

RPS



NATIONAL  
CFRAM  
PROGRAMME  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



OPW  
Oifig na nOibreacha Poiblí  
The Office of Public Works

EASTERN

Rialacháin na gComhphobal Eorpach (Measúnú agus Bainistiú Priacal Tuile) 2010 agus 2015  
*European Communities (Assessment and Management of Flood Risks) Regulations 2010 and 2015*

Dréachtphean um Bainistiú Priacal Tuile  
*Draft Flood Risk Management Plan*

# Measúnú Straitéiseach Comhshaoil

## Strategic Environmental Assessment

AB07 - An Bhóinn

UoM07 - Boyne

I gcomhpháirtíocht le  
In partnership with



Cavan  
County Council



COMHAIRLE CHOINTAE CHILL DARA  
Kildare County Council



LOUTH COUNTY COUNCIL



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South County Council



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# Eastern CFRAM Study

## UoM07

### Strategic Environmental Assessment

### Environmental Report

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## ABBREVIATIONS

AA	Appropriate Assessment
AFA	Area for Further Assessment
CAFE	Clean Air for Europe [Directive]
CFRAM	Catchment Flood Risk Assessment and Management
CJEU	Court of Justice of the European Union
DAFM	Department of Agriculture, Food and the Marine
DARD	Department of Agriculture and Rural Development (Northern Ireland)
DAHG	Department of Arts, Heritage and the Gaeltacht
DCENR	Department of Communications, Energy and Natural Resources
DECLG	Department of Environment, Community and Local Government
DEHLG	Department of Environment, Heritage and Local Government
EC	European Commission
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ERBD	Eastern River Basin District
FEMFRAM	Fingal East Meath Flood Risk Assessment and Management Study
FPM	Freshwater Pearl Mussel
FRA	Flood Risk Assessment
FRM	Flood Risk Management
FRMP	Flood Risk Management Plan
GSI	Geological Survey of Ireland
HA	Hydrometric Area
HPW	High Priority Watercourse
IFI	Inland Fisheries Ireland
IRBD	International River Basin District
IROPI	Imperative Reasons of Overriding Public Interest
LA	Local Authority
LAP	Local Area Plan
MCA	Multi-Criteria Analysis
MIDA	Marine Irish Digital Atlas
MPA	Marine Protected Area
MPW	Medium Priority Watercourse
NBIRBD	Neagh Bann International River Basin District
NHA	Natural Heritage Area
NIEA	Northern Ireland Environment Agency
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
NWIRBD	North Western International River Basin District

OD	Ordnance Datum
OPW	Office of Public Works
OSi	Ordnance Survey Ireland
OSPAR	(Oslo Paris) Convention on the protection of North-East Atlantic marine environment
PFRA	Preliminary Flood Risk Assessment
P/P	Plan or Project
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SERBD	South Eastern River Basin District
SI	Statutory Instrument
SOP	Standard Operating Procedures
SPA	Special Protection Area
SWRBD	South Western River Basin District
SuDS	Sustainable Drainage Systems
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UoM	Unit of Management
WFD	Water Framework Directive
WHO	World Health Organisation
WRBD	Western River Basin District

# NON-TECHNICAL SUMMARY

## INTRODUCTION

The Floods Directive is being implemented in Ireland through the European Communities (Assessment and Management of Flood Risks) Regulations 2010 [S.I.122/2010], which appoints the OPW as the Competent Authority for the Plans. The approach to implementing the directive has focused on a National Flood Risk Assessment and Management Programme. This was developed to meet the requirements of the Floods Directive, as well as to deliver on core components of the 2004 National Flood Policy. Catchment-based Flood Risk and Management (CFRAM) studies were commissioned at the scale of the River Basin Districts (RBDs) delineated for the first cycle of the implementation of the Water Framework Directive (WFD). The Eastern CFRAM study area includes four Units of Management (UoM) / Hydrometric Areas (HAs). The UoMs constitute major catchments / river basins (typically greater than 1000km<sup>2</sup>) and their associated coastal areas, or conglomerations of smaller river basins and their associated coastal areas. The UoM boundaries match the HA boundaries within the Eastern CFRAM Study Area. These are UoM07 (Boyne), UoM08 (Nanny–Delvin), UoM09 (Liffey-Dublin Bay) and UoM10 (Avoca-Vartry). There is a high level of flood risk within the Eastern CFRAM Study area with significant coastal and fluvial flooding events having occurred in the past. UoM07 covers an area of approximately 2,695 km<sup>2</sup> and includes parts of counties Louth, Cavan, Meath, Westmeath, Offaly, and Kildare.

