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East Meath Local Area Plan 2014-2020

Bettystown / Laytown / Mornington East / Donacarney / Mornington




Volume 3

Appendix C – Strategic Flood Risk Assessment

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Abbreviations

1D	One Dimensional (modelling)
2D	Two Dimensional (modelling)
AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
BLMEDM	Bettystown - Laytown - Mornington East - Donacarney - Mornington
CFRAM	Catchment Flood Risk Assessment and Management
DTM	Digital Terrain Model
EPA	Environmental Protection Agency
FEH	Flood Estimation Handbook
FEMFRAMS	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
LAP	Local Area Plan
MCC	Meath County Council
MPW	Medium Priority Watercourse
MRFS	Medium Range Future Scenario
OPW	Office of Public Works
OSi	Ordnance Survey
PFRA	Preliminary Flood Risk Assessment
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment

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1 Background to the Study

1.1 Commission

JBA Consulting was commissioned by Meath County Council (Meath CC) to undertake a Strategic Flood Risk Assessment (SFRA) of the East Meath Local Area Plan (LAP) which is defined by the settlements of Bettystown - Laytown - Mornington East - Donacarney - Mornington. This will assist Meath County Council in the preparation of the Local Area Plan for Bettystown - Laytown - Mornington East - Donacarney - Mornington 2014-2020 (BLMEDM LAP).

This report details the Flood Risk Assessment and Management Plan (otherwise referred to as the SFRA) for the BLMEDM LAP and has been prepared in accordance with the requirements of the DoEHLG and OPW Planning Guidelines, The Planning System and Flood Risk Management[1].

1.2 Scope of the Study

The BLMEDM LAP will be the key document for setting out a vision for how the settlements of Bettystown - Laytown - Mornington East - Donacarney - Mornington should develop during the plan period. The BLMEDM LAP sits beneath the Meath County Development Plan 2013-2019 and will remain consistent with the policies and objectives therein.

As a result of significant population increase since the adoption of the existing plan and the requirements of the Core Strategy, included within the Meath County Development Plan 2013-2019, the BLMEDM LAP is undergoing review. The new BLMEDM LAP will set out the strategic land use planning policy guidance for Bettystown - Laytown - Mornington East - Donacarney - Mornington. The BLMEDM LAP will fully consider the three pillars of Sustainable Communities; Sustainable Economy and Sustainable Heritage, and the SFRA will assist in the application of these principles over the plan area.

Under the "Planning System and Flood Risk Management" guidelines, the purpose for the FRA 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".*

In order to ensure that flood risk is integrated into the BLMEDM LAP, Meath CC 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. Prepare a flood risk assessment;
2. Undertake flood mapping for Bettystown - Laytown - Mornington East - Donacarney - Mornington;
3. Prepare a flood risk management plan in compliance with the DoEHLG and OPW Planning Guidelines; The Planning System and Flood Risk Management.

1.3 Report Structure

The SFRA considers the broader settlement strategy of the Greater Dublin Regional Planning Guidelines, the National Spatial Strategy and the countywide policies and objectives of the County Development Plan. It is intended to be read in conjunction with the Strategic Flood Risk Assessment for the current County Development Plan.

On a more local level, this study considers the development strategy that will form part of the LAP for the BLMEDM settlements. The context of flood risk in the BLMEDM area is considered with specific reference to people, property, infrastructure and the environment. A range of flood sources are analysed including fluvial, pluvial and groundwater.

A two stage assessment of flood risk has been undertaken for the BLMEDM settlements, as recommended in 'The Planning System and Flood Risk Management' guidelines. The first stage is to identify flood risk through examination of historical records and recent events that provide background information on flooding. The second stage and the main purpose of this SFRA report is to appraise the adequacy of existing information, to prepare flood zone maps and to highlight potential development areas that require more detailed assessment on a site specific level. The SFRA also provides guidelines for development within areas at potential risk of flooding, and specifically looks at flood risk and the potential for development within key sites.

[1] DoEHLG and OPW (2009) The Planning System and Flood Risk Management: Guidelines for Planning Authorities

Section 2 of this report provides an introduction to the study area and Section 3 discusses the concepts of flooding, Flood Zones and flood risk as they are incorporated into the Planning System and Flood Risk Management.

In Section 4, the available data related to flooding is summarised and appraised. This section also outlines the sources of flooding to be considered, based on the review of available data. Finally it discusses climate change and residual risk.

Having established flood risk within the settlements, Section 5 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 LAP. In Section 6, specific responses to flood risk are discussed in relation to a number of key development sites within the BLMEDM LAP.

Finally, triggers for the ongoing monitoring and future review of the SFRA are detailed in Section 7.

2 Study Area

2.1 Introduction

The area of interest comprises the settlement boundaries of Bettystown - Laytown - Mornington East - Donacarney - Mornington which comprise the BLMEDM LAP. The settlement areas cover the existing urban area and greenfield periphery sites. The five settlements are defined within the MCDP 2013-19 as follows:

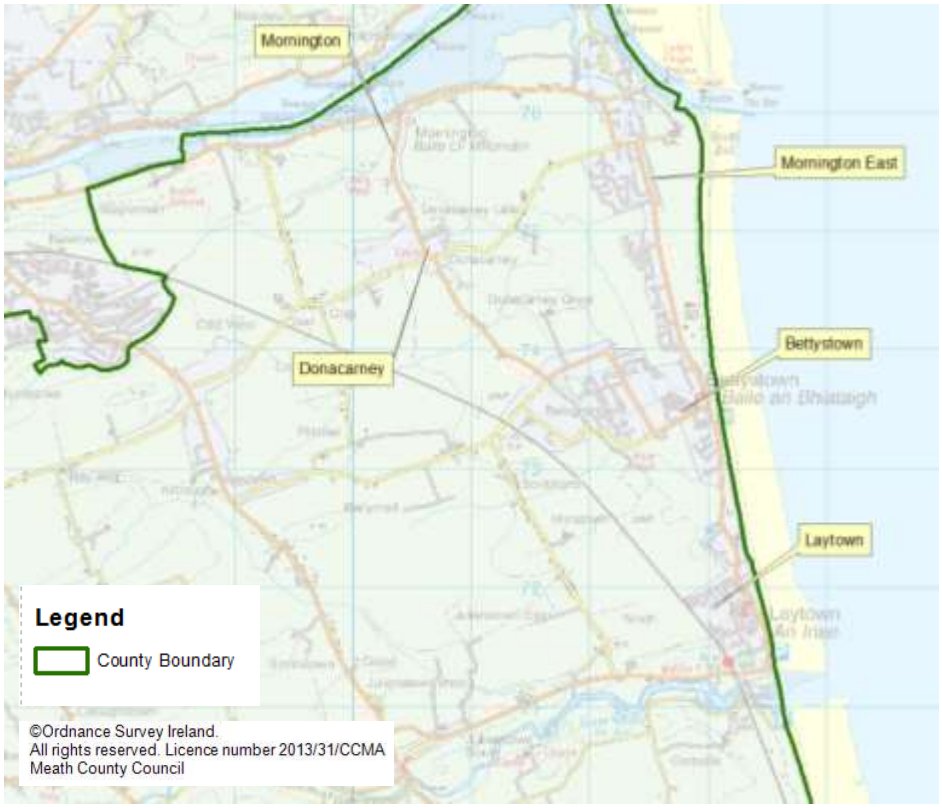
Table 2-1 Settlement Hierarchy and Roles within BLMEDM

Hierarchy	Settlement	Description
Small Towns	Bettystown	Good bus or rail links; 10km from large growth town (Drogheda Environs). Population between 1,500 - 5,000.
	Laytown	
	Mornington East	
Villages	Donacarney	Serve smaller rural catchment, provide local services and some smaller scale rural enterprises in a number of such villages. Population up to 1,000.
	Mornington	

The five settlements are concentrated on the coastal extent in between the Rivers Boyne and Nanny, as featured in Figure 2-1 below. Drogheda Southern Environs is the nearest large growth town and is to the north west of the settlements. The area is close to the border with County Louth/Drogheda Borough Council which is formed by the River Boyne and Drogheda Borough Council administrative boundary, which adjoins the northern extent of the Drogheda Environs (County Meath).

This section of the report will provide an overview of the study area, the drainage catchments, the population and the nature of settlement.

Figure 2-1 BLMEDM LAP Settlements



2.2 People and Property

The overall population of the area increased steadily between the period 2002 and 2011. The most recent census information indicates that the current population of the plan area is 10,889 persons which present an increase of 21% since the 2006 census results.

The area has maintained significant growth in population and within County Meath and over the last decade it is notable that the population has nearly doubled. It is therefore important that the

growth and development of the area is considered with respect to the impacts and extents of flooding.

Table 2-2 Population (Source: CSO)

Year	Population	% Change 02-06	% Change 06-11	% Change 02-11
2002	5,597			
2006	8,978	60%		
2011	10,889		21%	95%

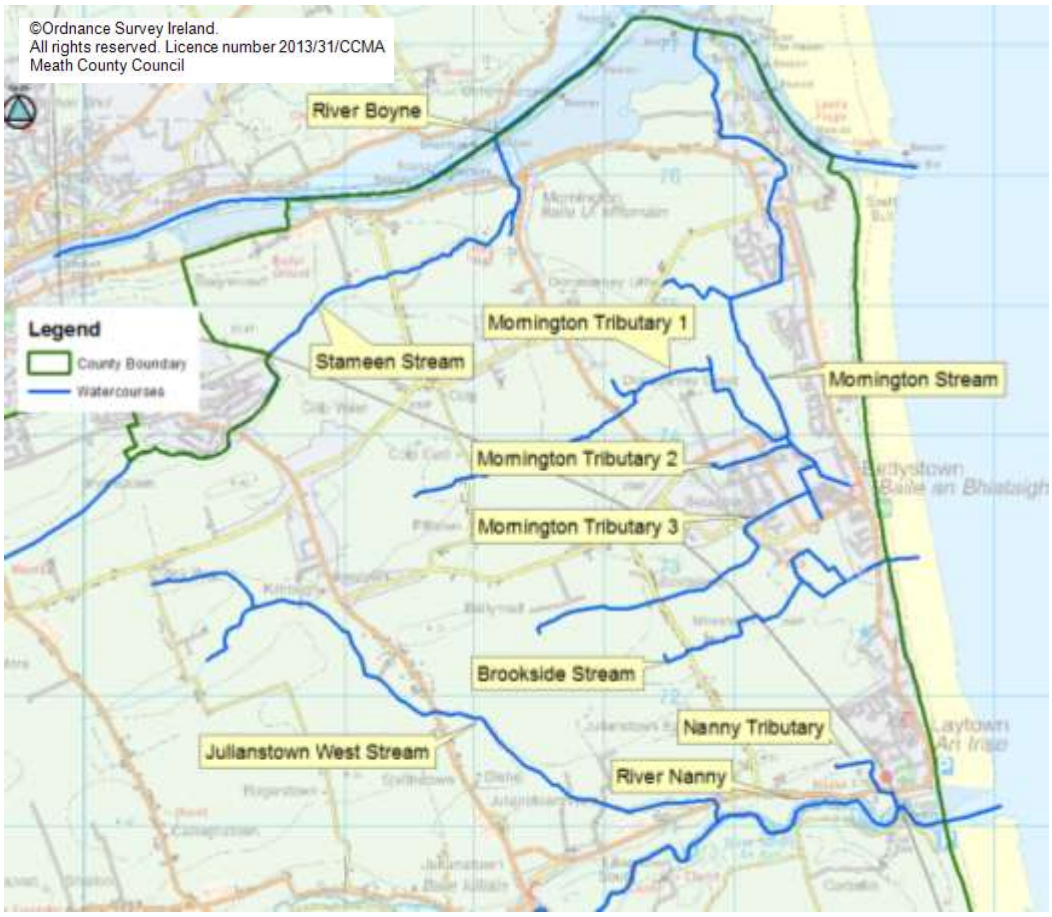
2.3 Watercourses

The tidal River Boyne forms the northern boundary for the Mornington and Mornington East settlements. The River Nanny dissects the Laytown settlement. The Mornington Stream and its tributaries flow through Bettystown and Mornington East in a northerly direction. Brookside Stream flows in an easterly direction through Bettystown, see Figure 2-2.

