

STRATEGIC FLOOD RISK ASSESSMENT

UNDERTAKEN AS PART OF THE PREPARATION OF

VARIATION No. 2 (A) TO THE GALWAY COUNTY DEVELOPMENT PLAN 2015-2021

BEARNA PLAN

for: Galway County Council

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Appendix I: Summary of Related Provisions contained in the Flood Guidelines for Land Uses in Flood Zones A and B

Section 1 Introduction and Policy Background

1.1 Introduction and Terms of Reference

Galway County Council has adopted Variation No. 2 (a) to the Galway County Development Plan 2015-2021. The Variation provides for the integration of a Plan for Bearna into the County Development Plan. This Plan provides land use zoning in addition to written provisions.

The preparation and adoption of the Variation has undergone an appropriate level of Strategic Flood Risk Assessment (SFRA) and this document presents the findings of the SFRA. The SFRA is an assessment of flood risk and includes mapped boundaries for Indicative Flood Risk Zones, taking into account factors including site walkovers and flood risk indicators.

The SFRA has been undertaken and prepared in accordance with *The Planning System and Flood Risk Management - Guidelines for Planning Authorities* (Department of the Environment, Heritage and Local Government and Office of Public Works, 2009) and Department of the Environment, Community and Local Government Circular PL 2/2014.

An earlier version of this final SFRA report was placed on public display alongside the Proposed Variation. This earlier version was updated in order to take account of evidence provided in submissions and in order to take account of changes that were made to the Proposed Variation that was placed on public display.

1.2 Summary of Conclusion and Recommendations

The SFRA provides an appropriately strategic assessment of flood risk within the town of Bearna and has been undertaken in full compliance with the 2009 Flood Guidelines and subsequent circular PL2/2014. The SFRA has been undertaken with the aim of protecting existing and future properties and populations from the adverse effects of flooding.

The preparation of the Variation, SEA and SFRA has taken place concurrently and the findings of the SFRA have informed both the Variation and the SEA. The SFRA has facilitated the integration of certain flood risk management considerations into the Variation – these are identified under Section 5. However, certain Material Alterations were made to the Proposed Variation and adopted by the Elected Members as part of the adopted Variation. These Material Alterations provide for a range of incompatible uses within areas that are at elevated risk of flooding and are contrary to *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009) and *Circular PL2/14*. Consequently, the Variation is contrary to these Guidelines and associated Circular.

1.3 Flood Risk and its Relevance as an Issue to the Proposed Variation

Flooding is an environmental phenomenon and can pose a risk to human health as well as causing economic and social effects. Some of the effects of flooding are identified on Table 1.

Certain lands within Bearna provided with land use zoning by the Variation have the potential to be vulnerable to flooding, such as that arising from tidal, fluvial and pluvial flooding sources, and this vulnerability could be exacerbated by changes in both sea level rise and the severity and frequency of extreme weather events. Local conditions such as low-lying lands and slow surface water drainage can increase the risk of flooding.

Table 1 Potential effects that may occur as a result of flooding

Tangible Effects	Intangible Human and Other Effects
Damage to buildings (houses)	Loss of life
Damage to contents of buildings	Physical injury
Damage to new infrastructure e.g. roads	Increased stress
Loss of income	Physical and psychological trauma
Disruption of flow of employees to work causing knock on effects	Increase in flood related suicide
Enhanced rate of property deterioration and decay	Increase in ill health
Long term rot and damp	Homelessness
	Loss of uninsured possessions

1.4 Flood Risk Management Policy

1.4.1 EU Floods Directive

European Directive 2007/60/EC on the assessment and management of flood risk aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU. The Directive requires Member States to:

- Carry out a preliminary assessment by December 2011 in order to identify the river basins and associated coastal areas where potential significant flood risk exists.
- Prepare flood hazard and risk maps for the identified areas (these maps have been finalised for inclusion in Flood Risk Management Plans – see below).
- Prepare flood risk management plans focused on prevention, protection and preparedness. These plans are to include measures to reduce the probability of flooding and its potential consequences. These plans have been prepared in Ireland and are publicly available.

Implementation of the EU Floods Directive is required to be coordinated with the requirements of the EU Water Framework Directive and the current River Basin Management Plans.

1.4.2 National Flood Policy

Historically, flood risk management focused on land drainage for the benefit of agricultural improvement. With increasing urbanisation, the Arterial Drainage Act, 1945, was amended in 1995 to permit the Office of Public Works (OPW) to implement localised flood relief schemes to provide flood protection for cities, towns and villages.

In line with changing national and international paradigms on how to manage flood risk most effectively and efficiently, a review of national flood policy was undertaken in 2003-2004. The review was undertaken by an Inter-Departmental Review Group, led by the Minister of State at the Department of Finance with special responsibility for the OPW. The Review Group prepared a report that was put to Government, and subsequently approved and published in September 2004 (Report of the Flood Policy Review Group, OPW, 2004).

The scope of the review included a review of the roles and responsibilities of the different bodies with responsibilities for managing flood risk, and to set a new policy for flood risk management in Ireland into the future. The adopted policy was accompanied by many specific recommendations, including:

- Focus on managing flood risk, rather than relying only flood protection measures aimed at reducing flooding;
- Taking a catchment-based approach to assess and manage risks within the whole-catchment context; and

- Being proactive in assessing and managing flood risks, including the preparation of flood maps and flood risk management plans.

1.4.3 National CFRAM Programme

The national Catchment Flood Risk Assessment and Management (CFRAM) programme commenced in Ireland in 2011. The CFRAM Programme is intended to deliver on core components of the National Flood Policy, adopted in 2004, and on the requirements of the EU Floods Directive. The Programme is being implemented through CFRAM studies that are being undertaken for each of the river basin districts in Ireland. Bearna is located within the Western River Basin District.

The CFRAM Programme comprises three phases as follows:

- The Preliminary Flood Risk Assessment¹ (PFRA) mapping exercise in 2011;
- The CFRAM Studies and parallel activities, from 2011; and
- Implementation and Review (2018 onwards).

The Programme provides for three main consultative stages as follows:

- PFRAs in 2011;
- Flood Hazard Mapping (these maps have been finalised for inclusion in Flood Risk Management Plans – see below); and
- Flood Risk Management Plans - these plans have been prepared in Ireland and are publicly available.

The OPW is the lead agency for flood risk management in Ireland. The coordination and implementation of Government policy on the management of flood risk in Ireland is part of its responsibility. The European Communities (Assessment and Management of Flood Risks) Regulations 2010 (S.I. No. 122) **identifies the Commissioners of Public Works as the 'competent authority' with overall responsibility for implementation of the Floods Directive 2007/60/EC.** The Office of Public Works is the principal agency involved in the preparation of Flood Risk Assessment and Management studies (FRAMs).

1.4.4 Flood Risk Management Guidelines

1.4.4.1 Introduction

In 2009, the OPW and the then Department of the Environment, Heritage and Local Government published Guidelines on flood risk management for planning authorities entitled *The Planning System and Flood Risk Management - Guidelines for Planning Authorities*. The Guidelines introduce mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. Implementation of the Guidelines is intended to be achieved through actions at the national, regional, local authority and site-specific levels. Planning authorities and An Bord Pleanála are required to have regard to the Guidelines in carrying out their functions under the Planning Acts.

The core objectives of the Guidelines are to:

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

¹ The PFRAs identified areas at risk of significant flooding and includes maps showing areas deemed to be at risk. The areas deemed to be at significant risk, where the flood risk that is of particular concern nationally, are identified as Areas for Further Assessment (AFAs) and more detailed assessment on the extent and degree of flood risk is currently being undertaken in these areas with the objective of producing Flood Hazard Mapping. Bearna is not identified as an AFA.

- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

1.4.4.2 Principles of Flood Risk Management

The key principles of flood risk management set out in the Flood Guidelines are to:

- Avoid development that will be at risk of flooding or that will increase the flooding risk elsewhere, where possible;
- Substitute less vulnerable uses, where avoidance is not possible; and
- Mitigate and manage the risk, where avoidance and substitution are not possible.

The Guidelines follow the principle that development should not be permitted in flood risk areas, particularly floodplains, except where there are no alternative and appropriate sites available in lower risk areas that are consistent with the objectives of proper planning and sustainable development.

Development in areas that have the highest flood risk should be avoided and/or only considered in exceptional circumstances (through a prescribed *Justification Test*) if adequate land or sites are not available in areas that have lower flood risk. Most types of development would be considered inappropriate in areas that have the highest flood risk. Only water-compatible development such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation and essential transport infrastructure that cannot be located elsewhere would be considered appropriate in these areas.

1.4.4.3 Stages of SFRA

The Flood Risk Management Guidelines recommend a staged approach to flood risk assessment that covers both the likelihood of flooding and the potential consequences. The stages of appraisal and assessment are:

Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and Local area Plans or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

Stage 3 Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

1.4.4.4 Flood Zones

Flood risk is an expression of the combination of the flood probability or likelihood and the magnitude of the potential consequences of the flood event. It is normally expressed in terms of the following relationship:

$$\text{Flood risk} = \text{Likelihood of flooding} \times \text{Consequences of flooding}$$

Likelihood of flooding is normally defined as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. For example, a 1% Annual Exceedance Probability (AEP) indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year.

Consequences of flooding depend on the hazards associated with the flooding (e.g. depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality), and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the population, the type of development, presence and reliability of mitigation measures etc.).

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning.

There are three types or levels of flood zones defined for the purposes of the Flood Guidelines:

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all other areas that are not in zones A or B.

