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1 INTRODUCTION

This Regional Flood Risk Appraisal (RFRA) has been prepared as part of the Strategic Environmental Assessment of the Northern and Western Regional Spatial and Economic Strategy (RSES) in accordance with national and EU legislation. This RFRA was prepared by considering the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). The purpose of this RFRA is to ensure that the RSES follow the principles of the Guidelines and implements policies and development strategies that:

- Avoid inappropriate development in areas at risk of flooding, unless there are proven wider sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level;
- Avoid developments increasing flood risk elsewhere;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Incorporate flood risk assessments into the planning process;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

The Northern and Western Regional Assembly (NWRA) is currently preparing the Northern and Western RSES (hereafter referred to as N&W RSES). The main statutory purpose of the RSES is to support the implementation of Project Ireland 2040 – the National Planning Framework (hereafter referred to as the NPF), and the economic policies and objectives of the Government by providing a long-term strategic planning and economic framework for the development of the region. The N&W RSES is a strategic plan which identifies regional assets, opportunities and pressures and will provide appropriate policy, objective and target responses. It will put in place policies and recommendations that will better manage regional planning and economic development throughout the region.

1.1 BACKGROUND

Under the 2012 Government’s policy paper “Putting People First”, and the Local Government Reform Act 2014, the former two Regional Assemblies (RAs) and former eight Regional Authorities were reconfigured into three new RAs, namely the Eastern and Midland (EMRA), the Southern Regional Assembly (SRA), and the NWRA. The main strategic planning functions of the RAs include the preparation and adoption of RSESs.

At a national level, the NPF replaces the National Spatial Strategy, first published in November 2002, and will form Ireland’s long-term strategy for the next 20 years which will set the groundwork for the spatial and economic development of Ireland. The NPF will lay the groundwork for a better quality of life for all and a basis for balanced and sustainable economic growth. It provides a focal point for spatial plans throughout the planning hierarchy, including the RSESs at the regional tier, and will assist in the achievement of more effective regional development. It will also coordinate the

1 The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014) hereafter will be referred to as ‘the Guidelines’
strategic planning of urban and rural areas in a regional development context to secure overall proper planning and development as well as co-ordination of the RSEs. Figure 1-1 shows Ireland’s planning hierarchy.

The current Regional Planning Guidelines (RPGs) have been a key aspect of the Government’s programme for spatial planning to date. New planning legislation under the Planning and Development Act 2000 (as amended) allows for the RSEs to replace the RPGs. The regional planning function will therefore be enhanced under the new RSEs through the inclusion of a significant economic strategy. The combined spatial and economic elements will establish a broad framework to allow for integrated local authority policy development and associated actions, outline the roles of government departments and other agencies, and to strengthen and clarify the role of local authorities in economic development and enterprise support/promotion.

The N&W RSES shall be prepared and adopted in accordance with the provision of Chapter III of Part II of the Planning and Development Act, 2000 (as amended).

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2 DHPLG (February 2018) Project Ireland 2040 – National Planning Framework
1.2 RFRA INTEGRATION WITH THE RSES

Increased flood risk as a result of land use planning has, above all else been one of the most costly (environmental, social and economic) legacy issues of previous national, regional and local land use decisions. The policies being proposed in the RSES to the 2040 epoch envisage significant population and economic growth. Subsequently, the RFRA provides a high level review of the known existing flood risk to the growth settlements in the geographic area of NWRA as identified in Section 4, Table 4-2, and an assessment of the potential flood risk impacts associated with the key messages of the 10 Chapters of Ireland 2040 to ensure NWRA makes informed strategic planning decisions in respect of the RFRA.

1.3 POLICY BACKGROUND

1.3.1 Irish Legislation

In 2004, an Inter-Departmental Review Group, led by the Minister of State at the Department of Finance with special responsibility for the Office of Public Works (OPW), published a review of national flood policy. 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:

- The Department will develop and implement policy and guidelines on the consideration of flood risk in planning and development control;
- The OPW should be the lead agency for implementing flood risk management policy in Ireland;
- 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.

To meet the requirements of these recommendations the OPW published The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (The Guidelines) in 2009 and developed the National Catchment Flood Risk Assessment and Management (CFRAM) Programme. The Guidelines were developed with the purpose of integrating flood risk assessment and management into spatial planning development plans and policies at all governmental levels. The CFRAM programme was developed to deliver on other core components of the national flood policy as well as the requirements of the 2011 EU Floods Directive (2007/60/EC) which were transposed into Irish Law under Statutory Instrument 122 of 2010.

In compliance with the Directive and the Planning and Development (Strategic Environmental Assessment) Regulations 2004, as amended, a Strategic Environmental Assessment (SEA) of the RSES has been carried out in parallel to this RFRA. The SEA has prepared an Environmental Report of the likely significant effects on the environment of implementing the Strategy. A Natura Impact Report
(NIR) has also been prepared as part of the Appropriate Assessment of the N&W RSES, in compliance with the Birds and Natural Habitats Regulations 2011, as amended.

The Environmental Protection Agency (EPA) SEA Scoping Guidance Document outlines that the SEA should adopt policies to avoid and restrict the zoning of lands in flood prone areas. It should also adopt a policy that requires flood risk assessments, prepared in accordance with the Guidelines, to be undertaken for developments and zoning being proposed in flood prone areas. Additionally the SEA should promote the adaptation measures to account for the likely increased risk of flooding due to Climate Change and include measures to promote the implementation of appropriate Sustainable Urban Drainage Systems (SuDS).

### 1.3.2 European Legislation

Under the Floods Directive, the EU recognises the importance of land use management and spatial planning as a key tool in flood risk management. The Floods Directive requires Member States to prepare catchment-based Flood Risk Management Plans (FRMPs) that will set out flood risk management objectives, actions and measures. The OPW has developed six regional FRMPs which were approved and published in May 2018.

The delivery of the Floods Directive is being coordinated with the requirements of the EU Water Framework Directive (WFD) (2000/60/EC). The WFD aims to improve the overall quality of the water environment including rivers, groundwater and coastal waters. This process is being delivered through the development of River Basin Management Plans (RBMPs) to enable all rivers and coastal waters to achieve good ecological status. The delivery of the RBMPs will ultimately bring a sustainable integrated catchment management to the rivers of Ireland and across the EU.

Similarly the integration of the RFRA within the SEA for the RSES is derived from the EU SEA Directive (2001/42/EC) legislation.

### 1.4 DISCLAIMER

The RFRA has been prepared in compliance with the Guidelines. It should be noted that the RFRA is based on the best available data at the time of preparation.

All information in relation to flood risk is provided for general policy guidance only. All landowners and developers are instructed that NWRA and their consultants can accept no responsibility for losses or damages arising due to assessments of the vulnerability to flooding of lands, uses and developments. Furthermore owners, users and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands in which they have an interest prior to making planning or development decisions.

The flood maps used in the RFRA are ‘predictive’ flood maps, as they provide predicted flood extents and other information for flood events that has an estimated probability of occurrence rather than information on floods that have occurred in the past.

NWRA makes no representations, warranties or undertakings about any of the information provided on these maps including, without limitation, their accuracy, their completeness or their quality or fitness for any particular purpose. To the fullest extent permitted by applicable law, NWRA nor any
of its members, officers, associates, consultants, employees, affiliates, servants, agents or other representatives shall be liable for loss or damage arising out of, or in connection with, the use of, or the inability to use, the information provided on the flood maps including, but not limited to, indirect or consequential loss or damages, loss of data, income, profit, or opportunity, loss of, or damage to, property and claims of third parties, even if NWRA has been advised of the possibility of such loss or damages, or such loss or damages were reasonably foreseeable.