This Strategic Environmental Assessment (SEA) Environmental Report has been prepared to provide a formal and transparent assessment of the likely significant impacts on the environment arising from the Flood Risk Management Plan (FRMP) for UoM07 under the Eastern CFRAM Study, including consideration of reasonable alternatives.

As the FRMP has the potential to impact upon European sites there is a requirement under the EU Habitats Directive to carry out an Appropriate Assessment (AA) and to produce a Natura Impact Statement (NIS). These sites are areas designated for the protection and conservation of habitats, flora and fauna, called Special Areas of Conservation and Special Protection Areas.

## METHODOLOGY AND CONSULTATION

A draft FRMP has been produced for UoM07 within the Eastern CFRAM Study Area to establish the most suitable ways to manage flood risk for areas with significant flood risk (Areas for Further Assessment or AFA). This SEA Environmental Report has been produced to assess the environmental impacts of the Flood Risk Management (FRM) options of the FRMP and to provide the environmental guidance to help create a more sustainable FRMP. In parallel to this a NIS has been prepared to inform the decision making process, in terms of the potential for the FRM options to impact the integrity of any European sites, in view of that sites conservation objectives. Both environmental assessments have been central to the development of the draft FRMP for UoM07.

The main steps of environmental input to the FRMP can be summarised as follows:

- 1 - Preliminary Screening of FRM Methods
- 2 - Multi-Criteria Analysis of FRM Options (Alternatives)
- 3 - Environmental Assessment of Preferred Options.

For each area of flood risk to be assessed the starting point was to look at a long list of FRM methods that could be implemented to manage this risk. This long list of FRM methods was specified by OPW and included structural and non-structural methods that are available to manage flood risk in Ireland. The FRM methods went through an initial screening to determine their technical, economic and social / environmental feasibility. The environmental and social criteria in the screening stage were based on the potential for impacts on designated European sites (namely special areas of conservation and special protection areas) and UNESCO World Heritage Sites (including tentative sites) in the first instance. Further social criteria were also taken into account for potentially detrimental impacts on socially important sites, e.g. relocation of hospitals would be deemed unacceptable. During this preliminary screening the environmental specialists helped to steer the planning team towards more sustainable FRM methods and provided guidance on environmental issues in the areas of interest. This screening process coincided with the development of the SEA Scoping Report and the AA Screening Report for the Eastern CFRAM Study.

The methods that were found to be technically, economically, socially and environmentally acceptable in the preliminary screening were then combined into groups of options, which were then subjected to detailed Multi-Criteria Analysis (MCA), looking at technical, economic, social and environmental criteria. The MCA is based on the numeric, but non-monetised assessment of options against the range of objectives, whereby indicators are set for each objective. These options are the alternatives available to the FRMP that are likely to have physical impacts in their development and operation. The FRM options were assessed against the FRMP Objectives within the MCA. This assessment considered the issues of social and environmental impacts alongside the technical and economic criteria. The MCA framework has been developed to take account of the broader range of issues relevant to delivery of the FRMP in the development and selection of FRM options, and their subsequent prioritisation.

The highest scoring option for each area of flood risk (e.g. catchment or AFA), along with consideration of feedback from public and stakeholder consultation, has been put forward into the draft FRMP for UoM07 as the preferred option. The SEA process has been critical for this MCA as it has provided the necessary information for the environmental and social inputs.

