STAGE 2 STRATEGIC FLOOD RISK ASSESSMENT

FOR THE

LONGFORD TOWN AND ENVIRONS LOCAL AREA PLAN 2016-2022

for: **Longford County Council**

Great Water Street

Longford

County Longford

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Section 1 Introduction and Policy Background

1.1 Introduction and Terms of Reference

Longford County Council is in the process of preparing a Local Area Plan for Longford Town and its Environs.

The preparation and adoption of the Plan 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 within the Longford Town and Environs area and includes mapped boundaries for Indicative Flood Risk Zones, taking into account factors including local knowledge, photography, 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. It has also taken into account submissions made by environmental authorities including the Department of the Environment, Heritage and Local Government and the Office of Public Works.

1.2 Summary of Conclusion and Recommendations

The purpose of this document is to detail the findings of the Stage 2 SFRA which has been undertaken alongside the preparation of the Plan.

The SFRA has informed the Plan and enabled compliance with the Flood Risk Management Guidelines. All SFRA recommendations – including those related to land use zoning and flood risk management provisions – have been integrated into the Plan.

1.3 Flood Risk and its Relevance as an Issue to the Plan

1.3.1 Flood Risk

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 overleaf.

Lands within Longford Town and its Environs are vulnerable to flooding and this vulnerability can be exacerbated by changes in both the occurrence of severe rainfall events and associated flooding. Local conditions such as low-lying lands and slow surface water drainage increase the risk of flooding. This risk can be increased by, for example, human actions including clearing of natural vegetation and new built development in the flood plains of rivers as well as by changing weather patterns.

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

The 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 by December 2013 (these maps are currently – 2016 – in the process of being finalised).
- Prepare flood risk management plans focused on prevention, protection and preparedness by (draft plans are currently estimated for 2016). These plans are to include measures to reduce the probability of flooding and its potential consequences.

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 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 which are being undertaken for each of the river basin districts in Ireland. Longford Town and its Environs is located in the Shannon International River Basin District.

The Programme comprises three phases as follows:

- The Preliminary Flood Risk Assessment (PFRA) in 2011;
- The CFRAM Studies and parallel activities, from 2011 to 2016 (estimated); and
- Implementation and Review from 2016 (estimated) onwards.

The Programme provides for three main consultative stages as follows:

- PFRAs in 2011;
- Flood Hazard Mapping, in 2013 (these maps are currently – 2016 – in the process of being finalised); and
- Flood Risk Management Plans, drafts of which are currently estimated for 2016.

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 which includes requirements to prepare a preliminary assessment by 2011, flood risk mapping by 2013 (these maps are currently – 2016 – in the process of being finalised) and flood risk management plans, drafts of which are currently estimated for 2016. It is the principal agency involved in the preparation of Flood Risk Assessment and Management studies (FRAMs).

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. Longford Town was deemed to be an AFA.

1.4.4 Flood Risk Management Guidelines

1.4.4.1 Introduction

In 2009, the OPW and the then Department of the Environment and Local Government (DEHLG) 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
- 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 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. Most types of development would be considered inappropriate in areas which 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 LAP's 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:

Flood risk = Likelihood of flooding x 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 areas of the plan which are not in zones A or B.

1.5 Emerging Information

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. The assessment and mapping of areas of flood risk, in particular, still awaits the finalisation of both Flood Hazard and Risk Maps for Areas for Further Assessment (AFAs) (currently – 2016 – in the process of being finalised) and for Flood Risk Management Plans (drafts of which are currently estimated for 2016).

The purpose of the CFRAM Studies is to assess and map existing and potential future flood hazard and flood risk within the AFAs and to identify viable structural and non-structural flood risk management measures for the AFAs and within each river catchment as a whole (in catchment-based Flood Risk Management Plans). The implications of these plans for Longford Town and Environs, which is located within the Shannon International River Basin District and is designated as an AFA, are uncertain at this point in time.

Future SFRAs undertaken for Longford Town and its Environs will integrate other new and emerging data, including, when available, any relevant information contained in the Flood Risk Management Plans.

1.6 Content of the Plan

The Longford Town and Environs Local Area Plan consists of a written statement and accompanying appendices and maps including a land use zoning map (see Figure 1 overleaf). The most relevant parts of the Plan for this SFRA relate to the land use zoning map and provisions relating to flood risk management (recommendations with respect to these, which have been integrated into the Plan by the Council, are provided under Section 4).