The River Boyne catchment covers approximately 2,695 km^2 and includes parts of counties Louth, Cavan, Meath, Westmeath, Offaly and Kildare. The River Nanny has a catchment area of 190km^2 at Duleek and at the confluence with the Irish Sea this value will be in excess of 200km^2. The smaller watercourses of the Mornington Stream and tributaries and the Brookside Stream have catchment areas that are under 10km^2.

All watercourses discharge into the Irish Sea which is subject to tidal variation and the impacts of tidal surge. The impact of these tidal levels can impact upon the levels within each of the watercourses.

Figure 2-2 Watercourses



2.4 Environment

Relevant Natura 2000 sites within the local area are summarised below:

- River Boyne and Blackwater candidate Special Area of Conservation (cSAC)
- River Boyne and Blackwater Special Protection Area (SPA)

- Boyne Coast and Estuary cSAC;
- Boyne Estuary SPA;
- River Nanny Estuary and Shore SPA.

Under Article 6(3) of the EU Habitats Directive, an “appropriate assessment” (AA) is required where any plan or project, either alone or ‘in combination’ with other plans or projects, could have an adverse effect on the integrity of a Natura 2000 site.

The management of flood risk within such areas must have regard to potential negative impacts to this environment. Further information is provided in the full Strategic Environmental Assessment (SEA) and AA for the BLMEDM LAP.

3 The Planning System and Flood Risk Management Guidelines

This chapter is replicated from the Meath County Development Plan 2013-2019 SFRA document; it is fundamental to understanding the SFRA process and has therefore been repeated.

3.1 Introduction

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

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

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

3.2 Definition of Flood Risk

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

Flood Risk = Probability of Flooding x Consequences of Flooding

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

Figure 3-1 Source Pathway Receptor Model

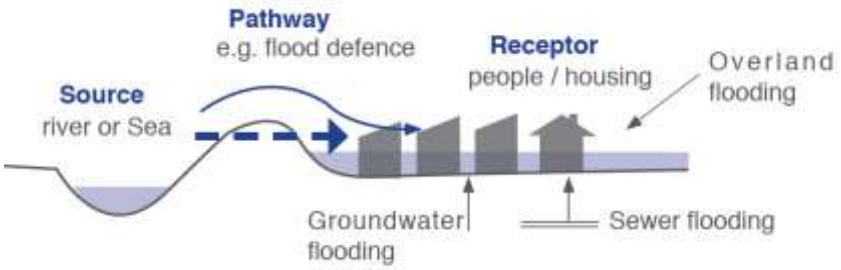


Fig. A1: Sources, pathways and receptors of flooding

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.

3.3 Likelihood of Flooding

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

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

Table 3-1 Probability of Flooding

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

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

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

3.3.1 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.

3.4 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 3-2.

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

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

Table 3-2 Definition of Flood Zones

Zone	Description
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).

3.5 Objectives and Principles of the Planning Guidelines

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

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

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

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

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

3.6 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 3-2 Sequential Approach Principles in Flood Risk Management

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

Where rezoning is not possible, exceptions to the development restrictions are provided for through the 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 3-3 shows which types of development, based on vulnerability to flood risk, are appropriate land uses for each of the Flood Zones. The aim of the SFRA is to guide development zonings to those which are 'appropriate' and thereby avoid the need to apply the Justification Test.

Table 3-3 Matrix of Vulnerability versus Flood Zone

	Flood Zone A	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 sequential approach and Justification Test in the context of specific development sites in the BLMEDM LAP is discussed in Section 6.

3.7 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 comprise of:

- **Regional Flood Risk Appraisal (RFRA)** – a broad overview of flood risk issues across a region to influence spatial allocations for growth in housing and employment as well as 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, which will be zoned for development. Where the initial flood risk assessment highlights the potential for a significant level of flood risk, or there is conflict with the proposed vulnerability of development, then a site specific FRA will be recommended, which will necessitate a detailed flood risk assessment.

- **Site Specific Flood Risk Assessment (FRA)** – site or project specific flood risk assessment to consider all types of flood risk associated with the site and propose appropriate site management and mitigation measures to reduce flood risk to and from the site to an acceptable level. If the previous tiers of study have been undertaken to appropriate levels of detail, it is highly likely that the site specific FRA will require detailed channel and site survey, and hydraulic modelling.

4 Flood Risk

4.1 Overview

There are a number of sources of flood data available for the BLMEDM settlements. Table 4-1 lists the core datasets used to compile the flood map for the BLMEDM LAP area and gives an assessment of the data quality and the confidence in its accuracy in defining flood risk.

Table 4-1 Flood Data Used to Compile Flood Zone Mapping

Description	Coverage	Quality & Confidence	Used
Mornington District Surface Water and Flood Protection Scheme	Mornington Stream	High	Yes for the listed coverage.
Fingal East Meath Flood Risk Assessment and Management Scheme (FEMFRAMS)	River Nanny, Brookside Stream	High /Moderate	Yes for the listed coverage.
Model update to Brookside Stream	Brookside Stream	High /Moderate	Yes, for the section upstream of the R151.
Irish Coastal Protection Strategy Study (ICPSS)	Meath Coastline	Moderate	Yes for coastal areas where better quality information does not exist.
Eastern CFRAM Flood Risk Review Report	All settlements within BLMEDM LAP	Moderate	Yes, indirectly to validate PFRA mapping.
OPW Benefitting land maps	Whole County	Moderate /Low	Yes, indirectly to validate other mapping.
OPW PFRA flood extent maps	Whole County	Moderate	Yes, where better quality information does not exist (Mornington Stream tributaries).
JFlow® Flood Mapping	Whole County	Moderate	Yes, where better quality information does not exist (for the un-named stream through Mornington).
Historical Flood Records and Consultation with Meath CC Engineer and OPW Area Engineer	Spot coverage of whole county and BLMEDM	Various	Yes indirectly to validate Flood Zones & identify other flood sources
Walkover Survey	BLMEDM settlements	Moderate	Yes, to validate outlines and flow paths at key locations

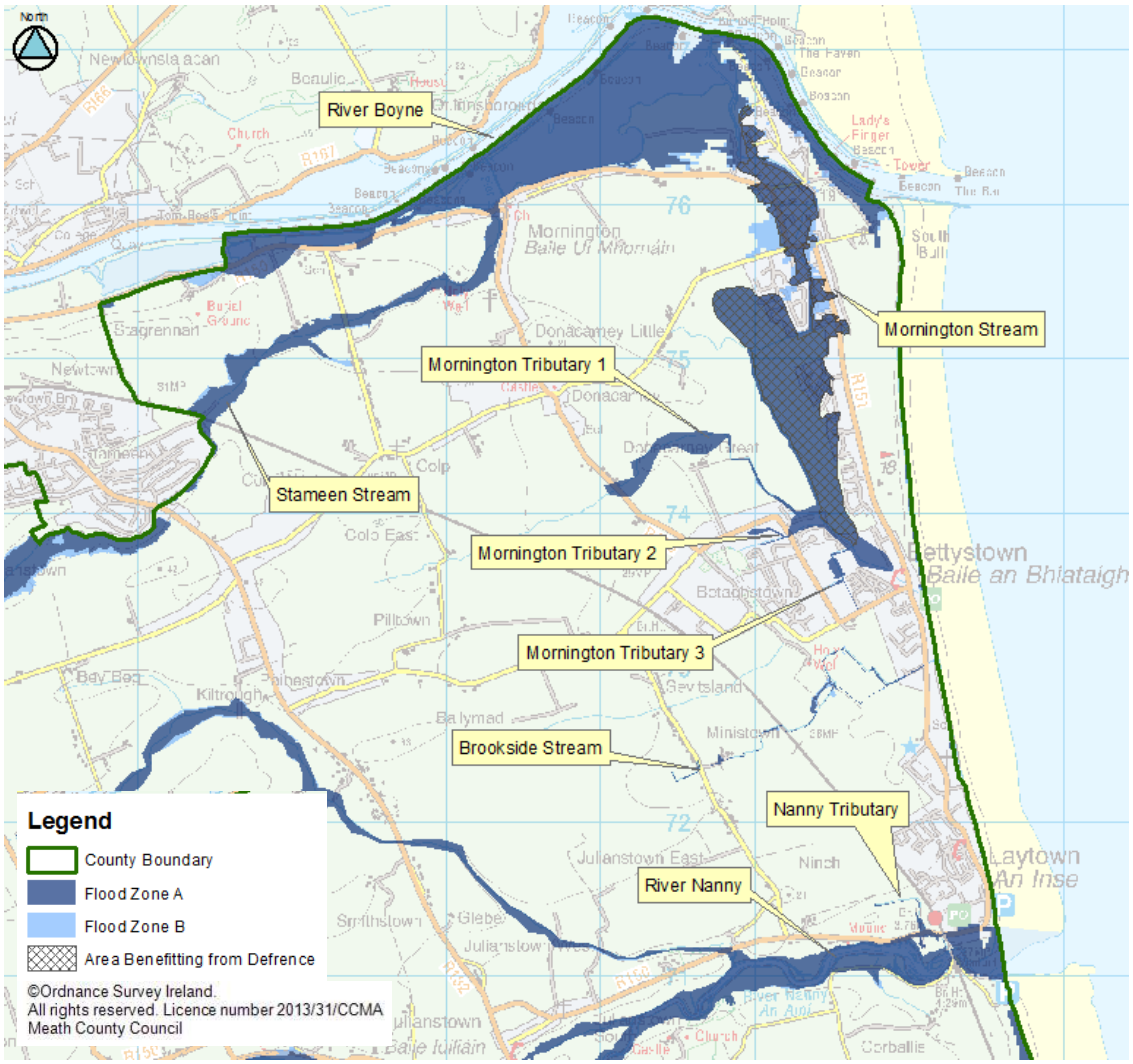
The Flood Zone mapping represents a combination of the above flood sources. The OPW FEMFRAMS mapping and the OPW Mornington East Flood Alleviation Scheme have formed the core source of the final Flood Zones and include for most of the flood extent coverage within the settlements. The Brookside Stream was included for within the FEMFRAMS study but the R151 culvert replacement has reduced flood risk to the upstream area. The impact of the increase in culvert size has been modelled and results are incorporated in the Flood Zone mapping.

The flood outlines have also been adjusted in places based on consultation with the Local Authority Engineer and OPW Area Engineer, a review of historic flood records, the OPW benefitting lands maps and the walkover survey.

The OPW PFRA mapping and JFlow mapping has been used as infill mapping for tributaries of the Mornington Stream and the un-named stream flowing through Mornington respectively.

The resultant Flood Zones, based on the best available information are presented in Appendix A. Figure 4-1 below gives an overview of the Flood Zones and watercourses with County Meath. Each of the sources of flood information is discussed in more detail in the following sections of report.

Figure 4-1 Flood Zone mapping with watercourse annotation



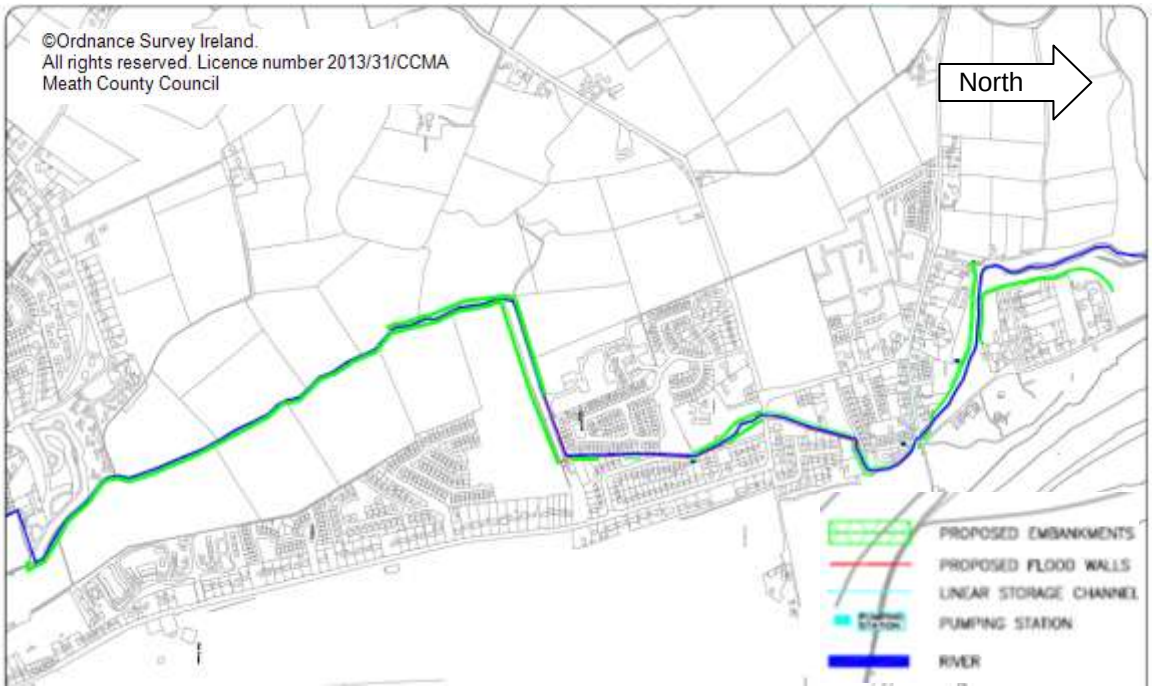
4.2 The Mornington District Surface Water and Flood Protection Scheme

The study was commissioned to investigate the potential mitigation of Mornington East from the impacts of fluvial and tidal flooding. It was completed to feasibility phase in 2003 and has subsequently been constructed.