The MCA of FRM options stage was heavily influenced by the environmental specialists involved in the study. The development of FRM options was an iterative process between the environmental and FRM planning specialists. Where possible, environmental and sustainability criteria were considered in the selection and positioning of FRM options, prior to assessment in the MCA. This MCA stage coincided with the development of this SEA Environmental Report and the NIS.

The preferred FRM options were then assessed in this Environmental Report, and were scored and reported on in terms of environmental impacts and their significance. The purpose of this further assessment of the preferred FRM options is to ensure all potential wider environmental impacts have been identified, to provide further transparency on the potential impacts of the preferred options and to ensure the requirements of the SEA Directive are met. The preferred options were assessed against the environmental and social objectives for their potential short, medium and long term impacts on environmental topic areas, taking account of any secondary, cumulative, synergistic, permanent and temporary, positive or negative effects.

Stakeholder and public engagement and consultation have taken place throughout the development of the FRMP, and environmental inputs have been involved at every stage. There are not anticipated to be any transboundary impacts from implementation of the FRMPs for the Eastern CFRAM Study and therefore it was determined that transboundary consultations would not be undertaken as part of this SEA process.

## **DESCRIPTION OF THE PLAN**

The Eastern CFRAM Study informs the development of the four FRMPs for the eastern region. The Eastern CFRAM study area is the same as the boundary identified for the Eastern RBD under the first cycle of the WFD implementation. The Eastern CFRAM Study and associated FRMPs will cover the period from 2016 to 2021, and will be reviewed every six years. The purpose of the FRMP for UoM07 is to set out a proposed strategy, including a prioritised set of actions and measures, for the sustainable, long-term management of flood risk in the UoM. The preparation of the FRMP is required to meet Government policy on flood risk management, and Ireland's obligations under the 2007 EU 'Floods' Directive.

The draft FRMP for UoM07 sets out the proposed strategy, actions and measures that are considered to be the most appropriate at this stage of assessment. The observations and views submitted as part of the consultation on the draft Plan will be reviewed and taken into account before the Plan is submitted for comment, amendment or approval by the Minister. Some changes may arise as a result of the consultation process.

## **ENVIRONMENTAL BASELINE**

Baseline environmental information was gathered for UoM07 within the Eastern CFRAM study area. The baseline has been divided by topic into the issues requiring assessment under the SEA legislation, including additional topic areas requested by the OPW. The purpose of this information is to demonstrate the level of baseline environmental information to be used in the assessment of potential impacts of the Plan FRM options. This baseline information will form the indicators which the FRM options will have the potential to impact upon. Future variation in these indicators due to the FRMPs will be monitored as part of the Plan and SEA review.

## **Biodiversity, Flora and Fauna**

The UoM07 study area is of high ecological value, with a variety of habitats and species of conservation concern which are protected under a number of European and national designations. There are eight SACs in the study area, of which two are classed as “water dependent” SACs. There are two SPAs in the study area, of which one is classed as “water dependent” SPA. There is one Ramsar Site in the study area (Raheenmore Bog). There are eight NHAs and 23 proposed Natural Heritage Areas (pNHA) in the study area. There is one wildfowl sanctuary in the UoM07 study area (Boyne Estuary). There is one nature reserve in the study area (Raheenmore Bog)

## **Population / Human Health**

The 2011 census data held by the Central Statistics Office (CSO, 2011) shows a total population for the UoM07 study area of approximately 217,500. Population has increased in the study area since the previous census in 2006. In terms of people at risk of flooding, the FRMP is using the number of residential properties at risk of flooding as an indicator for the risk to the population and human health. Within UoM07, the average number of persons per household ranges from 2.78 to 2.97 (CSO, 2011). Within each of the AFAs in UoM07 there is also the potential risk of flooding to high vulnerability sites.