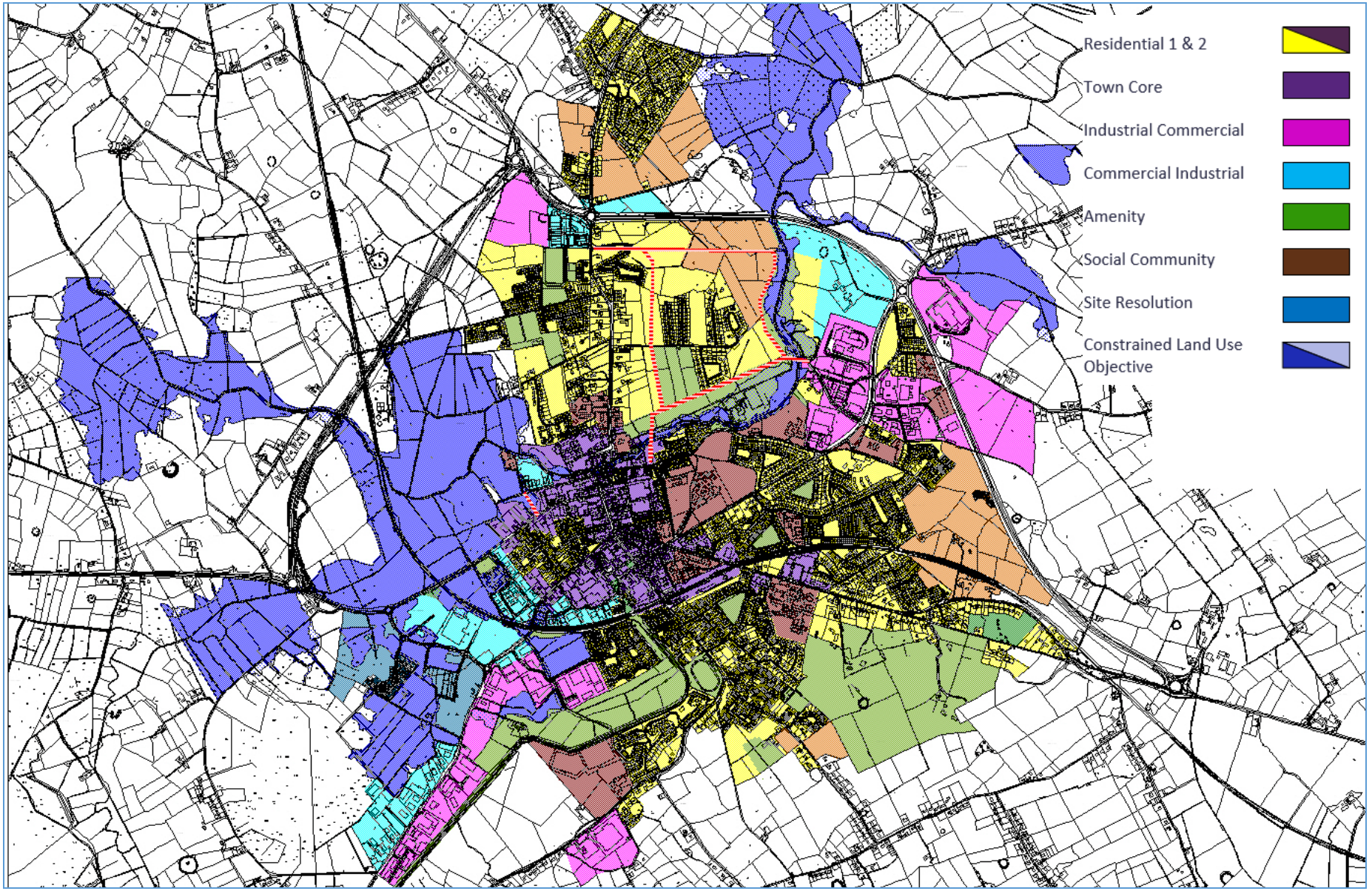

Figure 1 Land Use Zoning Map from the Plan

Section 2 Stage 1 SFRA - Flood Risk Identification

2.1 Introduction

Stage 1 SFRA (flood risk identification) was undertaken in order to identify whether there may be any flooding or surface water management issues within the town 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 and involved consulting with a range of sources as detailed under Section 2.3 below. The information provided in this section clearly identifies a potential flood risk issue within the Plan area, therefore a Stage 2 SFRA was proceeded to.

2.2 Overview[1]

The River Camlin is a significant fast flowing river through Longford. While much of Longford and its Environs are not subject to flooding (large majorities to the north, south and east), there are sufficient, critical receptors at significant risk of fluvial flooding to warrant Longford's designation as an Area for Further Assessment. The town centre and parts of the surrounding environs witnessed flooding from the River Camlin in 2009.

The River Camlin flows through Longford Town and meanders in a westerly direction to the river's confluence with the River Shannon, approximately 6km to the north-west of Longford.

Twelve flood events are recorded on floodmaps.ie for the Longford area. Low level areas in the grounds of St. Mel's College are susceptible to flooding at times of peak flow in the River Camlin. Flooding also occurs periodically upstream of the 600mm drain through the Ardnacassagh Estate. Immediately downstream of Longford Town a considerable area of floodplain exists and in recent years development has taken place of the higher parts of the floodplain.

There are two river sub-basins relevant to the Longford Town and Environs area (see Figure 2), both of which contain the River Camlin. One drains an area to the north-west, west and south of Longford (river sub-basin - code: CAMLIN_060), while the other drains an area to the north, east and south-east (river sub-basin - code: CAMLIN_050).

Good floodplain capacity exists throughout the Longford area, however, certain elements which are present may potentially increase the risk of flooding. The main risk to existing development in the town is if the bridges in the town centre became blocked. The road bridge and former mill races upstream of Main Street (R198) tend not to constrain flow normally; however, there are two low capacity footbridges providing access to the cinema development on the right bank downstream of R198. The River Camlin flows under the two footbridges. The cinema development is identified as having a low threshold with regard to flooding.

[1] This section has been informed by the OPW's Flood Risk Review for Longford undertaken as part of the CFRAMS process (OPW, 2011)

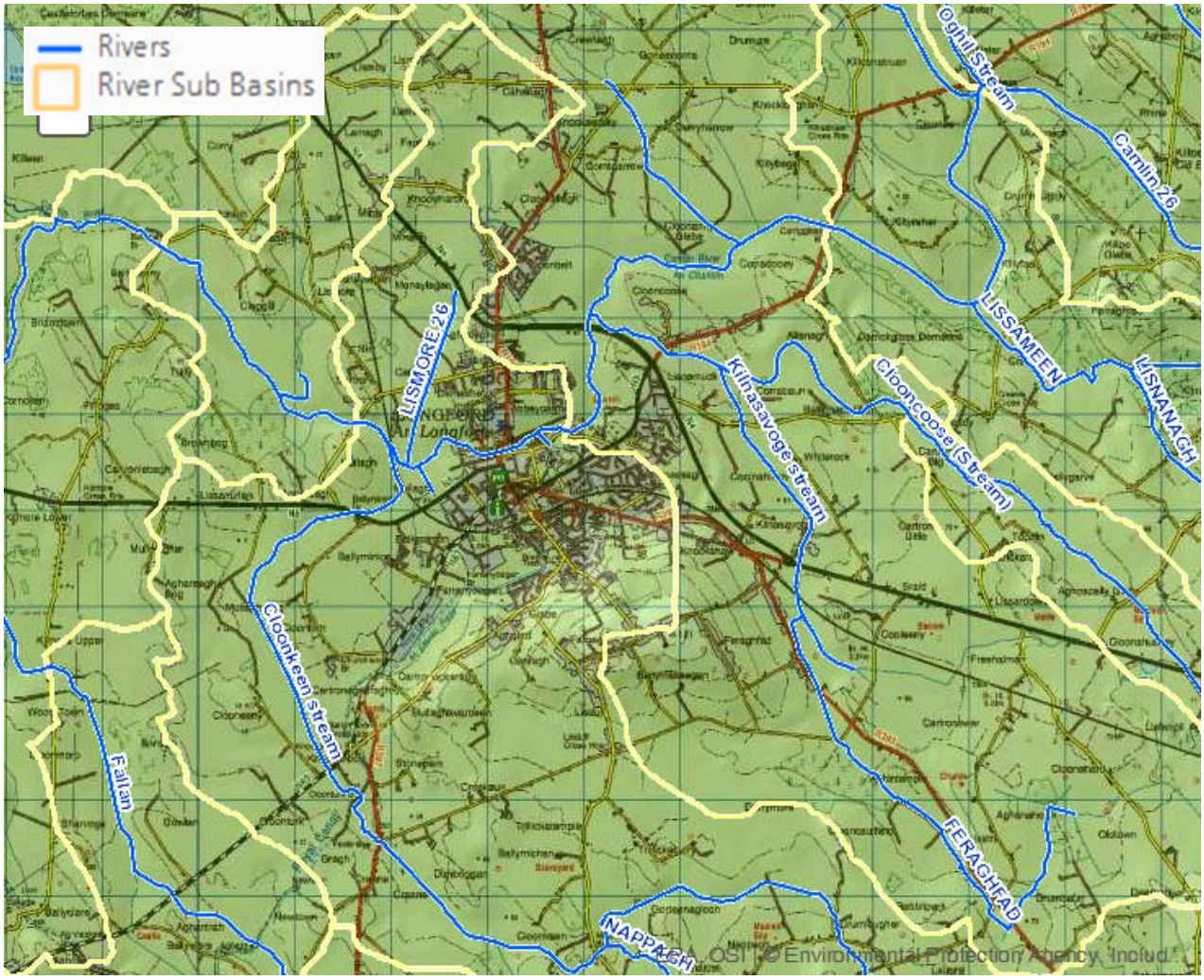

Figure 2 Rivers and River Sub Basins
Source: Environmental Protection Agency

2.3 Flood Risk Indicators

Indicators of flood risk that are based on historical flooding events are identified and described on Table 2 below.