NWRA reserves the right to change the content and/or presentation of any of the information provided on the flood maps at its sole discretion, including these notes and disclaimer. This disclaimer, guidance notes and conditions of use shall be governed by, and construed in accordance with, the laws of the Republic of Ireland. If any provision of these disclaimer, guidance notes and conditions of use shall be unlawful, void or for any reason unenforceable, that provision shall be deemed severable and shall not affect the validity and enforceability of the remaining provisions.
2 CONTENTS AND MAIN OBJECTIVES OF THE PLAN

2.1 RESPONSIBLE AUTHORITY FOR THE NORTHERN AND WESTERN RSES

The lead authority for the preparation of the N&W RSES is the NWRA. The N&W RSES itself will cover the geographic area of the NWRA, which includes the administrative areas of nine local authorities—Cavan, Donegal, Leitrim, Galway, Mayo, Monaghan, Roscommon and Sligo and the city council of Galway. The coverage of the respective regional assemblies is shown in Figure 2-1.

![Figure 2-1 Regional Assembly Coverage](image)

2.2 REQUIREMENT FOR AN RSES

One of the principle functions of the N&W RSES will be to practically support and advance the delivery of the national policy objectives contained in the NPF. The NWRA will bring forward the NPF in a manner which best reflects the challenges and opportunities of the region. It has been anticipated by the NPF that each of the three regional assemblies will begin to fill out the national policy objectives, in some cases giving them geographic or temporal context and in other cases elaborating on project concepts. The N&W RSES will support the delivery of the NPF removing the top-down perception and replacing it with a shared responsibility and understanding.

2.3 GEOGRAPHIC SCOPE

As one of the three Regional Assemblies in Ireland, the NWRA has a land area of almost 11,500 km² with a population of almost 900,000 residents. The Atlantic Ocean forms the western and northern boundaries of the assembly area along the coastline of Galway, Mayo, Sligo, a small stretch of Leitrim and Donegal. To the south there are boundaries with Clare and Tipperary and to the east
boundaries with the Eastern and Midland Regional Assembly counties of Offaly, West Meath and Longford. To the North West is the international boundary with Northern Ireland. The Northern and Western region is divided into 5 sub regional catchments as shown in Figure 2-2 below.

Figure 2-2 NWRA Sub Regional Catchments

2.4 STRATEGIC VISION FOR THE NWRA

The ambition of the NWRA is to play a transformative role in the success of the region. This will be achieved by focusing on three objectives: Better Places, Competitiveness and Collaboration as elaborated below:

1. The Regional Assembly is intent on adopting international best practice in planning and development in order to create BETTER PLACES.
2. Underpinning this approach is the commitment to enhancing COMPETITIVENESS through policies that build resilience and sustainability, working with our stakeholders to utilise EU & Exchequer funding.

3. Achieving this will be done through a dedicated and principled approach to COLLABORATION.

2.5 KEY ASPECTS OF THE DRAFT NWRA RSES

The recently produced NPF – Ireland 2040 has set out the long term strategic planning framework for Ireland’s long term strategic planning framework for our country’s future growth and prosperity over this timescale. This document replaces the former the National Spatial Strategy and former Regional Planning Guidelines will also be replaced by the Regional Spatial and Economic Strategies.

The RSES for the NWRA is based 6 Growth Ambitions. These are:

- Growth Ambition 1 Economy and Employment – Vibrant Region
- Growth Ambition 2 Environment – Natural Region
- Growth Ambition 3 Connectivity – Connected Region
- Growth Ambition 4 Quality of Life – Inclusive Region
- Growth Ambition 5 Infrastructure – Enabling our region
- Growth Ambition 6 All Island Cohesion.

Each of these Growth Ambitions will require investment and the development of key infrastructure including transport and utilities, protection of the environment and facilitating the compact development of the Key Regional Settlements.
3 THE PLANNING SYSTEM AND FLOOD RISK ASSESSMENT GUIDELINES FOR PLANNING AUTHORITIES

3.1 PURPOSE OF THE GUIDELINES

In 2009, the Department in conjunction with the OPW published The Guidelines with the purpose of ensuring that flood risk is considered by all levels of government when preparing development plans and planning guidelines. The Guidelines are the key document in the integration of the flood risk management best practice and land use planning decisions. They are required to be used at all levels of the planning process from national level strategic assessments to individual planning applications being brought forward. The Guidelines require the planning system at all governance levels to:

- Avoid development in areas at risk of flooding, unless there are proven wider sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level without increasing flood risk elsewhere;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

Therefore, it is incumbent on the Regional Assemblies to introduce strategies and policies that implement the Guidelines and follow the core principles of avoidance in so far as possible without hindering justifiable development and to the adopt the sequential approach when identifying development areas for growth. The Guidelines are not in place to stunt or limit development strategies but to ensure that they are sustainable and limit the exposure of communities and businesses to flood risk.

3.2 OBJECTIVES OF THE GUIDELINES

The objectives of the Guidelines are implemented by undertaking Flood Risk Appraisals / Assessments (FRA) to identify the risk of flooding to land, property and people. The Guidelines state that FRAs should be carried out at different scales by government organisations, local authorities and for proposed developments appropriate to the level of information required to implement the core objectives of the Guidelines. The FRA scales are as follows:

- National Flood Risk Appraisal (NFRA) – There is no specific guidance in the Guidelines for a NFRA, however it must ensure the Guidelines are applied to policies, strategies and objectives and that flood risk is addressed in a national context
- Regional Flood Risk Appraisal (RFRA) – a broad overview of flood risk issues across a region to influence spatial allocations for growth in housing and employment as well as to identify where flood risk management measures may be required at a regional level to support the proposed growth. This should be based on readily derivable information (in particular the CFRAM Studies) and undertaken to inform the Regional Spatial and Economic Strategies.
- Strategic Flood Risk Assessment (SFRA) – an assessment of all types of flood risk informing land use planning decisions. This will enable the Planning Authority to allocate appropriate sites for development, whilst identifying opportunities for reducing flood risk. The SFRA will revisit and develop the flood risk identification undertaken in the RFRA, and give
consideration to a range of potential sources of flooding. An initial flood risk assessment, based on the identification of Flood Zones, will also be carried out for those areas, which will be zoned for development. Where the initial flood risk assessment highlights the potential for a significant level of flood risk, or there is conflict with the proposed vulnerability of development, then a site specific FRA will be recommended, which will necessitate a detailed flood risk assessment.

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

Figure 3-1 below shows Figure 1.1 of the Guidelines which summarises the levels of FRAs and how they integrate into the planning process. For the purpose of this assessment which is a RFRA the main decision making tool is the sequential approach and integration with the SEA.

### 3.3 FLOOD RISK ASSESSMENT APPROACH

The Guidelines recommend that Flood Risk Assessments (FRA) be carried out to identify the risk of flooding to land, property and people. FRAs should use the Source-Pathway-Receptor (S-P-R) Model to identify the sources of flooding, the flow paths of the floodwaters and the people and assets impacted by the flooding. Figure 3-2 shows the SPR model that should be adopted in FRAs.
Regional Flood Risk Appraisal

FRAs in general terms are carried out using a staged approach, an appraisal and/or assessment is carried out as is needed for the purposes of decision-making at the appropriate governance level. 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 RSEs, 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.

3.4 SEQUENTIAL APPROACH

A key aspect of ensuring the Guidelines are applied to all levels of the planning process is the Sequential Approach. As outlined in Figure 3-3, the approach recommends the principle of “Avoid” areas of flood risk as a first consideration but if not possible then “Substitute” a different land use that is less vulnerable to the effects of flooding. When avoidance or substitution are not a practical approach then a robust Justification Test (refer to the Guidelines for a more detailed description on the Justification Test) should be undertaken to quantify and mitigate any potential increase in risk and facilitate the development of the area. The Sequential Approach is required to be applied at all levels of the planning process including the development of the RSES.

Figure 3-2 Flood Risk Assessment Source - Pathway - Receptor Model
### 3.5 TYPES OF FLOODING

Flooding can occur from a range of sources, individually or in combination, as described below.