1.5 Emerging Information and Disclaimer

It is important to note that compliance with the requirements of the Flood Risk Management Guidelines is currently based on emerging and incomplete data as well as estimates of the locations and likelihood of flooding.

Accordingly, all information in relation to flood risk may be altered in light of future data and analysis, or future flood events. As a result, all landowners and developers are advised that Galway County Council and their agents can accept no responsibility for losses or damages arising due to assessments of the vulnerability to flooding of lands, uses and developments. Owners, users and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands and buildings (including basements) in which they have an interest prior to making planning or development decisions.

An earlier version of this final SFRA report was placed on public display alongside the Proposed Variation. This earlier version was updated in order to take account of evidence provided in submissions and in order to take account of changes that were made to the Proposed Variation that was placed on public display.

Any future SFRAs for the area will integrate other new and emerging data.

1.6 Context for this SFRA: SFRA for the Galway County Development Plan 2015-2021

SFRA has already been undertaken on the Galway County Development Plan 2015-2021. That SFRA facilitated the integration of various provisions into the County Development Plan that provide for flood risk management within County Galway, including Bearna. New developments within Bearna will be required to comply with the flood risk management provisions from the County Plan, in addition to the provisions from the Bearna Plan that is provided for by the Variation.

1.7 Content of Variation 2 (a)

The Variation consists of a written statement and accompanying maps. The relevant parts of the Variation for this SFRA relate to the land use zoning map for Bearna (see Figure 1) and provisions relating to flood risk management (see Section 4).

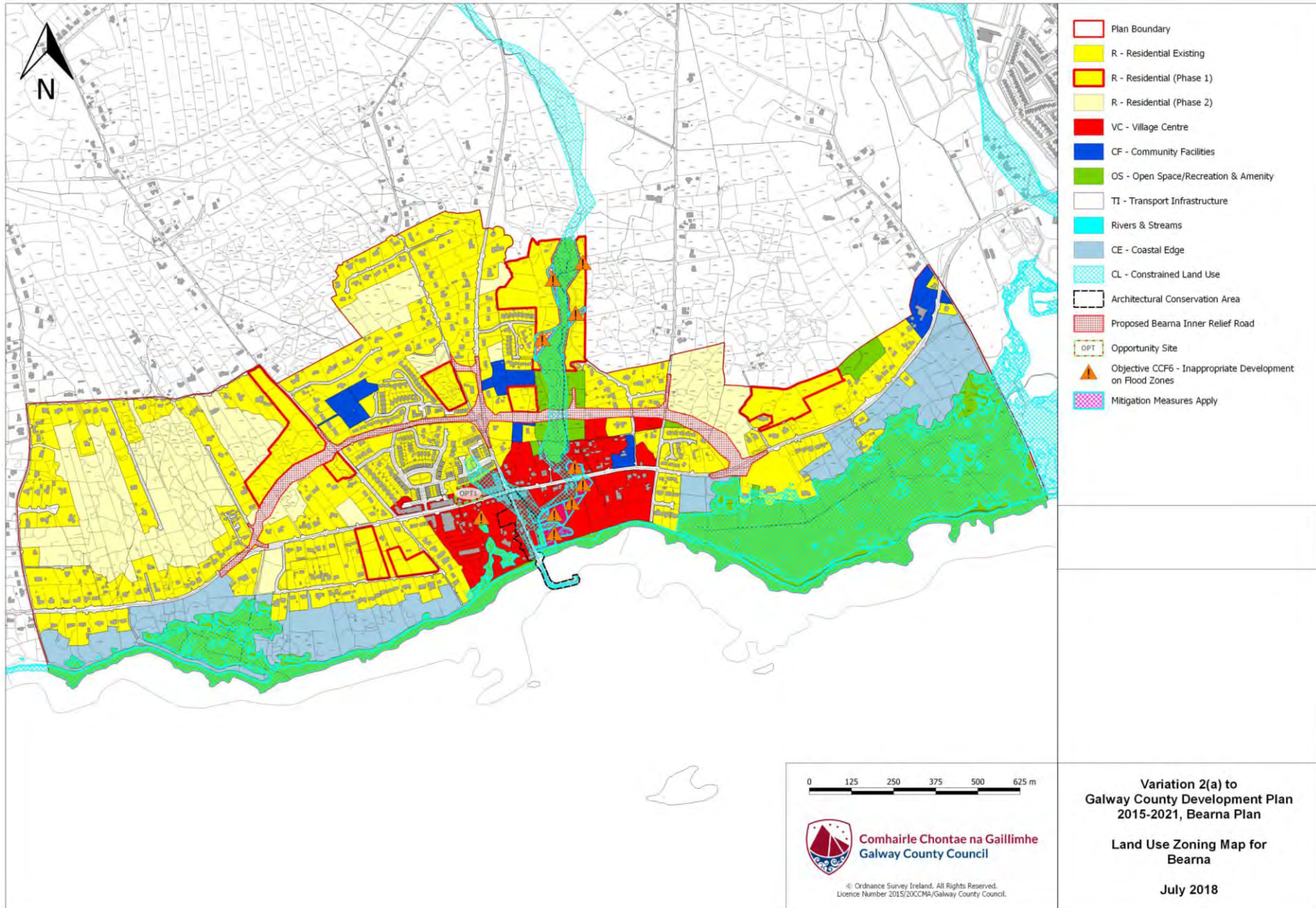


Figure 1 Land Use Zoning Map for Adopted Variation 2 (a)

Section 2 Stage 1 SFRA - Flood Risk Identification

2.1 Introduction

Stage 1 SFRA (flood risk identification) was undertaken with in order to identify whether there may be any flooding or surface water management issues within or adjacent to the lands in Bearna proposed to be zoned by the Variation and consequently whether Stage 2 SFRA (initial flood risk assessment) should be proceeded to.

The Stage 1 SFRA was based on existing information on flood risk indicators based on historical evidence and computational models.

Bearna is a coastal village situated on the western edge of Galway City, along the R336 Regional Road, approximately 6.5km west of the City centre and 11km east of Spiddle. Most of the Plan area is located within the Bearna House Stream (also referred to as Trusky Stream) River Sub-Basin with eastern parts located within the Bearna Stream River Sub-Basin.

There are no flood relief schemes existing or planned within the town. The Trusky stream has been culverted near the Twelve Hotel and under the R336.

2.2 Flood Risk Indicators

The Stage 1 SFRA was a desk-based exercise based on existing information on flood risk indicators and involved consulting with a range of sources as detailed on Table 2 below. A number of these sources are mapped on Figure 2 (Flood Risk Indicators).

Table 2 Information Sources Consulted with for the Identification of Flood Risk

Information Source	Description	Indicator within or adjacent to Bearna?
Predictive, Modelled Flood Risk Indicators		
Previous Strategic Flood Risk Assessments	Strategic Flood Risk Assessments required for land use plans, based on best available information.	Yes, previous Galway County Council Strategic Flood Risk Assessments (SFRAs) taken into account. Specifically <ul style="list-style-type: none"> - Stage 2 SFRA for Proposed Amendments to the Bearna Local Area Plan 2007-2013 (December 2012) - Stage 1 SFRA for the Galway County Development Plan 2015-2021 (February 2015) taken into account
The OPW Preliminary Flood Risk Assessment (PFRA) Fluvial, Coastal, Groundwater and Pluvial flood maps	<p>The Draft OPW Preliminary Flood Risk Assessment (PFRA) mapping dataset has been arrived at by:</p> <ul style="list-style-type: none"> • Reviewing records of floods that have happened in the past; • Undertaking analysis to determine which areas might flood in the future, and what the impacts might be; and • Extensive consultation with each local authorities and other Government departments and agencies. <p>This assessment has considered all types of flooding, including that which can occur from rivers, the sea and estuaries, heavy rain, groundwater, the failure of infrastructure, and so on. It has also considered the impacts flooding can have on people, property, businesses, the environment and cultural assets.</p> <p>The PFRA is only a preliminary assessment, based on available or readily derivable information. Analysis has been undertaken to identify areas prone to flooding, and the risks associated with such flooding, but this analysis is purely indicative and undertaken for the purpose of completing the draft PFRA. The mapping has been developed using simple and cost-effective methods and is based on broad-scale simple analysis and may not be accurate for a specific location/use. There are instances where lands are transected by the PFRA Fluvial mapping boundary and the boundary does not reflect local topographical and flood path conditions on the ground. This is due to the strategic nature of development of the PFRA Fluvial mapping and the inaccuracies contained within it.</p> <p>The prime source will ultimately be the flood zone maps produced by the OPW, but where these have not been prepared or are not on watercourses that will be covered by a CFRAM study then the planning body or developer will need to refer to alternative sources of information.</p> <p>For pluvial flooding, the process for developing the pluvial flood extent maps (Flood Risk Assessment and Management Programme: National Pluvial Screening Project for Ireland – Rep EX6335/2.0, HR Wallingford, November 2010) was based on 'dropping' various depths and intensities of rainfall over a range of durations, and modelling how that rainfall would flow over the land and, in particular, pond in low-lying areas. The rainfall events (depth, duration and intensity) were derived from the rainfall analysis undertaken by Met Éireann on behalf of the OPW for the Flood Studies Update research programme. The amount of rainfall that was absorbed by the ground or, in urban areas, drained by the urban storm-water drainage system, and hence deducted from the water that would flow overland and pond, was estimated. It must be noted however that process assumed a constant capacity of urban storm-water drainage systems and generally did not taken into account local drainage</p>	Yes fluvial, coastal and pluvial areas present. No groundwater areas present.