The scheme is now fully operational and offers significant benefits to existing development and has a design standard of 1 in 200 years for the tidal influence and 1 in 100 years for the fluvial sections of the watercourse. The Flood Zones are shown in Figure 4-1 above and Appendix A, the maps include a hatched area that represents the area benefitting from defences.

Figure 4-2 over the page displays a design drawing indicating the extent of flood defences along the Mornington Stream. Formal protection begins on the watercourse in Bettystown, adjacent to Eastham House. The defences then continue downstream beyond the last of the existing properties in Mornington East, prior to the confluence with the River Boyne Estuary.

Figure 4-2 Mornington District Surface Water and Flood Protection Scheme Design Drawing (now all built)



4.3 FEM FRAMS Flood Outlines & Management Plan

Fingal County Council along with project partners Meath County Council 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 existing 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 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.

Within the BLMEDM LAP area the FEMFRAMS provides modelled outlines for the Brookside Stream, River Nanny and its tributaries. It also provides tidal outlines for the Meath coastline and part of the Boyne estuary. The FEMFRAM confirmed the main flood risk to Laytown arises from combined fluvial and tidal flood risk along the Nanny River estuary.

FEMFRAMS rejected the construction of flood defence embankments and demountable defences to protect properties at risk along the coast and from the Nanny River as a result of a benefit cost ratio below 1.

A more beneficial option was recommended for the construction of flood embankments and walls on the left bank of the River Nanny along the R150 southwest of Laytown. Approximately 210m of flood defence walls are required. Immediately downstream of the railway bridge, approximately 240m of flood embankment are required along the left bank of the Nanny River. At the time of writing it is understood that this option has not been progressed further.

4.3.1 Additional Modelling of the Brookside Stream (R151 culvert)

The Brookside Stream was originally included for within the FEMFRAMS study and identified the R151 culvert as being a constriction point that causes high upstream water levels.

The R151 culvert has since been replaced with a 1.5m diameter concrete pipe and this has greatly increased the capacity of the culvert. The impact of the increase in culvert size has been modelled using a 1D hydraulic model and results are incorporated in the Flood Zone mapping. Channel capacity upstream of the R151 is significant and flood extents have reduced accordingly.

The issue of residual risk to the lands upstream of the R151 culvert, as a result of potential culvert blockage, still remains. Any proposals for new development in the area should consider these impacts and provide for an assessment of the risk along with appropriate consideration of mitigation measures.

4.4 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 will lead to, and inform, more detailed assessment that will be undertaken as part of the Catchment Flood Risk Assessment and Management (CFRAM) studies. The PFRA study considered flooding from a number of sources; fluvial, tidal, pluvial and groundwater and prepared 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, is ongoing as the National CFRAM programme continues. In County Meath at selected Flood Risk Review Sites, the PFRA outlines have been reviewed 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.

4.5 JFLOW® Flood Mapping

JBA developed software, known as JFLOW®[2] to undertake multi-scale two dimensional hydraulic fluvial and tidal flood modelling. The fluvial flood mapping process involved two stages, hydrology and hydraulic modelling. JBA Consulting 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)[3] 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[4] 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.

JFLOW®, a two dimensional hydraulic modelling software, was used to simulate overland flooding. 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 and this was the OSi national 10m height model with updated height data in over 30 urban areas. This process was completed for all river catchments greater than 10km^2 and in some urban areas 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.

4.6 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, North-West and Neagh-Bann regions.

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

3 Flood Estimation Handbook, Institute of Hydrology, 1999

4 www.opw.ie/hydro

County Meath mainly falls under the jurisdiction of the Eastern CFRAM but also falls under the study area of the Fingal East Meath (FEM FRAMS), the North West and Neagh Bann 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 4.3 above). The initial Flood Risk Review (FRR) stage of the Eastern CFRAM has been completed and this included a site based review of the PFRA flood outlines in Mornington, which was forwarded as an Area for Further Assessment (AFA). A detailed assessment of the settlement is now being carried out and flood risk and hazard maps will be available in 2014 with Management Plans by the end of 2015 or early 2016. It is unlikely that there will be any large change in flood extents or management recommendations for this settlement.

4.7 Historical Flood Review and Consultation with Area Engineer

Records of past flooding are useful for looking at the sources, seasonality, frequency and intensity of flooding, they provide important background information.

4.7.1 OPW Floodmaps.ie

The OPW hosts a National Flood Hazard Mapping website[5] that makes available information on areas potentially at risk from flooding. This website provides information on historical flood events across the country and formed the basis of the Regional Flood Risk Appraisal.

Information is provided in the form of reports and newspaper articles which generally relate to rare and extreme events. Since the establishment of the hazard mapping website, more records are available which identify more frequent and often recurring events. These tend to include memos and meeting records from local authority area engineers, often relating to road flooding.

4.7.2 Consultation

A consultation with an MCC Engineer and an OPW Area Engineer was conducted and this helped to clarify and improve on the general appreciation of flood risk in the BLMEDM LAP area. The following details were gathered through this consultation process:

- Flood extent within the Northlands Estate was confirmed.
- Additional areas of surface water flooding were identified.
- Existing Flood Zones were confirmed and verified.
- The full operational status of the Mornington District Surface Water and Flood Protection Scheme was confirmed.

The pertinent flood risk history from both the consultation and OPW floodmaps.ie sources are summarised in the table over page.

4.8 Northlands Estate Flood Alleviation Study

Work is ongoing in relation to a minor works scheme with the aim of reducing flood risk to the Northlands Estate in Bettystown. The estate has been subject to multiple recent flood events. The study is nearing completion and will recommend mitigation works for the site and watercourse (tributary of the Mornington Stream). Until the scheme is complete there will be no indication of any defended area within the Flood Zone maps presented within the SFRA or BLMEDM LAP.

[5] www.floodmaps.ie

Table 4-2 Historic Flooding Information (source: Eastern CFRAM Flood Risk Review[6])

Settlement	Location / Date of Flood	Comment
Laytown	Recurring	The mouth of the Nanny River is prone to flooding from high tides.
Laytown	February 2002	Flooding occurred in Laytown as the East coast experienced high tide conditions on a Friday afternoon.
Laytown	Recurring : Alvera Heights	Alvera Heights is a housing estate in Laytown that experiences flooding. Recurring flooding occurs as a result of inadequate surface water drainage and heavy rain.
Bettystown	Pilltown Recurring	A tributary of the Mornington River flows through the locality of Pilltown. The watercourse overflows its banks after heavy rain and a nearby road is also liable to flooding.
Bettystown	Northlands Estate 24th October 2011 & September 2012	Flooding occurred in the Northlands Estate from the Mornington Stream tributary overtopping its banks. The factors contributing to the flooding were heavy rainfall and structure blockage in the watercourse.
Bettystown	Mornington November 2012	Flooding occurred from a combination of high tides and heavy rainfall.
Mornington	Recurring	Flooding occurs after periods of heavy rainfall. It is noted that this occurs on an annual basis.
Mornington East	February 2002	The East Coast experienced extreme high tide conditions on Friday afternoon. This area is prone to flooding from extreme high tides that occurred on 1st February 2002.
Mornington East	November 2002	The combination of high tides and high rainfall that occurred on the 6th November 2000 caused flooding on areas.
Donacarney	Recurring	The R150 floods every year after heavy rain due to inadequate drainage on road.

4.9 Walkover Survey

A walkover survey of key sites was conducted to help assess flood risk and provide a local understanding of the sites. Information collated on the site visits was used to inform the Flood Zone mapping process.

Photographs taken on site are presented in Figure 4-3 below.

Figure 4-3 Site Walkover Photographs

Flood defence wall and culvert parapet in Mornington East.

Undeveloped land within Flood Zone A (high risk), behind Funtasia, Bettystown.

[6] OPW Eastern CFRAM Flood Risk Review http://www.eastcframstudy.ie/

Properties in Mornington within Flood Zone C (low risk), Stameen Stream/Estuary flood plain on right of image.

New R151 culvert exit in Bettystown.

4.10 Sources of Flooding

A review of the historical event data and predictive flood information has highlighted a number of sources of potential flood risk to the town. These are discussed in the following sections.

4.10.1 Fluvial Flooding

Flood risk from the Mornington Stream and its tributaries presents the largest historical risk to the settlements of Bettystown and Mornington Stream. The flood alleviation scheme has now addressed the issue up to the agreed design standards, but a residual risk of flooding remains and the three principal tributaries do not benefit from flood defences. Other watercourses which give rise to fluvial flood risks include the Brookside Stream, the Stameen Stream, the River Boyne and the River Nanny. A full review of locations where development is impacted by flood risk is included in Section 6.

4.10.2 Coastal/Tidal Flooding

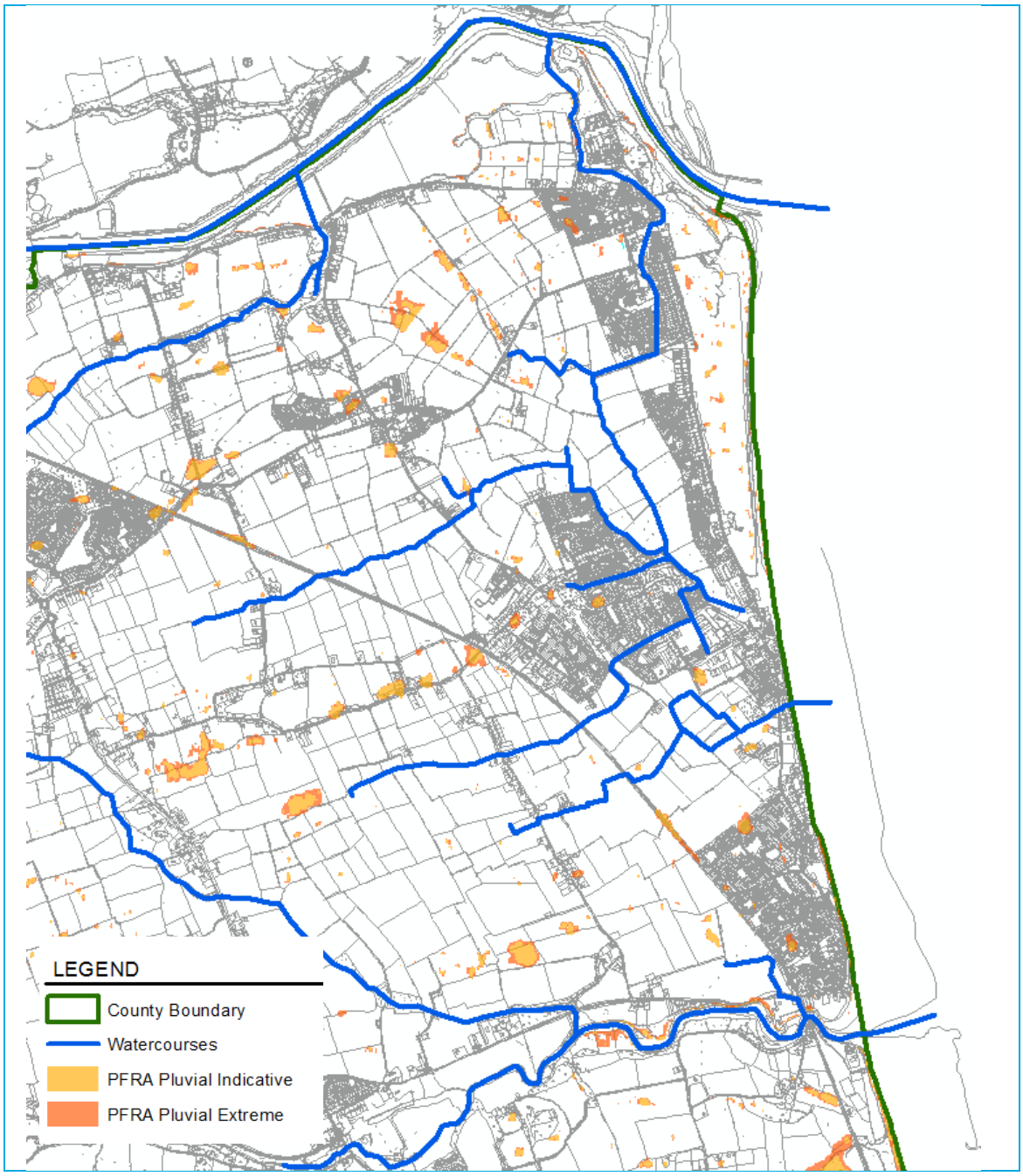
The coastal facing settlements of Bettystown, Laytown, Mornington East and Mornington are mainly impacted though high sea levels extending up the watercourses which drain the inland area. This issue has been addressed on the Mornington Stream through the flood defence scheme, but causes some risk on the River Nanny, the Stameen Stream and to a much lesser extent the Brookside Stream. The beach and links area/dune systems offer enough protection to the seaward facing periphery against current extreme sea levels. Laytown is at most risk from extreme sea levels and the FEMFRAMS recommends some management measures in this regard.

