All development should be subject to an appropriately detailed FRA at development management stage. This will ensure that FFLs and ground levels are set appropriately and that the risk of surface water flooding is correctly managed. Ensure that the distributor road has appropriate site specific FRA and OPW Section 50 consent. Review required pending publication of the Eastern CFRAM flood hazard mapping and subsequent management plans 2014-2016.

5.34 Dunshaughlin

Hierarchy	MODERATE SUSTAINABLE GROWTH TOWN
Area for Further Assessment under CFRAM programme?	FEM FRAMS published 2011



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS, OPW PFRA and JBA site visit
Historic Flooding	Flooding event occurred in November 2000 from a tributary to the River Boyne.

Comment

There is limited predicted flood risk in Dunshaughlin and land use zoning is generally appropriate. Fluvial flooding from the Broadmeadow River mainly affects agricultural lands to the north east of the town. A minor watercourse drains in a westerly direction adjacent to the GAA pitches and exerts a small risk of flooding to surrounding lands.

Any proposed development within Dunshaughlin should consider the management of surface water (WS POL 31).

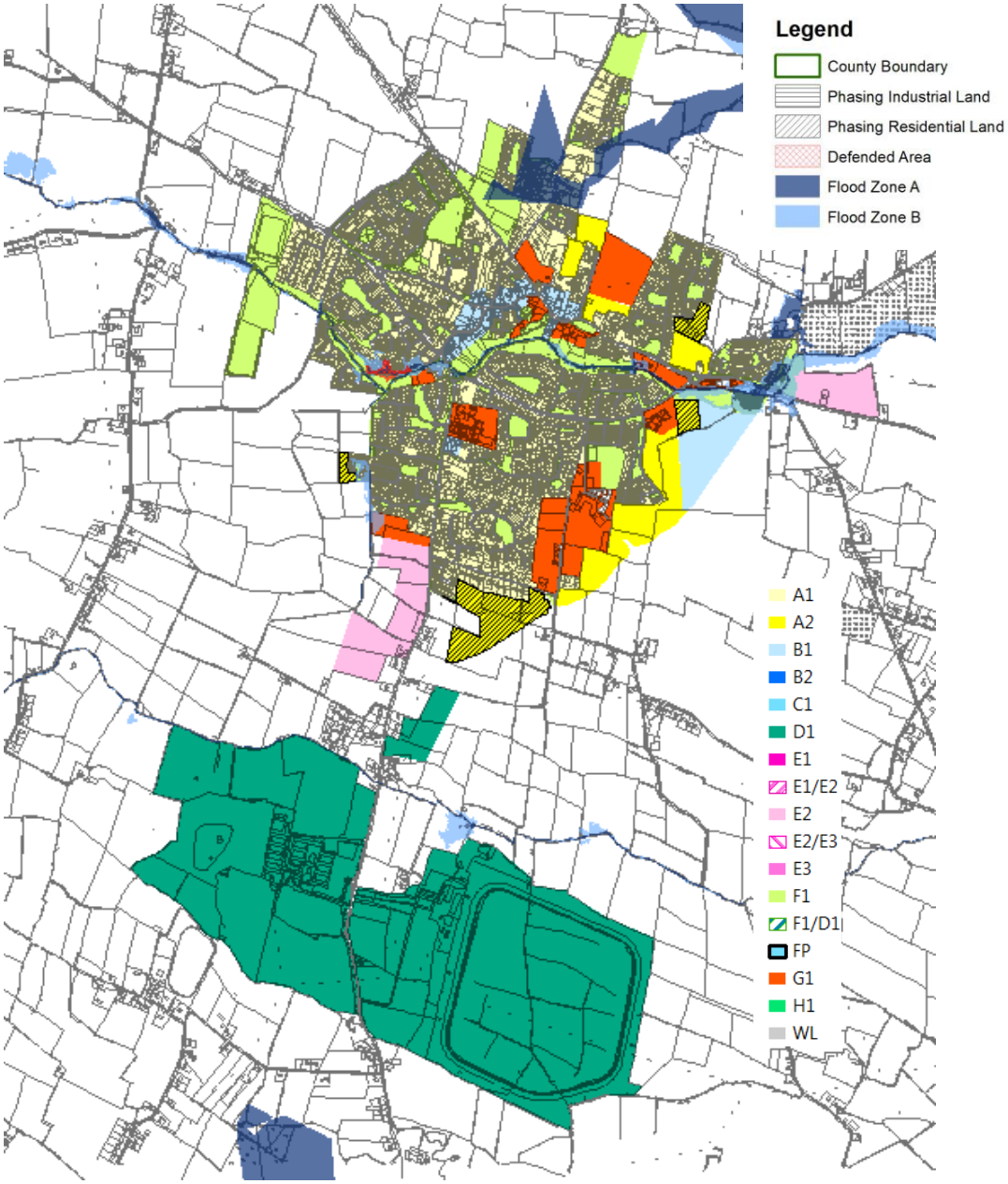
Other land use objectives at potential risk include Open Space and Community Infrastructure and (F1 & G1), these are generally appropriate and any less vulnerable development within the GAA site (G1) should be directed to Flood Zone C in preference, the margin of Flood Zone A/B is very minor and will not restrict any future development.