## **Geology, Soil and Landuse**

The geology of the UoM07 consists of mostly dark limestone and shale, while massive unbedded lime-mudstone has a large presence in the southern half of the UoM. A number of Irish Geological Heritage (IGH) sites are within or in the vicinity of an AFA in UoM07. Deep well-drained minerals derived from mainly calcareous parent materials, including grey brown podzolics and brown earth soils, are distributed over significant parts of UoM07 (particularly the southern two thirds of the UoM). Agricultural lands comprise nearly 90% of the UoM07 with the majority used for pasture (79%) to graze dairy cows, cattle, and sheep. However, there are also large areas of arable land, used for the production of grains, fruit, vegetables, poultry and pigs. Peat bogs comprise the next most common land use, covering around 3% of the land area. Drainage of bog lands and peat extraction activities potentially lead to large quantities of peat silt being discharged to the receiving waters.

## **Water**

The Water Framework Directive (WFD), similar to the Floods Directive, supports the management of water resources on a catchment wide basis, however focuses on water status rather than flood risk management. All waterbodies are classified under the WFD according to their chemical, biological and hydromorphological status. In UoM07, 29% of rivers, 55% of lakes, and 100% of coastal and transitional water bodies were classified as being of satisfactory condition in the WFD first cycle Eastern River Basin Management Plan. Five lakes and sections of six different rivers in UoM07 are designated as Drinking Water Lakes/Rivers. There is a designated bathing water in the study area, which is inland (freshwater) at Lough Lene. There are 28 Industrial Emission Directive (IED) sites within the area, flooding of which has the potential to generate new pathways for pollutants to reach rivers and other waterbodies and result in failure to achieve WFD objectives. In addition, 93 km of the River Boyne is designated as a Salmonid River. All waterbodies within UoM07 need to either remain at

Good/High Status or improve to at least Good Status under the WFD. Furthermore, it is vital that designated drinking waters and salmonid water bodies are not negatively impacted upon by the development of FRM Options.

### **Air**

Due to the lack of potential issues with Air, and in line with all other CFRAM studies in Ireland, the Air topic was scoped out of the SEA process during the SEA Scoping Stage and will not be assessed within this environmental report.

### **Climate**

Within Ireland the predicted impacts of climate change are likely to include increases in the frequency and intensity of rainfall, increases in peak flows, a rise in sea levels and increased storminess and coastal squeeze impacts on biodiversity associated with sea-level rise. There is a strong likelihood of increased fluvial and coastal flooding resulting from the effects of climate change and FRM Measures will need to be adaptable to future flood risk.

### **Material Assets**

The UoM07 study area has 12 km of designated river waterways for the abstraction of drinking water and five drinking water lakes. There are also 69 water treatment plants and 30 waste water treatment facilities within the study area. The area is well serviced by transport infrastructure, with 6,280 km of roads and 110 km of this being motorway. There are two train stations (Drogheda and Innfield), two airfields (Ballyboy and Trim) and one port (Drogheda) in the study area.

Flooding of transport infrastructure has the potential to cause disruption to movements of residents and commuters which could have a short-term impact on the local economy as well as potentially causing damage which could have longer-term impacts as repairs are undertaken. Other potentially relevant infrastructure features within the UoM07 study area that could be impacted by flooding and flood risk management include 49 Eircom exchanges and three large renewable projects (wind farms). Flooding of these assets could result in disruptions to the provision of services to communities within the study area.

### **Cultural, Architectural and Archaeological Heritage**

The UoM07 study area hosts a variety of archaeological and architectural heritage sites which are afforded varying levels of protection under national legislation such as the National Monuments Acts (1930 to 2004) and the Planning and Development Act (2000). There is one World Heritage Site within the study area, the Brú na Bóinne (“Bend of the Boyne”) complex of megalithic sites, including the prehistoric monument at Newgrange. The “Early Medieval Monastic Sites” (including those at Kells (Meath)), and the “Royal Sites of Ireland” including Tara (Meath) are also on the UNESCO “tentative list” for future recognition. There are currently 2,786 recorded monuments within the study area under the Records of Monuments and Places (RMP). There are 2,141 records in the National Inventory of Architectural Heritage (NIAH) within the study area. There are 53 sites subject to a Preservation

Order (including four temporary sites) within the UoM07 study area, eight of which are assessed as being at “high” vulnerability and 14 at “moderate” vulnerability of flooding.