4.10.3 Pluvial Flooding

Flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. Areas at risk from fluvial flooding will almost certainly be at risk from surface water flooding. The indicative pluvial map from the OPW PFRA study is presented in Figure 4-4. It has been used to identify development areas at particular risk of surface water and pluvial flooding.

Based on the PFRA mapping, the risk of pluvial flooding is generally low although some isolated areas are predicted to have a higher probability of pluvial flooding. Most of the higher risk areas are within undeveloped lands; there are some reports of historical surface water flooding affecting the settlements and management of risk can be addressed by individual works. For new development, adhering to the policies on the management of surface water will ensure the risk will be adequately managed.

Figure 4-4 PFRA Indicative Pluvial Flood Map[7]



[7] Source: OPW, PFRA Study Draft Data, licensed to Meath County Council

4.10.4 Groundwater Flooding

Groundwater flooding is caused by the emergence of water originating from the subsurface, and is particularly common in karst landscapes. This source of flooding can persist over a number of weeks and poses a significant but localised issue that has attracted an increasing amount of public concern in recent years. In most cases groundwater flooding cannot be easily managed or lasting solutions engineered.

The draft PFRA groundwater flood maps[8], which entailed an evidence-based approach and considered the hydro-geological environment, such as the presence of turloughs, did not show any significant risk in the BLMEDM LAP area. Based on the PFRA study the risk of groundwater flooding is not considered significant enough to warrant further investigation in this SFRA.

4.11 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. 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 4-3 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) accordingly; 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

4.11.1 Climate Change and Flood Risk Assessment

In the East Meath area climate change will have the greatest impact in relation to the predicted increase in sea levels and the resulting increase in water levels on the watercourses draining into the River Boyne estuary, River Nanny estuary and the Irish Sea. Results from the OPW PFRA mapping for extreme coastal levels suggests that the most significant increase in risk is limited to the Mornington Stream. The sensitivity of the other watercourses to sea level increase appears to be much lower as a result of a more abrupt drop in level close to the coastal margin,

The Mornington District Surface Water and Flood Protection Scheme incorporated an allowance of 4mm/yr into the freeboard of the design levels for the flood defence structures. Whilst this is below the now published OPW guidance for future scenarios in Table 4-3 the scheme has been assessed in terms of adaptability for future increases in sea level. The constructed defences have a form which will allow additional height to be added at a later date.

Further consideration to the potential future impacts of climate change will be given for specific areas of the BLMEDM LAP settlements within Section 6. Where development is proposed within an area of potential flood risk, a flood risk assessment of appropriate scale will be required and this assessment must take into account climate change and associated impacts.

[8] Reference: Preliminary Flood Risk Assessment Groundwater Flooding, June 2010

5 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 is achieved through the application of policies and objectives within specific development plans.

Section 7.15 'Flood Risk Management' of Volume 1 of the Meath County Development Plan (MCDP) 2013-2019 includes a number of policies and objectives which set out the framework for flood management within the County.

The BLMEDM LAP SFRA will build on the overview of flood risk contained within the MCDP 2013-2019 SFRA by considering the policies and objectives contained within the MCDP and adding to them, where necessary, to cater for the specific needs of the East Meath area.

5.1 Flood Risk Policies and Objectives

The policies and objectives listed in this section are taken from Volume 1, Section 7.15 of the MCDP 2013-2019 are listed below. They have all been considered and applied during the preparation of the BLMEDM LAP 2014-2020. In particular Policies 29-30 and 35 have ensured that the sequential approach has been adopted when considering land use zoning objectives and where necessary the Justification Test has been applied. This has resulted in re-zoning of land to open space in areas at risk of flooding. It has also protected development areas where there is a strategic requirement for town centre expansion.

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.

5.2 Specific Policy Recommendations

In addition to the more general management policies and objectives in the MCDP 2013-2019, it is also appropriate to include for policies and objectives that are specific to the development plan area. This approach allows for the management of specific flood risk issues on a local basis.

5.2.1 Development Management - Planning Applications in BLMEDM LAP settlements

To clarify the application of WS POL 31 & 32 contained within the MCDP 2013-2019 the following outlines the key requirements relating to the management of development and flood risk in the BLMEDM LAP settlements;

- Development proposals will require an appropriately detailed FRA. As a minimum this will include a "Stage 1 - Identification of Food Risk"; where flood risk is identified a "Stage 2 - Initial FRA" will be required, and depending on the scale and nature of the risk a "Stage 3 - Detailed FRA" may be required. The requirement for all applications to have an accompanying stage 1 assessment is important, as for example a large site located in Flood Zone C may be appropriate in terms of vulnerability, but might be at potential risk of surface water flooding or residual risk of culvert failure, it is noted that this SFRA effectively deals with Stage 1 and can be referred to as such.
- Under the FRA the impacts of climate change and residual risk (culvert/structure blockage) should be considered and remodelled where necessary, using an appropriate level of detail, in the design of FFL.
- All development proposals will require the FRA to consider surface water management in line with the GDSDS as stated in the MCDP WS POL 31.

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

Ground levels and FFLs must be clearly defined within the site specific FRA and must take into account the land use vulnerability and flood levels, including the impacts of climate change and additional freeboard. Flood levels for the Mornington Stream are presented in the RPS Mornington District Surface Water and Flood Protection Scheme Final Preliminary Report Addendum (Report IBE5613.00/AS/RW01 dated 16/10/07) available from www.floodmaps.ie. Note that this report supersedes all previous versions of the report.

Specific requirements for new development FRA are specified on a site by site basis in Section 6.

5.2.2 Existing Development at Risk of Flooding

For existing development it is not feasible to alter the wider land use zoning objective and in most cases will not be possible to re-locate the existing development to an area at lower risk of flooding. For this reason, changes to existing development or reconstruction/new development (within existing developed areas) will require careful management.

Areas of existing development, along with their corresponding land use zoning objective, that are at risk of flooding in the BLMEDM settlements are identified in the Flood Zone Mapping presented in Appendix A.

Any proposal in an area at high or moderate risk of flooding (Flood Zone A or B) that is considered acceptable in principle must demonstrate that appropriate mitigation measures can be put in place and that residual risks can be managed to acceptable levels through the submission of an appropriately detailed FRA as detailed in Section 5.2.1.

5.2.3 Extension of Duration

For planning applications that were granted prior to the publication of the Planning System and Flood Risk Management Guidelines in 2009, and are subsequently applying for an extension of duration it is recommended that an appropriately detailed FRA should be provided as part of the application. If the permitted development is found not to conform with the Planning Guidelines then the application should be refused on flood risk grounds and a new application can be provided, allowing for appropriate design and FRA.

5.2.4 New Development with A2, B1, E2 and G1 zoning objectives at risk of flooding

Section 6 identifies new development sites with A2, B1, E2 and G1 zoning objectives that are subject to marginal impacts of flooding. Under these conditions flood risk is managed by the adoption of the sequential approach and the Justification Test is not applied.

Under this approach, development proposals for the subject site must employ the sequential approach and allocate water compatible development within Flood Zones A and some/all of Zone B.

Planning applications within these zoning objectives must be accompanied by an appropriately detailed FRA. The FRA will set out the above approach and clearly assesses flood risks, mitigation measures (ground and FFLs) and demonstrate compliance with the Planning Guidelines in line with Section 5.2.1 and for the individual requirements stated within Section 6.

5.2.5 FEMFRAMS Recommendations

The FEMFRAMS management report recommended the construction of flood embankments and walls on the left bank of the River Nanny along the R150 southwest of Laytown. The BLMEDM LAP should seek to promote the general recommendations of the FEMFRAMS within a suitable policy, as indicated within the MCDP 2013-2019.

5.2.6 Future Distributor Roads

River crossings are included for the Brookside Stream for both strategic objectives TM OBJ 1 (north-south spine road) and TM OBJ 4 (southern end of north-south spine road link to R150).

The Justification Test has been applied to the TM OBJ 1 north south route alignment as this route is confirmed and intersects Flood Zone A/B. 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 also be required.

The east west spine road is identified by TM OBJ 4, but alignments are not yet confirmed. During the environmental assessment stage, the Justification Test will need to be applied if alignments interact with Flood Zone A/B. FRA will then 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.

6 Development Zoning and the Justification Test

This section presents the land use zoning objectives contained within the BLMEDM LAP and reviews the flood risk to these objectives. Where new development is zoned within areas at risk of flooding then more detailed commentary is provided along with details for justification.

6.1 Land Use Zoning

The purpose of zoning is to indicate to property owners and members of the public the types of development which the Planning Authority considers most appropriate in each land parcel.

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.

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. The vulnerability of the land use, coupled with the Flood Zone in which it lies, guides the need for application of the Justification Test.

Table 6-1 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
E2 - General Enterprise & Employment	High / Less	For highly vulnerable development in Flood Zone A or B For less vulnerable 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	Water Compatible	Development is generally appropriate
WL - White Lands	n/a	Not required

* 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.

The land zoning objectives and their respective vulnerabilities are shown in Table 6-1. It is important to note that this table 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'. For example the B1, C1, D1, E2 and G1 zonings can include for high or less vulnerable development, and depending which flood zone they lie in, there is a varying requirement for the application of the Justification Test.

6.2 Development Land Use Zoning Review in the BLMEDM LAP Settlements

This review will look at each of the land use zonings in turn and discuss the associated flood risk issues in each settlement. Whilst preparing the BLMEDM LAP 2014-2020 zoning objectives for new development, the Local Authority have applied the sequential approach and preferentially avoided highly vulnerable or less vulnerable land uses within areas of moderate or high flood probability (Flood Zone A or B). Section 2.4 of the written statement explains the evaluation procedure and wider context for zoning considerations with regard to residential use. Where land use zonings are subject to flooding, but development pressures remain, the Justification Test has been applied.

Where there is existing development it is not feasible to alter zoning objectives during development plan preparation. For this reason, changes to existing development or reconstruction/new development (within existing developed areas) will require a site specific FRA to be conducted at the development management stage when planning permission is being sought.

For sites where planning permission has been granted but no construction has taken place the land use zoning has been retained. The Justification Test does not apply in these cases and an initial assessment of flood risk to the potential development is provided. Any application for extension of duration or new applications within the zoning will require appropriately detailed FRA at development management stage and it may be found at that stage that is it not possible to develop the site as originally planned.

The procedure for site specific FRA is outlined in Sections 5.2.1, 5.2.2 and 5.2.4. A review of flood risk to the land use zoning objectives is presented in Table 6-2 below. Detailed commentary on sites identified for the Justification Test then follows.