Pedestrian walkways may require FRA during planning application stage but the Justification Text is not required.

Climate Change	FEM FRAMS Climate change modelling suggests a moderate increase in flood extent for the area of ponding to the east of the settlement.
Conclusion	Manage flood risk and development in line with approved policies and objectives. Consider the management of surface water flood risk carefully in this urban area and apply WS POL 31 from the MCDP to ensure any new development or redevelopment appropriately manages the risk of surface water flooding.

5.35 Ratoath

Hierarchy	SMALL TOWN
Area for Further Assessment under CFRAM programme?	FEM FRAMS published 2011



The Flood Zone 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. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS, OPW PFRA and JBA site visit.
Historic Flooding	No historic records of flooding were found.

Comment:

Ratoath is exposed to fluvial flooding from the Broadmeadow River. Flood Zone A mainly affects agricultural lands and a small number of properties on the eastern side of Ratoath in the Moulden Bridge Area. Defences in the Somerville Estate in Ratoath provide protection up to the 1% AEP event (Flood Zone A). For return periods above this standard of protection the area is still at risk (Flood Zone B is unchanged).

The flood extents impact on existing development for Residential (A1), Open Space (F1), Community Infrastructure (G1) and Town Centre (B1) lands. Risk to existing A1, B1 and G1 development should be

managed in line with the policies (WS POL 29 to 36) of the MCDP. Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to WS POL 29-36 of the MCDP 2013-2019.

Potential risk to new development to east of town for, G1 and B1. Any new development under the proposed G1 land use zoning bordering the Broadmeadow River should be subject to appropriately detailed FRA at the development management stage in line with the MCDP policies.

Risk to development in the defended area of Somerville estate should be managed in line with the current policies and objectives. Any development is likely to be limited by the Justification Test to extensions and residual risk should be considered under the associated FRA.

Significant lands to the south of Ratoath (Fairyhouse and Tattersalls) are zoned for tourism (D1) and incorporate equine uses. A small watercourse passes alongside the northern boundary of the site and does not significantly impact the zoned land. Flood risk should be managed by the application of the sequential approach and appropriately detailed FRA at development management stage, as required.

The FEM FRAMS highlighted possible risk from conveyance/blockage from the R125 bridge and a culvert on the tributary of the Broadmeadow River. Any FRAs undertaken in this area at development management stage should include consideration of the residual flood risk related to blockage.

FEM FRAMS mitigation options identified the improvement of channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and replacing a culvert on a tributary of the Broadmeadow River. However, the benefit cost ratio was not greater than 1 and unless additional analysis can increase this value above 1 then a scheme will not be progressed. Proactive maintenance of the existing flood defence in Ratoath was recommended and this is not subject to further review.

Pedestrian walkways may require FRA during planning application stage but the Justification Text is not required.

Climate Change	The impact of Climate change on increased river flows results in a large increase in flood risk in Ratoath, particularly around the R125 bridge.
Conclusion	Manage flood risk and development in line with approved policies and objectives. At development management stage any FRAs should include consideration of culvert blockage when assessing risk and recommending design details. Pedestrian walkways may require FRA during planning application stage but the Justification Text is not required.

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Appendices

A Justification Test

A.1 Athboy - Backland Area north of Upper Bridge Street/Main Street

Provision of a B1 Land-Use Zoning Objective to a Backland area north of Upper Bridge Street/Main Street in Athboy

Issue – The proposal to zone lands north of Upper Bridge Street/Main Street for a B1 land use zoning objective partially encroaches on Flood Zone A & B identified for Athboy in the Strategic Flood Risk Assessment (Appendix 6) of the Meath County Development Plan 2013 – 2019. A Justification Test is thus required.

A.1.1 JUSTIFICATION TEST

1. Urban settlement is targeted for growth – Yes.

National Spatial Strategy 2002 – 2020

Athboy is identified as an 'Urban Centre – Circa 1,000' in the National Spatial Strategy. It is a town located within an area of 'Strategic Rural Assets within the Metropolitan Hinterland'.

Development of urban generated housing in such areas, which can be accommodated in nearby urban areas, should be minimised. Through County Development Plan policies, County Development Board Strategies, tourism marketing initiatives and local efforts such as tidy towns and village improvements, the attributes of these rural areas should be harnessed to attract visitors and local business and generate local employment opportunities.

Parts of the Mid East region which are more distant from the larger urban areas have experienced population decline or stagnation. This can be reversed through a focus on boosting the development capacity of smaller villages and rural towns. This can be supported by Local Authority and private investment in water services to release development land. It also involves encouraging appropriately scaled new development that reinforces the character of these towns and villages and supports local service, retail and employment functions. County Development Plans have a key role in this process.