Information Source	Description	Indicator within or adjacent to Berna?
	<p>structures such as culverts through embankments or other local drainage that would not be resolved in the model used for the mapping at a national scale. In addition to the above limitations, there are further intrinsic uncertainties associated with pluvial flooding and it can be influenced by, for example, blocked drains. Taking this into account, it was recommended the Council deal with pluvial risk through written Plan provision(s).</p> <p>Further information on the purpose, development and limitations of the OPW PFRA Maps are available in the available report (see www.cfram.ie)</p>	
National Coastal Protection Strategy Study flood and coastal erosion risk maps	<p>The predicted flood extents that were produced under the Irish Coastal Protection Strategy Study (ICPSS) are based on analysis and modelling. The project included:</p> <ul style="list-style-type: none"> • Analysis of historic recorded sea levels • Numerical modelling and statistical analysis of combined tide levels and storm surges to estimate extreme water levels along the national coastline • for defined probabilities • Calculation of the extent of the predictive flooding, by comparing calculated extreme tide and surge waters levels along the coast with ground level based on a Digital Terrain Model (DTM). <p>These indicative national coastal flood maps are included in the Draft PFRA Maps, provided in a separate volume, for the purposes of consultation on the PFRA.</p>	Yes, extents included as part of PFRA Coastal above.
Western CFRAM Flood Risk Review	<p>The Western CFRAM Flood Risk Review (JBA for OPW, May 2011) was undertaken to help validate the findings of the PFRA, informing decisions on which sites will be taken forward as Areas for Further Assessment for a more detailed assessment within the CFRAM Programme. It uses the PFRA mapping described above. It also includes a 'Recommended Extreme Flood Outline' estimation that replaces the existing PFRA fluvial outlines where the outlines are considered to be significantly in error. The guidelines for creating the 'Recommended Extreme Flood Outline' were simply for the assessor to amend existing outlines where they were considered to be either over or under estimated, or to create new outlines where flood probability is not presented by the PFRA outlines. The 'Recommended Extreme Flood Outline' is not linked to a specific return period but it is expected be in or around the 1% AEP to 0.1% AEP event (1 in 100: 1 in 1000).</p>	Yes.
Historical Flood Risk Indicators		
Alluvium Soils	<p>Mineral alluvial soil mapping is An Teagasc dataset indicative of recurrent or significant fluvial flooding at some point in the past.</p> <p>This dataset does not provide full coverage and is found to provide a reasonable indicator of high-medium probability fluvial flood hazard. Drainage may have changed significantly since the laying down of these soils.</p>	Yes.

2.3 Conclusion of Stage 1 SFRA

The information provided in this section identifies that there is potentially elevated levels of coastal and/or fluvial flood risk arising within Berna therefore Stage 2 SFRA must be undertaken.

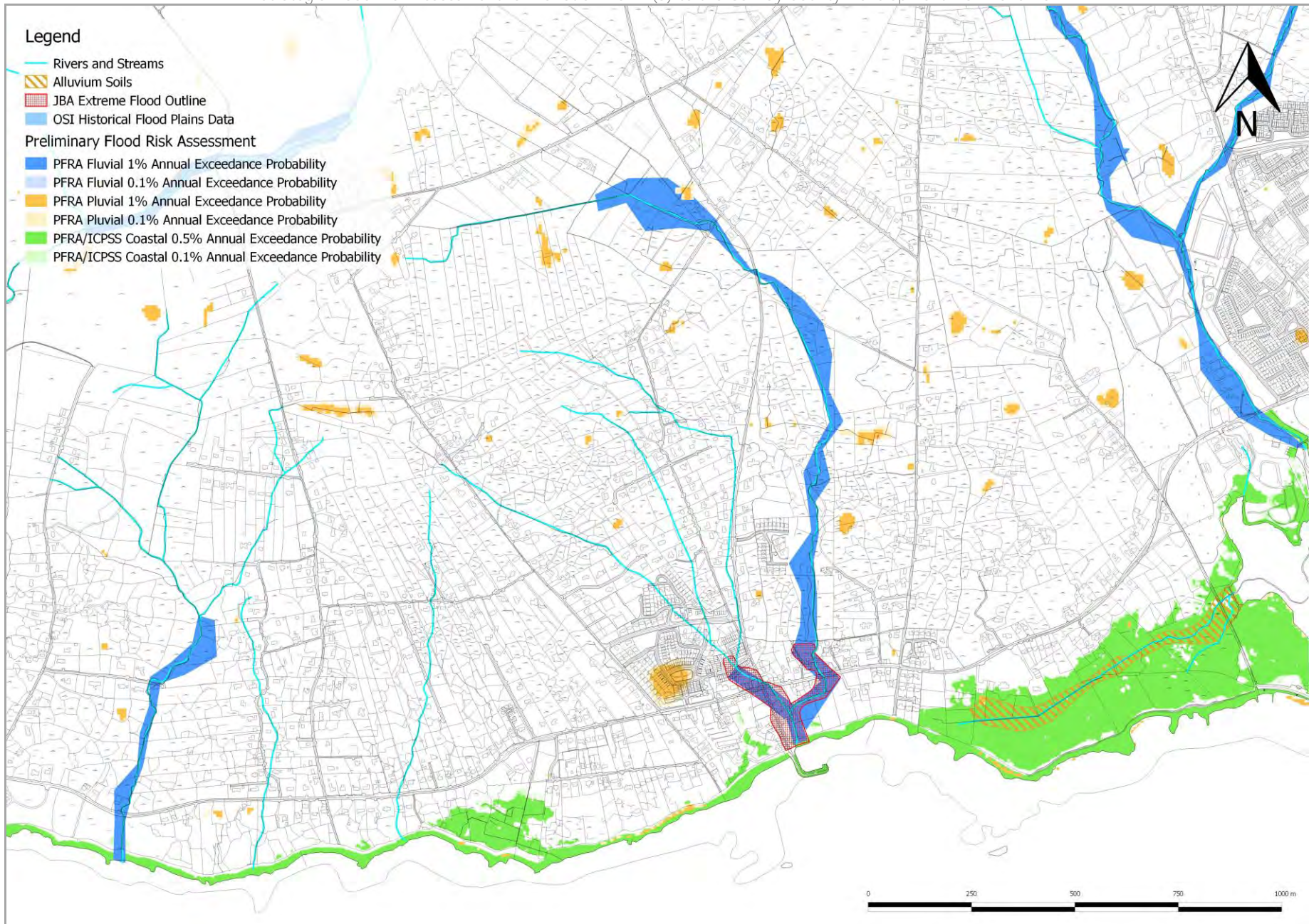


Figure 2 Flood Risk Indicators

Section 3 Stage 2 SFRA - Initial Flood Risk Assessment

3.1 Introduction

A Stage 2 SFRA (initial flood risk assessment) was undertaken at Bearna to:

- Confirm the sources of flooding that may affect zoned and adjacent areas;
- Appraise the adequacy of existing information as identified by the Stage 1 SFRA; and
- Scope the extent of the risk of flooding through the preparation of flood zone maps.

3.2 Site Walkovers and Groundtruthing

In order to inform the Stage 2 assessment, the town was inspected on foot by experienced professionals (lands were visited on 14th September 2017) to examine, inter alia, the potential source and direction of flood paths from fluvial and coastal sources, locations of topographic and built features that coincide with the flood indicator related boundaries and to identify vegetation associated with a high frequency of inundation. Flood risk indicator information that was considered during the Stage 2 SFRA is detailed under Section 2.

3.3 Findings and Delineation of Flood Zones in advance of public display of Proposed Variation and associated documents

Table 3 summarises the findings of groundtruthing undertaken. Indicative Flood Risk Zone maps were produced in advance of public display of Proposed Variation and associated documents taking into account the findings of the Stage 1 and Stage 2 SFRA as detailed in Section 2 and Table 3.

Figure 3 identifies Flood Zone A (darker blue) and Flood Zone B (lighter blue) that were produced in advance of public display of Proposed Variation and associated documents. All other areas were identified as Flood Zone C. As per the Guidelines, the flood zones are a combination of fluvial and coastal risk areas as follows:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

As identified by the Guidelines, in rivers with a well-defined floodplain or where the coastal plain is well defined at its rear, the limits of Zones A and B will virtually coincide. Zone B will only be significantly different in spatial extent from Zone A where there is extensive land with a gentle gradient away from the river or the sea.

Pluvial flood risk is identified in a number of areas within and surrounding Bearna. Pluvial flood risk is not taken into account in the delineation of flood zones, however; it has informed the development of flood risk management provisions detailed in Section 4.

Additional evidence relating to flood events that was not initially considered by the SFRA was provided in submissions and this was taken into account later in the process (see Section 4).