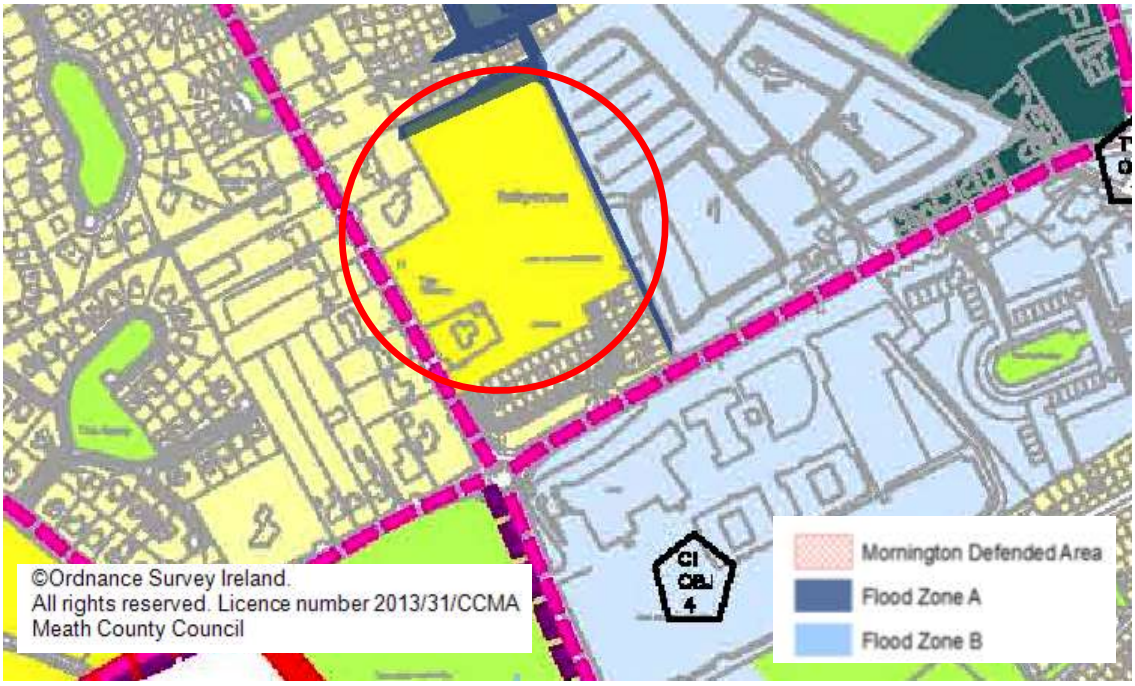
Table 6-2 Land Use Zoning and Flood Risk in BLMEDM LAP

Settlement	Comment on Flood Risk	Justification Test Required?
Bettystown	Potential flooding from the Mornington Stream and its tributaries as well as the Brookside Stream. New development zoning objectives largely avoid risk but there are areas of A2 and B1 that are within Flood Zone A/B. All A2 sites are subject to extant permissions that have been subject to FRA at development management stage. The Mornington District Surface Water and Flood Protection Scheme provides some protection to existing development and undeveloped lands adjacent to the Mornington Stream. Other existing development remains at risk and any future extensions or change of use should be managed with appropriately detailed FRA at the development management stage. Future impacts of climate change and sea level rise should be monitored. The Justification Test has been applied and passed for the north south spine road alignment.	Yes - for the north-south spine road.
Donacarney	Donacarney is not impacted by current fluvial or tidal/coastal flood risk. The risk of surface water flooding remains and this can be managed through the application of appropriate policies and objectives relating to surface water.	No
Laytown	Laytown is subject to potential flooding from the River Nanny Estuary, its tributaries and from tidal/coastal levels. Development has largely avoided high risk areas, existing development must be managed in line with the stated policies and objectives and seek appropriate FRA where necessary. New development zonings impacted by flooding include a very small section of E2, G1 lands are under existing water compatible use and the sites can appropriately manage flood risk. Future impacts of climate change and sea level rise should be monitored.	No
Mornington	Mornington is subject to potential flooding from the Stameen Stream, however, existing development has largely avoided the floodplain which is appropriately zoned H1. The risk of surface water flooding remains and this can be managed through the application of appropriate policies and objectives relating to surface water. Future impacts of climate change and sea level rise should be monitored.	No
Mornington East	Historic flooding of existing property in Mornington East lead to the design and construction of the flood alleviation scheme which protects property against fluvial/tidal flooding from the Mornington Stream. There is still a residual risk of flooding behind the defences and new development zonings B1/G1 have been subject to careful consideration. The Justification Test has been applied to the B1/G1 zoning and was demonstrated to pass. Future development on the site must be subject to an appropriately detailed FRA at development management stage. Changes or extensions to existing development should be managed in line with the policies and objectives. Future impacts of climate change and sea level rise should be monitored.	Yes - for the B1/G1 land use zoning objective

6.3 Bettystown

6.3.1 New Residential (A2) - Undeveloped Zoned Land

Overview



JBA Comment:

The site is undeveloped and has retained an A2 zoning. The land is upstream of the Northlands Estate and has been subject to earth works, raising the levels of some parts of the site. There is a small margin of Flood Zone A from the two streams that border the land parcel. Risk can be managed by applying the sequential approach and avoiding development in the margins of the site, instead maintaining a green corridor with no increase in ground levels adjacent to the watercourses (as a minimum within Flood Zone A/B). As a consequence, risk is avoided and the Justification Test does not need to be applied.

Under an appropriately detailed FRA it must be demonstrated that the FFLs of all residential dwellings are set above the 100yr flood level including the impacts of climate change and additional freeboard. In adopting this approach it must be demonstrated that there is no increase in risk to neighbouring development.

Conclusions	Any future planning applications on the site should be subject to an appropriately detailed FRA at development management stage to demonstrate that the sequential approach has been applied and that the application fully adheres to the Planning System and Flood Risk Management Guidelines. FFLs should be set above the 100yr flood level including the impacts of climate change and additional freeboard.

6.3.2 New Residential (A2) - Undeveloped Zoned Land with Extant Planning Permission

Overview

JBA Comment:

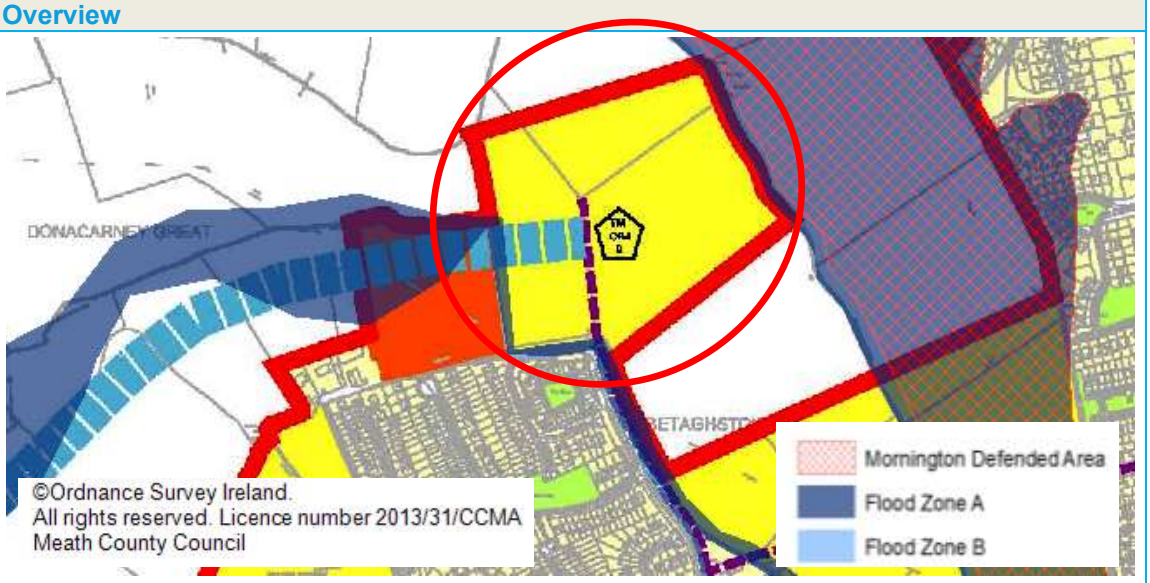
The site is undeveloped, partly behind flood defences constructed as part of the Morning District Flood Alleviation Scheme and has retained an A2 zoning. Extant permissions are in place for which an FRA was completed. The FRA demonstrated that flood risk to the site is addressed by the design. In the 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 (prior to the next variation or draft of the BLMEDM LAP) should be subject to an appropriately detailed FRA specific to the new site layout and it may be found that the site cannot be developed as planned. Under the next variation or draft of the BLMEDM 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.

Conclusions	The Justification Test is not applied for extant permissions. However, any new applications will be subject to FRA and under the next variation or draft LAP (if there is no extant permission in place) the zoning should be considered in line with the sequential approach.

6.3.3 New Residential (A2) - Undeveloped Zoned Land with Extant Planning Permission

Overview



JBA Comment:

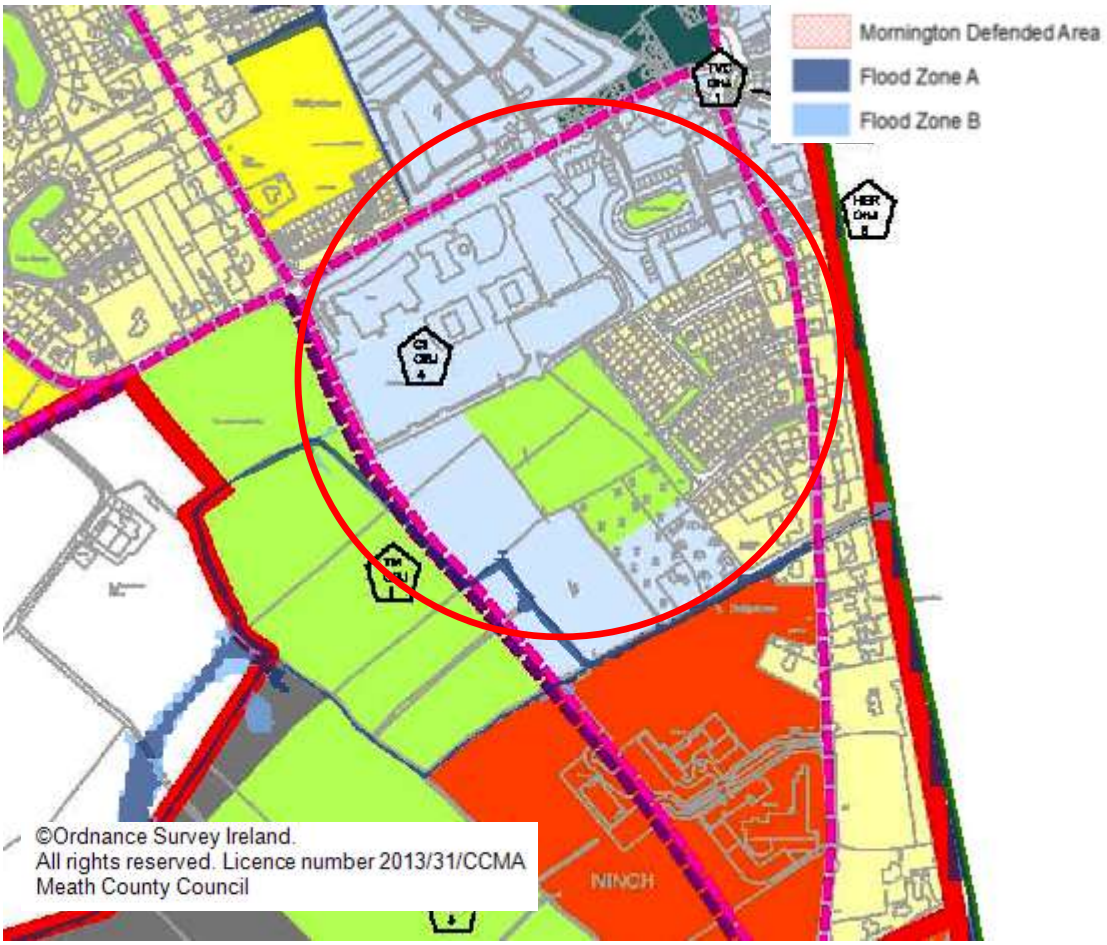
The land in question is partly within Flood Zone A, undeveloped and has retained an A2 zoning. Extant permissions are in place and an FRA was carried out. The site layout and design includes for land raising which provides adequate mitigation of risks to the site. In the case of an extant permission the Justification Test is not applied.