Indicators of flood risk that are based on computational models are identified and described on Table 3 below.

Table 2 Historical Flood Risk Indicator Mapping

Information Source	Description	Spatial Spread	Strategic Limitations	Figure No. in this report
Alluvium Soils	Mineral alluvial soil mapping is indicative of recurrent or significant fluvial flooding at some point in the past and was generated by Teagasc with co-operation of the Forest Service, EPA and GSI. This project was completed May 2006.	Mineral Alluvium soil is identified within the Plan area surrounding the banks of the River Camlin	Drainage may have changed significantly since these soils were deposited.	Figure 3
Photographs	Photography identifies that some developed and undeveloped lands flooded in 2009	Coverage limited to certain areas at certain times	Coverage limited to certain areas at certain times	Longford County Council file of photographs considered but not reproduced in this document
Flood Events and Flood Extents from the OPW	A flood event is the occurrence of recorded flooding at a given location on a given date. The flood event is derived from different types of information (reports, photographs etc.). A flood event that has occurred more than once at a certain area is named a recurring flood event. A flood extent is an inundated area as recorded at a certain moment in time.	There are 12 flood events recorded on floodmaps.ie – 8 of which are recurring flood events. The flood events listed are located within Longford Town and also to the east and west of the surrounding environs of the town.	This dataset only provides a spot location and does not list flood events which have not been recorded as part of the dataset.	Not applicable.
Drainage Districts (OPW)	This drainage scheme mapping dataset was prepared on behalf of the Drainage Districts (Local Authorities with statutory responsibility for maintenance under the Arterial Drainage Act, 1925). These maps identify land that might benefit from the implementation of Arterial (Major) Drainage Schemes and indicate areas of land subject to flooding or poor drainage.	Historical mapping – Drainage Districts can be found within Longford Town and also to the east, west and north of the area	Identifies large broad areas - very low resolution for flood risk management	Not applicable
Entries from the following information sources have not been identified within the existing Plan area:				
Information Source	**Description**	**Spatial Spread**	**Strategic Limitations**	**Figure No. in this report**
Benefitting lands (OPW)	Benefitting lands mapping is a dataset identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land estimated or reported to be subject to flooding or poor drainage.	Historical mapping – none identified	Identifies broad areas - low resolution for flood risk management	Not applicable

Table 3 Modelled Flood Risk Indicator Mapping

Information Source	Description	Spatial Spread	Strategic Limitations	Figure No. in this report
OPW Preliminary Flood Risk Assessment (PFRA) Fluvial, Groundwater and Pluvial flood maps	The OPW PFRA mapping dataset has been arrived at by: • 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. This assessment has considered all types of flooding, including that which can occur from rivers, the sea and estuaries (not relevant for Longford Town and Environs), 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. Further information on the purpose and development of the OPW PFRA Maps are available on www.cfram.ie.	PFRA fluvial mapping includes lands adjacent to the River Camlin as it flows through the current Plan area. PFRA groundwater mapping does not include areas within the Plan area. Pockets of PFRA pluvial mapping are found at a number of locations within the Plan boundary.	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.	PFRA mapping is provided on Figure 4
Information Source	**Description**	**Spatial Spread**	**Strategic Limitations**	**Figure No. in this report**
Emerging data from the Western CFRAM Study	Emerging data from the Western CFRAM Study - such as that contained in the Flood Risk Reviews for certain settlements - may inform lower tier plans or planning applications. The Western CFRAM Flood Risk Review was undertaken to help validate the findings of the PFRA, informing decisions on which sites will be taken forward as Areas for Further Assessment (AFAs) for a more detailed assessment within the CFRAM Programmes. The settlement of Longford has been designated as an AFA. Other emerging data from the Western CFRAM Study which was considered by the SFRA included the Draft Flood Hazard mapping.	General comments from the Flood Risk Review has informed the text detailed under Section 2.2 above.	Study was to examine whether area presented a significant enough risk as to be taken forward as an AFA – not focused upon flood hazard in all undeveloped areas.	Not applicable.

River Camlin Flood Study Integrated Report (Nicholas O'Dwyer on behalf of Longford County Council)	For the Camlin River and its flood plain at and downstream of Longford town, this study maps: • The November 2009 flood extent; and • A 1% Annual Exceedance Probability design flood.	This study relates to Camlin River and its flood plain at and downstream of Longford town. Relevant to zoned areas of Clondra and Longford Environs.	Coverage limited. Other limitations relate to the modelled flood, such as those of the computer model HEC-RAS Software Version 4.1.0.	Not applicable.