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

Athboy is not specifically referenced in the current Regional Planning Guidelines, however it does fit the category of a 'Small Town' within the regional settlement hierarchy with a population between 1,500 and 5,000 people, located within the hinterland area of the GDA with good bus links and 10km from a large growth town (i.e. Navan).

Relatively small and locally financed businesses are expected to located in Small Towns, however other economic investment opportunities should be considered and supported where sustainable and in keeping with the size and services of the town. Levels of growth in all small towns shall be managed in line with the ability of local services to cater for any growth responding to local demand and in line with the recommendations for small towns described in the DoEHLG Guidelines – 'Sustainable Residential Development in Urban Areas'.

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

i. Essential to facilitate regeneration and / or expansion of the centre of the urban settlement - Yes.

The Backland area has already been identified in both the 2001 County Development Plan & 2009 Athboy Local Area Plan as an 'Opportunity Site' which can accommodate town centre

expansion. The site currently has a B1 land use zoning objective in the Local Area Plan to allow for town centre expansion and has a requirement for the preparation of a Framework Plan. The Backland area north of the existing Main Street is the only area identified to facilitate the orderly expansion of the town centre. The lands in question require the provision of a new local distributor road to be constructed from Connaught Street to access the backland area. This again has been an identified planning objective for the town since 2001 Meath County Development Plan.

ii. Comprises significant previously developed and / or under utilised lands - Yes.

The Backland area north of Upper Bridge Street/Main Street is partially subject to the flood risk zones. The land contains a commercial business onsite which is considered to represent a non conforming use; namely the MacCann & Byrne's, building construction suppliers. The Council will favourably consider the appropriate redevelopment of this site for uses which are consistent with the planning policies and development objectives of this Development Framework. It is the Planning Authority's preference that the current non-conforming use be relocated to appropriately zoned industrial land within the development boundary of the town.

iii. Is within or adjoining the core of an established or designated urban settlement - Yes.

This Backland area is located adjacent to the core retailing area of Athboy consisting of Main Street and Upper Bridge Street. It will be possible to forge connectivity with the established core business area of the town.

iv. Will be essential in achieving compact and sustainable urban growth - Yes.

As identified above, the site has been identified as a suitable site for town centre expansion since 2001. The application of the sequential approach to retail planning would further reinforce such findings.

v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement - Yes.

Due to the compact urban form of Athboy arising from his historic development as an Anglo Norman walled town, there are no other suitable sites of sufficient size adjacent to the town centre that do not impinge on backland areas or traverse Flood Zones A or B.

Justification Test has advanced past Step 2 for Development Plans (Box 4.1 refers).

3. A flood risk assessment to the appropriate standard of detail has been carried out as part of the SEA as part of the development plan preparation process.

Current information suggests that developing within Flood Zones A or B could have negative impacts on flood risk elsewhere, both through obstructing flow paths and reducing floodplain capacity. However, given that a significant percentage of the site is within Flood Zone C, it is anticipated that sustainable flood risk mitigation measures could be designed to allow development of the wider subject site. This must be undertaken through an appropriately detailed Flood Risk Assessment, which would form part of the planning application. The FRA should consider the Sequential Approach within the subject site which would involve allocating water compatible development within Flood Zones A and some/all of Zone B. Where necessary; compensatory storage should be provided. Further details on compensatory storage are provided in Appendix B of the Planning System and Flood Risk Management. Buildings should be sited at an appropriate FFL, which should be above the 1 in 100 year flood level, with an allowance for freeboard and climate change.

Justification Test has advanced past Step 3 for Development Plans and must adhere to the recommendations from the Part 3 assessment.

A.2 Dunboyne - Reconsideration of area within Flood Zones A & B south of Station Road / Clonee Road

Issue – Land configuration from adherence to Flood Risks A & B results in a land configuration which is not conducive to residential development and may impact negatively on the ability to deliver proposed Local Distributor Road from Rooske Road to Station Road / Clonee Road as a piece of key infrastructure delivered by the private sector in tandem development.

A.2.2 JUSTIFICATION TEST

1. Urban settlement is targeted for growth – Yes.

National Spatial Strategy 2002 – 2020

Dunboyne is categorised as a town with a population of 1,500 – 5,000 persons, positioned on a National Transport Corridor (Motorway and Rail Connection to Dublin). The population of Dunboyne now exceeds 5,000 population which was the next category of urban centre identified in the NSS.

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

Dunboyne is listed as a Large Growth Town II in the settlement hierarchy within the Metropolitan Area of the Greater Dublin Area. Such centres are identified as strong active growth towns, economically vibrant with high quality transport links to larger towns/city. The spatial dimension to the Strategy supports the growth of the polycentric gateway and primary economic growth towns linked by multi-modal corridors and focused on identified Core Economic Areas. Dunboyne is identified as a 'Secondary Economic Growth Town' along with Ashbourne. Dunboyne is also identified as a Level 3 Sub County Town in the Retail Hierarchy of the GDA but intended to develop gradually to a Level 2 Centre over a 20 year period.