If the site remains unconstructed and the planning application lapses, any future planning applications on the site (prior to the next variation or draft of the BLMEDM LAP) should be subject to an appropriately detailed FRA specific to the new site layout and it may be found that the site cannot be developed as planned. Under the next variation or draft of the BLMEDM 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.

Conclusions	The Justification Test is not applied for extant permissions, however, any new applications should be subject to FRA and under the next variation or draft LAP (if there is no extant permission in place) the zoning should be considered in line with the sequential approach.

6.3.4 Commercial/Town Centre (B1) - Undeveloped/Part Developed Zoned Land

Overview



JBA Comment:

Site is part developed and is subject to B1 Commercial Town Centre zoning. Extant permission is in place on part of the zoned area, but this does not extend within Flood Zone A or B.

There is a small margin of Flood Zone A from the Brookside stream that flows along the western and southern boundary of the site. Risk can be managed by applying the sequential approach and avoiding development alongside the stream. Instead, a green corridor can be maintained, which should be retained at existing ground levels adjacent to the watercourses (as a minimum within Flood Zone A/B). As a consequence, risk is avoided and the Justification Test does not need to be applied.

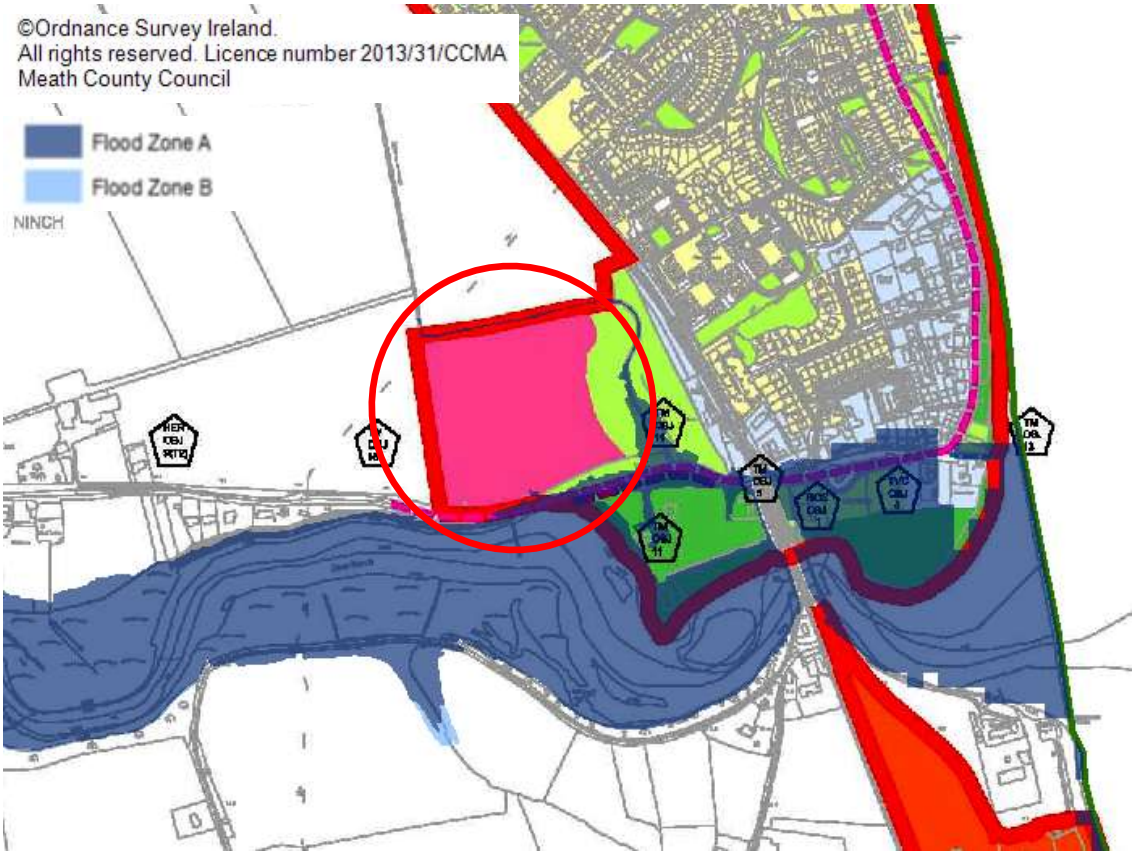
Under an appropriately detailed FRA it must be demonstrated that the FFLs are set to take into account land use vulnerability and residual risk of flooding from a blockage or failure of the R151 culvert.

Conclusions	Application of the sequential approach within the B1 zoning to avoid development within Flood Zone A or B. Appropriately detailed FRA required to demonstrate that any planning applications are provide suitable FFLs. FRA, must include consideration of culvert blockage.

6.4 Laytown

6.4.1 General Enterprise & Employment (E2) - Undeveloped Zoned Land

Overview



JBA Comment:

The site is undeveloped and is subject to E2 General Enterprise and Employment zoning. There are no extant permissions in place and there is a small margin of fluvial/tidal risk from the River Nanny. The site topography rapidly increases away from the road and the level of risk to the site is generally low. As a result there is a very small portion of the site that is potentially impacted by Flood Zone A. Risk can be managed by applying the sequential approach and avoiding development in Flood Zone A, instead maintaining this land as open space. As a consequence, risk is avoided and the Justification Test does not need to be applied.

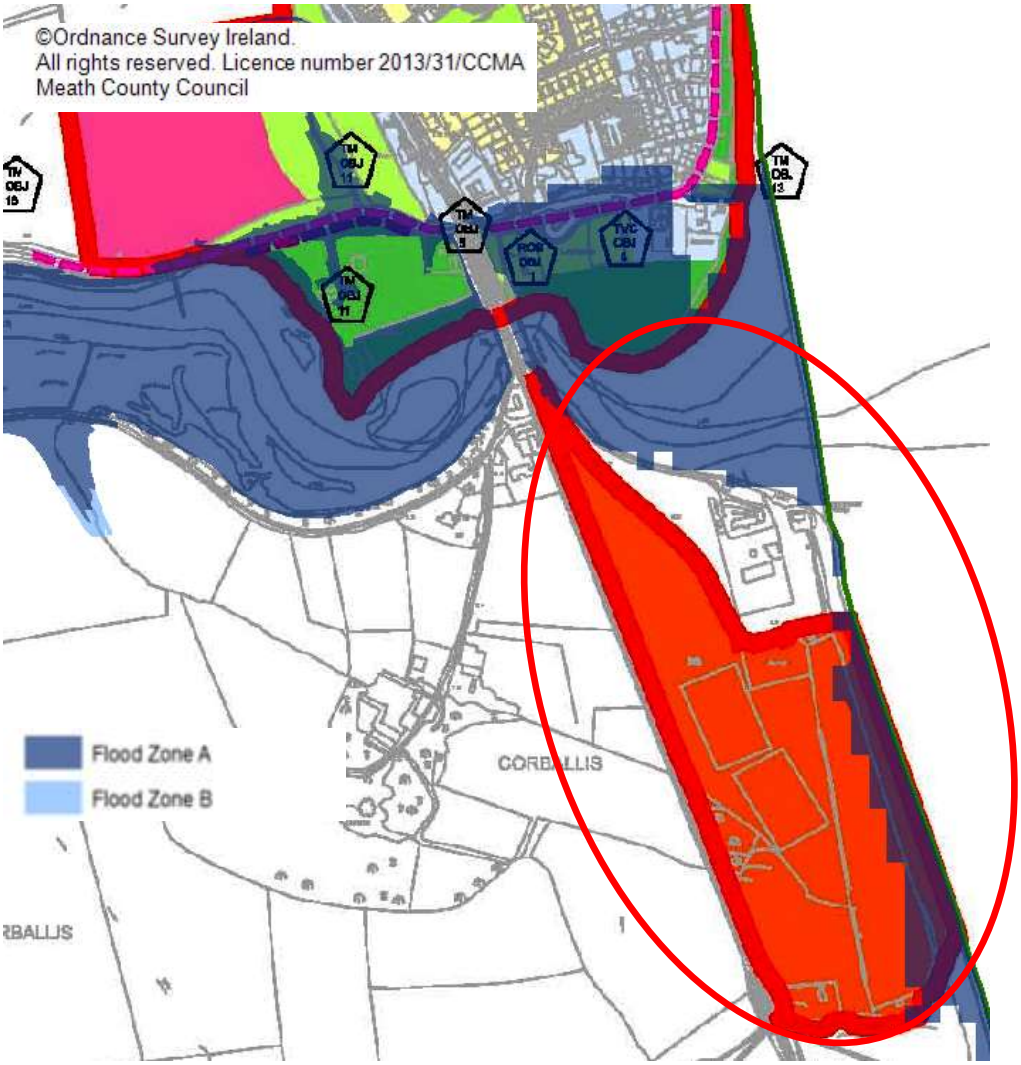
Under an appropriately detailed FRA it must be demonstrated that the FFLs take into account land use vulnerability and residual risk of flooding from the future impacts of sea level rise.

Attention should be given to the consideration of future climate change impacts.

Conclusions	Application of the sequential approach within the E2 zoning to avoid development within Flood Zone A. Appropriately detailed FRA to demonstrate that any planning applications are providing for adequate site and FFLs. Consideration of the future impacts of sea level rise should also be provided.

6.4.2 Community Infrastructure (G1) - Developed/Undeveloped Zoned Land

Overview



JBA Comment:

The site is largely comprised of existing water compatible land uses, such as sports pitches and golfing, in line with the Planning Guidelines these uses will not be restricted by flood risk and are appropriate in Flood Zone A.

For any new applications on the site, risk can be managed to any less vulnerable or highly vulnerable land uses by applying the sequential approach within the land holding and locating less or highly vulnerable development within Flood Zone C. By adopting this approach, the Justification Test does not need to be applied in this case.

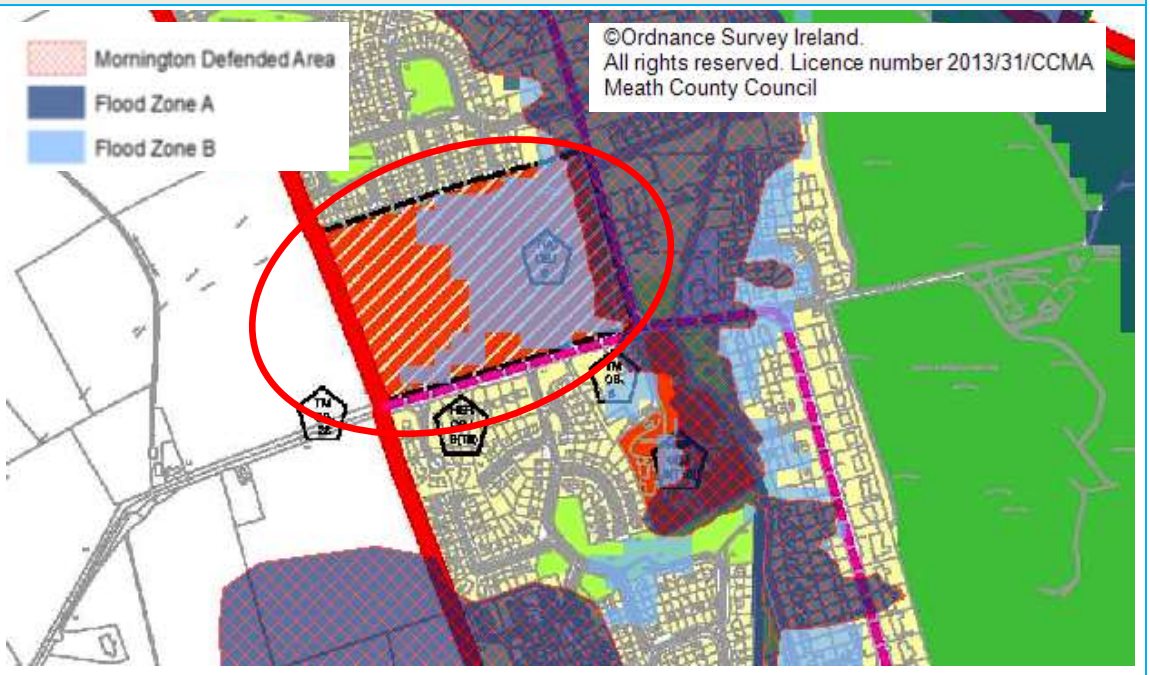
Any future planning applications on the site should be subject to an appropriately detailed FRA at development management stage to demonstrate that the application fully adheres to the Planning System and Flood Risk Management Guidelines. Attention should be given to the impacts of future climate change to the operation of any development within the zoning objective.