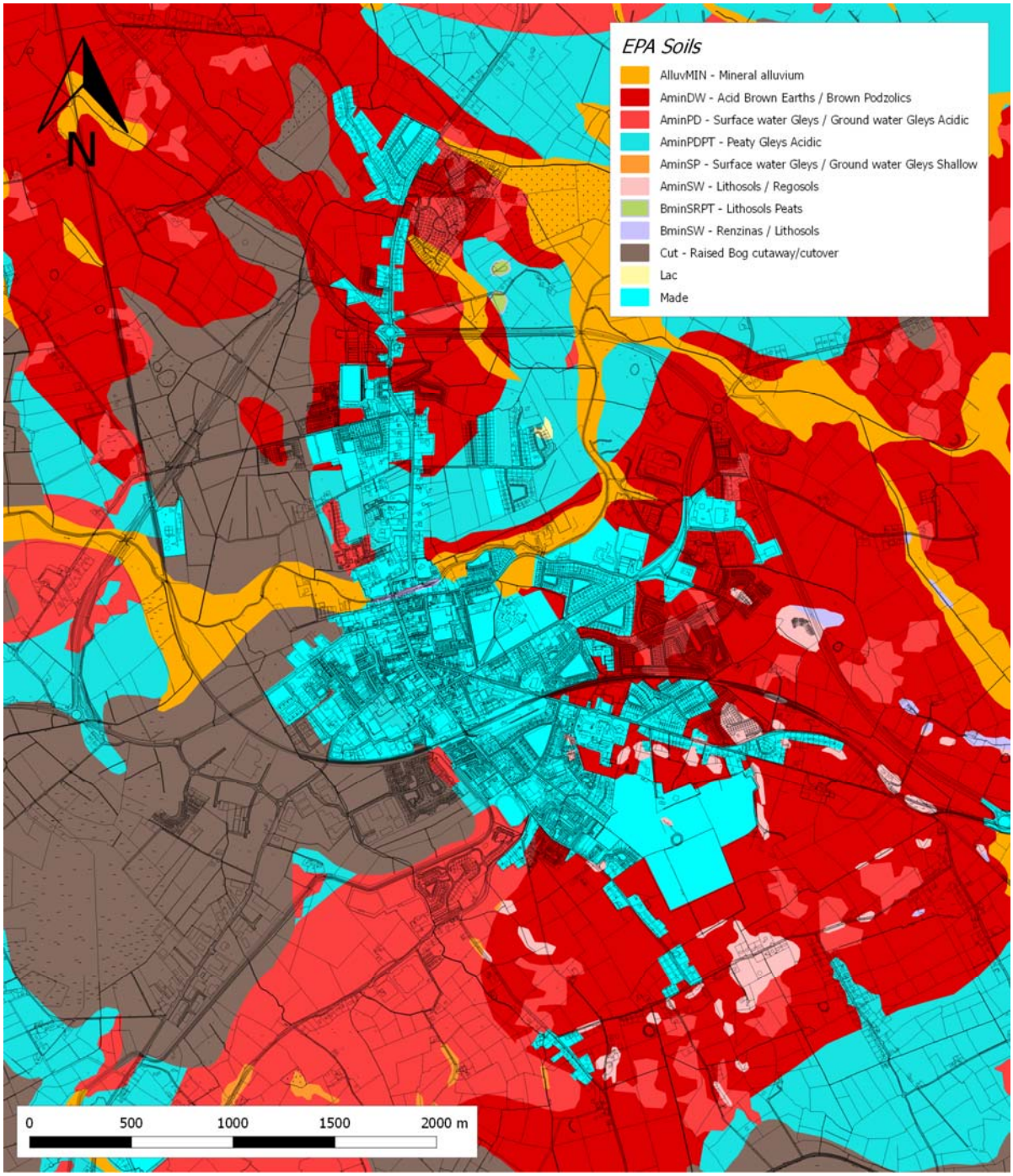

Figure 3 Alluvium Soils
Sources: Teagasc, Forest Service & EPA

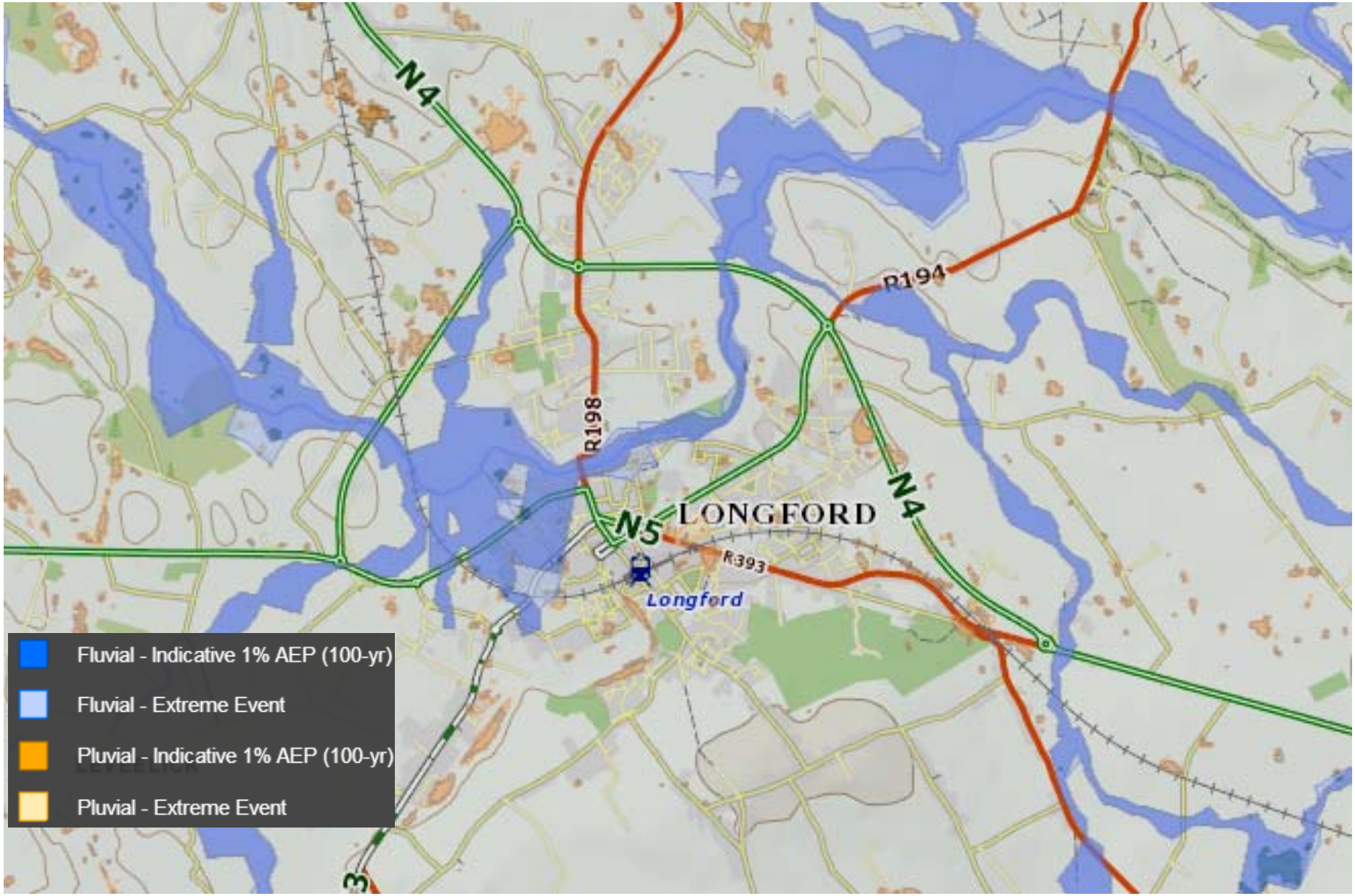

Figure 4 Preliminary Flood Risk Assessment Mapping (groundwater and pluvial)
Source: myplan.ie

Section 3 Stage 2 SFRA - Initial Flood Risk Assessment

3.1 Introduction

A Stage 2 SFRA (initial flood risk assessment) was undertaken 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 indicative flood zone maps.

3.2 Site Walkovers and Groundtruthing

In order to inform the Stage 2 assessment, the Plan lands were inspected on foot by experienced professionals (lands were visited on the 27th April 2016) to examine, inter alia, the potential source and direction of flood paths from the River Camlin and its tributaries, 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.

Local knowledge was provided Council Officials.

Flood risk indicator information that was considered during the Stage 2 SFRA is detailed under Section 2.

3.3 Site Walkover Findings and Adequacy of Existing Information and Delineation of Flood Zones

Table 4 overleaf details the findings of the groundtruthing at specific locations (see map at Figure 5 for locations) and the SFRA recommendation in respect of these locations.

3.4 Structures including Defence Assets

There are four bridges within the town – all of which cross over the River Camlin. Information relating to bridges contained in the Flood Risk Review is provided under Section 2 above.