### **Landscape**

The surface of UoM07 is predominantly lowland. The upland areas border the UoM include Monercrom at 338m in south east Cavan, Sliabh na Caillighe at 276m in western Meath, and Mount Oriel at 244m in southern Louth. The AFAs within UoM07 are within the landscapes of counties Kildare, Offaly, Meath and Louth. The Brú na Bóinne UNESCO site is just upstream of the Drogheda AFA, which has a development buffer zone. The Boyne and Mattock Valleys, and the Lower Boyne Valley are considered to be sensitive landscapes of international importance that are to be conserved.

### **Fisheries, Aquaculture and Angling**

The River Boyne is a designated salmonid river. Lamprey is also known to be present in the river. In addition, it is also known as a good fishing river for sea trout. Licensed mussel beds are found in the lower stretches of the River Boyne. In the transitional waters of this UoM at the River Boyne Estuary, 23 species of fish were captured during 2012, including five-bearded rockling, flounder, lesser sandeel, pollack, sand goby and three-spined stickleback. Other commercially important fish recorded included brown trout, sea trout, flounder, pollack, salmon and cod. The Boyne was classified as “good” status under the Transitional Fish Classification Index (TFCI) in 2012. The Blackwater, a tributary of the Boyne, is known for good stocks of wild brown trout. Another area within UoM07 popular for fishing is in the Royal Canal, where coarse fishing takes place.

The Irish Sea is an important fishery and the nearshore area is fished for several species including scallops, lobsters, prawns, whelks and periwinkles. Although there is only a small amount of coastline within the UoM07, it offers sea angling. Anglers have a variety of fishing types available, including inshore, small boat, charter boat, rock fishing or flyfishing.

### **Amenity, Community and Socio-Economics**

In the 2011 census, over 75,000 residential properties were identified in the UoM07 study area. The most densely populated areas are found in Navan and Ballyboggan (south of Kinnegad). Health care facilities in the UoM07 study area include five hospitals and 26 health centres distributed throughout the region. The study area also includes 11 nursing homes and seven residential care homes for the elderly, many of which are also associated with hospitals or health centres. There are 122 primary schools and 24 post-primary schools in the UoM07. There are seven fire stations, 22 Garda stations and one civil defence site in the UoM07 study area.

The UoM07 study area is an important amenity, tourism and recreation resource. The study area offers a variety of natural coastal and inland landscapes, which provide tourism and recreation opportunities and attractions. There are around 123 km of amenity walks within the study area and around 8 km of on-road cycle trails. There are cycle paths and greenways alongside many of the waterways within the UoM. There is one designated bathing waters in the study area, which is inland

(freshwater) at Lough Lene. There is one statutory Nature Reserves within the study area (Raheenmore Bog), which provides valuable amenity areas. There is one main horse racecourse within the study area, at Navan. The Brú na Bóinne complex of megalithic sites, including the prehistoric monument at Newgrange, which attracts up to 200,000 visitors a year, has been granted status as a UNESCO World Heritage Site, one of only two in Ireland. The UoM07 study area encompasses many popular tourist attractions, including Battle of the Boyne Visitor Centre (Newgrange and Knowth), Solstice Arts Centre, Knowth Passage Tombs and The TLT Concert Hall & Theatre. There are 17 galleries, museums and theatres in the study area.