Conclusions	Application of the sequential approach within the G1 zoning to site water compatible development within Flood Zone A. Appropriately detailed FRA to demonstrate that any planning applications are employing the stated approach. Consideration of the future impacts of sea level rise should also be provided.

6.5 Mornington East

6.5.1 Community Infrastructure (G1) and Commercial/Town Centre (B1) - Undeveloped Zoned Land

Overview



JBA Comment:

The site is undeveloped and is located behind the Mornington District Surface Water and Flood Protection Scheme defences. However, part of the site is within Flood Zone A and a significant proportion is within Flood Zone B, which is a design standard that is not catered for by the defences.

B1 can include for highly vulnerable and or less vulnerable land uses. G1 zoning can include for highly vulnerable, less vulnerable or water compatible land uses. Since it is intended for the site to include for highly vulnerable usage then the Justification Test has been applied and passed (see Appendix B). 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. Whilst locating new development behind flood defence infrastructure is not normally preferable, the strategic requirement for the use and location of this site is clearly demonstrated by the Justification Test parts 1 and 2. Therefore, development can proceed as the management of flood risk is achievable through the application of simple measures that will not cause significant adverse impacts elsewhere.

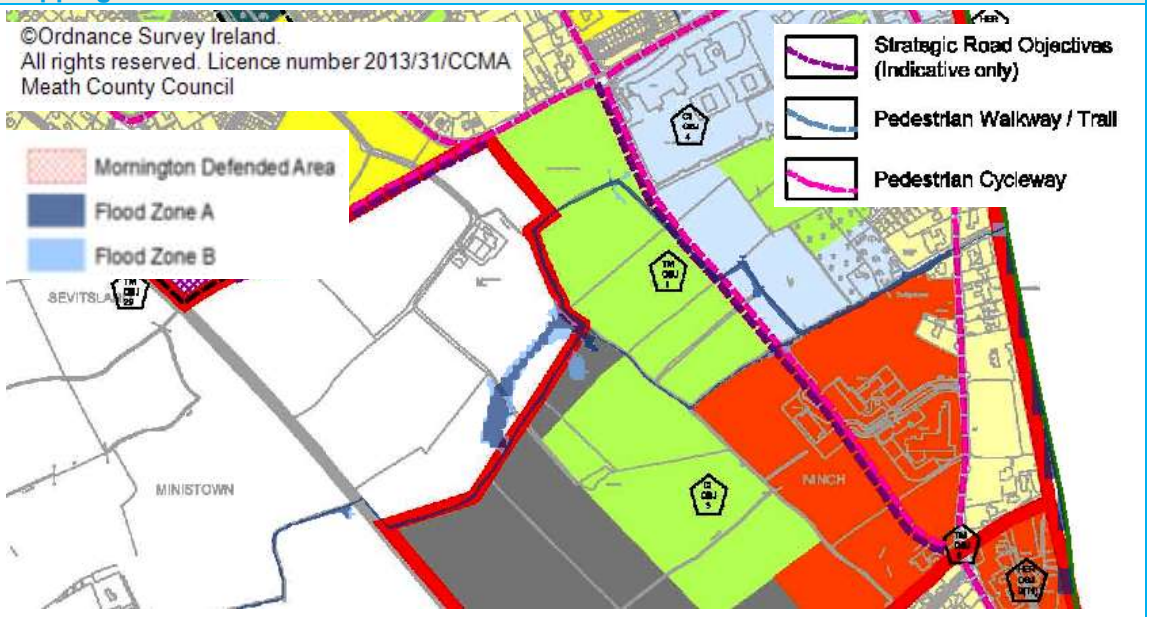
To adequately manage the risk to the site any future planning applications must be subject to an appropriately detailed FRA under which it should be demonstrated that the FFLs for any highly vulnerable development are set above the 100yr flood level including the impacts of climate change. Levels for less vulnerable development do not have to be increased to the same standard; however, it may be prudent to apply the same approach. For defended areas the requirement to provide for compensatory storage within the FRA is not required. Freeboard above the 100yr level plus climate change is not required as the Mornington defences already include for adequate freeboard. In adopting this approach it must be demonstrated that access can be maintained from the development directly to Flood Zone C.

Conclusions	Any future planning applications on the site should 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. FFLs should be set above the 100yr flood level including the impacts of climate change.

6.6 Transport Objectives

6.6.1 North South & East West Distributor Roads

Mapping



Distributor road alignments are included as strategic objective linkages in the mapping above.

River crossings are included for the Brookside Stream for both strategic objectives TM OBJ 1 (north-south spine road) and TM OBJ 4 (southern end of north-south spine road link to R150).

TM OBJ 1 crosses the Brookside stream at more than one location and the Justification test has been applied and passed (see Appendix B). 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 Brookside stream is relatively low, an appropriate design will adequately mitigate the potential impacts of flooding and will ensure there are no significant adverse impacts elsewhere.

Any future planning applications for the spine 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.

At present TM OBJ 4 is an indicative configuration. During the environmental assessment stage of the road scheme design, the Justification Test will need to be applied if alignments are confirmed to interact with Flood Zone A/B. Part 8 FRA and Section 50 consent may also be required.

Conclusions	For TM OBJ 1; an appropriately detailed FRA must be completed at development management stage. Section 50 consent will also be required from the OPW to ensure the appropriate design of culverts. At present TM OBJ 4 is an indicative configuration, the Justification Test will need to be passed when the route is confirmed and if the alignment crosses any watercourses.

7 SFRA Review and Monitoring

An update to the SFRA will be triggered by the six year review cycle that applies to Local Area Plans. In addition, there are a number of other potential triggers for an SFRA review and these are listed in the table below.

There are a number of key outputs from possible future studies and datasets, which should be incorporated into any update of the SFRA as availability allows. Not all future sources of information should trigger an immediate full update of the SFRA; however, new information should be collected and kept alongside the SFRA until it is updated.

Mornington is currently subject to a detailed flood risk mapping and management study under the Eastern CFRAM. It will be necessary to review the results and recommendations of the Eastern CFRAM with respect to Mornington when the results become available, however it is not anticipated that there will be any significant recommendations as part of the study. Bettystown and Laytown are covered by the FEMFRAMS and as such the recommendations for management have already been made and are listed for consideration in the policies and objectives. Mornington East and part of Bettystown has been subject to the Mornington District Surface Water and Flood Protection Scheme and measures are in place to manage risk. Any future updates to the scheme should be monitored and included for within any future updates of the SFRA, this will include consideration of the future impacts of climate change on the operation of the scheme.

Table 7-1 SFRA Review Triggers

Trigger	Source	Possible Timescale
Updates or changes implemented by the Mornington District Surface Water and Flood Protection Scheme	OPW	As required
Catchment Flood Risk Assessment and Management (CFRAM) Flood Hazard Mapping	OPW under the Floods Directive	2013/4
Eastern River Basin Flood Risk Assessment and Management (EFRAM) Plan	OPW	2015/6
Flood maps of other sources, such as drainage networks	Various	Unknown
Significant flood events	Various	Unknown
Changes to Planning and / or Flood Management Policy	DoEHLG / OPW	Unknown
Detailed FRAs	Various	Unknown

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Appendices

A Flood Zone Mapping

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North

LEGEND

- County Boundary
- Defended Area
- Flood Zone A
- Flood Zone B

JBA consulting

APPENDIX A

FLOOD ZONE MAPPING
BETTYSTOWN

North

LEGEND

County Boundary

Flood Zone A

Flood Zone B

JBA consulting

APPENDIX A

FLOOD ZONE MAPPING
LAYTOWN

North

LEGEND

- County Boundary
- Defended Area
- Flood Zone A
- Flood Zone B

JBA consulting

APPENDIX A

FLOOD ZONE MAPPING
MORNINGTON EAST

North

LEGEND

County Boundary

Flood Zone A

Flood Zone B

JBA consulting

APPENDIX A

FLOOD ZONE MAPPING

DONACARNEY - MORNINGTON

B Justification Test

The Justification Test for Development Plans has been undertaken in an iterative process, and has involved consultation between Meath County Council, JBA Consulting and RPS, who prepared the text below in tandem with Meath County Council.

B.1 Introduction

Meath County Council (MCC) is currently preparing a new Local Area Plan (LAP) for Bettystown-Laytown-Mornington East-Donacarney-Mornington in East Meath. JBA Consulting Engineers have been instructed to carry out a strategic flood risk assessment (SFRA) of the LAP. Comparing the findings of the SFRA with the proposed LAP zoning objectives reveals that there are a number of areas in which proposed development zones coincide with Flood Zones A, B and C.

According to the Planning System and Flood Risk Management Guidelines for Planning Authorities, development should preferentially be located in areas with little or no flood hazard thereby avoiding or minimising the risk. The Guidelines however recognise that this is not always possible and make some provision for the use of such lands for development under certain conditions. Accordingly, a sequential approach to flood risk management is outlined in the Guidelines. This approach comprises of the following steps; Avoid, substitute, justify, mitigate, and finally proceed.

The Planning Authority in drawing up its proposals to date has sought to 'Avoid' and 'Substitute' on vulnerable lands. The proposed sites which are now required to undergo a Justification Test are strategically located within Mornington East (Site 6.5.1) and Bettystown (Site 6.6.1). Accordingly, the options of 'avoidance' and 'substitution' are not readily implementable on the basis of an otherwise logical approach to the land use and movement strategy for the LAP area.

In accordance with the sequential approach outlined in the Guidelines then, the next step to undertake is the Justification Test. The purpose of the Justification Test is to demonstrate on a solid evidence basis that there are no reasonable viable alternatives to the zoning or designation of land for development within the particular context of a specific town or area.

As part of the SFRA process, RPS is instructed to provide planning inputs in respect of the first two points of Justification Tests in the context of a sequential approach to flood risk management for two strategic sites described below:-

These sites are:-

- Site 6.5.1; A centrally located site has been identified to provide local services, community infrastructure and recreational facilities within Mornington East to cater for the immediate population. This site is located in Mornington East to the north west of the R151 regional road to Mornington and Coney Hall Road to Donacarney. This site was identified for neighbourhood centre and community facility type uses within the 2005 East Meath LAP. It was upon this basis that applications for residential development were assessed and developed in Mornington East over the period of the 2005 Plan. Part of this site is identified as being of high and moderate risk of flooding. It is noted that development of the site is subject to objective TVC OBJ 6 of the LAP which states:-

  'To ensure that development of the site at Mornington East takes place in accordance with an approved Framework Plan which identifies appropriate uses at specific locations compatible with the zoning objectives and the Flood Zones A and B as set out in the SFRA.'

- Site 6.6.1; Meath County Council has identified a new route running north south linking the Eastham Road Roundabout to the R150 regional road which forms the basis for the land use and movement strategy between Bettystown Town Centre, the Educational Campus, Laytown Train Station and Residential Areas. This indicative route was identified in the 2005 East Meath LAP and is the basis upon which development in the vicinity of the route have been assessed and undertaken. It is noted that part of this route is identified as being of high and moderate risk of flooding. This route is also subject to objective TM OBJ 1 of the LAP which states:-

  'To facilitate the provision of a north-south spine road connecting the R150 at Scoil an Sprioraid Naoimh primary school to the Eastham road roundabout. This road will include quality footpaths and cycleways. The link road will proceed in conjunction with the development of adjoining lands and be provided by the relevant developer. Meath County Council may assist with the delivery of all or part of this road by using its compulsory purchase powers to acquire lands in certain circumstances e.g. in the

instance where the Department of Education and Skills or another agency sought to improve access arrangements to the schools by way of the provision of all or part of this road, subject to necessary funding being made available.'