- **Fluvial flooding** occurs when rivers and streams break their banks and water flows out onto the adjacent low-lying areas (the natural floodplains). This can arise where the runoff from heavy rain exceeds the natural capacity of the river channel, and can be exacerbated where a channel is blocked or constrained or, in estuarine areas, where high tide levels impede the flow of the river out into the sea. While there is a lot of uncertainty on the impacts of climate change on rainfall patterns, there is a clear potential that fluvial flood risk could increase into the future.

- **Pluvial flooding** occurs when the amount of rainfall exceeds the capacity of urban storm water drainage systems or the infiltration capacity of the ground to absorb it. This excess water flows overland, ponding in natural or man-made hollows and low-lying areas or behind obstructions. This occurs as a rapid response to intense rainfall before the flood waters eventually enter a piped or natural drainage system. This type of flooding is driven in particular by short, intense rain storms.

- **Groundwater flooding** occurs when the level of water stored in the ground rises as a result of prolonged rainfall, to meet the ground surface and flows out over it, i.e. when the capacity of this underground reservoir is exceeded. Groundwater flooding results from the interaction of site-specific factors such as local geology, rainfall infiltration routes and tidal variations. While the water level may rise slowly, it may cause flooding for extended periods of time. Hence, such flooding may often result in significant damage to property or disruption to transport. In Ireland, groundwater flooding is most commonly related to turloughs in the karstic limestone areas prevalent in particular in the west of Ireland.

- **Coastal flooding** occurs when sea levels along the coast or in estuaries exceed neighbouring land levels, or overcome coastal defences where these exist, or when waves overtop the coastline or coastal defences.

- **Failure of infrastructure** can lead to flooding whether it is the catastrophic failure of a dam or flood defence, the blockage of culvert or a watermain burst.
The wide range of flooding types described indicates that, not only our urban areas, but also our rural and coastal environments are also susceptible to flood risk. The Guidelines acknowledge this fully, recognising the potential detrimental impacts on people, communities, the economy and the environment should consideration of the recommendations for land use and infrastructure planning in the Guidelines not be incorporated into national, regional, and local development plans.

3.6 FLOOD ZONES

The Guidelines recommend identifying flood zones which show the extent of flooding for a range flood event probabilities. The Guidelines identify three levels of flood zones:

- **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).
- **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.

The flood zones are generated without the inclusion of climate change factors. The flood zones only account for inland and coastal flooding. They should not be used to suggest that any areas are free from flood risk as they do not account for potential flooding from pluvial and groundwater flooding. Similarly flood defences should be ignored in determining flood zones as defended areas are still carry a residual risk of flooding from overtopping, failure of the defences and deterioration due to lack of maintenance.

3.7 CLIMATE CHANGE

Climate Change is expected to increase flood risk. It could lead to more frequent flooding and increase the depth and extent of flooding. Due to the uncertainty surrounding the potential effects of climate change a precautionary approach is recommended in the Guidelines:

- Recognise that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopt a cautious approach to zoning land in these potential transitional areas.
- Ensure 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.
- Ensure 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.

The RSES sets a new strategic planning and development framework up to the year 2040 when the initial predicted effects of climate change may have to be realised. It is imperative therefore that the predicted effects of climate change on flooding are considered in this process.
3.8 RFRA METHODOLOGY

The Guidelines recommend that due to the scale of flood risk at a regional level the emphasis of the appraisal should primarily follow a Stage 1 flood risk identification approach that will detect areas of future growth conflicting with flood risk, it will promote the sequential approach, and help flag the need for more detailed FRAs at lower level development plans. As recommended by the Guidelines the RFRA should address the following:

- Summary plans/figures and statement showing the broad spatial distribution of flood risk and any potential conflicts with growth/ development areas (Shown in Figures in Section 4);
- Supplementary description of any areas of a region where addressing flood risk is especially important – e.g. central urban areas in Gateways or areas of development pressure, with a view to highlighting these as priority locations for further assessment of flood risk, and / or the need for coordinated action at development plan level (Described in Section 4 for the growth settlements);
- Suggested policies for sustainable flood risk management for incorporation into the RPGs (Section 5); and
- Guidance on the preparation of city and county level SFRAs and the management of surface water run-off within new development, highlighting significant flood risk issues, potential infrastructure investment requirements and the need for co-operation between planning authorities and identifying any need for more detailed assessment (Discussed in Section 4 for the growth settlements and Section 6).
4 FLOOD RISK ASSESSMENT

4.1 GENERAL STATEMENT OF FLOOD RISK TO THE NWRA AREA

The principal of the RFRA is to ensure the correct and appropriate application of The Guidelines to the RSES in accordance with the Sequential Approach and to highlight areas of potential flood risk that could impact on the growth strategies for development areas.

Flood risk in the NWRA can come from a wide range of flooding sources including coastal, fluvial, groundwater and surface water.

Coastal areas including the Key Regional settlements of Galway City, Ballina, Sligo and Letterkenny are at risk from storm surge and/or high tides emanating from the Atlantic Ocean. Fluvial flooding affects almost all urban areas in the region to varying degrees which is indicative of the origins of many settlements adjacent to rivers. Surface water or pluvial flooding is also a key consideration in many urban areas as the expansion of towns and cities has not always met the demands placed on the drainage networks. This issue is exacerbated further when combined with the interaction of flooding from the rivers and the sea.

Groundwater flooding is also a key consideration in this area of Ireland with Karsts in areas such as the Burren and uplands of Sligo, Leitrim and Cavan and lowland Karsts in many areas west of the River Shannon including the western lowlands of East Galway.

On 3rd May 2018 the Catchment Flood Risk Assessment and Management (CFRAM) plans were launched and these provide a comprehensive analysis of the main areas of significant risk. They assessed the risk of flooding in 300 areas of significant flood risk throughout the Country, providing detailed Flood Mapping and investment and policy decisions for coming 5-10 years on flood risk management solutions. In relation to the NWRA the online flood maps and flood plans are available at www.floodinfo.ie. The flood plans relevant to the NWRA area are listed in Table 4.1. These plans provide a range of flood mitigation measures not only related to necessary capital expenditure and asset management but also on the integration of policy and land use planning decisions with respect to flood risk management.

Table 4.1 - Flood Plans for NWRA Area

<table>
<thead>
<tr>
<th>Unit of Management</th>
<th>Plan Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>UOM01</td>
<td>North Western River Basin</td>
</tr>
<tr>
<td>UOM35</td>
<td>Sligo Bay &amp; Drowse River Basin</td>
</tr>
<tr>
<td>UOM36</td>
<td>Erne River Basin</td>
</tr>
<tr>
<td>UOM07</td>
<td>Boyne River Basin</td>
</tr>
<tr>
<td>UOM06</td>
<td>Neagh Bann River Basin</td>
</tr>
<tr>
<td>UOM25-26</td>
<td>Shannon Upper and Lower River Basin</td>
</tr>
<tr>
<td>UOM34</td>
<td>Moy and Killala Bay River Basin</td>
</tr>
<tr>
<td>UOM32-33</td>
<td>Erriff - Clew Bay - Blacksod - Broadhaven River Basin</td>
</tr>
<tr>
<td>UOM31</td>
<td>Galway Bay North River Basin</td>
</tr>
</tbody>
</table>
4.2 FLOOD RISK ASSOCIATED WITH THE KEY REGIONAL SETTLEMENTS

The NWRA RSES has identified 12 Key Regional Settlements (Table 4.2) which are considered growth areas or where there is existing development pressure. This section of the RFRA seeks to supplement the broad statement of flood risk to the NWRA area by providing a more detailed description of the existing flood risk to these 12 areas. This does not present a complete assessment of flood risk to the NWRA area and does not negate the need to undertake a Strategic Flood Risk Appraisal to inform a Development plan or Local Area Plans or when strategic infrastructure and utilities are being planned. It instead provides an indication of the flood risk to these Key Regional Settlements and some of the structural measures proposed. It will highlight some of the potential flooding constraints that need to be sustainably managed in these growth areas by the application of the Planning System and Flood Risk Management Guidelines. Full reference to the CFRAM Flood Plans and Flood maps should be made in all circumstances to understand the complete analysis that has been undertaken.