Table 4 Findings and Recommendations at Specific Locations

No.	Location	Draft zoning	Finding, informed by local knowledge	SFRA Recommendation taken on board
1	Ballyminion / Farranyoogan SW LAP	Industrial/ Commercial/ Employment	Oil tanks observed at edge of flood plain. Subsidence could increase flood risk. This area is at risk due to low-lying topography of the land and the Ballyminion / Farranyoogan/ Cloonkeen Streams. The larger Cloonkeen Stream that drains a catchment stretching from the town of Ardagh (over 10 km upstream) to its confluence with the Camlin River at the Longford-Drumod railway line. Vegetation associated with a high frequency of inundation was observed in this part of the LAP area. Significant flooding in this area has occurred in the past. Recent filling has reduced flood risk of certain lands but longer time subsidence could be an issue and would need to be considered by any application for development in this area.	Constrained Land Use Objective to be applied over ICE zoning The local authority took note of oil tanks on site. SFRA recommendations for plan policies and objectives to require planning applications to take into account potential increase in flood risk arising from subsidence in areas which have been infilled
2	Ballyminion / Farranyoogan, SW LAP (Glenn Riada)	Specific Objective – Masterplan	Area between Glenn Riada housing estate and the Primary Healthcare Centre is at elevated levels of flood risk. This area is at risk due to low-lying topography of the land and the Ballyminion / Farranyoogan/ Cloonkeen Streams. The larger Cloonkeen Stream that drains a catchment stretching from the town of Ardagh (over 10 km upstream) to its confluence with the Camlin River at the Longford-Drumod railway line. Vegetation associated with a high frequency of inundation was observed in this part of the LAP area. Significant flooding in this area has occurred in the past. Recent filling has reduced flood risk of certain lands but longer time subsidence could be an issue and would need to be considered by any application for development in this area.	Constrained Land Use Objective to be applied over SO zoning Need to flag flood risk clearly in Masterplan text – to notify prospective developers SFRA recommendations for plan policies and objectives to require planning applications to take into account potential increase in flood risk arising from subsidence in areas which have been infilled
3	Ballyminion / Farranyoogan Lands to north east of Royal Canal Avenue	Residential (Phase 2)	Lands to north east of Royal Canal Avenue, low-lying. This area is at risk due to low-lying topography of the land and the Ballyminion / Farranyoogan/ Cloonkeen Streams. The larger Cloonkeen Stream that drains a catchment stretching from the town of Ardagh (over 10 km upstream) to its confluence with the Camlin River at the Longford-Drumod railway line. Vegetation associated with a high frequency of inundation was observed in this part of the LAP area. Significant flooding in this area has occurred in the past.	Remove zoning

No.	Location	Draft zoning	Finding, informed by local knowledge	SFRA Recommendation taken on board
			Recent filling has reduced flood risk of certain lands but longer time subsidence could be an issue and would need to be considered by any application for development in this area.	
4	Ballyminion/ Farranyoogan Lands to south of Royal Canal Avenue	Industrial/ Commercial/ Employment	Lands to north east of Royal Canal Avenue, low-lying. This area is at risk due to low-lying topography of the land and the Ballyminion / Farranyoogan/ Cloonkeen Streams. The larger Cloonkeen Stream that drains a catchment stretching from the town of Ardagh (over 10 km upstream) to its confluence with the Camlin River at the Longford-Drumod railway line. Vegetation associated with a high frequency of inundation was observed in this part of the LAP area. Significant flooding in this area has occurred in the past. Recent filling has reduced flood risk of certain lands but longer time subsidence could be an issue and would need to be considered by any application for development in this area.	Constrained Land Use Objective to be applied over ICE zoning SFRA recommendations for plan policies and objectives to require planning applications to take into account potential increase in flood risk arising from subsidence in areas which have been infilled
5	Lisnamuck	Industrial/ Commercial/ Employment	Low-lying lands; vegetation associated with a high frequency of inundation. It is noted that there is an area of elevated flood risk to the north -east of the existing use and that the car parking for the existing use is located in an area that is not at risk.	Constrained Land Use Objective to be applied over ICE zoning
6	Glack/ Culverts of Demesne Stream including at railway line behind Dunnes	Various	Development on the hill area at Glack has increased speed of conveyance from this area into culverted drainage system. The capacity of the combined sewer is limited in this location and would be likely to contribute towards flooding in extreme events. Fuel storage area to the rear of Dunnes stores	Avoid new development that would further increase speed of conveyance on the hill area at Glack. Ineffective septic tanks in Glack area (and potential interactions with water quality and human health) to be referred to by the SEA The local authority took note of fuel tank area on site.
7	Great Water Street/ Barracks area	Town Core	Area at risk from flooding from River Camlin. Narrowing of channel and new pedestrian bridge to the west of Main Street bridge has increased levels of flood risk.	Remove Town Centre zoning objective from undeveloped areas and replace with Recreation/Amenity/Agriculture.
8	Lands to the south of Richmond Street	Town Core	Area at risk from flooding from River Camlin.	Constrained Land Use Objective to be applied over Town Core zoning

3.5 Indicative Flood Risk Zone Mapping[2]

An Indicative Flood Risk Zone map was produced taking into account the findings of the Stage 1 SFRA and the Stage 2 groundtruthing and site walkovers, informed by local knowledge.

Figure 5 and Figure 6 show both:

- Indicative Flood Zone A – where the probability of flooding is highest (greater than 1% or 1 in 100); and
- Indicative Flood Zone B – where the probability of flooding is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100)

All other areas are considered to be Indicative Flood Zone C – where the probability of flooding from rivers is low (less than 0.1% or 1 in 1000).

[2] In rivers with a well-defined floodplain, 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. With regard to climate change flood extents these can be assessed by using the Flood Zone B outline as a surrogate for Flood Zone A with allowance for the possible impacts of climate change. The Flood Zone Mapping does not incorporate a factor for climate change in accordance with guidelines set out by the OPW.