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

i. Essential to facilitate regeneration and / or expansion of the centre of the urban settlement - No.

The lands are located in an out-of-centre, suburban location. It is considered that the extent of B1 "Town Centre" land use zoning objective would broadly correspond with the defined urban centre of Dunboyne by the Planning Authority.

ii. Comprises significant previously developed and / or under utilised lands - No.

The lands are predominantly greenfield in character whilst accepting that the area immediately adjoining Dunboyne Bridge consists of a herbal medical centre / treatment rooms, herbal processing facility, private dwelling and outbuildings. However, the area affected by Flood Zones A & B under consideration in this Justification Test is agricultural in nature and undeveloped.

iii. Is within or adjoining the core of an established or designated urban settlement - No.

The lands are in an out-of-centre, suburban location having regard to the definition of "core" provided in the OPW Guidelines. It is considered that the extent of B1 "Town Centre" land use zoning objective would broadly correspond with the defined core by the Planning Authority. It is also indicated in the adopted LAP for Dunboyne that the area is located south of the designated neighbourhood centre which would develop around the car park of the Dunboyne train station. It is not considered that an argument can be successfully made to the contrary.

iv. Will be essential in achieving compact and sustainable urban growth - No.

Development of the lands would assist in achieving sustainable and managed urban growth as they are proximate to the railway station serving Dunboyne town and would facilitate use of public transport thus seeking to maximise existing public transport infrastructure investment. Whilst the lands are located at the edge of the built up area of Dunboyne, they would support the sequential expansion of the town, thus assisting in achieving a compact urban form. However, the lands are not unique in either of these respects, with other greenfield lands available also adjoining to the developed area of Dunboyne and the train station, and therefore could not be said to be "essential" in this regard.

v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement - No.

There are other lands available in Flood Zone C as close to the core of the urban settlement which can accommodate residential development. It is considered that this criterion has been assessed in (iv) above.

Justification Test has failed to advance past Step 2 for Development Plans (Box 4.1 refers of the OPW Guidelines).

Note:

The following Justification Tests have been carried out for Road objectives in 4 no. centres across the County. The Planning Authority considers that the format of the plan making Justification Test provided in the OPW Guidelines on the Planning System & Flood Risk Management was devised with land use zoning objectives in mind rather than being tailored specifically for such infrastructural objectives. Nonetheless, the Planning Authority has adhered to this format for the purposes of justifying their retention.

A.3 Dunboyne - Proposed Local Distributor Road linking the Rooske Road to the Station Road / Clonee Road across the Dunboyne to Clonsilla Rail Line

Issue – The proposed Local Distributor Road traverses lands identified on the flood risk mapping as being located within Flood Zones A & B south of Station Road / Clonee Road noting that there are existing flood defences in place at this location.

A.3.3 JUSTIFICATION TEST

1. Urban settlement is targeted for growth – Yes.

National Spatial Strategy 2002 – 2020

Dunboyne is categorised as a town with a population of 1,500 – 5,000 persons, positioned on a National Transport Corridor (Motorway and Rail Connection to Dublin). The population of Dunboyne now exceeds 5,000 population which was the next category of urban centre identified in the NSS.

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

Dunboyne is listed as a Large Growth Town II in the settlement hierarchy within the Metropolitan Area of the Greater Dublin Area. Such centres are identified as strong active growth towns, economically vibrant with high quality transport links to larger towns/city. The spatial dimension to the Strategy supports the growth of the polycentric gateway and primary economic growth towns linked by multi-modal corridors and focused on identified Core Economic Areas. Dunboyne is identified as a 'Secondary Economic Growth Town' along with Ashbourne. Dunboyne is also identified as a Level 3 Sub County Town in the Retail Hierarchy of the GDA but intended to develop gradually to a Level 2 Centre over a 20 year period.

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

The proposed Local Distributor Road is an integral part of the proposed Dunboyne Eastern Distributor Road which will connect the Rooske Road to the Clonee Road to the former Navan Road and ultimately to connect to the Dunboyne bypass. Vehicular bridges will be required to pass over the railway line to accommodate the major distributor road at two separate locations. The existing zoned lands, which are contained in Flood Zone C, generally to the east of the rail line, are identified to accommodate the majority of the required additional residential growth which is allocated to Dunboyne under the Core Strategy of the County Development Plan. The development of these lands are subject to the provision of the associated infrastructure, including in particular the Eastern Distributor Road.

This is provided for in the existing Dunboyne Clonee Pace Local Area Plan by MOV POL 9 which seeks

To facilitate the development of the Dunboyne Eastern Distributor Road in conjunction with the development of the A4 lands to the east and south of the railway line in Dunboyne, to include arrangements for the delivery of a rail overpass at the south and north these lands.

i. Essential to facilitate regeneration and / or expansion of the centre of the urban settlement - Yes.