Table 3 Summary of Groundtruthing Findings in Bearna

Selected Location	Description	Findings	Conclusion on delineation of Indicative Flood Risk Zone ²
<p>Overall Findings</p> <p>The PFRA Fluvial and the ICPSS/PFRA Coastal mapping and the findings of the Stage 2 SFRA for Proposed Amendments to the Bearna Local Area Plan 2007-2013 (December 2012) were found to generally reflect what was observed to be the main areas of elevated flood risk on the ground during groundtruthing.</p> <p>There is a significant risk from coastal flooding to the south of the village centre. Due to the size of the Trusky Stream catchment there is a short response time to fluvial flooding and there is elevated risk of flash flooding, especially at culverts such as those along the R336. The worst outcome for a flood event in the village would be a high tide combined with a storm surge interacting with fluvial flooding from the Trusky Stream and Cloghscoltia River.</p> <p>There appears to be an anomaly in the PFRA Fluvial mapping where it does not follow the course of water bodies at a number of locations. Preparation of the indicative flood risk zone maps have taken into account this issue and ensured consolidation of the flood zone³.</p> <p>Informed by, inter alia, local topography and structures, flow path and direction, flood risk indicator mapping and the previous Stage 2 SFRA for Proposed Amendments to the Bearna Local Area Plan 2007-2013 (December 2012), flood Risk Zones were delineated.</p> <p>Indicative Flood Risk Zone A (Dark Blue) is a combination of:</p> <ul style="list-style-type: none"> • PFRA Fluvial 100 mapping in all areas apart from the coastal area to the east of the pier (Location 1) • The JBA Extreme Flood Outline at the coastal area to the east of the pier (Location 1) • Intervening areas between the Trusky Stream and the PFRA Fluvial 100 mapping • ICPSS/PFRA Coastal mapping • Outline of Flood Zone C on lands (consistent with information on flood risk that was submitted by a landowner as part of the consultation on the Proposed Amendments to the Bearna Local Area Plan 2007-2013, December 2012) <p>Indicative Flood Risk Zone B is a combination of Zone A plus:</p> <ul style="list-style-type: none"> • PFRA Fluvial Extreme 1000 mapping • PFRA Coastal Extreme 			
<p>Location 1 Figure 3</p>	<p>Cnoc Fraoigh Housing Estate</p>	<p>The Cloghscoltia River flows in a north-south direction to the east of the existing Cnoc Fraoigh Housing Estate.</p> <p>There is an area of elevated flood risk along the river and the PFRA Fluvial mapping is consistent with this.</p> <p>Micro-topography at this area would influence predicted flow paths and direction at the site-specific level.</p>	<p>These lands form part of Flood Zone A. Please refer to Section 4 for requirements.</p>

² Note that there are various uncertainties associated with the delineation of flood zones; Local Area Plan Objective FL 8 'New and Emerging Data' requires future amendments to the plan to consider new and/or emerging data, as appropriate.

³ This is because the river line that was used in the model is from the EPA River Line GIS dataset (which was deemed the best available dataset). The dataset is not always complete and correct and where rivers are culverted, river lines may not necessarily be up to date in the dataset. In addition, the generalised model that was used left out smaller tributaries of rivers if there was little to no risk and the potential flood depths were very low.

Selected Location	Description	Findings	Conclusion on delineation of Indicative Flood Risk Zone ²
Location 2 Figure 3	Lands to the east and west of the pier, to the south of the R336	<p>In the coastal area to the east of the pier, the PFRA Fluvial area appears to be exaggerated in parts and does not match field observations with regard to topography and vegetation. The JBA 'Recommended Extreme Flood Outline' mapping matched observations in this area.</p> <p>Certain lands to the west of the pier, to the south of the R336 are identified by the ICPSS/PFRA as being at risk of coastal flooding. Field observations determined that the ICPSS/PFRA mapping is reliable and that the micro-topography on these lands is important. In addition to being at risk from storm surges and/or high tides, field observations indicated that these lands may be at risk of pluvial flooding.</p> <p>These lands are protected to an extent by a coastal wall however many stones were observed on the landward side of this wall, indicating previous overtopping by energetic waves. It should be noted that these new coastal structures may have the effect of detaining/retaining coastal flood events thus worsening the effects.</p> <p>The Trusky Stream has been culverted under the R336 and other structures and any future blockages combined with sufficient flow could result in a sudden localised flood event with significant implications for existing properties.</p>	<p>Some of these lands form part of Flood Zones A.</p> <p>The delineation of Flood Zone A to the east of Pier Road was informed by and is consistent with information on flood risk that was submitted by a landowner as part of the consultation on the Proposed Amendments to the Bearna Local Area Plan 2007-2013 (December 2012)⁴. This information was reviewed again as part of this SFRA. Prospective applicants should ensure compliance with flood risk management provisions contained within the Plan as varied (see Section 4 of this report).</p>

⁴ On the figures provided by the landowner, a .01% AEP flood level of 4.46m at the 95 percentile upper confidence level would be found at the site. This exceeds the combined historical astronomical and surge level of 3.77 to 3.82m that was provided by the Marine Institute and is lower than some of the levels found on the site. Taking this into account, Flood Risk Zone C is delineated at the site along a contour of 4.5 m (the nearest available contour to 4.46 taking into account the precautionary principle). Taking into account guidance from the OPW on climate change it is important that decision makers are informed of the implications of climate change with regard to flood risk so that they can take it into account in their decisions. Mid-range future scenario figures from the OPW make an allowance of a rise of 50 cm in sea level. If this occurred this would result in a future Flood Risk Zone C along a contour of 4.96 m. Prospective applicants should ensure compliance with flood risk management provisions contained within the Plan as varied (see Section 4 of this report).

3.4 Sensitivity to Climate Change

Certain lands within Bearna have the potential to be vulnerable to flooding, such as that arising from tidal, fluvial and pluvial flooding sources, and this vulnerability could be exacerbated by changes in both sea level rise and the severity and frequency of extreme weather events.

Coastal areas are highly sensitive to climate change impacts arising from increases in flooding due to both rising sea levels and more frequent and more severe storms.

'The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009' recommends that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects. In this regard, the Guidelines recommends:

- Recognising that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopting a cautious approach to zoning land in these potential transitional areas;
- Ensuring that the levels of structures designed to protect against flooding such as flood defences, land raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect (normally 85-100 years); and
- Ensuring that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.

Advice on the expected impacts of climate change and the allowances to be provided for future flood risk management in Ireland is given in the OPW Draft Guidance. Two climate change scenarios are considered. These are the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). The MRFS is intended to represent a "likely" future scenario based on the wide range of future predictions available. The HEFS represents a more "extreme" future scenario at the upper boundaries of future projections. Based on these two scenarios, the OPW recommended allowances for climate change in relation to river flows and sea levels - these are given in Table 4 overleaf. These climate change allowances are particularly important at the development management stage of planning, and will ensure that proposed development is designed and constructed to take into account best current knowledge. Climate change allowances have been integrated into the recommendations provided at Section 4 of this report.

At this, the development planning stage, a detailed knowledge of the impact of climate change on flood levels is not required to inform the strategic allocation of land. Instead, and in the absence of detailed projections of climate change impacts, flood extents can be assessed by using the extent of the Flood Zone B outline to indicate where climate change may result in greater extents in the future.

Table 4 Allowances for Future Scenarios (100-Year Time Horizon)

Criteria	MRFS – to be considered for most development scenarios	HEFS – to be considered in relation to high value, high vulnerability development which cannot be relocated
Extreme Rainfall Depths	+20%	+30%
Flood Flows	+20%	+30%
Mean Sea Level Rise	+500mm	+1000mm



Figure 3 Indicative Flood Risk Zones in advance of public display of Proposed Variation and associated documents

Section 4 Submissions made during the Variation-preparation process and changes arising

4.1 Submissions received providing evidence of flood events

On foot of a number of submissions from Bearna residents that contained video and photographic evidence of historic flooding in the Cnoc Fraoigh area on lands adjoining the Trusky Stream in 2015 and 2017, Flood Zone A at Cnoc Fraoigh was extended.

A sample photograph identified from the December 2015 flood event taken from inside the Cnoc Fraoigh estate is provided at Figure 4.



Figure 4 Sample photograph identified from the December 2015 flood event

The revised flood zones are shown on Figure 5, indicating the areas where evidence was provided within the submissions of historical flooding.