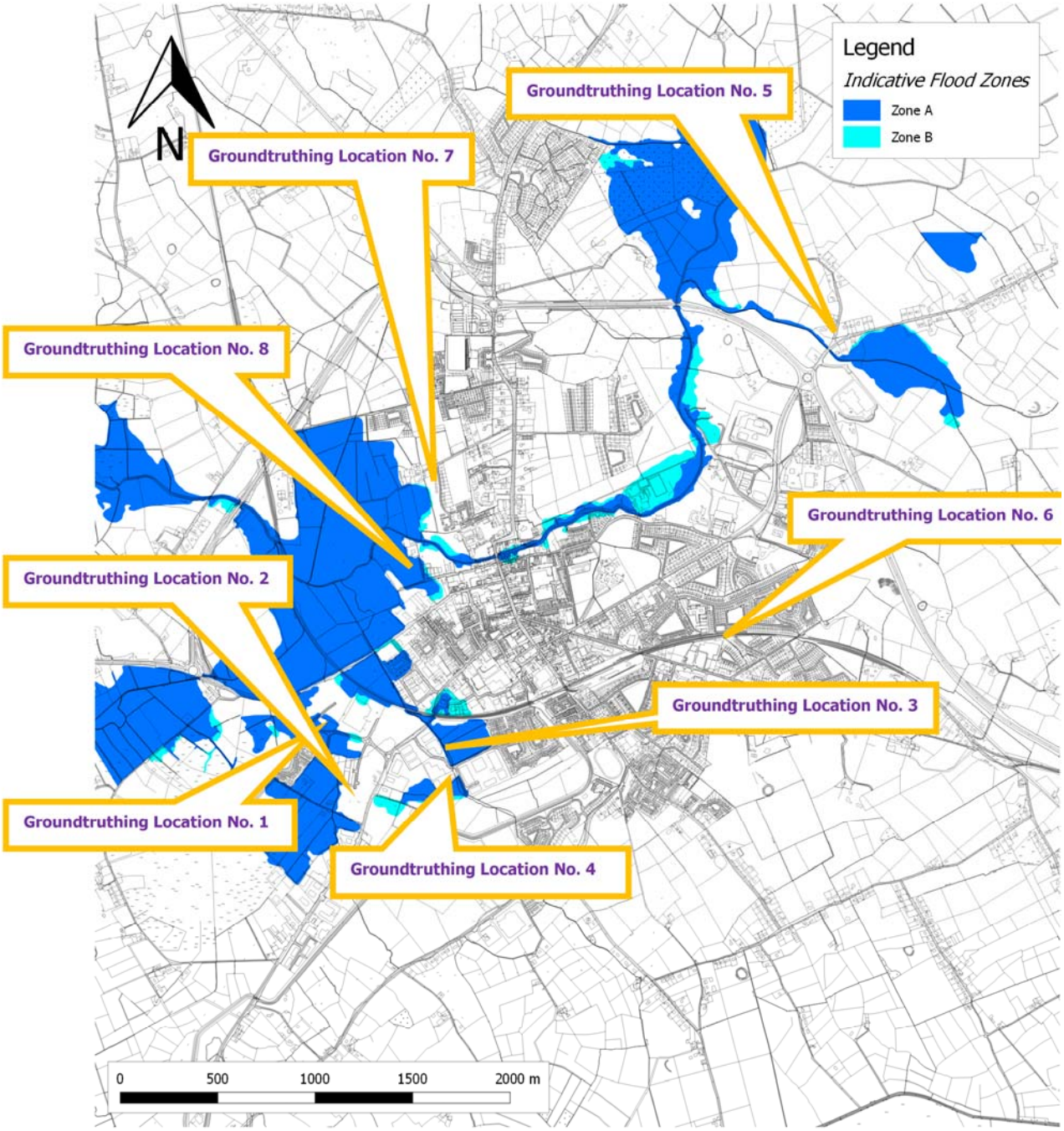

Figure 5 Indicative Flood Risk Zones with locations covered in Table 4 inserted

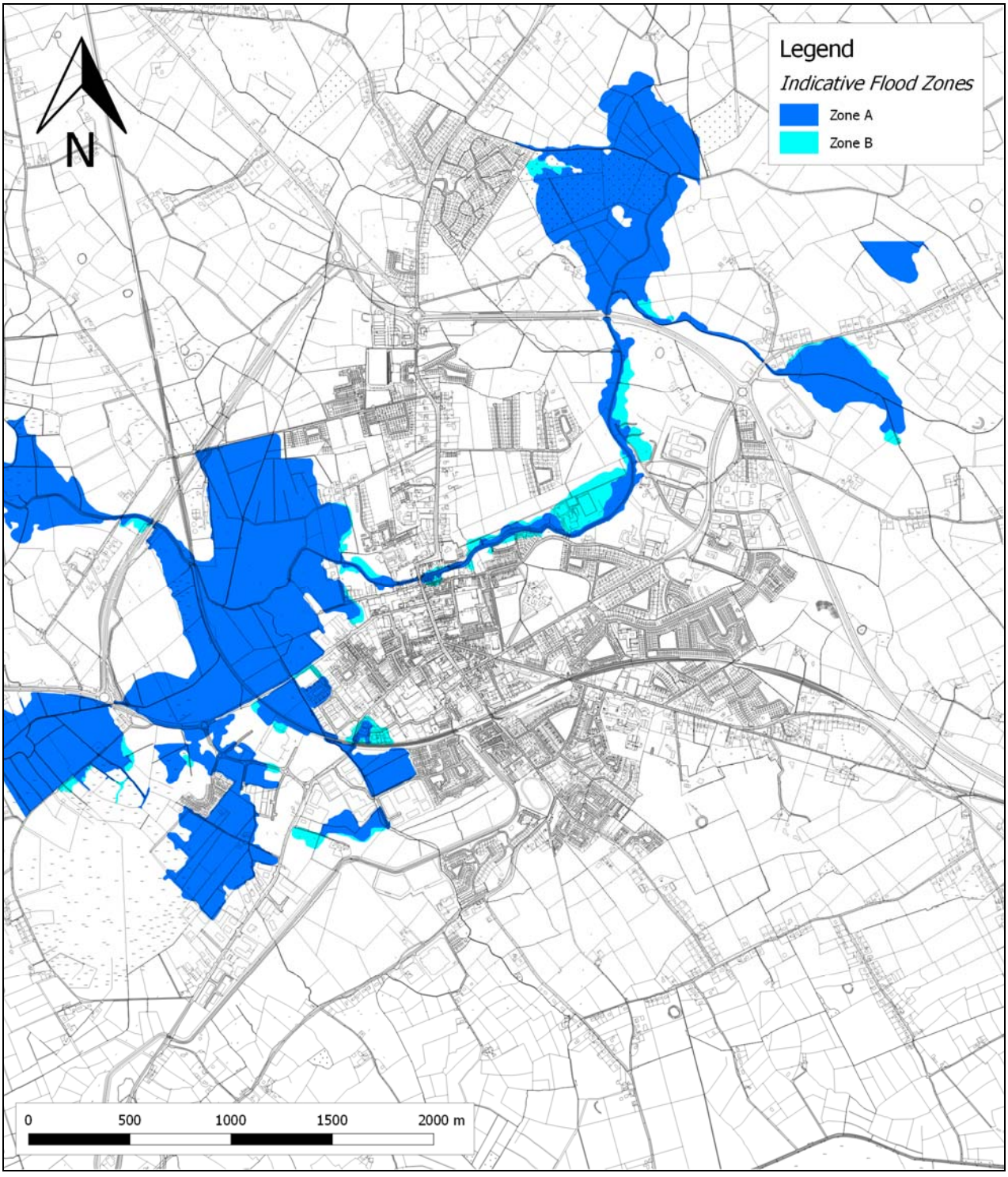

Figure 6 Indicative Flood Risk Zones

Section 4 Conclusions and Recommendations

4.1 Conclusion

A Stage 2 Strategic Flood Risk Assessment (SFRA) has been undertaken to inform the preparation and adoption of the Plan. The requirement for SFRA is provided under 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' (DEHLG, 2009). The SFRA has mapped boundaries for Indicative Flood Risk Zones, taking into account factors including flow path and direction, local knowledge, photography, vegetation, site walkovers and flood risk indicators.

All SFRA recommendations (see below and Table 4 in Section 3) have been integrated into the Local Area Plan.

The SFRA facilitated the integration of a Constrained Land Use Zoning Objective into the Plan, provided for through objectives CLU1, CLU2 and CLU3. Whereby existing developed areas are located within the flood zone, new development in these areas will be subject to these Plan provisions. It is noted that zoning of undeveloped lands in one location was changed to Residential after public consultation on the Draft Plan. Any development on these lands would be subject to Plan provisions including Objective CLU3 which requires the undertaking of site-specific flood risk assessment.