This project is a key part of the future development of the plan area. Development cannot take place without the necessary infrastructure. This piece of infrastructure will enable the primary area identified to accommodate additional residential land to expand sequentially from the town centre in a logical and coherent manner and which also adjoins the existing educational campus. The proposed route will enable the consolidation of the urban area; improve connectivity between the key centres to access local services, community infrastructure and recreational facilities.

ii. Comprises significant previously developed and / or under utilised lands - Yes.

This route will pass through under-utilised land in flood zone C which is identified primarily for residential development and has been prioritised for release in the evaluation of residentially zoned lands which inform this variation.

iii. Is within or adjoining the core of an established or designated urban settlement - not relevant.

The Flood Risk Management Guidelines defines the 'core' area of an urban settlement as "The core area of a city, town or village which acts as a centre for a broad range of employment, retail, community, residential and transport functions".

It is questionable as to the relevance of this criterion to the consideration of a Distributor Roadway such as proposed. The overall Eastern Distributor Road has been identified as a strategic transport objective to be delivered in tandem with residential, local shopping, commercial, education and community facilities.

iv. Will be essential in achieving compact and sustainable urban growth - Yes.

Developing the overall Eastern Distributor Road is essential to facilitating compact and sustainable urban growth of the LAP area within which a range of land uses may be accommodated to benefit the existing and proposed residential, working and visiting communities.

The Eastern Distributor Road will enable:-

- Growth of Dunboyne to logically take place eastwards maximising the ability of the town to develop as a rail based settlement;

- Unlocking lands for future residential development sequentially from Dunboyne town centre;

Improve connectivity from north to south Dunboyne and reduce the extent of unnecessary through traffic within the historic central core of Dunboyne by linking the existing Rooske Road to the Dunboyne bypass which serves the M3 northbound along with the Maynooth and Summerhill roads.

v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement - Yes.

The proposed development will better connect the eastern and southern areas of Dunboyne and also Clonee with the wider roads infrastructure in the area, improving access between existing residential areas to town centre functions, to educational facilities, to Dunboyne Train Station and to recreational areas. The lands identified primarily for development which will be served by the proposed Local Distributor Road are within Flood Zone C. The proposed roadway traverses Flood Zones A and B. There is no alternative alignment which could avoid having to traverse Flood Zones A and B.

Justification Test has advanced past Step 2 for Development Plans (Box 4.1 refers of the OPW Guidelines).

3. A flood risk assessment to the appropriate standard of detail has been carried out as part of the SEA as part of the development plan preparation process.

Part 3 of the Test requires that an adequately detailed FRA has been completed for the site to indicate that it can be developed for such use. Transport routes routinely cross watercourses and in this case the route consideration has minimised environmental impact and the strategic requirement for the alignment is clearly demonstrated by the Justification Test. The management of flood risk is achievable through the application of appropriate culvert/structure design in line with OPW Section 50 considerations. Risk from the Castle Stream is significant and the management of flood risk will need to be carefully considered. However, an appropriate design will adequately mitigate the potential impacts of flooding and ensure there are no significant adverse impacts elsewhere.

Any future planning applications for the distributor road must be subject to an appropriately detailed FRA at development management stage to demonstrate that the application fully adheres to the Planning System and Flood Risk Management Guidelines. Section 50 consent will also be required from the OPW to ensure the appropriate design of culverts.

Justification Test has advanced past Step 3 for Development Plans and must adhere to the recommendations from the Part 3 assessment.

A.4 Drogheda Southern Environs - The provision of a road link between the M1 Motorway and R132 (Old N1) which is referred to as the Southern Access Road

Issue – The proposed Local Distributor Road traverses lands identified on the flood risk mapping as being located within Flood Zones A & B.

A.4.4 JUSTIFICATION TEST

1. Urban settlement is targeted for growth – Yes.

National Spatial Strategy 2002 – 2020

Drogheda is designated as a Primary Development Centre in the Greater Dublin Area (GDA) under the NSS and therefore its close relationship with GDA has been recognised. The NSS states that Primary Development Centres should be aware of their relationship with the Metropolitan area. Notwithstanding this, they should be able to support and strengthen their own catchments and neighbouring regions. A population figure of 40,000 is recommended for self

sustaining growth in these Primary Development Centres. The NSS also recognises and supports the role of the Dublin- Belfast Corridor of which Drogheda forms part.

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

The Drogheda Environs are located within the Hinterland Area of the Greater Dublin Area as defined in the Guidelines. Within this area, the Guidelines state that large towns should absorb most of the new population growth and will continue to act as major service centres for adjoining towns and the surrounding rural area.