Table 4.2 - Key Regional Settlements

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Population 2016 Census</th>
<th>Proposed % Increase</th>
<th>Uplift to 2040</th>
<th>Proposed 2026 Uplift(^2)</th>
<th>Proposed 2031 Uplift(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galway City</td>
<td>79,900</td>
<td>55(^1)</td>
<td>44,000</td>
<td>18,050</td>
<td>27,300</td>
</tr>
<tr>
<td>Regional Growth Centres</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letterkenny</td>
<td>19,300</td>
<td>40</td>
<td>7,700</td>
<td>3,150</td>
<td>4,750</td>
</tr>
<tr>
<td>Sligo</td>
<td>19,200</td>
<td>40</td>
<td>7,700</td>
<td>3,150</td>
<td>4,750</td>
</tr>
<tr>
<td>Athlone</td>
<td>25,000</td>
<td>40</td>
<td>10,000</td>
<td>4,100</td>
<td>6,200</td>
</tr>
<tr>
<td>Support Towns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ballina</td>
<td>10,200</td>
<td>30</td>
<td>3,100</td>
<td>1,300</td>
<td>1,900</td>
</tr>
<tr>
<td>Castlebar</td>
<td>12,100</td>
<td>30</td>
<td>3,600</td>
<td>1,500</td>
<td>2,250</td>
</tr>
<tr>
<td>Cavan</td>
<td>10,900</td>
<td>30</td>
<td>3,300</td>
<td>1,350</td>
<td>2,050</td>
</tr>
<tr>
<td>Ballinasloe</td>
<td>6,700</td>
<td>30</td>
<td>2,000</td>
<td>800</td>
<td>1,200</td>
</tr>
<tr>
<td>Carrick-on-Shannon</td>
<td>4,100</td>
<td>30</td>
<td>1,200</td>
<td>500</td>
<td>750</td>
</tr>
<tr>
<td>Monaghan</td>
<td>7,700</td>
<td>30</td>
<td>2,300</td>
<td>950</td>
<td>1,450</td>
</tr>
<tr>
<td>Roscommon</td>
<td>5,900</td>
<td>30</td>
<td>1,800</td>
<td>750</td>
<td>1,100</td>
</tr>
<tr>
<td>Tuam</td>
<td>8,800</td>
<td>30</td>
<td>2,600</td>
<td>1,050</td>
<td>1,600</td>
</tr>
</tbody>
</table>
Figure 4-1 Key for Generalised Zone Types for Maps provided in 4.2.1 to 4.2.12
4.2.1  Flood Zones - Galway City Metropolitan Area Strategic Plan (MASP)

Figure 4-2 Broad spatial distribution of flood risk in Galway City
<table>
<thead>
<tr>
<th>GALWAY Flood Zone Mapping</th>
<th>CFRAM Flood Zone mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commentary</td>
<td>Generally, lands within Flood Zone A &amp; B comprise of existing development or water compatible uses however areas zoned for mixed/general community services and strategic reserve are at risk of flooding and encroach into Flood Zones A &amp; B (tidal flooding). The CFRAM study has identified that defences along the Dyke Road are critical and should be raised and strengthened in order to support intensification of land use behind it. Land identified for flood risk management measures should be protected as such, so that future flood risk schemes can be maintained. The CFRAM flood maps for Galway provide the full flood extents for fluvial and tidal flooding in the town.</td>
</tr>
<tr>
<td>Existing - Flood Risk Management Measures</td>
<td>The Corrib Clare Catchment Drainage Scheme was completed over a ten year period from 1954-1964. This arterial drainage scheme offers varying degrees of protection to parts of Galway City.</td>
</tr>
</tbody>
</table>
| Proposed - Flood Risk Management Measures | Flood defences measures were proposed for Galway City, as part of the OPW FRMP for the Corrib Catchment, to provide protection for up to a 1 in 200 year event (0.5% AEP). The flood defences measures proposed for Galway City consist of the following:  
  - Placement of quay defence walls with an average wall height of 1.2m, as required for public safety. This includes a freeboard allowance of 0.3m. The quay walls would extend from the dock, Long Walk and Spanish Arch.  
  - The properties in the Claddagh area, along Grattan road and Father Griffin would be provided protection by building a quay wall along the Claddagh basin and Nimmo's pier. Flood defences along the property line and localised land and road raising in Salthill will manage wave overtopping risks.  
  - Installation of a simple flood-forecasting unit, which includes the addition of telemetry to an existing hydrometric gauge to send warning messages when water level reaches a specified trigger point. |
4.2.2 Flood Zones - Regional Growth Centre – Letterkenny

Figure 4-3 Broad spatial distribution of flood risk in Letterkenny
LETTERKENNY
Flood Zone Mapping

<table>
<thead>
<tr>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letterkenny is subject to flooding during a 1% AEP fluvial event and a 0.5% AEP coastal event. This is predominantly along the banks of the River Swilly as it meanders through the low lying areas of the town. Flooding mechanisms are complex and while the centre of the town is seen as being tidally dominant the influence of fluvial flood risk in combination is an issue. Upper reaches of the Swilly within the town are fluvially dominant. There are a number of tributaries within the town which present a fluvial risk in their own right causing a flood risk to the Ballmacool Street area and North of Port Road in the vicinity of the Ramelton Road and De Valera Road and to the West of the N56 in the vicinity of the Kiltoy Road. On the lower reaches of these tributaries the water levels on the River Swilly are dominant. The CFRAM flood maps for Letterkenny provide the full flood extents for fluvial and tidal flooding in the town.</td>
</tr>
</tbody>
</table>

Existing - Flood Risk Management Measures

| The Swilly Embankment Arterial Drainage Scheme was completed between 1961 and 1968. This arterial drainage scheme offers varying degrees of protection to parts of parts of Letterkenny. |

Proposed - Flood Risk Management Measures

| Flood defences measures were proposed for Letterkenny, as part of the OPW FRMP for the North Western River Basin, to provide protection for up to a 1 in 100 year fluvial event and up to 1 in 200 coastal event. The flood defences measures proposed for Letterkenny consist of the following: |
| - Construction of a series of flood walls and embankments. The hard defences will provide a Standard of Protection (SoP) of 0.5% AEP for coastal flood events and an SoP of 1% AEP for fluvial flood events. The hard defences have an average height of 1.4m and a total length of 3.8km. |
| - The replacement of the footbridge on the Cullion watercourse and will have a minimum soffit level of 6.5mOD Malin. |
| - Extending and raising existing flood defences where they are found to have insufficient height/length to prevent flooding. |
4.2.3 Flood Zones - Regional Growth Centre – Sligo

Figure 4-4 Broad spatial distribution of flood risk in Sligo
### SLIGO

<table>
<thead>
<tr>
<th>Flood Zone Mapping</th>
<th>CFRAM Flood Zone mapping</th>
</tr>
</thead>
</table>

| Commentary | On the Sligo River, flood mapping depicts areas zoned for "Community Uses" adjacent to Sligo Institute of Technology inside Flood Zone A and B. Any development in this area would be subject to a justification test and a site specific flood risk assessment. In Rathbraghan, an area adjacent to the Shannon Eighth zoned for Business, Industry and Technology Park and industrial land is within Flood Zone A. Early consideration of the drainage infrastructure requirements across the site will provide opportunities to combine the surface water drainage strategy with a flood mitigation scheme for the wider catchment. The CFRAM flood maps for Sligo provide the full flood extents for fluvial and tidal flooding in the town. |

| Existing - Flood Risk Management Measures | No existing Flood Risk Management Measures (including arterial drainage schemes or minor works) are present in Sligo. |

| Proposed - Flood Risk Management Measures | Flood defences measures were proposed for Sligo, as part of the OPW FRMP for the Sligo Bay and Drowse River Basin, to provide protection. The flood defences measures proposed for the Rathbraghan area in Sligo consist of the following:  
- The construction of a storage embankment measuring 415m long and 1.2m average height to store / attenuate flood water in larger events and an associated controlled outfall to prevent overland flooding of properties downstream (including the Woodlands Estate and the nursing home) when flow exceeds the existing culvert capacity. |
4.2.4 Flood Zones - Regional Growth Centre – Athlone

Figure 4-5 Broad spatial distribution of flood risk in Athlone
The spatial growth of Athlone is dominated by the River Shannon and Lough Ree to the north of the town. The lands to the south of the town are dramatically impacted by extreme flooding from the River Shannon. This influences the town to grow spatially to the east and west which is already prevalent from an aerial view of the town. The principal of avoidance is particularly important along the banks of the Shannon as inappropriate development could potentially put more lives at risk of flooding. Design of the Athlone flood relief scheme is underway with construction of the scheme set to take place in the next two to three years. The CFRAM flood maps for Athlone provide the full flood extents for fluvial flooding in the town.