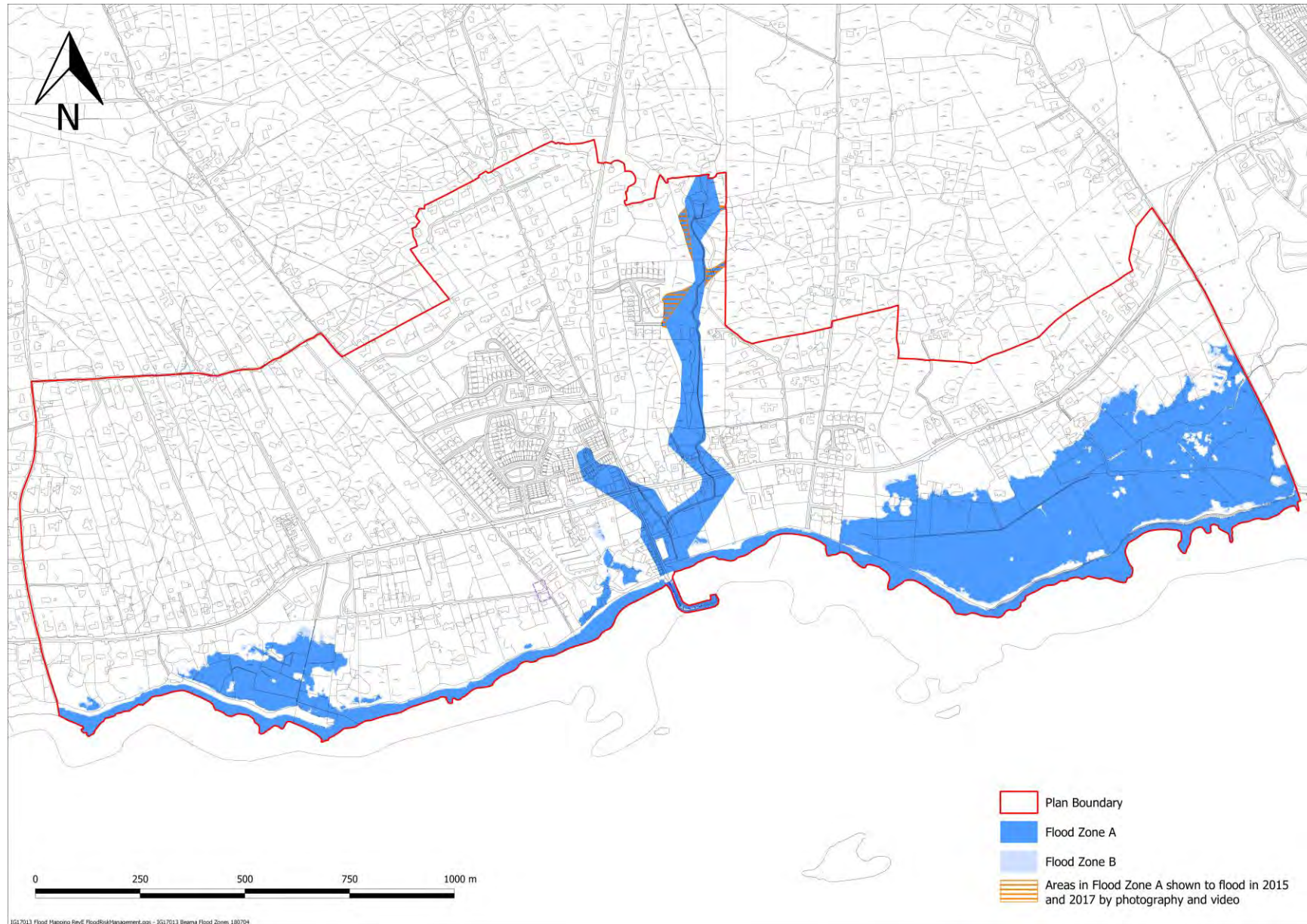


Figure 5 Revised Flood Zones taking into account evidence of flooding submitted within submissions

In addition to the photographic and video evidence that was submitted for the 2015 and 2017 flood events, evidence was provided of a flood event in 1977 in the vicinity of the R336, the Twelve Pins Hotel and Pier Road, when a number of houses in the Pier Road area were flooded as well as undeveloped land that is now developed. This excerpt is provided at Figure 6.



The photo is taken approximately from where the entrance to Cúl an Aith is today, looking southwards towards the back of the Twelve Pins (on the right), and Donnelly's (tall building in the middle back of pic).

Figure 6 Excerpt from the Connacht Sentinel demonstrating 1977 flood event in Bearna – included within submission

4.2 Submissions received requesting zoning for incompatible uses in the floodplain and/or reductions in the flood plain

Various submissions were received during the Variation-preparation/adoption process that requested reductions to these flood zones, however in all instances insufficient evidence was provided to justify any reductions to the extents of the flood zones and therefore changes on this basis would be contrary to the Flood Guidelines. Zoning of these lands as requested, for residential and/or village centre development, would be inappropriate and contrary to the Guidelines.

Allowing inappropriate land use zoning in flood zones would also be contrary to the correct approach followed in the 2012 Bearna Plan – where the Flood Guidelines were adhered to.

Submissions requesting changes to land use zoning failed to demonstrate awareness of the evidence of historical flooding in this area in 1977, 2015 and 2017. Photos and videos have been submitted on two occasions during the Variation-preparation process, January 2018 and May 2018, which relate to lands adjoining the Trusky Stream.

A number of submissions identify that flood risk arising from zoning for incompatible uses in within Flood Zones A/B can be adequately managed by structural and non-structural flood risk management measures however; this would not be in compliance with the Flood Risk Management Guidelines⁵.

Furthermore, where channel clearance works have been undertaken, the Office of Public Works (OPW) have advised (February 2018) that it would be contrary to the precautionary principle to assume that rivers will be maintained in their improved state by a private land-owner. There is no statutory duty on or budget for the OPW to maintain river schemes in Bearna. The OPW have identified that it would not actively condone private clearance for the purpose of achieving a re-zoning of land. Is it therefore unreasonable to identify flood zones based on the non-equilibrium depth of the channel.

A Flood Study for the Cnoc Fraoigh lands that was included as part of a separate submission requesting zoning of the flood plain did not provide any contrary evidence that the photos of flooding referred to under Section 4.1 were incorrect or that there was any rationale for flooding on these lands on two occasions. In review of this submission, reference was made to a previous planning application (09-1278) **that referenced "Other Natural Lake/Flooding" to lands to the east of Cnoc Fraoigh Housing Estate.**

Given the issues that presented during the Variation preparation/adoption process as summarised above and combined with the significant number of recent floods in the County, it was identified that it would be irresponsible and reckless to zone lands for vulnerable uses in these areas.

4.3 Material Alterations to Proposed Variation 2 (a) that was placed on public display

16 Material Alterations were proposed after public display of the Proposed Variation. Proposed Material Alterations No. 1-7 were determined as requiring full Strategic Environmental Assessment (SEA).

The findings of the SEA (informed by SFRA) were provided to the Elected Members and included the following:

- Material Alterations No. 1-6 provide for a range of incompatible uses within areas that are at elevated risk of flooding (these areas were identified by the Strategic Flood Risk Assessment);

⁵ Page 21 "Chapter 3 Principles and Key Messages", "Key Messages": *"Only when both avoidance and substitution cannot take place should consideration be given to mitigation and management of risks."*

Lands proposed by submissions to be zoned for inappropriate uses are within Flood Zone A, an area at elevated risk of flooding. The Guidelines require a sequential approach involving firstly to avoid inappropriate development in this area. Exceptions to the restriction of development are only allowed where a detailed Justification Test (taking into account flood risk management measures) is passed. A Justification Test would not be passed in this instance as there are more alternative lands available for village centre/residential uses in Bearna. As a Justification Test would not be passed consideration cannot be given to the mitigation and management of risk.

- Material Alterations No. 1-6 provide incompatible uses that are contrary to proper and sustainable flood risk management and contrary to *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009) and *Circular PL2/14*;
- If any of the lands subject to Proposed Material Alterations No. 1-6 that are located within Flood Zones A or B were developed, there would be a heightened risk of flooding and associated adverse effects on people and their assets. Such effects are identified on Table 4.1 and range from loss of life, to damage to property, to loss of income; and
- Material Alterations No. 1-6 would result in elevated potential for water quality to be adversely affected (as a result of flooding of water treatment systems and collection networks and flooding of unknown substances stored onsite). Polluted or contaminated waters would have the potential to adversely affect human health and biodiversity and flora and fauna (including designated European Sites).

Table 4.1 Selection of Adverse Effects (on People and Property) that occur as a result of Flooding

Tangible Effects	Intangible Human and Other Effects
Damage to buildings (houses)	Loss of life
Damage to contents of buildings	Physical injury
Damage to new infrastructure e.g. roads	Increased stress
Loss of income	Physical and psychological trauma
Disruption of flow of employees to work causing knock on effects	Increase in flood related suicide
Enhanced rate of property deterioration and decay	Increase in ill health
Long term rot and damp	Homelessness
	Loss of uninsured possessions

In order to be consistent with the need to contribute towards proper planning and sustainable development and in order to comply with the Flood Risk Management Guidelines, it was recommended by the SEA that zoning as proposed by Variation 2 (a) and not zoning as proposed by the Material Alterations was selected.

Elected Members decided to select zoning as proposed by the Material Alterations. This zoning is contrary to *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009) and *Circular PL2/14*. Consequently, the Variation is contrary to these Guidelines and associated Circular.

Section 5 Measures for Flood Risk Management

The measures detailed on Table 6 will contribute towards flood risk management in Bearna. However, certain Material Alterations were made to Proposed Variation and adopted by the Elected Members as part of the adopted Variation. These Material Alterations provide for a range of incompatible uses within areas that are at elevated risk of flooding and are contrary to *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009) and *Circular PL2/14*. Consequently, the Variation is contrary to these Guidelines and associated Circular.