Drogheda is also identified as a Large Growth Town I and a Primary Economic Growth Centre in the Regional Planning Guidelines for the Greater Dublin Area. Large Growth Towns should accommodate significant new investment in transport, in economic and commercial activity and in housing. The Large Growth Towns I in Meath (Drogheda and Navan) are noted as being economically active towns supporting the surrounding area and located on multi modal corridors.

The Guidelines state that Primary Economic Growth Towns, such as Drogheda, should be promoted as anchors for regional enterprise. These centres are also important in delivering balanced regional development by serving their urban and rural hinterland areas and should be prioritised for economic development and investment to redress the imbalance of residential development and jobs and emergence of dormitory areas.

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

The M1 to R132 Link Road will form an important component of the development of the Southern Environs. It is expected that the construction of this road will be developer driven with the first section from Junction 8 on the M1 to the Beamore Road being progressed during the life of this County Development Plan.

The proposed Local Distributor Road was also identified in as a key objective of the Greater Drogheda Planning Strategy jointly prepared by Meath County Council, Louth County Council and Drogheda Borough Council. This Planning Strategy was a key consideration in the preparation of the resultant preferred land use strategy which is contained in the Drogheda Southern Environs Local Area Plan.

i. Essential to facilitate regeneration and / or expansion of the centre of the urban settlement - Yes.

This project is a key part of the future development of the overall Drogheda area as outlined above. Development cannot take place without the necessary infrastructure being provided. The Southern Access Road has been identified in high level plans for the past decade. The development of this roadway, would over time open up the Bryanstown lands identified for release as residential phase II, enable the wider movement patterns to be managed onto the national road network at the M1 and thus allowing the existing road infrastructure in the town to be served by public transport modes. It is therefore considered essential to the orderly expansion of the core of Drogheda.

ii. Comprises significant previously developed and / or under utilised lands - Yes.

This route will serve lands identified for employment, recreational and community use over the life of this plan and serve lands identified for residential development post 2019. All of the subject lands identified with a land use zoning objective that can accommodate vulnerable land uses are within flood zone C.

iii. Is within or adjoining the core of an established or designated urban settlement - not relevant.

The Flood Risk Management Guidelines defines the ‘core’ area of an urban settlement as “The core area of a city, town or village which acts as a centre for a broad range of employment, retail, community, residential and transport functions”.

It is questionable as to the relevance of this criterion to the consideration of a Distributor Roadway such as proposed.

iv. Will be essential in achieving compact and sustainable urban growth - Yes.

Developing the Southern Access Road is essential to facilitating compact and sustainable urban growth of the LAP area within which a range of land uses may be accommodated to benefit the existing and proposed residential, working and visiting communities. The Greater Drogheda Planning strategy identified the Northern Environs (Louth County Council) and Southern Environs (Meath County Council) as the preferred areas to expand their residential function in the medium to longer term.

v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement - Yes.

Justification Test has advanced past Step 2 for Development Plans (Box 4.1 refers of the OPW Guidelines).

3. A flood risk assessment to the appropriate standard of detail has been carried out as part of the SEA as part of the development plan preparation process.

Part 3 of the Test requires that an adequately detailed FRA has been completed for the site to indicate that it can be developed for such use. Transport routes routinely cross watercourses and in this case the route consideration has minimised environmental impact and the strategic requirement for the alignment is clearly demonstrated by the Justification Test. The management of flood risk is achievable through the application of appropriate culvert/structure design in line with OPW Section 50 considerations. Risk from the Stameen Stream is significant and the management of flood risk will need to be carefully considered, particularly along sections of the roadway that run parallel with the watercourse. However, an appropriate design can adequately mitigate the potential impacts of flooding and ensure there are no significant adverse impacts elsewhere.

Any future planning applications for the distributor road must be subject to an appropriately detailed FRA at development management stage to demonstrate that the application fully adheres to the Planning System and Flood Risk Management Guidelines. Section 50 consent will also be required from the OPW to ensure the appropriate design of culverts.

Justification Test has advanced past Step 3 for Development Plans and must adhere to the recommendations from the Part 3 assessment.

A.5 Kilcock - The provision of a Distributor Road link extending from the R148 (Maynooth Road) to the R125 (Dunshaughlin Road) which is referred to as the Northern Orbital Road

Issue – The proposed Local Distributor Road traverses lands identified on the flood risk mapping as being located within Flood Zones A & B.

Note:

Planning permission had already been granted by Meath County Council and upheld by An Bord Pleanála for the provision of this roadway.

A.5.5 JUSTIFICATION TEST

1. Urban settlement is targeted for growth – Yes.

National Spatial Strategy 2002 – 2020

Kilcock did not feature on Map No. 5 which outlined the strategy for the Dublin and Mid East regions. In 2002, the population of Kilcock was 2,985 persons and has since increased to 5,533.

Kilcock would now be categorised as a town with a population greater than 5,000 persons, positioned on a National Transport Corridor (Motorway and Rail Connection to Dublin).