### **Evolution of the Environment in the Absence of the Plan**

In the absence of the Plan, i.e. the Do Nothing Scenario, flood risk management in the UoM would continue to be addressed on an ad hoc basis, with no prioritisation and overarching management of flood risk management activities. There would also be no establishment of flood risk and flood hazard with detailed hydrological and hydraulic modelling for all areas at risk in the UoM. There is still likely to be benefits to both protected sites and species, and the wider aquatic environment and water quality, with the implementation of measures to achieve good ecological status or potential under the WFD and the continued development of specific biodiversity action plans under the National Biodiversity Plan and related plans. Without the FRMP however the risk of flooding to these habitats and species will remain and may adversely impact biodiversity, and the risk of flooding to water quality will remain with potential sources of pollution having not been identified and are therefore less likely to be managed in the future.

The population trend within UoM07 is likely to be one of increasing growth in the future, broadly matching the national average. In the absence of the FRMP there will be increasing risk to human health and high vulnerability properties as the population expands and development increases, as there will likely be increased development in areas of potential flood risk, as the risk has never been established and quantified. This risk to life may be heightened with higher numbers of vulnerable young and old people in the UoM. While it is unlikely that the general pattern of land use will be substantially changed in the future, the increasing population will continue to drive a requirement for new housing and the expansion of developed areas. Increases in population pose pressures on agriculture to increase productivity, which coincides with the Irish agricultural industry also aiming to provide more goods to the global market.

The implementation of, or lack of, the FRMP is not expected to affect future climate trends, such as increases in the frequency and intensity of rainfall, increases in peak flows, a rise in sea levels and increased storminess. However any future flood risk management activities planned without the FRMP may not be taking into account of the required adaptability to climate change.

Without the FRMP there is the potential for flood risk to not be understood or adequately taken into account in the development of future infrastructure. In the absence of the FRMP there may be some archaeological and architectural heritage features within AFAs that will be lost or damaged from flood

events. There may also be some archaeological and architectural heritage features along river banks and river beds within AFAs that will remain in situ and undiscovered, as there is less likely to be the development of FRM measures in these areas. The existing landscape is not expected to change significantly in the future, however if population targets under the National Spatial Strategy are reached, urban expansion is likely to place localised pressure on the landscape. In the absence of the FRMP any future FRM activities that take place may however be carried out on a local basis, without an appreciation of activities in the wider UoM.

The absence of the FRMP is unlikely to influence the future tourism trends in Ireland. The future demands of the growing population will however need more amenity areas, community facilities and places of employment. The existing and required amenity areas, community facilities, commercial properties and tourist destinations will need to be protected from flood risk. In the absence of the FRMP the existing flood risk to these sites will not have been established and the management of this risk will be done on an ad hoc or reactionary basis by the relevant authority. Also these areas, facilities and properties may be planned in inappropriate locations, putting them at a higher risk of flooding.

## **REVIEW OF RELEVANT PLANS, PROGRAMMES AND POLICIES**

A review of the Plans, Policies and Programmes relevant to the FRMP was carried out at International, European, National, Regional and Sub-Regional scales. This exercise was carried out with a view to establishing the hierarchical position of the FRMP, the influence these Plans and Programmes will have on the FRMP and how the FRMP will interact with the objectives of these other Plans.

## **ENVIRONMENTAL OBJECTIVES, TARGETS AND INDICATORS**

It is a requirement of the EU 'Floods' Directive [Art. 7(2)] as transposed through SI No. 122 of 2010 [Section 15(2)] that Flood Risk Management Objectives be established as part of the planning process. The Flood Risk Management Objectives set out the goals the FRMP is aiming to achieve. The objectives are focussed at considering potential benefits and impacts across a broad range of issues including human health, the environment, cultural heritage and economic activity. This broadly aligns with the environmental considerations defined for SEA. Many of the FRMP objectives therefore coordinated directly with the SEA objectives as were directly compatible. The FRMP objectives / sub-objectives that match the SEA issues are shaded green in **Table 1**.