Table 6 Measures for Flood Risk Management

From existing Plan or Proposed Variation?	Measure
From Proposed Variation	<p>Flood and Flood Related Objectives</p> <p>Objective CCF 1 - Flood Zones and Appropriate Land Uses Protect Flood Zone A and Flood Zone B from inappropriate development and direct developments/land uses into the appropriate Flood Zone in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 (or any superseding document) and the guidance contained in the Flood Risk Management Guidelines (DM Guidelines DM 2). Where a development/land use is proposed that is inappropriate within the Flood Zone, then the development proposal will need to be accompanied by a Development Management Justification Test and Site-Specific Flood Risk Assessment in accordance with the criteria set out under with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 & Circular PL2/2014 (as updated/superseded). In Flood Zone C, where the probability of flooding is low (less than 0.1%, Flood Zone C), the developer should satisfy him or herself that the probability of flooding is appropriate to the development being proposed.</p> <p>Objective CCF 2 - Specific Flood Risk Locations Planning applications on lands in Bearna identified within pluvial PFRA areas outside of Indicative Flood Zone A on Flood Maps for Bearna shall be accompanied by a Site Specific Flood Risk Assessment that corresponds with that outlined under Chapter 5 'Flooding and Development Management' of The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009). Such assessments shall be prepared by suitably qualified experts with hydrological experience and shall quantify the risks and effects of any necessary mitigation, together with the measures needed or proposed to manage residual risks.</p> <p>Objective CCF 3 - Structural and Non-Structural Risk Management Measures in Flood Vulnerable Zones Ensure that applications to existing developments in flood vulnerable zones shall provide details of structural and non-structural risk management measures to include, but not be limited to specifications of the following - floor levels, internal layout, flood resilient construction, flood resistant construction, emergency response planning, access and egress during flood events.</p> <p>Objective CCF 4 - Water Bodies and Watercourses The existing streams in Bearna should be protected as follows:</p> <ul style="list-style-type: none"> • Restore and reinstate streams or portions of streams that have been filled in or covered over as part of new developments. • Culverting of the streams should be restricted. <p>Objective CCF 5 - Coastal Protection Promote the use of soft approaches to coastal protection that work with the natural features and processes at the foreshore.</p> <p>Objective CCF6- Inappropriate Development on Flood Zones Where a development/land use is proposed within any area subject to this objective the development proposal will need to be accompanied by a detailed hydrological assessment and robust SUDS design which demonstrates the capacity to withstand potential flood events to maintain water quality and avoid potential effects to ecological features.</p> <ul style="list-style-type: none"> • Any development proposals should be considered with caution and will be required to comply with The Planning System and Flood Risk Management Guidelines for Planning Authorities/Circular PL2/2014 & the associated Development Management Justification Test. • Climate Change should be duly considered in any development proposal. • Protect the riparian zones of watercourse systems throughout the plan area through a general 10 metre protection buffer from rivers within the plan area as measured from the near river bank, (this distance may be increased and decreased on a site by site basis, as appropriate). • Any development proposals submitted for this site will require a detailed ecological report (s), carried out by suitably qualified personnel for the purposes of informing Appropriate Assessment Screening by Galway County Council, the competent authority (in accordance with Objective DS 6 of the Galway CDP 2015-21). • The relevant lands will be outlined and flagged with a symbol on the land use zoning map and on the GIS system of Galway County Council so that staff and the public are aware of the special conditions/constraints attached. • A briefing will be provided to relevant staff within Galway County Council on the special conditions and constraints on relevant lands

From existing Plan or Proposed Variation?	Measure																
From Proposed Variation	<p>Land Use Zoning Objectives</p> <p>Objective LU9 - Constrained Land Use Zone (CL)</p> <p>To facilitate the appropriate management and sustainable use of flood risk areas.</p> <p>This zoning limits new development, while recognising that existing development uses within these zones may require small scale development, as outlined below, over the life of the Bearna Plan, which would contribute towards the compact and sustainable urban development of the village.</p> <p>The underlying zoning or the existing permitted uses are deemed to be acceptable in principle for minor developments to existing buildings (such as small extensions to houses, most changes of use of existing buildings), which are unlikely to raise significant flooding issues, provided they do not obstruct important flow paths, introduce a significant additional number of people into flood risk areas or entail the storage of hazardous substances.</p> <p>Development proposals within this zone shall be accompanied by a detailed Flood Risk Assessment, carried out in accordance with The Planning System and Flood Risk Assessment Guidelines & Circular PL 2/2014 (or as updated), which shall assess the risks of flooding associated with the proposed development.</p> <p>Proposals shall only be considered where it is demonstrated to the satisfaction of the Planning Authority that they would not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities, or increase the risk of flooding to other locations. The nature and design of structural and non-structural flood risk management measures required for development in such areas will also be required to be demonstrated, so as to ensure that flood hazard and risk will not be increased. Measures proposed shall follow best practice in the management of health and safety for users and residents of the development.</p> <p>Specifications for developments in flood vulnerable areas set out in this plan shall be complied with, as appropriate (Please also refer to DM Guidelines FL 1 & 2 of this plan).</p>																
From Proposed Variation	<p>DM Guideline FL 1 – Flood Zones and Appropriate Land Uses</p> <p>The table below indicates the types of land uses that are appropriate in each of the Flood Zones identified within the plan area, in accordance with <i>The Planning System and Flood Risk Management Guidelines 2009</i> (and as updated). Where developments/land uses are proposed that are considered inappropriate to the Flood Zone, then a Development Management Justification Test and Site-Specific Flood Risk Assessment will be required in accordance with <i>The Planning System and Flood Risk Management Guidelines 2009</i> (and as updated).</p> <table border="1" data-bbox="467 1256 1401 1597"> <thead> <tr> <th>Land Uses</th> <th>Flood Zone A</th> <th>Flood Zone B</th> <th>Flood Zone C</th> </tr> </thead> <tbody> <tr> <td>HVD – Highly Vulnerable Development</td> <td>Inappropriate (if proposed then Justification Test & detailed FRA required)</td> <td>Inappropriate (if proposed then Justification Test & detailed FRA required)</td> <td>Appropriate (screen for flood risk)</td> </tr> <tr> <td>LVD – Less Vulnerable Development</td> <td>Inappropriate (if proposed then Justification Test & detailed FRA required)</td> <td>Inappropriate due to climate change (if proposed then Justification Test & detailed FRA required)</td> <td>Appropriate (screen for flood risk)</td> </tr> <tr> <td>WCD – Water-Compatible Development</td> <td>Appropriate (detailed FRA may be required)</td> <td>Appropriate (detailed FRA may be required)</td> <td>Appropriate (screen for flood risk)</td> </tr> </tbody> </table> <p>Notes (refer to <i>Flood Risk Management Guidelines 2009</i> for additional detail):</p> <ol style="list-style-type: none"> HVD – Houses, schools, hospitals, residential institutions, emergency services, essential infrastructure, etc. LVD – Economic uses (retail, leisure, warehousing, commercial, industrial, non-residential institutions, etc.), land and buildings used for agriculture or forestry, local transport infrastructure, etc. WCD – Docks, marinas, wharves, water-based recreation and tourism (excluding sleeping accommodation), amenity open space, sports and recreation, flood control infrastructure, etc. <p>Please refer to separate supporting document ‘Stage 2 Strategic Flood Risk Assessment for the Bearna Plan,</p>	Land Uses	Flood Zone A	Flood Zone B	Flood Zone C	HVD – Highly Vulnerable Development	Inappropriate (if proposed then Justification Test & detailed FRA required)	Inappropriate (if proposed then Justification Test & detailed FRA required)	Appropriate (screen for flood risk)	LVD – Less Vulnerable Development	Inappropriate (if proposed then Justification Test & detailed FRA required)	Inappropriate due to climate change (if proposed then Justification Test & detailed FRA required)	Appropriate (screen for flood risk)	WCD – Water-Compatible Development	Appropriate (detailed FRA may be required)	Appropriate (detailed FRA may be required)	Appropriate (screen for flood risk)
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WCD – Water-Compatible Development	Appropriate (detailed FRA may be required)	Appropriate (detailed FRA may be required)	Appropriate (screen for flood risk)														
From existing County Development Plan	<p>Development Strategy Objectives</p> <p>Objective DS 7 - Flood Risk Management and Assessment</p> <p>Ensure that proposals for developments located within identified or potential flood risk areas, or which may exacerbate the risk of flooding elsewhere, are assessed in accordance with the provisions of the Flood Risk Management Guidelines 2009 (or any updated/superseding document) the relevant policies, objectives and guidelines within this plan and shall also take account of the National CFRAM Programme Flood Hazard Mapping and Flood Risk Management Plans when they become available.</p> <p>Objective DS 8 – Climate Change</p> <p>Galway County Council shall support the National Climate Change Strategy and follow on document National Climate Change Adaptation Framework Building Resilience to Climate Change 2012, on a ongoing basis through implementation of supporting objectives in this plan, particularly those supporting the use of</p>																