The Al River Athlone Works were initiated in 2002 and constructed from 2002 to 2003. The works comprise of the following:
- Channel and culvert improvements along the Al River downstream of the culvert in the Technology Park to improve capacity to at least $2\text{m}^3/\text{sec}$
- Construction of a penstock to attenuate the flow

Athlone Weir was constructed in the 1840s, with sluices being installed in the 1880s to provide the facility for drawing down the level of Lough Ree below the fixed weir crest, potentially providing some flood storage.

Flood defences measures were proposed for Athlone, as part of the OPW FRMP for the Shannon Upper & Lower Catchment, to provide protection for up to a 1 in 100 year event. The flood defence measures proposed for Athlone consist of the following:
- Construction of 1.038km of new flood defence walls, 2.29km of embankments, and a 16m floodgate.
- Installation of a simple flood-forecasting unit, which includes the addition of telemetry to an existing hydrometric gauge to send warning messages when water level reaches a specified trigger point.
- Introduction of a storage area.
- Targeted public awareness will be introduced for properties affected by the various floodgates throughout the town.

The FRMP outlined that a detailed study is required to investigate non-fluvial flooding sources in the vicinity of a proposed development.
4.2.5 Flood Zones - Support Town – Ballina

Figure 4-6 Broad spatial distribution of flood risk in Ballina
### BALLINA

#### Commentaries

Ballina lies at the mouth of the River Moy where it enters Killala Bay. There is a predominant risk of coastal flooding but the influence of fluvial flooding from the River Moy is a relevant consideration also. There are a number of tributaries which join the River Moy within the development limits of the town. Each of the tributaries presents a small fluvial risk in their own right but they are dominated by levels on the Moy over their lower reaches. Full extents of fluvial and coastal flooding can be found on the CFRAM flood maps. Many of the locations at risk of flooding are zoned for development. The CFRAM flood maps for Ballina provide the full flood extents for fluvial and tidal flooding in the town.

#### Existing - Flood Risk Management Measures

The Moy Catchment Drainage Scheme was completed between 1960 and 1971. This arterial drainage scheme affects parts of Ballina.

#### Proposed - Flood Risk Management Measures

Flood defences measures were proposed for Ballina, as part of the OPW FRMP for the Moy and Killala Bay River Basin, to provide protection for up to a 1 in 100 year fluvial event (1% AEP) and up to 1 in 200 year coastal event (0.5% AEP). The flood defences measures proposed for Ballina consist of the following:

- Constructing new quay walls with piled foundations, 1.2m high at Bachelors Walk (470m long) and 0.6m high with 0.6m high railings above, in front of properties on Clare Street (340m long).
- The flood wall at Clare Street will continue north for 170m to tie into higher ground.
- In front of the Cathedral on the N59, 210m of river bank will be raised to fit into the existing landscape.
- Along Ridgepool Road railings will be replaced with flood defence walls, in some points the existing walls will be raised with a total of 200m length of works here.
- In many of the gaps, walls will only need to be raised to 0.6m above ground level with 0.6m high railings (to provide a 1.2m guarding height). This will fit into the height of the existing river walls and maintain some visual connection. Freeboard for all walls and raised river banks is in excess of 0.3m above the peak flood level.
- Two pumping stations (either new or upgraded existing) will be required to manage surface water and fluvial flooding behind the river walls, one on each bank of the River Moy. On the Knockanelo (or Sruffaunbrogue) the inlets to the flood relief culvert and downstream culverts will be improved with some further works to the existing box culverts at Marian Crescent.
- This option includes ongoing maintenance of the river walls, pumping stations and enhanced maintenance above the current Arterial Drainage maintenance programme for the full length of culverts on the Knockanelo through the town centre and the Flood Relief Culvert.
- Upstream catchment and land management should be reviewed as a means of optimising the benefits of capital and resource expenditure. Due to the economies of scale of this option, preliminaries (site preparation etc.) have been estimated at a further 8% of the cost of the methods.
4.2.6 Flood Zones - Support Town – Castlebar

Figure 4-7 Broad spatial distribution of flood risk in Castlebar
### CASTLEBAR

#### Flood Zone Mapping
CFRAM Flood Zone mapping

#### Commentary
Fluvial flooding in Castlebar has been identified in the vicinity of the Saleen Lough and Lough Lannagh and in a narrow corridor along the Castlebar River which flows through the centre of the town. This affects relatively few properties but there are areas of flooding which are currently undeveloped and within the development limits of the town. These need to be managed in accordance with the requirements of the Planning System and Flood Risk Management Guidelines. The CFRAM flood maps for Castlebar provide the full flood extents for fluvial flooding in the town.

#### Existing - Flood Risk Management Measures
The Moy Catchment Drainage Scheme was completed between 1960 and 1971. This arterial drainage scheme offers a standard of protection to areas of Castlebar.

#### Proposed - Flood Risk Management Measures
Potentially viable structural flood relief measures have been investigated for this community as part of the OPW FRMP. However, it was determined that the benefits accruing from these measures would not justify the costs of structural works at this time. The current level of risk will be reviewed, along with all areas, on a regular basis into the future. The existing Arterial Drainage Scheme will be maintained under the Arterial Drainage Act 1945 and the Amendment of the Act 1995.
4.2.7 Flood Zones - Support Town – Cavan

Figure 4-8 Broad spatial distribution of flood risk in Cavan
### CAVAN

<table>
<thead>
<tr>
<th><strong>Flood Zone Mapping</strong></th>
<th><strong>CFRAM Flood Zone mapping</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commentary</strong></td>
<td>The main flood risk within Cavan AFA is to receptors adjacent to the Cavan River and the subsequent impact on the lower reaches of the Aghnaskerry River. There are a number of locations along these watercourses affected by flooding during the 1% AEP event, due to either insufficient channel capacity or insufficient culvert or structure capacity. These areas are considered complex as they can influence one another due to the undulating topography in the area. There are also a number of other discrete areas of flood risk across the development limits of the town. The CFRAM flood maps for Castlebar provide the full flood extents for fluvial flooding in the town.</td>
</tr>
<tr>
<td><strong>Existing - Flood Risk Management Measures</strong></td>
<td>The Erne River Drainage District affects parts of Cavan these are maintained by OPW under the Arterial Drainage Act.</td>
</tr>
<tr>
<td><strong>Proposed - Flood Risk Management Measures</strong></td>
<td>Flood defences measures were proposed for Cavan, as part of the OPW FRMP for the Erne River Basin, to provide protection for up to a 1 in 100 year event. The flood defences measures proposed for Cavan consist of the following:</td>
</tr>
<tr>
<td></td>
<td>- A series of flood embankments and walls. These hard defences would protect to the 1% AEP flood event with an average height of 1.4m and a total length of 2km.</td>
</tr>
</tbody>
</table>
4.2.8  Flood Zones - Support Town – Ballinasloe

Figure 4-9 Broad spatial distribution of flood risk in Ballinasloe
## BALLINASLOE

### Commentary
Fluvial flooding in Ballinasloe emanates from the River Suck which is a tributary of the River Shannon. There are significant areas of flood risk from the river affecting large areas of agricultural land adjacent to the town. These would be classified under the Planning system and Flood Risk Management Guidelines as Flood Zone A. There are also properties in the vicinity of the R446 as it passes in a southerly direction through the town which are currently at risk of flooding. The CFRAM flood maps for Ballinasloe provide the full flood extents for fluvial flooding in the town.