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

Kilcock is identified as Moderate Sustainable Growth Town in the Dublin Metropolitan area in the RPGs. Such centres are to develop as strong edge of Metropolitan area district service centres with, high quality linkages and increased densities at nodes on public transport corridors. Kilcock and Celbridge have supporting roles in the Maynooth/Leixlip Core Economic Area. Kilcock is identified as a Level 3 Town and/or District Centres & Sub-County Town Centres in the Retail Hierarchy of the GDA.

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

The transport principles for Kilcock include:

- To provide an Northern Orbital Road Corridor within the development framework area and suitable linkages with the existing road network; and
- To provide robust linkages between the development framework lands and Kilcock Town and existing and future strategic transport corridors.

It is intended that the Northern Orbital Road serving the Northern environs of Kilcock will eventually connect the Maynooth Road (R148) from the east to the existing roundabout junction along the Summerhill Road (R158) to the west. It may be possible to then extend this roadway through the employment generating lands and beyond within the development framework area to the county boundary with Kildare. It is expected that the section of this roadway linking the R125 (Dunshaughlin Road) to the Maynooth Road (R148) will be delivered during the life of this plan in conjunction with primarily residential development.

i. Essential to facilitate regeneration and / or expansion of the centre of the urban settlement - Yes.

The proposed infrastructure would enable a coherent and planned approach to the future growth of Kilcock which has extended to a considerable distance to the south and away from the historic core of the town at the Square. Such growth would generally in accordance with the provisions of the Regional Planning Guidelines, and, given the proximity of the land to the town centre and the existing road interconnections serving the northern side of the town, would represent a suitable location to accommodate growth of the settlement.

ii. Comprises significant previously developed and / or under utilised lands - Yes.

It is envisaged under the Regional Planning Guidelines and the County Development Plans of Meath and Kildare that the town of Kilcock, which is situated in the Metropolitan Area, will continue to develop and expand. It is considered that these lands would be suitable to accommodate such growth. The coherent development of the subject lands is desirable and offers the prospect of properly planned neighbourhoods, well connected with the core of the settlement.

iii. Is within or adjoining the core of an established or designated urban settlement - not relevant.

The Flood Risk Management Guidelines defines the 'core' area of an urban settlement as "The core area of a city, town or village which acts as a centre for a broad range of employment, retail, community, residential and transport functions".

It is questionable as to the relevance of this criterion to the consideration of a Distributor Roadway such as proposed. Nonetheless in this instance, it is considered that the proposed infrastructure is adjoining the core of Kilcock.

iv. Will be essential in achieving compact and sustainable urban growth - Yes.

Having regard to;

- The existing pattern of development of the town of Kilcock;
- The provisions of the Kilcock Local Area Plan 2009-2015, and;
- The proposed land use zoning objectives to be included in the County Development Plan as part of this Variation which identifies these residential lands for release during the life of the County Development Plan.

It is considered that the development of the subject lands which will require the Northern Orbital Road provides the opportunity to rebalance the development of the town towards the north of the Royal Canal.

v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement - Yes.

The proposed roadway traverses Flood Zones A and B. The lands which it will serve are generally located in Flood Zone C. There is no alternative alignment which could avoid having to traverse Flood Zones A and B.

Justification Test has advanced past Step 2 for Development Plans (Box 4.1 refers of the OPW Guidelines).

3. A flood risk assessment to the appropriate standard of detail has been carried out as part of the SEA as part of the development plan preparation process.

Part 3 of the Test requires that an adequately detailed FRA has been completed for the site to indicate that it can be developed for such use. Transport routes routinely cross watercourses and in this case the route consideration has minimised environmental impact and the strategic requirement for the alignment is clearly demonstrated by the Justification Test. The management of flood risk is achievable through the application of appropriate culvert/structure design in line with OPW Section 50 considerations. Risk from the River Rye Water is significant and the management of flood risk will need to be carefully considered. However, an appropriate design can adequately mitigate the potential impacts of flooding and ensure there are no significant adverse impacts elsewhere.

Any future planning applications for the distributor road must be subject to an appropriately detailed FRA at development management stage to demonstrate that the application fully adheres to the Planning System and Flood Risk Management Guidelines. Section 50 consent will also be required from the OPW to ensure the appropriate design of culverts.

Justification Test has advanced past Step 3 for Development Plans and must adhere to the recommendations from the Part 3 assessment.

A.6 Maynooth - The provision of a new Local Distributor Road linking the R157 (Maynooth – Dunboyne Regional Road) with the Moyglare Road to form part of the Maynooth Outer Relief Road.

Issue – The proposed Local Distributor Road traverses lands identified on the flood risk mapping as being located within Flood Zones A & B where it crosses the Lyreen watercourse.

A.6.6 JUSTIFICATION TEST

1. Urban settlement is targeted for growth – Yes.

National Spatial Strategy 2002 – 2020

Maynooth is categorised as a town with a population greater than 5,000 persons, positioned on a National Transport Corridor (Motorway and Rail Connection to Dublin).