From existing Plan or Proposed Variation?	Measure
	<p>alternative and renewable energy sources, sustainable transport, air quality, biodiversity, green infrastructure, coastal zone management, flooding and soil erosion.</p> <p>Objective DS 9 – Projects/Associated Improvement Works/Infrastructure and Appropriate Assessment</p> <p>Ensure that proposed projects and any associated improvement works or associated infrastructure relating to renewable energy projects; water supply and abstraction; wastewater and discharges; flood alleviation and prevention; roads, power lines and telecommunications; and amenity and recreation provision are subject to Appropriate Assessment where relevant.</p>
From existing County Development Plan	<p>Wastewater Policies and Objectives</p> <p>Objective WW 7 – Surface Water Drainage & Sustainable Drainage Systems (SuDS)</p> <p>Maintain and enhance, as appropriate, existing surface water drainage systems in the County, ensure that new developments are adequately serviced with surface water drainage infrastructure and promote the use of Sustainable Drainage Systems in all new developments.</p>
From existing County Development Plan	<p>Flood Risk Management Policies and Objectives</p> <p>Policy FL 1 - Flood Risk Management Guidelines</p> <p>It is the policy of Galway County Council to support, in co-operation with the OPW, the implementation of the EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI No. 122 of 2010) and the DEHLG/OPW publication <i>The Planning System and Flood Risk Management Guidelines (2009)</i> (and any updated/superseding legislation or policy guidance). Galway County Council will also take account of the Shannon International and Western Catchment Flood Risk Assessment and Management Studies.</p> <p>Policy FL 2 – Catchment Planning</p> <p>The Council will actively work with the CFRAM Programme and catchment based Flood Planning Groups, especially in the east of the County where catchments go beyond the Council’s administrative boundary, in the development and implementation of catchment-based strategies for the management of flood risk - including those relating to storage and conveyance.</p> <p>Policy FL 3 – Improvement and/or Restoration of Natural Flood Risk Management Functions</p> <p>Where resources are available and subject to compliance with the Habitats and Birds Directives, the Council will contribute towards the improvement and/or restoration of the natural flood risk management functions of flood plains.</p> <p>Policy FL 4 – Principles of the Flood Risk Management Guidelines</p> <p>The Council shall implement the key principles of flood risk management set out in the Flood Risk Management Guidelines as follow:</p> <ol style="list-style-type: none"> 1) Avoid development that will be at risk of flooding or that will increase the flooding risk elsewhere, where possible; 2) Substitute less vulnerable uses, where avoidance is not possible; and 3) Mitigate and manage the risk, where avoidance and substitution are not possible. <p>Development should only be permitted in areas at risk of flooding when there are no alternative, reasonable sites available in areas at lower risk that also meet the objectives of proper planning and sustainable development.</p> <p>Development in areas which have the highest flood risk should be avoided and/or only considered in exceptional circumstances (through a prescribed Justification Test) if adequate land or sites are not available in areas which have lower flood risk.</p> <p>Policy FL 5 – SFRA of Lower Tier Plans</p> <p>Lower tier plans shall undertake SFRA (Strategic Flood Risk Assessment) in compliance with the Flood Risk Management Guidelines and in consultation with the OPW.</p> <p>Flood Risk Management Objectives</p> <p>Objective FL 1 - Flood Risk Management and Assessment</p> <p>Comply with the requirements of the DoEHLG/OPW The Planning System and Flood Risk Management-Guidelines for Planning Authorities and its accompanying Technical Appendices document 2009 (including any updated/superseding documents). This will include the following:</p> <ol style="list-style-type: none"> a) Avoid, reduce and/or mitigate, as appropriate in accordance with the Guidelines; b) Development proposals in areas where there is an identified or potential risk of flooding or that could give rise to a risk of flooding elsewhere will be required to carry out a Site-Specific Flood Risk Assessment, and justification test where appropriate, in accordance with the provisions of The Planning System and Flood Risk Management Guidelines 2009 (or any superseding document). c) Development that would be subject to an inappropriate risk of flooding or that would cause or exacerbate such a risk at other locations shall not normally be permitted; d) Galway County Council shall work with other bodies and organisations, as appropriate, to help protect critical infrastructure, including water and wastewater, within the County, from risk of flooding. <p>Objective FL 2 – Surface Water Drainage and Sustainable Drainage Systems (SuDs)</p> <p>Maintain and enhance, as appropriate, the existing surface water drainage system in the County. Ensure that new developments are adequately serviced with surface water drainage infrastructure and promote the use of Sustainable Drainage Systems in all new developments. Surface water runoff from development sites will be limited to pre-development levels and planning applications for new developments will be required to provide details of surface water drainage and Sustainable Drainage Systems proposals.</p> <p>Objective FL 3 - Protection of Waterbodies and Watercourses</p> <p>Protect waterbodies and watercourses within the County from inappropriate development, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains. This will include protection buffers in riverine, wetland and coastal areas as appropriate.</p> <p>Objective FL 4 – Flood Risk Assessment for Planning Applications & CFRAMS</p> <p>Site-specific Flood Risk Assessment (FRA) is required for all planning applications in areas at risk of</p>

From existing Plan or Proposed Variation?	Measure
	<p>flooding, even for developments appropriate to the particular Flood Zone. The detail of these site-specific FRAs will depend on the level of risk and scale of development. A detailed site-specific FRA should quantify the risks, the effects of selected mitigation and the management of any residual risks.</p> <p>The Council shall have regard to the results of any CFRAM Studies in the assessment of planning applications.</p> <p>Objective FL 5 – SFRA/FRA & Climate Change SFRA's and site-specific FRAs shall provide information on the implications of climate change with regard to flood risk in relevant locations. The 2009 OPW Draft Guidance on 'Assessment of Potential Future Scenarios for Flood Risk Management' (or any superseding document) shall be consulted with to this effect.</p> <p>Objective FL 6 – FRA & Environmental Impact Assessment (EIA) Flood risk may constitute a significant environmental effect of a development proposal that in certain circumstances may trigger a sub-threshold EIS. FRA should therefore be an integral part of any EIA undertaken for projects within the County.</p>
From existing County Development Plan	<p>Natural Heritage and Biodiversity Policies</p> <p>Objective NHB 14 – Protection of Riparian Zones Protect the riparian zones of watercourse systems throughout the county, recognising the benefits they provide in relation to flood risk management and their protection of the ecological integrity of watercourse systems and ensure they are considered in the land use zoning in Local Area Plans.</p>
From existing County Development Plan	<p>Chapter 13: Development Management Standards</p> <p>DM Standard 27: Surface Water Drainage & Flooding Developments will be subject to the following requirements with regard to surface water drainage and flood prevention and management:</p> <p>a) Surface Water Drainage Drainage from paved surfaces may, after suitable treatment, be discharged to available watercourses or to adequate soakage areas on site. In any event, surface water shall not be permitted to flow on to the public road from any proposed development. Accesses and road frontage should be designed in such a manner as to deal with surface water and ensure that it does not impact on the public road. For rural houses, existing roadside drainage shall be maintained by the incorporation of a suitably sized drainage pipe. Each application shall be accompanied by design calculations or appropriate evidence to support the size of the pipe selected.</p> <p>b) Surface Water Run-Off Land uses shall not give rise to increases in the run-off characteristics above those that currently exist.</p> <p>c) Sustainable Drainage Systems The use of Sustainable Drainage Systems (SuDs) shall be encouraged in new developments to minimise the risk of flooding and contamination and to protect environmental and water resources. The Council will seek to ensure applicants incorporate sustainable drainage systems for significant developments in both urban and rural areas and will encourage them for other developments. SuDS is an approach that seeks to manage the water as close as possible to its origin by various engineering solutions that replicate natural drainage processes, before it enters the watercourse. The incorporation of SuDS techniques allows surface water to be either infiltrated or conveyed more slowly to water courses using porous surface treatments, ponds, swales, filter drains or other installations. SuDS should be designed to be cost-effective and require minimum maintenance.</p> <p>d) Flooding Development should not itself be subject to an inappropriate amount of flooding or exacerbate the risk of flooding at other locations. Development must so far as is reasonably practicable incorporate the maximum provision to reduce the rate and quantity of run-off. In particular, where appropriate:</p> <ul style="list-style-type: none"> • Hard surface areas (car parks. etc.) should be constructed in permeable or semi-permeable materials; • On site storm water ponds to store and/or attenuate additional run-off from the development, should be provided. <p>e) Flood Risk Assessment Where flood risk may be an issue for any proposed development, a flood risk assessment should be carried out that is appropriate to the scale and nature of the development and the risks arising. This shall be undertaken in accordance with the DoEHLG Flood Risk Assessment Guidelines 2009 (or any superseding document). Applicants are requested to refer to the OPW National Flood Hazard Mapping Website, to the County Stage 1 Strategic Flood Risk Assessment undertaken for the County Development Plan and Stage 2 Strategic Flood Risk Assessments undertaken for recently adopted and/or amended Local Area Plans where appropriate prior to submitting proposals for development.</p> <p>f) Floodplains Appropriately designed development that is not sensitive to the effects of flooding may be permissible in floodplains, provided it does not reduce the floodplain area or otherwise restrict flow across floodplains. Examples of such development might include park areas, sports pitches, certain types of industry warehousing, etc. designed to be flood resistant and/or sensitive. Such developments should only be permitted provided it incorporates adequate measures to cope with the over-existent flood risk, for example, adequate drainage systems, safety measures, emergency response facilities and/or warning and response systems, and where it is considered that flooding would not result in significant hardship/ financial loss or cost.</p> <p>g) Watercourses For developments adjacent to all watercourses of a significant conveyance capacity or where it is necessary to maintain the ecological or environmental quality of the watercourse, any structures (including hard landscaping) must be set back from the edge of the watercourse to allow access for channel clearing/</p>

From existing Plan or Proposed Variation?	Measure
	<p>maintenance/vegetation. A minimum setback of 5-10m is required either side depending on the width of the watercourse. Development consisting of the construction of embankments, wide bridge piers or similar structures will not normally be permitted in or across floodplains or river channels, as these structures restrict/obstruct flow and increase the risk of flooding to property and land upstream. It is considered necessary in exceptional cases to permit such structures, however they should be designed to minimise and/or compensate for any potential negative effects.</p> <p>h) Flood Design Standards All new development must be designed and constructed to meet the following minimum flood design standards:</p> <ul style="list-style-type: none"> • For urban/built up areas or where developments (existing, proposed or anticipated) are involved – the 100 year flood; <ul style="list-style-type: none"> • For rural areas or where further developments (existing, proposed or anticipated) are not involved – the 25 year flood; • Along the coast and estuaries – the 200 year tide level; • Where streams, open drains or other watercourses are being culverted - the minimum permissible culvert diameter is 900mm (access should be provided for maintenance as appropriate). <p>DM Standard 42: Coastal Management and Protection The following requirements shall be considered and applied where appropriate with respect to coastal management and protection:</p> <p>a) Natural Processes Where possible, developments shall ensure that the landward migration of coastal features, such as dunes and marshes, shall be facilitated as these features form an integral part of the coastal system – both physically and ecologically - and provide protection against wave energy through dissipation.</p> <p>b) Sea Level Change and Flooding New developments shall generally comply with the following approach to coastal management for sea level change:</p> <ul style="list-style-type: none"> • No new building or new development within 100m of 'soft' shoreline; • No further reclamation of estuary land; • No removal of sand dunes, beach sand or gravel; • All coastal defence measures to be assessed for environmental impact. <p>c) Coastal Edge In addition to the above, a general minimum horizontal setback of 30m from the foreshore field boundary line, for new development, or along the 3m natural contour line, whichever is the greatest, is to be created. Any planning applications within this setback must demonstrate that any development would not be subject to potential rising sea levels as a result of climate change including global warming, and must address any issues with regard to rising sea levels, with regard to the siting of any development. New developments should not restrict opportunities for providing public access to the foreshore. The coastal edge and coastal habitats shall be protected from destruction and degradation to ensure their roles as ecological corridors, coastal flooding and storm surge buffers are retained and enhanced, and developers proposing developments in the vicinity of this area will be requested to carry out an ecological plan that incorporates the natural vegetation and topography of the area</p>

Section 6 Conclusion

The SFRA provides an appropriately strategic assessment of flood risk within the town of Bearna and has been undertaken in full compliance with *The Planning System and Flood Risk Management - Guidelines for Planning Authorities* (Department of the Environment, Heritage and Local Government and Office of Public Works, 2009) and Department of the Environment, Community and Local Government Circular PL 2/2014.