**Table 1 FRMP Objectives used in MCA and their SEA Compatibility**

CRITERIA		OBJECTIVE	SUB-OBJECTIVE		Related SEA Topic
<b>1</b>	<b>Social</b>	<b>a</b> Minimise risk to human health and life	i)	Minimise risk to human health and life of residents	<b>P/HH</b>
			ii)	Minimise risk to high vulnerability properties	<b>P/HH</b>
		<b>b</b> Minimise risk to community	i)	Minimise risk to social infrastructure and amenity	<b>ACS</b>
			ii)	Minimise risk to local employment	<b>ACS</b>
<b>2</b>	<b>Economic</b>	<b>a</b> Minimise economic risk	i)	Minimise economic risk	
		<b>b</b> Minimise risk to transport infrastructure	i)	Minimise risk to transport infrastructure	<b>MA</b>
		<b>c</b> Minimise risk to utility infrastructure	i)	Minimise risk to utility infrastructure	<b>MA</b>
		<b>d</b> Minimise risk to agriculture	i)	Minimise risk to agriculture	<b>S</b>
<b>3</b>	<b>Environmental</b>	<b>a</b> Support the objectives of the WFD	i)	Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives.	<b>W</b>
		<b>b</b> Support the objectives of the Habitats Directive	i)	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones.	<b>BFF</b>
		<b>c</b> Avoid damage to, and where possible enhance, the flora and fauna of the catchment	i)	Avoid damage to or loss of, and where possible enhance, nature conservation sites and protected species or other know species of conservation concern.	<b>BFF</b>

		<b>d</b>	Protect, and where possible enhance, fisheries resource within the catchment	i)	Maintain existing, and where possible create new, fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species.	<b>F</b>
		<b>e</b>	Protect, and where possible enhance, landscape character and visual amenity within the river corridor	i)	Protect, and where possible enhance, visual amenity, landscape protection zones and views into / from designated scenic areas within the river corridor.	<b>L</b>
		<b>f</b>	Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting	i)	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	<b>H</b>
				ii)	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	<b>H</b>
<b>4</b>	<b>Technical</b>	<b>a</b>	Ensure flood risk management options are operationally robust	i)	Ensure flood risk management options are operationally robust	
		<b>b</b>	Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options	i)	Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options	
		<b>c</b>	Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change	i)	Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change	<b>C</b>

BFF – Biodiversity, Flora, Fauna. P/HH – Population, Human Health. S – Soils, Geology, Landuse. W – Water. MA – Material Assets. H – Heritage. L – Landscape. F – Fisheries. ACS – Amenity, Community, Socio-Economics.

## ALTERNATIVES

The viable alternatives that are available to the FRMP to manage flood risk can be classified into structural options and non-structural options. The majority of the non-structural options proposed do not in their own right manage flood risk as a stand-alone method have been brought forward as complimentary options. These options are generally applied across a larger scale, e.g. the whole UoM, however flood forecasting and warning, and land use management will only be applicable to suitable catchments of the UoM.

- Do-Nothing;
- Sustainable Planning and Development Management - Proper application of the Guidelines on the Planning System and Flood Risk Management by the planning authorities;
- Sustainable Urban Drainage Systems (SuDS);
- Voluntary Home Relocation;
- Preparation of Local Adaptation Plans by Local Authorities;
- Land Use Management and Natural Flood Risk Management Measures;
- Maintenance of Arterial Drainage Schemes;
- Maintenance of Drainage Districts;
- Flood Forecasting and Warning;
- Review of Emergency Response Plans for Severe Weather by Local Authorities;
- Promotion of Individual and Community Resilience;
- Individual Property Protection;
- Flood-Related Data Collection, and
- Minor Works Scheme.

The engineering methods that were assessed as being most appropriate for managing flood risk as a stand-alone method have been brought forward into the FRMP as either stand-alone or in-combination with other FRM methods. These 'FRM options' are generally applied on the AFA scale. **Table 2** demonstrates the engineering options (alternatives) that were considered for UoM07. In each case the preferred option has been highlighted in green. If an AFA was discovered to have no flood risk, or no options could be found that were technically and economically feasible, no further assessment took place for the FRMP and therefore no further assessment took place for the SEA and NIS.