### Existing - Flood Risk Management Measures
The Derrymullan Flood works were initiated in 2010 following major flooding in the 2009 flood event, and constructed from 2010 to 2011. The works comprise of the following:
- Construction of a flood relief wall around Derrymullan
- Installation of penstock and flood gates

The works provide protection against a 1% AEP (100 year) fluvial event from the Deerpark River for 135 properties. Ballinasloe is also in the Suck Drainage District.

### Proposed - Flood Risk Management Measures
Flood defences measures were proposed for Ballinasloe, as part of the OPW FRMP for the Shannon Upper & Lower Catchment, to provide protection. The flood defences measures proposed for Ballinasloe consist of the following:
- Construction of 530m of new flood defence walls, 5,050m of flood defence embankments and a demountable flood gate;
- Construction of two new 6m wide flood alleviation arch culverts at Ballinasloe East Bridge. The invert level of these culverts is 35.3m;
- Regarding of the riverbank 130m upstream and downstream of the bridge to 35.3m to maximize efficiency of the flood alleviation culverts;
- Construction of two Lock Gates across the Canal and a sluice gate across the channel flowing into the marina from the canal;
- Upgrade existing culvert to a 2.0m dia. Culvert;
- Upgrade the existing Kilclooney Road Bridge on the River Deerpark;
- Regarding of the riverbed upstream and downstream of Kilclooney Road Bridge to maximize efficiency of the upgraded structure;
- Public Awareness, Flood Forecasting will also be required as part of this measure;
- Maintain all existing defences; and
- The West and East Atlas channels need to be maintained to ensure their full capacity can be utilised in a flood event.
4.2.9 Flood Zones - Support Town – Carrick-On-Shannon

Figure 4-10 Broad spatial distribution of flood risk in Carrick-On-Shannon
### CARRICK ON SHANNON

<table>
<thead>
<tr>
<th><strong>Flood Zone Mapping</strong></th>
<th>CFRAM Flood Zone mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commentary</strong></td>
<td>There is historical evidence of flooding from the drainage network, pluvial sources and groundwater coinciding with fluvial events from the River Shannon within Carrick-on-Shannon. Flood risk from the drainage network, pluvial sources or groundwater was not considered as part of the CFRAM process. Therefore, given the close interaction of the fluvial, groundwater, pluvial and drainage flood risks for Carrick on Shannon, it is a recommendation that an assessment of the drainage system, pluvial flood risk and groundwater flood risk is carried out to fully understand the complex flood mechanism within the town. The CFRAM flood maps for Carrick-on-Shannon provide the full flood extents for fluvial flooding.</td>
</tr>
<tr>
<td><strong>Existing - Flood Risk Management Measures</strong></td>
<td>Carrick-On-Shannon is within both the Croghan and Cavetown Drainage Districts and is therefore maintained under the requirements of the Arterial Drainage Act of 1945 and subsequent amendment of 1995.</td>
</tr>
</tbody>
</table>
| **Proposed - Flood Risk Management Measures** | Flood defences measures were proposed for Carrick-On-Shannon, as part of the OPW FRMP for the Shannon Upper & Lower Catchment, to provide protection. The flood defences measures proposed for Carrick-On-Shannon consist of the following:  
  - Construction 1,799m of new flood defence walls, 846m of new embankments and a 2m floodgate.  
  - Raising the road level.  
  - Installation of a simple flood forecasting unit, including an addition of telemetry to an existing hydrometric gauge to send warning messages when water level reaches a specified trigger point. |
4.2.10 Flood Zones - Support Town – Monaghan

Figure 4-11 Broad spatial distribution of flood risk in Monaghan
**MONAGHAN**

<table>
<thead>
<tr>
<th><strong>Flood Zone Mapping</strong></th>
<th>CFRAM Flood Zone mapping</th>
</tr>
</thead>
</table>

**Commentary**

Monaghan is affected by fluvial flooding from the Blackwater and Cor Rivers which flow through and around the town. The interaction between the two rivers is a key consideration. There are several developed areas within the town which are currently at risk and also areas beyond the boundaries which are currently agricultural land. The main flooding issues arise from insufficient culvert and critical structure capacity. The CFRAM flood maps for Monaghan provide the full flood extents for fluvial flooding.

<table>
<thead>
<tr>
<th><strong>Existing - Flood Risk Management Measures</strong></th>
<th>The Monaghan Blackwater Arterial Drainage Scheme was completed between 1986 and 1992. This arterial drainage scheme affects parts of Monaghan and is maintained under the Arterial Drainage Act of 1945 and subsequent amendment of 1995.</th>
</tr>
</thead>
</table>

| **Proposed - Flood Risk Management Measures** | Flood defences measures were proposed for Monaghan, as part of the OPW FRMP for the Neagh Bann River Basin, to provide protection for up to a 1 in 100 year event (1% AEP). The flood defences measures proposed for Monaghan consist of the following:
- A series of flood embankments and walls with additional measure in place to protect properties in the Milltown area. The Hard Defences would provide design SoP with an average height of 1m and a total length of 3km. |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
4.2.11 Flood Zones - Support Town – Roscommon

Figure 4-12 Broad spatial distribution of flood risk in Roscommon
### ROSCOMMON

<table>
<thead>
<tr>
<th><strong>Flood Zone Mapping</strong></th>
<th>CFRAM Flood Zone Mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commentary</strong></td>
<td>Fluvial flooding in Roscommon is predicted in the area in Loughlenane Park adjacent to Roscommon Castle and also from a small watercourse, a tributary of the River Hind, which from flows along the northern and eastern boundaries of the town. Flooding in these two locations affects existing areas of the town, agricultural land and the public amenity space around the castle. The CFRAM flood maps for Roscommon provide the full flood extents for fluvial flooding.</td>
</tr>
<tr>
<td><strong>Existing - Flood Risk Management Measures</strong></td>
<td>Roscommon is within both the Hind and Suck Drainage Districts which will continue to be maintained under the Arterial Drainage Act of 1945 and subsequent amendment of 1995.</td>
</tr>
<tr>
<td><strong>Proposed - Flood Risk Management Measures</strong></td>
<td>Flood defences measures were proposed for Roscommon, as part of the OPW FRMP for the Shannon Upper &amp; Lower Catchment, to provide protection. The flood defences measures proposed for Roscommon consist of the following:</td>
</tr>
<tr>
<td></td>
<td>- Construct 2,065m of flood defence walls and 350m of flood defence embankment;</td>
</tr>
<tr>
<td></td>
<td>- Upgrade existing culvert along N63 Galway Road at Ballinagard tributary; and</td>
</tr>
<tr>
<td></td>
<td>- Public awareness.</td>
</tr>
</tbody>
</table>
4.2.12 Flood Zones - Support Town – Tuam

Figure 4-13 Broad spatial distribution of flood risk in Tuam
## TUAM

<table>
<thead>
<tr>
<th>Flood Zone Mapping</th>
<th>CFRAM Flood Zone mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commentary</td>
<td>The River Clare flows to the west of the town and there are significant areas of floodplain predominantly affecting existing agricultural land. There is a relatively low level of flood risk to properties within the town. All land shown at risk from flooding would be classified under the Planning system and Flood Risk Management Guidelines as Flood Zone A. The CFRAM flood maps for Tuam provide the full flood extents for fluvial flooding.</td>
</tr>
<tr>
<td>Existing - Flood Risk Management Measures</td>
<td>The Corrib Clare Catchment Drainage Scheme was completed over a ten year period from 1954-1964. This arterial drainage scheme affects parts of Tuam and is maintained under the Arterial Drainage Act of 1945 and subsequent amendment of 1995.</td>
</tr>
<tr>
<td>Proposed - Flood Risk Management Measures</td>
<td>The flood risk maps for the Tuam AFA have not highlighted significant risk within the 1% AEP flood event. For the level of risk identified to continue to be representative, it is implicit in the flood maps that the form and capacity of the existing river channels remains broadly the same. Generally this form and capacity would be preserved by preventing a reduction in the conveyance capacity of the channel and ensuring structures currently containing or diverting flows continue to do so.</td>
</tr>
</tbody>
</table>
5 ASSESSMENT OF NWRA RSES GROWTH AMBITIONS