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

Maynooth is identified as a Large Growth Town II in the settlement hierarchy within the Metropolitan Area of the Greater Dublin Area. Such towns are intended to develop as strong active growth towns, economically vibrant with high quality transport links to larger towns/city. The spatial dimension to the Strategy supports the growth of the polycentric gateway and primary economic growth towns linked by multi-modal corridors and focused on identified Core Economic Areas. Maynooth and Leixlip have been identified as a 'Primary Economic Growth Towns' in the Maynooth/Leixlip Core Economic Area. They have been identified on equal footing as the principal economic growth centres, with both having interconnecting sectoral strengths. The cluster also includes two additional supporting towns of Kilcock and Celbridge. Maynooth is identified as a Level 3 Town and/or District Centres & Sub-County Town Centres in the Retail Hierarchy of the GDA.

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

TRAN OBJ 19 of the Meath County Development Plan seeks to liaise with Kildare County Council in the identification, design, reservation and delivery of the section of the Maynooth Outer Relief Road located within the administrative area of Meath County Council. Therefore, the proposed development is already an objective of the Meath County Development Plan and the written statement and detailed objectives of Maynooth Environs must be consistent with this high level objective.

Furthermore, the proposed road link is included in the recently adopted Maynooth LAP (2013) by Kildare County Council and is partially constructed within the Moyglare Hall development. Congestion remains a significant problem in the town centre and one of the key elements of the Maynooth LAP (2013) is the provision of various objectives particularly the outer orbital road to alleviate congestion problems.

Objective TRO 2 seeks to facilitate the future construction of the following roads and in the interim protect these routes from development:

(b) Between the Moyglare Road (C) and the County Boundary (D) (only a small section of this road to the County Boundary has to be completed).

i. Essential to facilitate regeneration and / or expansion of the centre of the urban settlement - Yes.

Without the development of the Maynooth Outer Relief Road, the existing congestion levels being experienced in the town centre will exacerbate and prevent the logical expansion of the town centre unless alternatives for road based traffic can be delivered.

ii. Comprises significant previously developed and / or under utilised lands - Yes.

The road infrastructure in the vicinity of the Development Framework area requires to be upgraded given the quantum of development which is envisaged by both Kildare and Meath County Councils. Meath County Council is keen to ensure the delivery of this important piece of infrastructure for the town of Maynooth which will be facilitated by the development of the lands within the Development Framework boundary. It is also considered critical to provide greater connectivity to the proposed Education Campus on lands owned by Co. Kildare VEC at Moyglare Road, Maynooth. The Campus will consist of an all-new 1,000 pupil Second Level School serving as Maynooth Community College. This will open to first years in September 2014. Another 1,000 pupil Second Level School to replace Maynooth Post Primary School will also be in situ on the Campus.

iii. Is within or adjoining the core of an established or designated urban settlement - not relevant.

The Flood Risk Management Guidelines defines the 'core' area of an urban settlement as "The core area of a city, town or village which acts as a centre for a broad range of employment, retail, community, residential and transport functions".

It is questionable as to the relevance of this criterion to the consideration of a Distributor Roadway such as proposed.

iv. Will be essential in achieving compact and sustainable urban growth - Yes.

The completion of the Maynooth Outer Relief Road is critical to the development of the lands within the framework boundary. Vehicular access to the lands within the Moygaddy area will be via the Maynooth Outer Relief Road. These measures will encourage pedestrian and cyclist usage within the development framework area.

v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement - Yes.

The alignment of this roadway has been identified in statutory land use plans on either side of the County boundary. It is impossible to connect the permitted roundabout at Moygaddy Gate to the existing road alignment in Moyglare Hall without traversing the Lyreen stream.

Justification Test has advanced past Step 2 for Development Plans (Box 4.1 refers of the OPW Guidelines).

3. A flood risk assessment to the appropriate standard of detail has been carried out as part of the SEA as part of the development plan preparation process.

Part 3 of the Test requires that an adequately detailed FRA has been completed for the site to indicate that it can be developed for such use. Transport routes routinely cross watercourses and in this case the route consideration has minimised environmental impact and the strategic requirement for the alignment is clearly demonstrated by the Justification Test. The management of flood risk is achievable through the application of appropriate culvert/structure design in line with OPW Section 50 considerations. Risk from the River Rye Water tributary is well contained within a narrow floodplain and an appropriate design can adequately mitigate the potential impacts of flooding and ensure there are no significant adverse impacts elsewhere.

Any future planning applications for the distributor road must be subject to an appropriately detailed FRA at development management stage to demonstrate that the application fully adheres to the Planning System and Flood Risk Management Guidelines. Section 50 consent will also be required from the OPW to ensure the appropriate design of culverts.

Justification Test has advanced past Step 3 for Development Plans and must adhere to the recommendations from the Part 3 assessment.

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