The SFRA has been undertaken with the aim of protecting existing and future properties and populations from the adverse effects of flooding.

The SFRA has facilitated the integration of certain flood risk management considerations into the Variation – these are identified under Section 5. However, certain Material Alterations were made to Proposed Variation and adopted by the Elected Members as part of the adopted Variation. These Material Alterations provide for a range of incompatible uses within areas that are at elevated risk of flooding and are contrary to The Flood Risk Management Guidelines and associated Circular. Consequently, the Variation is contrary to these Guidelines and associated Circular.

Appendix I: Summary of Related Provisions contained in the DEHLG Flood Guidelines for Land Uses in Flood Zones A and B

The provisions set out in the DEHLG's 2009 Flood Guidelines (including at Chapter 3 Principles and Key Mechanisms and Chapter 5 Flooding and Development Management) and Departmental Circular PL2/2014 and should be adhered to.

- The Sequential Approach, including the Justification test -

The key principles of the **Guidelines'** risk-based sequential approach (see Figure 7) are:

- Avoid development in areas at risk of flooding. If this is not possible, consider substituting a land use that is less vulnerable to flooding. Only when both avoidance and substitution cannot take place should consideration be given to mitigation and management of risks.
- Inappropriate types of development that would create unacceptable risks from flooding should not be planned for or permitted.
- Exceptions to the restriction of development due to potential flood risks are provided for through the use of a Justification Test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated.

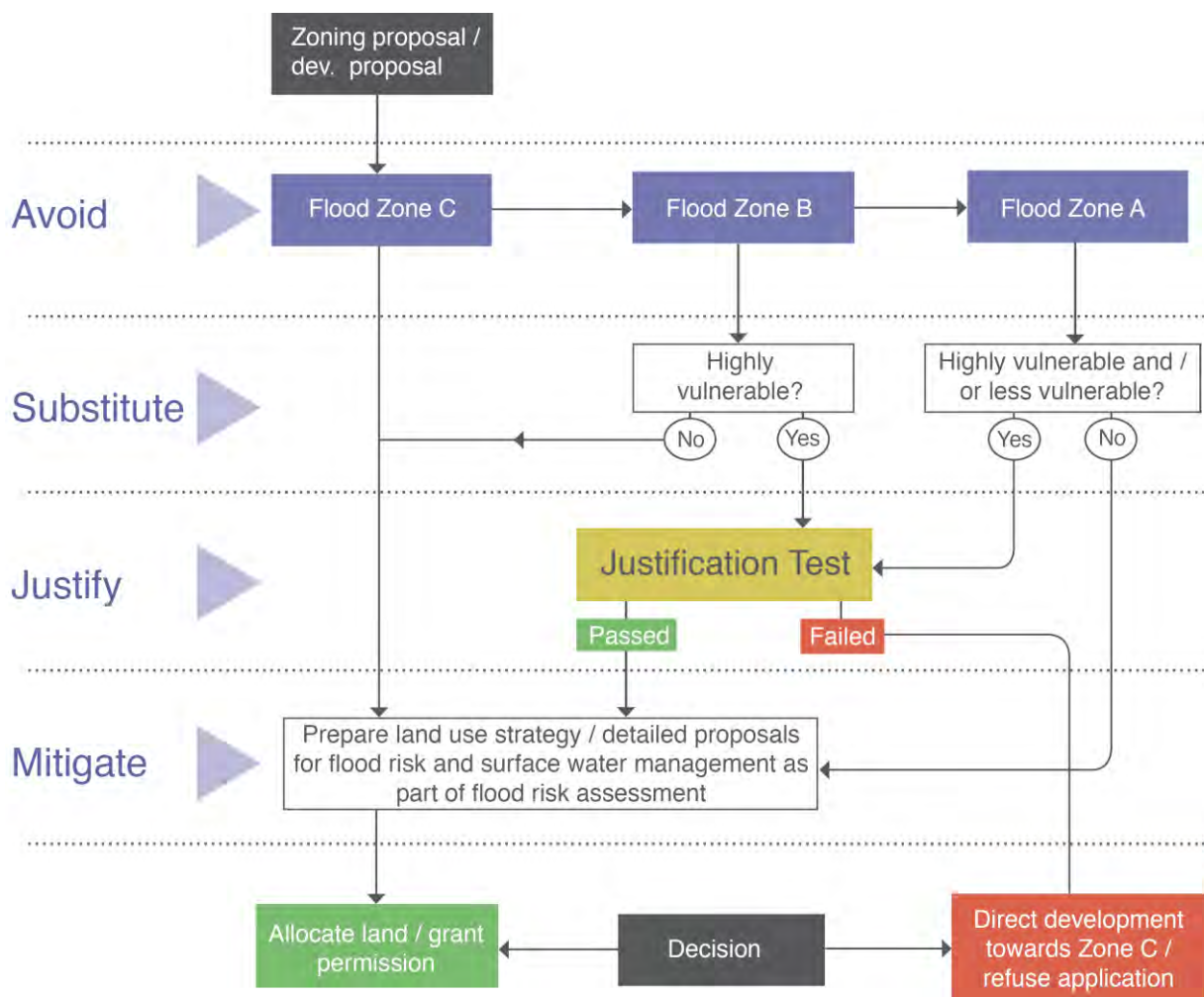


Figure 7 Sequential Approach Process⁶

In summary, the **planning implications** for each of the flood zones are:

Zone A - High probability of flooding. Most types of development would be considered inappropriate in this zone. Development in this zone should be avoided and/or only considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the Justification Test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation, would be considered appropriate in this zone.

Zone B - Moderate probability of flooding. Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone, unless the requirements of the Justification Test can be met. Less vulnerable development, such as retail, commercial and industrial uses, sites used for short-let for caravans and camping and secondary strategic transport and utilities infrastructure, and water-compatible development might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone C and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to and from the development can or will adequately be managed.

Zone C - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but

⁶ Flood Zone C covers all areas outside of Zones A and B

would need to meet the normal range of other proper planning and sustainable development considerations.

Table 7 overleaf classifies the vulnerability of different types of development while Table 8 identifies the appropriateness of development belonging to each vulnerability class within each of the flood zones as well as identifying what instances in which the Justification Test should be undertaken. Inappropriate development that does not meet the criteria of the Justification Test should not be considered at the plan-making stage or approved within the development management process.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	<p>Garda, ambulance and fire stations and command centres required to be operational during flooding;</p> <p>Hospitals;</p> <p>Emergency access and egress points;</p> <p>Schools;</p> <p>Dwelling houses, student halls of residence and hostels;</p> <p>Residential institutions such as residential care homes, children's homes and social services homes;</p> <p>Caravans and mobile home parks;</p> <p>Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and</p> <p>Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.</p>
Less vulnerable development	<p>Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions;</p> <p>Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;</p> <p>Land and buildings used for agriculture and forestry;</p> <p>Waste treatment (except landfill and hazardous waste);</p> <p>Mineral working and processing; and</p> <p>Local transport infrastructure.</p>
Water-compatible development	<p>Flood control infrastructure;</p> <p>Docks, marinas and wharves;</p> <p>Navigation facilities;</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;</p> <p>Water-based recreation and tourism (excluding sleeping accommodation);</p> <p>Lifeguard and coastguard stations;</p> <p>Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).</p>

*Uses not listed here should be considered on their own merits

Table 7 Classification of vulnerability of different types of development

	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

Table 8 Vulnerability Classes and Flood Zones

The **Justification Test** which is referred to as part of the Sequential Approach is an assessment of whether a development proposal within an area at risk of flooding meets specific criteria for proper planning and sustainable development and demonstrates that it will not be subject to unacceptable risk nor increase flood risk elsewhere. The Justification Test should be applied only where development is within flood risk areas that would be defined as inappropriate under the screening test of the sequential risk based approach outlined above. This Justification Test is shown below.

Where, as part of the preparation and adoption or variation and amendment of a development/local area plan¹, a planning authority is considering the future development of areas in an urban settlement that are at moderate or high risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out in Table 3.2, all of the following criteria must be satisfied:

- 1 The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.
- 2 The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:
 - (i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement²;
 - (ii) Comprises significant previously developed and/or under-utilised lands;
 - (iii) Is within or adjoining the core³ of an established or designated urban settlement;
 - (iv) Will be essential in achieving compact and sustainable urban growth; and
 - (v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.⁴
- 3 A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere.

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

Figure 8 Justification Test ⁷

⁷ Footnotes: ¹ Including Strategic Development Zones and Section 25 Schemes in the area of the Dublin Docklands Development Authority ²In the case of Gateway planning authorities, where a number of strategic growth centres have been identified within the overall area of the authority, the Justification Test may be applied for vulnerable development within each centre. ³ See definition of the core of an urban settlement in Glossary of Terms. ⁴ This criterion may be set aside where section 4.27b applies.