The RSES for the NWRA sets out the objectives for the region based around 6 Growth Ambitions as well as a focus on People and Places. The NWRA believes by focusing on these Ambitions this will achieve the overall objectives of Better Places, Competitiveness and Collaboration. There will be a need to develop new infrastructure facilitate the expansion of towns and urban areas to achieve these ambitions as well as preserve and maintain the environment. An assessment of each of the Growth Ambitions is provided in Table 5-1 along with an Outline Summary of the Regional Policy Objectives with a specific mention for objectives that may have an impact on flood risk.
### Table 5.1 - Assessment of Growth Ambitions

<table>
<thead>
<tr>
<th>Chapter and Section of RSES</th>
<th>Regional Policy Objective Number</th>
<th>Outline Summary of Regional Policy Objectives</th>
<th>Impact Assessment in Context of The Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>People and Places</td>
<td>1-23</td>
<td>Development of compact urban centres to meet population and increasing housing demand serviced by sustainable infrastructure and provision of public transport and world class infrastructure and education. Grouping and co-relocation of businesses and provision for services sites within each Council Area.</td>
<td>The continued expansion of towns, cities and urban areas needs to be managed in a sustainable manner with due consideration to the capacity of existing drainage infrastructure and areas already at risk of groundwater, pluvial, fluvial and coastal flood risk. Sustainable drainage planning adhering to best practice and Implementation of the Planning System and Flood Risk Management Guidelines and Circular PL02/2014 (August 2014) at all stages of the Development Plan Process and while planning strategic infrastructure is required (see RPO 21)</td>
</tr>
<tr>
<td><strong>Growth Ambition 1</strong></td>
<td>24-76</td>
<td>Development of the vibrant tourist economy by upgrading infrastructure and enhancement of tourism assets and destinations. Supporting the renewable energy, agri-food, bio-economy, marine and seafood economies and assets, Med Tech, Retail industries.</td>
<td>The development of infrastructure to support a vibrant economy will need to managed with due consideration given to the impact on the identified floodplains and existing drainage infrastructure. Sustainable drainage planning adhering to best practice and Implementation of the Planning System and Flood Risk Management Guidelines and Circular PL02/2014 (August 2014) at all stages of the Development Plan Process and while planning strategic infrastructure is required (see RPO 21)</td>
</tr>
<tr>
<td>Environment – Natural Region</td>
<td>77-103</td>
<td>Protect, manage and conserve the quality, character and distinctiveness of the landscape and seascape, the cultural built and natural heritage, blueways and greenways and</td>
<td>The management of environment can be integrated with good flood risk management practice to reduce overall flood risk to a region. Consideration of an integrated approach to sustainable flood risk management. Co-ordination of Water</td>
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<table>
<thead>
<tr>
<th>Chapter and Section of RSES</th>
<th>Regional Policy Objective Number</th>
<th>Outline Summary of Regional Policy Objectives</th>
<th>Impact Assessment in Context of The Guidelines</th>
</tr>
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<tbody>
<tr>
<td><strong>Growth Ambition 3</strong></td>
<td>104-162</td>
<td>Development of transport infrastructure centred around the road, rail and bus network, seaports and airports. Providing sustainable rural transport and enabling local transport plans. Development of Telecommunications and digital networks and promotion of smart technology and approaches related to the environment, economy, mobility and people.</td>
<td>Framework Directive River Basin Management Plans is required and provides opportunities in this regard. Infrastructural projects should include a comprehensive flood risk assessment and SuDS to ensure runoff is controlled to at least the greenfield runoff rate. These assessment should be undertaken utilising the sequential approach set out in the Planning System and Flood Risk Management Guidelines and Circular PL02/2014 (August 2014) at all stages of planning strategic infrastructure. (see RPO 21)</td>
</tr>
<tr>
<td><strong>Growth Ambition 4</strong></td>
<td>163-186</td>
<td>Improving the quality of life in the region with a focus on healthy places and supporting the needs of aging population, childcare and education, social, housing and community facilities</td>
<td>All infrastructural development associated with improving the places and facilities available to people will require implementation of the Planning System and Flood Risk Management Guidelines and Circular PL02/2014 (August 2014). (see RPO 21)</td>
</tr>
<tr>
<td><strong>Growth Ambition 5</strong></td>
<td>187-207</td>
<td>Improving the supply of utilities to the region specifically the Electric Grid, Gas Network, waste and water services infrastructure.</td>
<td>For the planning of major linear infrastructure projects associated with Gas and Electric networks inevitably has an interaction with floodplains. Water and waste schemes need to consider fully the implications of pollution and contamination both into the water supply network and into rivers and coastal areas. All of these types of projects should consider be subject to a detailed Flood risk Assessment in compliance with the requirements of the Planning System and Flood Risk Management Guidelines and Circular PL02/2014 (August 2014) (see RPO 21)</td>
</tr>
<tr>
<td><strong>Growth Ambition 6</strong></td>
<td>208-211</td>
<td>Co-ordination of investments in Infrastructure across cross borders and council boundaries and cross jurisdictional management of River</td>
<td>A joined up approach to infrastructural planning across borders and among departments with different objectives can bring multiple benefits including reduction in flood risk</td>
</tr>
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(See RPO 21)
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<tr>
<td></td>
<td></td>
<td>Basin Management Plans. Establishment of Cross Jurisdictional Working Group to collaborating on blueways, greenways and trails to improve local and regional links.</td>
<td>Implementation of the Planning System and Flood Risk Management Guidelines and Circular PL02/2014 (August 2014) should be considered at all stages. (see RPO 21)</td>
</tr>
</tbody>
</table>
5.1 CHANGES MADE TO DRAFT RSES BY NWRA

On 12th October 2018, the NWRA Director issued a Working Draft RSES to be considered by Members of the Regional Assembly. Subsequently the SEA (including RFRA) and AA have been undertaken on the draft and mitigation measures have been recommended. From an internal review undertaken by the NWRA of the working document it was considered that none of alterations/additions would benefit the RSES and these are identified below.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Changes Made</th>
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| **Chapter 1:** Economy and Employment – Vibrant Region | Pg. 171: Regional Planning Objective RPO62  
Add – sustainable before expansion  
Add – subject to environment, visual, economic viability and transportation requirements  
Reason: To acknowledge that this is an IROPI project and as advised by RPS in their NIR.  
Regional Planning Objective 62 will now read:  
To support the sustainable expansion & upgrade of Galway Harbour & Galway Port (under IROPI) as part of the overall vision to grow Galway as a City Region subject to environment, visual, economic viability and transportation requirements. |
| Assessment | No changes to the RFRA |
| Proposed Mitigation | None proposed. |

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| **Chapter 3:** Connectivity - Connected Region | Pg 208: Regional Planning Objective 133  
Add – and have regard to the National Policy Framework for Alternative Fuels Infrastructure for Transport.  
Reason: To acknowledge advice given in the environmental report with respect to more sustainable travel.  
Regional Planning Objective will now read:  
Reduce dependency on the fossil fuel powered vehicles and have regard to the National Policy Framework for Alternative Fuels Infrastructure for Transport. |
| Assessment | No changes to the RFRA |
| Proposed Mitigation | None proposed. |