4.2 Recommendations

In order to comply 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) the following recommendations were made which were integrated into the Plan:

4.2.1 Land Use Zoning

That the Indicative Flood Zones identified by the SFRA are used in line with the provisions contained in the Flood Risk Management Guidelines which are summarised in Appendix I. Undeveloped land should not be zoned for incompatible uses and can be zoned as, for example, Greenbelt.

With respect to lands which have already been developed, the potential conflict between zonings and *highly* and *less vulnerable* development (see Tables 5 and 6 in Appendix I) can be avoided by applying a 'Constrained Land Use Zoning Strategy', with a hatch applied on the land use zone mapping in order to differentiate that there is a flood risk issue.

To this effect, the following provisions were integrated into the Plan:

Character Areas Map

Constrained Land Use Objective

> The principle of 'Constrained Land Use' will apply to existing non-Greenbelt lands which fall within Flood Risk Zones A or B. Within such areas, new development will be limited, although there will be a recognition that:
>
> 1. Certain sites are transected by Flood Risk Zones. Overarching Land Use Zoning Objectives that apply to these sites allow for a variety of uses, some of which may not be compatible with Flood Risk Zones A and B, and some of which may be compatible with Flood Risk Zones A and B. Proposals for development in these areas should ensure that the configuration of uses allow for compliance with the provisions of this Plan; and

2. Existing vulnerable development within certain areas may require small scale development.

Please refer to Section 3.8 (containing Plan provisions on flood risk management) and Appendix 1 'Advice for Development within Constrained Lands Use Zones'.

Section 3.8 of the Plan (containing provisions on flood risk management)

Constrained Land Use Zoning Strategy

The Constrained Land Use Zoning Strategy aims to facilitate the appropriate management and sustainable use of flood risk areas.

This constrained zoning derives from the recommendations set out in the SFRA undertaken for the Longford LAP. This constrained zoning limits new development, while recognising that:

1. Certain sites are transected by Flood Risk Zones. Overarching Land Use Zoning Objectives that apply to these sites allow for a variety of uses, some of which may not be compatible with Flood Risk Zones A and B, and some of which may be compatible with Flood Risk Zones A and B. Proposals for development in these areas should ensure that the configuration of uses allow for compliance with the provisions of this Plan; and
2. Existing vulnerable development within certain areas may require small scale development. Such proposals may be deemed acceptable provided that it has been demonstrated to the satisfaction of the Planning Authority, that the development will not give rise to significant flooding issues, will not obstruct important flow paths, introduce a significant additional number of people into flood risk areas or entail the storage of hazardous substances. In this instance, specifications for developments in flood vulnerable areas as set out in this Plan (including at Appendix 1 'Advice for Small Scale Development to Existing Vulnerable Development within Constrained Lands Use Zones') shall be complied with as appropriate.

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* and associated *Circular PL 2/2014* (or as updated), which shall assess the risks of flooding associated with the proposed development.

With regard to climate change, Strategic Flood Risk Assessments and site-specific Flood Risk Assessments shall provide information on the implications of climate change with regard to flood risk in relevant locations. The 2009 OPW Draft Guidelines on 'Assessment of Potential Future Scenarios for Flood Risk Management' (or any superseding document) shall be consulted with to this effect.

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 may 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.

Appendix 1 'Advice for Small Scale Development to Existing Vulnerable Development within Constrained Lands Use Zones'

This appendix contains advice for small scale development to existing vulnerable development within certain Constrained Land Use Zones.

Constrained Land Use Zones are shown on Figure 6 – Character Area Map and referred to in Section 3.8.

Applications for small scale development to existing vulnerable development within 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

In areas of limited flood depth, the specification of the threshold and floor levels of new structures shall be raised above expected flood levels to reduce the risk of flood losses to a building, by raising floor heights within the building structure using a suspended floor arrangement or raised internal concrete platforms.

When designing an extension or modification to an existing building, an appropriate flood risk reduction measure shall be specified to ensure the threshold levels into the building are above the design flood level. However, care must also be taken to ensure access for all is provided in compliance with Part M of the Building Regulations.

Where threshold levels cannot be raised to the street for streetscape, conservation or other reasons, the design shall specify a mixing of uses vertically in buildings - with less vulnerable uses located at ground floor level, along with other measures for dealing with residual flood risk.

Internal Layout

Internal layout of internal space shall be designed and specified to reduce the impact of flooding [for example, living accommodation, essential services, storage space for provisions and equipment shall be designed to be located above the predicted flood level]. In addition, designs and specifications shall ensure that, wherever reasonably practicable, the siting of living accommodation (particularly sleeping areas) shall be above flood level.

With the exception of single storey extensions to existing properties, new single storey accommodation shall not be deemed appropriate where predicted flood levels are above design floor levels.

In all cases, specifications for safe access, refuge and evacuation shall be incorporated into the design of the development.

Flood-Resistant Construction

Developments in flood vulnerable zones shall specify the use of flood-resistant construction aimed at preventing water from entering buildings - to mitigate the damage floodwater caused to buildings.

Developments shall specify the use of flood resistant construction prepared using specialist technical input to the design and specification of the external building envelope – with measures to resist hydrostatic pressure (commonly referred to as "tanking") specified for the outside of the building fabric.

The design of the flood resistant construction shall specify the need to protect the main entry points for floodwater into buildings - including doors and windows

(including gaps in sealant around frames), vents, air-bricks and gaps around conduits or pipes passing through external building fabric.

The design of the flood resistant construction shall also specify the need to protect against flood water entry through sanitary appliances as a result of backflow through the drainage system.

Flood-Resilient Construction
Developments in flood vulnerable zones that are at risk of occasional inundation shall incorporate design and specification for flood resilient construction which accepts that floodwater will enter buildings and provides for this in the design and specification of internal building services and finishes. These measures limit damage caused by floodwater and allow relatively quick recovery.

This can be achieved by specifying wall and floor materials such as ceramic tiling that can be cleaned and dried relatively easily, provided that the substrate materials (e.g. blockwork) are also resilient. Electrics, appliances and kitchen fittings shall also be specified to be raised above floor level, and one-way valves shall be incorporated into drainage pipes.

Emergency Response Planning
In addition to considering physical design issues for developments in flood vulnerable zones, the developer shall specify that the planning of new development also takes account of the need for effective emergency response planning for flood events in areas of new development.

Applications for developments in in flood vulnerable zones shall provide details that the following measures will be put in place and maintained:

- Provision of flood warnings, evacuation plans and ensuring public awareness of flood risks to people where they live and work;
- Coordination of responses and discussion with relevant emergency services i.e. Local Authorities, Fire & Rescue, Civil Defence and An Garda Siochána through the SFRA; and
- Awareness of risks and evacuation procedures and the need for family flood plans.

Access and Egress during Flood Events
Applications for developments in in flood vulnerable zones shall include details of arrangements for access and egress during flood events. Such details shall specify that:

- Flood escape routes have been kept to publicly accessible land.
- Such routes will have signage and other flood awareness measures in place, to inform local communities what to do in case of flooding.
- This information will be provided in a welcome pack to new occupants.

Further Information
Further and more detailed guidance and advice can be found at http://www.flooding.ie and in the Building Regulations.