Justification Tests are now to be completed in respect of these two sites as identified by Meath County Council in line with requirements of section 4.23 and Box 4.1 of the Guidelines.

B.2 JUSTIFICATION TEST

The Justification Test as prescribed in the Planning System and Flood Risk Management Guidelines for Planning Authority has been designed to rigorously assess the appropriateness of potential development that are considered in areas of moderate or high flood risk. The Plan Making Justification Test is set out in Box 4.1 of the Guidelines. In this regard this test has been applied to Site 6.5.1 in Mornington East and site 6.6.1 in Bettystown. The responses to each of the test criteria are set out under the relevant headings in the paragraphs that follow.

B.2.1 Mornington East Site 6.5.1 & Bettystown Site 6.6.1

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

With respect to the plan area and sites 6.5.4 and 6.6.1, the National Spatial Strategy (NSS) identifies Bettystown-Laytown-Mornington East as a '1,500 - 5,000 Town' located near a transportation corridor radiating from Dublin and is relatively close to Drogheda a Primary Development Centre. While the Primary Development Centres will be the main focus for responding to future growth in the Greater Dublin Area (GDA) hinterland, these smaller towns cater for local growth in residential, employment and service functions through enhancing the built environment, water services, public transport links and capacity for development in these centres. Accommodating such additional functions must however be balanced with protecting the character and quality of these towns.

The Regional Planning Guidelines for the Greater Dublin Area (RPGGDA) provides a settlement typology for its settlement strategy. None of the towns and villages within the LAP area are specifically designated within the Guidelines. In this regard the Guidelines direct the designation of Small Towns and Villages to be undertaken through the County Development Plan process.

The Meath County Development Plan (CDP) 2013 – 2019 Settlement Strategy designates Bettystown-Laytown-Mornington East as a 'Small Town'. Such towns should:

- Reduce the pattern of commuter led development.
- Cater for a greater proportion of local growth.
- Allow for a period of consolidation of local facilities and infrastructure to serve the local population.
- Facilitate more sustainable communities.
- Nurture small and local financed businesses.
- Support economic investment opportunities where sustainable and in keeping with the intended role and function of the town.
- No one proposal for residential development should increase the existing stock generally by more than 15% within the CDP period.

The Settlement Strategy outlined in the Meath CDP 2013-2019 for Donacarney-Mornington provides that this cluster should develop as a 'Village'. Such Villages should:

- Provide important local services with some small scale rural enterprise.
- Managed so as to cater for local need in line with existing services and infrastructure provision.
- Development should be in keeping with the character of the village.
- Future growth managed in order to safeguard against becoming a catalyst for unsustainable growth patterns.
- No one proposal for residential development should increase the existing stock generally by more than 15% within the County Development Plan period.

The strategy for the future development of Bettystown-Laytown-Mornington East-Donacarney-Mornington focuses on the principles established in the Core Strategy as contained in the Meath CDP 2013-2019.

Based on the Meath CDP Core Strategy which applies an allocation of 100 additional dwelling units within the towns and villages combined with the number of extant permissions (1,490 units), it is estimated that the target population for the LAP area over the plan period up to 2019 and beyond shall be 15,029 persons (an increase of 4,140 persons on Census 2011). There will be a need to ensure that services and employment uses are delivered in tandem with this growth.

Bettystown/Laytown is identified in the Meath CDP as a 'Local Employment Centre' in the hierarchy of economic centres in the County. These centres should provide employment needs for their urban population and rural hinterland. Sectors targeted in the Meath CDP include tourism and incubator units which are permitted uses within the B1 zoning.

The County Retail Strategy identifies Laytown/Bettystown as a 'Sub-County Town Centre' in the County Retail Hierarchy. This designation is to assist in facilitating the provision of convenience and comparison goods to cater for the resident population. The County Retail Strategy notes that large quantum of retail expenditure is flowing from the catchment area and the County to Drogheda and Balbriggan.

In this regard it is important to ensure that existing retailers within Laytown/Bettystown are accessible and have scope to improve and expand the retail offer in order to reduce expenditure leakage from the catchment area and increase the attractiveness of Laytown/Bettystown as a retail and tourist destination.

Mornington East is not specifically designated within the County Retail Hierarchy however given the size and scale of this residential settlement it is considered necessary that a local centre be facilitated in the interests of fulfilling its role as part of the designated Bettystown-Laytown-Mornington East Small Town in the County Settlement Strategy and the proper planning and sustainable development of the area and its future development.

The remainder of the test is applied to each site separately.

B.2.2 Mornington East Site 6.5.1

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:

Mornington East currently lacks any focal point or sense of identity as an urban settlement. As a Small Town it is essential for the development strategy for Mornington East that functions akin to its role with the County Settlement Strategy are delivered in a location which is central to the surrounding residential population. In this regard it is considered appropriate to zone Site 6.5.1 to accommodate B1 Commercial/Town Centre and G1 Community Infrastructure uses. These land use zoning objectives are intended to facilitate the provision of local services, employment, community infrastructure and recreational facilities within Mornington East to cater for the immediate population. These uses will also assist Mornington East in fulfilling its role as part of a Small Town in the County Settlement Structure and as a Village in the County Retail Hierarchy.

The residential need of the plan area has been satisfied on sites within Bettystown. Given the level of residential development within Mornington East additional lands for residential uses are not required. It is necessary to ensure supporting village functions and commercial infrastructure can be delivered in an appropriate location. A Framework Plan for this site will be prepared in advance of the site's development. This plan will set out the uses considered appropriate to the B1 and G1 zoning objective and which are compatible with Flood Zones A and B.

Is essential to facilitate regeneration and /or expansion of the centre of the urban settlement

Services within Mornington East are limited resulting in local residents travelling longer distances to satisfy their everyday needs. In the interests of the proper planning and sustainable development of Mornington East it is important to ensure that the most appropriate location with respect to surrounding land uses is reserved to accommodate local services, local employment, community infrastructure and recreational facilities. This centrally located site will contribute to the creation of a focal point for Mornington East surrounded by new and established residential

areas. This will also enable Mornington East to achieve its role as a Village within the County Retail Strategy and as part of the Bettystown-Laytown-Mornington East Small Town in the County Settlement Strategy.

Comprises significant previously developed and / or under-utilised lands

The proposed zoning objectives are located on lands that are under-utilised given their location within the settlement's layout. This site represents an opportunity to create a good quality urban designed focal point on an under-utilised infill site surrounded by residential development to the north, south and east. Lands to the west of the site remain unzoned are located outside of the LAP boundary.

Is within or adjoining the core of an established or designated urban settlement

The Flood Risk Management Guidelines define 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 noted that the core area for the purposes of these Guidelines does not directly correlate to the definition of core areas used in retail planning terms.

Mornington East is currently devoid of any traditional village centre. It is therefore essential for the development strategy for Mornington East to ensure that provision is made for functions akin to its role with the County Settlement Strategy and County Retail Strategy can be delivered in a location which is central to the surrounding residential population.

In this regard it is considered appropriate to zone Site 6.5.1 to accommodate B1 Commercial/Town Centre and G1 Community Infrastructure uses. This site will form the core area of Mornington East as defined by the Flood Risk Management Guidelines. It is envisaged that this site will assist in the creation of a neighbourhood centre where local services and facilities which are currently absent from the range of functions befitting an urban centre of Mornington East's scale in terms of the existing population can locate. Facilitating the development of this site for a range of B1 and G1 uses will assist in the creation of a focal point and core in Mornington East.

Will be essential in achieving compact and sustainable urban growth.

It is considered appropriate and necessary to facilitate the development of a neighbourhood centre at this location in order to reduce the need to travel and remove social exclusion from local services and facilities required to meet every day needs for the residents of Mornington East. The development of this site will be subject to the preparation of a Framework Plan. This plan will set out the parameters within which development can take place in accordance with the SFRA, the land use strategy and the proper planning and sustainable development of Mornington East.

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.

The proposed development will provide opportunities for the local residential and working population to foster a sense of community and identity in Mornington East. The proposed site is centrally located within Mornington East with residential areas located to the north, south and east. Land to the west of the subject site remain unzoned and are located outside of the LAP boundary. There are no other appropriately located sites within Mornington East to deliver local services, facilitate local employment opportunities and fulfil its role as part of the Bettystown-Laytown-Mornington East Small Town within the Settlement Strategy and Village within the Retail Hierarchy.

Part 3 FRA

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. Whilst locating new development behind flood defence infrastructure is not normally preferable, the strategic requirement for the use and location of this site is clearly demonstrated by the Justification Test parts 1 and 2. Therefore, development can proceed as the management of flood risk is achievable through the application of simple measures that will not cause significant adverse impacts elsewhere.

To adequately manage the risk to the site any future planning applications must be subject to an appropriately detailed FRA under which it should be demonstrated that the FFLs for any highly vulnerable development are set above the 100yr flood level including the impacts of climate change. Levels for less vulnerable development do not have to be increased to the same standard; however, it may be prudent to apply the same approach. For defended areas the requirement to provide for compensatory storage within the FRA is not required. Freeboard above the 100yr level plus climate change is not required as the Mornington defences already include for adequate freeboard. In adopting this approach it must be demonstrated that access can be maintained from the development directly to Flood Zone C.

Further information is provided in Section 6.5.1.

7.1.1 Bettystown Site 6.6.1

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 indicative alignment will pass through four different zoning objectives, these are:

B1: To protect, provide for and/or improve town and village centre facilities and uses;

F1: To provide for and improve open spaces for active and passive recreational amenities;

G1: To provide for necessary community, social and educational facilities; and;

WL: To protect strategic lands from inappropriate forms of development which would impede the orderly expansion of a strategic urban centre.

These zoned lands are centrally located within the overall plan area. Development of the north south spine road will improve connectivity between Laytown and Bettystown and overall access to community infrastructure and town centre functions from residential areas in Laytown, Bettystown, Mornington East, Donacarney and Mornington.

Is essential to facilitate regeneration and /or expansion of the centre of the urban settlement

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 central area to expand sequentially from the town centre and educational campus in a logical and coherent manner. The proposed route will enable the consolidation of the urban area, improved connectivity between the key centres to access local services, community infrastructure, recreational facilities and the scenic coastal area. This new infrastructure will improve the quality of life of the existing and future resident, working and visiting communities in the area. The north south spine route will enable:-

- Consolidation of the urban area to accommodate town centre and commercial functions;
- Growth of Bettystown town centre to logically take place westwards; and
- Unlocking lands for future development sequentially from Bettystown town centre.
- Connectivity between Bettystown and Laytown.

Comprises significant previously developed and / or under-utilised lands

Part of this route will pass through the educational campus, an intensively used site. The remainder of the alignment will pass through under-utilised land between the built up urban area and the Belfast-Dublin railway line alignment.

Is within or adjoining the core of an established or designated urban settlement

As noted within the application of the test on Site 6.5.1, 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 noted that the core area for the purposes of these Guidelines does not directly correlate to the definition of core areas used in retail planning terms.

This alignment adjoins the new town centre development at the Eastham Road Roundabout and is close to the Core Retail Frontage as defined within the County Retail Strategy in Appendix 5 of the Meath CDP 2013-2019. Consequently, in accordance with the definitions set out in the

Flood Risk Management Guidelines, it is considered that the site is within the core area of Bettystown with regard to its proximity to employment, retail, community and residential uses.

The proposed development will provide the main link between Laytown and Bettystown improving pedestrian/cyclist /road user access to Bettystown town centre, the coastal road, the educational campus, Laytown Train Station and lands reserved for recreational uses. This new route will also facilitate the further development of adjoining land between the built up urban area and the Belfast-Dublin railway line.

Will be essential in achieving compact and sustainable urban growth.

Bettystown-Laytown-Mornington East form a linear urban settlement concentrated along the east coast and west of the R150 regional road. Developing a new link road between Laytown and Bettystown to the west of the Bettystown town centre 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 new residential, working and visiting communities.

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.

The proposed development will better connect Laytown and Bettystown, improving access between existing residential areas, town centre functions, educational facilities, Laytown Train Station and recreational areas. There are no other suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of Bettystown town centre.

Part 3 FRA

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 Brookside stream is relatively low, an appropriate design will adequately mitigate the potential impacts of flooding and will ensure there are no significant adverse impacts elsewhere.

Any future planning applications for the spine 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.

Further information is provided in Section 6.6.1.