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</table>
| **Chapter 5:** Utilities Infrastructure Enabling our Region | Pg. 249: Regional Planning Objective 199  
Add – and as outlined in (ii) above  
Reason: To ensure that all priority water services projects are clearly supported by RSES.  
Regional Planning Objective 199 will now read:  
Support investment for water and wastewater services in the first instance where existing facilities are insufficient to meet current demands and as outlined in (ii) above. |
<table>
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<tr>
<td><strong>Assessment</strong></td>
<td>No changes to the RFRA</td>
</tr>
<tr>
<td><strong>Proposed Mitigation</strong></td>
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<tbody>
<tr>
<td><strong>Chapter 8: People and Places</strong></td>
<td>(Pg. 123) To the last bullet (relating to Key Town Cavan) point add - including the prioritization of projects having regard to Cavan being listed as an Urban Priority Region by the EPA. Reason: To deal with identified water quality standards identified by EPA and in the environment report prepared on the Draft RSES. Last bullet point will now read: Support the actions set out in the Cavan Town Revitalisation Plan including the prioritization of projects having regard to Cavan being listed as an Urban Priority Region by the EPA.</td>
</tr>
<tr>
<td><strong>Assessment</strong></td>
<td>No changes to the RFRA</td>
</tr>
<tr>
<td><strong>Proposed Mitigation</strong></td>
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<tr>
<td><strong>Chapter 9: Strategic Analysis &amp; Vision</strong></td>
<td>Overarching Environmental Regional Policy Objective No. 2 on pg. 26 Add - and support measures to control and manage the spread of invasive and alien species within the region Reason: To acknowledge the advice given in the environmental report with respect to protection of bio-diversity, flora and fauna. Overarching Environmental Regional Policy Objective No. 2 on pg. 26 will now read: The Assembly supports the implementation of the All-Ireland Pollinator Plan 2015 – 2020 and support measures to control and manage the spread of invasive and alien species within the region.</td>
</tr>
<tr>
<td><strong>Assessment</strong></td>
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</tr>
<tr>
<td><strong>Proposed Mitigation</strong></td>
<td>None proposed.</td>
</tr>
</tbody>
</table>
6 GUIDANCE ON STRATEGIC FLOOD RISK ASSESSMENT

6.1 PREPARATION OF DEVELOPMENT PLANS

All city and county level SFRAs should be developed in accordance with the Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). The Guidelines Technical Appendices give detail descriptions on how to undertake FRAs of all levels. FRAs should include an appropriate level of detail in line with the level of flood risk associated with a development. The CFRAM FRMPs have the most up to date flood risk information available to help develop FRAs. Flood Maps and the proposed flood risk management measures identified in the FRMPs should be reviewed for all development plans.

Pluvial or surface water flood risk shall be a key consideration for all development plans. The impact of new development and in particular an increase in hard standing areas needs to be evaluated in the context of ensuring that there is sufficient capacity within existing drainage infrastructure. In all cases SUDs or attenuation measures should be required to prevent any increase in the rate of run off. Reference should be made to best practice guidance such as the Construction Industry Research and Information Association (CIRA) SuDS Manual (C753).

FRAs should follow the sequential approach as described in Section 3.4 above and also undertake Justifications Tests where appropriate. All Justification Tests should ensure that adequate flood risk management measures have been recommended.

LAPs should ensure that any FRAs they undertake or are assessing have considered flood zones as described in section 3.6 and climate change scenarios as described in Section 3.7. The CFRAM FRMP have developed climate change scenario mapping that can be used for such assessments.

FRAs aim to identify, quantify and communicate to decision-makers and other stakeholders the risk of flooding to land, property and people. The purpose is to provide sufficient information to determine whether particular actions (such as zoning of land for development, approving applications for proposed development, the construction of a flood protection scheme or the installation of a flood warning scheme) are appropriate.

A FRA can be undertaken either over a large area or for a particular site to:

- Identify whether and the degree to which flood risk is an issue;
- Identify flood zones (if not already available);
- Inform decisions in relation to zoning and planning applications; and
- Develop appropriate flood risk mitigation and management measures for development sited in flood risk areas.

The general principles of FRAs should be:

- Proportionate to the risk scale, nature and location of the development;
- Undertaken by competent people, such as a suitably qualified hydrologist, flood risk management professional or specialist water engineer;
Undertaken as early as possible in the particular planning process;
Supported by appropriate data and information, including historical information on previous events, but focusing more on predictive assessment of less frequent or more extreme events, taking the likely impacts of climate change into account;
Clearly state the risk to people and development and how that will be managed over the lifetime of the development;
Focused on addressing the impact of a change in land use or development on flood risk elsewhere, ensuring that any such change or development must not add to and should, where practicable, reduce flood risk;
Consider the vulnerability of those that could occupy the development, including arrangements for safe access and egress; and
Consider the modification to flood risk that infrastructure such as raised defences, flow channels, flood-storage areas and other artificial features provide, together with the consequences of their failure.

6.2 PLANNING AUTHORITY COLLABORATION

Planning authorities that share administrative boundaries should work together during the SFRA process to ensure that all flood risk issues are captured to inform their preparation of spatial plans. Where it is found to be necessary the planning authorities should prepare joint studies to address flood risk issues. Section 4 outlines some potential planning authority partnerships for the growth settlements addressed in this RFRA.
7 SUMMARY

7.1 OVERVIEW

The RFRA has been prepared as part of the SEA of the NWRA RSES in accordance with national and EU legislation. This RFRA was prepared by considering the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). The purpose of the RFRA is to ensure that the RSES follow the principles of the Guidelines and implements policies and development strategies that:

- Avoid inappropriate development in areas at risk of flooding, unless there are proven wider sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level;
- Avoid developments increasing flood risk elsewhere;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Incorporate flood risk assessments into the planning process;
- 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.

7.2 METHODOLOGY

This Regional Flood Risk Assessment has been prepared in accordance with the Planning System and Flood Risk Management Guidelines. The scale of assessment at a regional level recommends that the appraisal should primarily undertake a flood risk identification that will detect areas of future growth conflicting with flood risk. This will promote the sequential approach and help identify the need for more detailed Strategic at lower level development plans. As recommended by the Guidelines the RFRA addressed the following:

- Summary plans/figures and statement showing the broad spatial distribution of flood risk and any potential conflicts with growth/development areas
- Supplementary description of any areas of a region where addressing flood risk is especially important – e.g. central urban areas in Gateways or areas of development pressure, with a view to highlighting these as priority locations for further assessment of flood risk, and / or the need for coordinated action at development plan level
- Suggested policies for sustainable flood risk management for incorporation into the RPGs
- Guidance on the preparation of city and county level SFRAs and the management of surface water run-off within new development, highlighting significant flood risk issues, potential infrastructure investment requirements and the need for co-operation between planning authorities and identifying any need for more detailed assessment

The appraisal identified the broad nature of flooding to the NWRA area and elaborated on the description of flood risk to the Key Regional Settlements in the region. It also assessed the flood risk impact associated with the 6 Growth Ambitions proposed for the NWRA RSES.
The appraisal utilised several sources of relevant flood risk information available for the NWRA geographical region however the main source used was the flood zones and flood extents generated as part of the national Catchment Flood Risk Assessment and Management (CFRAM) Programme studies. This dataset forms part of the most comprehensive flood risk assessment ever undertaken in Ireland. They have been generated using expert hydrological and hydraulic assessments which have been calibrated against actual measured data insofar as possible. While the CFRAM studies are comprehensive, they do not cover all sources of flooding and they only focus on areas of significant risk. There are numerous other areas within settlements and within the NWRA geographic area which have local scale flooding issues and these need to be captured in SFRAs accompanying County/City Development plans and LAPs.

7.3 KEY FLOOD RISK MITIGATION MEASURES

The integration of land use planning and flood risk in working towards achieving the objectives of the 6 Growth Ambitions is facilitated by the sequential approach required in the Planning System and Flood Risk Management Guidelines. This document will be applied at all levels of the planning process and in the development of significant infrastructure projects.

All developments will be subject to robust site / route selection and appropriate environmental assessment.