4.2.2 Integration of other provisions relating to flood risk management into the Plan

The following other provisions relating to flood risk management have been integrated into the Plan:

No.	Reference	Provision
1	**Flood Risk and Protection Strategy**	The Flood Risk Management Strategy aims to: • Avoid flooding in areas at risk of flooding, by not permitting development in these areas, particularly floodplains, unless there are wider sustainability grounds for the development and the flood risk can be managed at an acceptable level without increasing flood risk elsewhere and where possible, reducing the overall flood risk; • Adopt a sequential approach to flood risk management based on avoidance, reduction and then mitigation of flood risk as the overall framework for assessing the location of new development in the development planning process; and • Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.
2	**EU Floods Directive and Guidelines**	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 *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009) and *Departmental Circular PL2/2014* (or any updated/superseding legislation or policy guidance).
3	**Flood Zones A and B**	Protect Flood Zone A and Flood Zone B (Figure 6 – Land Use Zoning Map within the plan) from inappropriate development and direct developments/land uses into the appropriate Flood Zone in accordance with the Flood Risk Management Guidelines. 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 the Flood Risk Management Guidelines for Planning Authorities (2009).
4	**Constrained Land Use Zoning Strategy**	See above
5	**Site-specific Flood Risk Assessment**	Require a site-specific Flood Risk Assessment (FRA) for all planning applications within and adjacent to areas at risk of flooding, including developments that may be appropriate to the particular Flood Zone. Such FRAs shall take into account potential increase in flood risk arising from subsidence in areas which have been infilled.
6	**Climate change**	Ensure that Strategic Flood Risk Assessments and site-specific Flood Risk Assessments consider and 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.
7	**Sustainable Urban Drainage Systems**	Require all new large scale developments to provide 'Sustainable Urban Drainage Systems' (SUDS) as part of their development proposals.
8	**Surface Water Disposal Infrastructure**	In conjunction with Irish Water, and where technically feasible and economically viable, improve and extend the surface water disposal infrastructure to serve all zoned areas, in order to facilitate development.
9	**Protection of water bodies and watercourses**	Protect water bodies and watercourses from inappropriate development, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains. This will include protection buffers in riverine and wetland areas as appropriate. Promote the sustainable management and uses of water bodies and avoid, where possible, culverting or realignment of these features.
10	**Appropriate Assessment**	Any proposals aimed at alleviating flooding will be subject to Appropriate Assessment in accordance with Article 6(3) and 6 (4) of the EU Habitats Directive.

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

- The Sequential Approach, including the Justification test -

The key principles of the risk-based sequential approach (see Figure 7) to managing flood risk in the preparation of plans are set out in Chapter 3 of the DEHLG Flood Guidelines and Departmental Circular PL2/2014 and should be adhered to. These principles 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.

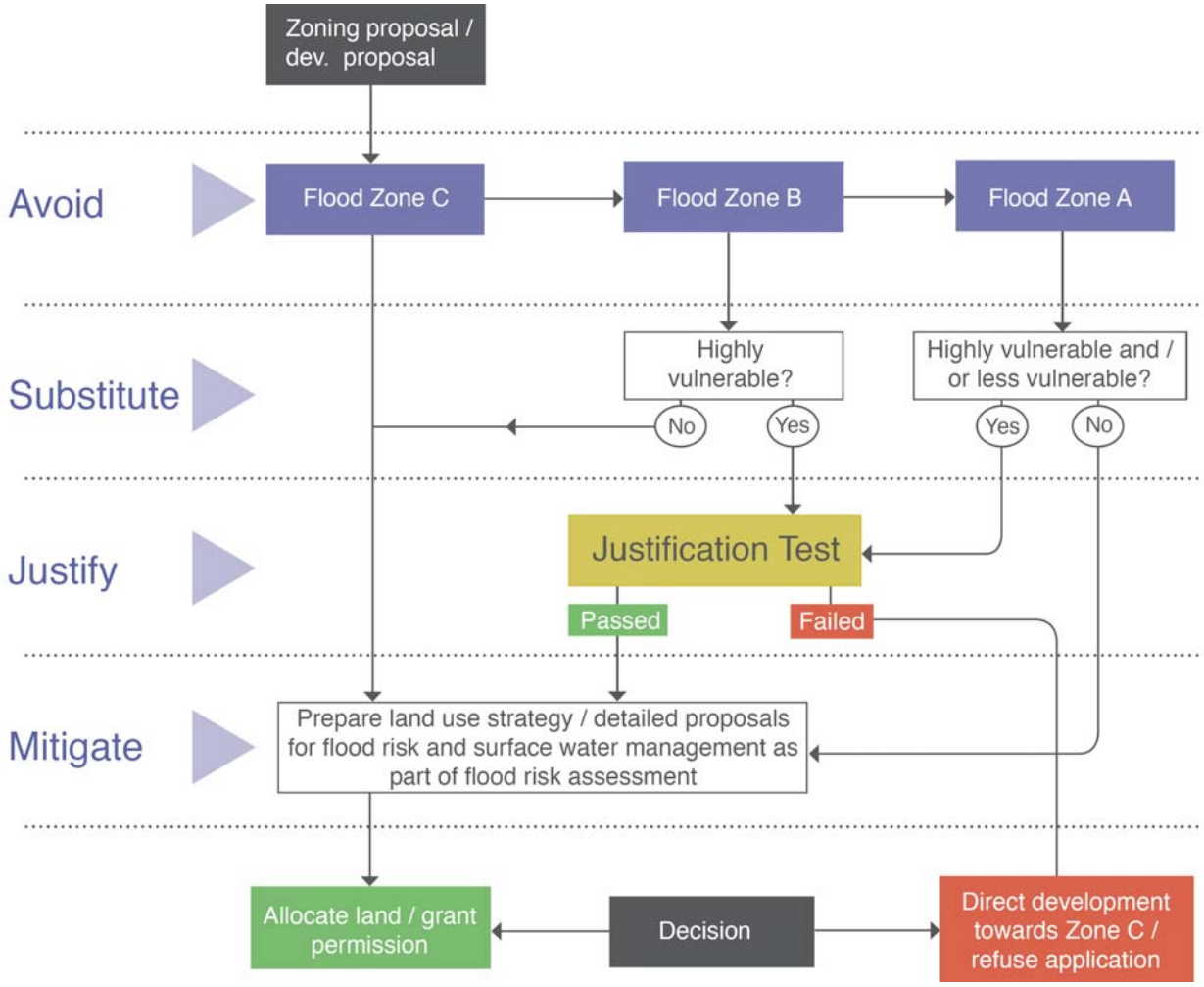

Figure 7 Sequential Approach Process[3]

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

[3] 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 5 overleaf classifies the vulnerability of different types of development while Table 6 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)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Table 5 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 6 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 plan[1], 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 settlement[2];
- (ii) Comprises significant previously developed and/or under-utilised lands;
- (iii) Is within or adjoining the core[3] 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 [4]

[4] Footnotes: [1] Including Strategic Development Zones and Section 25 Schemes in the area of the Dublin Docklands Development Authority [2]In 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.