**Table 2 FRM Options for UoM07**

Spatial Scale	Name	Option Number	Description
Sub-Catchment	Boyne	0	No Options Technically and Economically feasible.
AFA	Athboy	0	No Options Technically and Economically feasible.
AFA	Ballivor	0	No Options Technically and Economically feasible
AFA	Baltray	1	Hard Defences (Improve existing)
AFA	Baltray	2	Hard Defences (New)
AFA	Drogheda	1	Hard Defences and Flow Diversion
AFA	Drogheda	2	Hard Defences, Flow Diversion and Improving Channel Conveyance
AFA	Drogheda	3	Hard defences, flow diversion and storage
AFA	Edenderry	0	No Options Technically and Economically feasible
AFA	Johnstown Bridge	0	No Options Technically and Economically feasible
AFA	Longwood	0	No Options Technically and Economically feasible
AFA	Mornington	1	Hard Defences
AFA	Navan	1	Hard Defences and Do Minimum
AFA	Trim	0	No Options Technically and Economically feasible

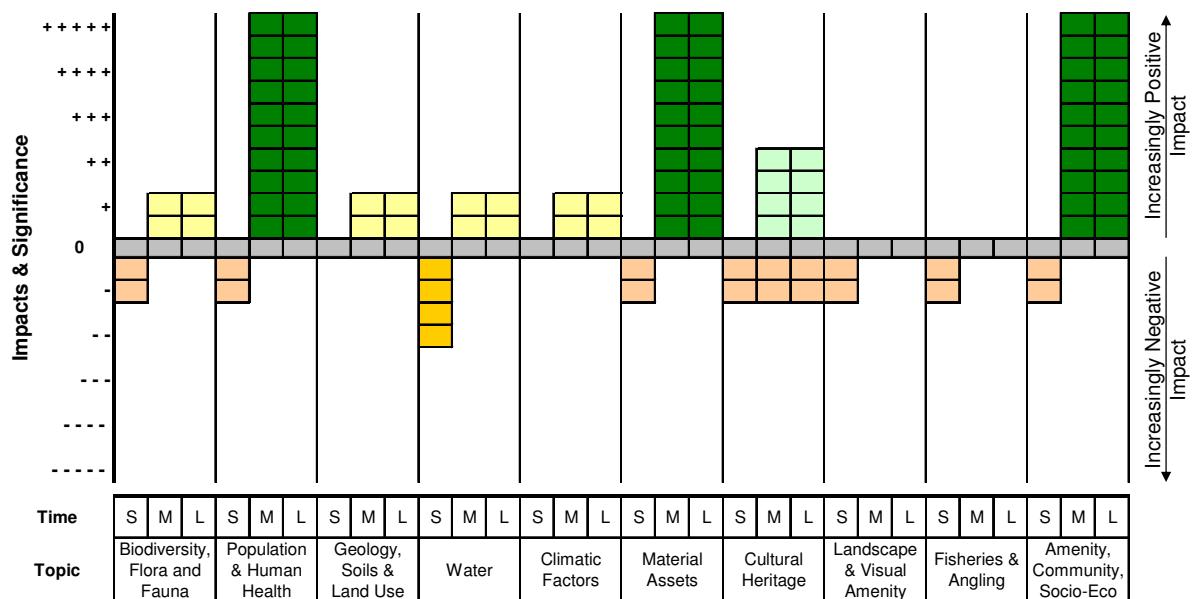
## ASSESSMENT

The methodologies for the many levels of environmental assessment that have been undertaken for the UoM07 FRMP are described in **Section 4** of this Environmental Report. The assessments were carried out by environmental baseline categories and were assessed to give the positive and negative effects, their significance and permanence, any secondary, cumulative or synergistic effects, and any inter-relationship of effects. Each Alternative was given an impact summary table to provide a summary visual representation of the scale of potential positive and negative effects. The below lists the assessment outcomes for the AFAs in UoM07 and provides a summary of the potential environmental impacts of the preferred options.

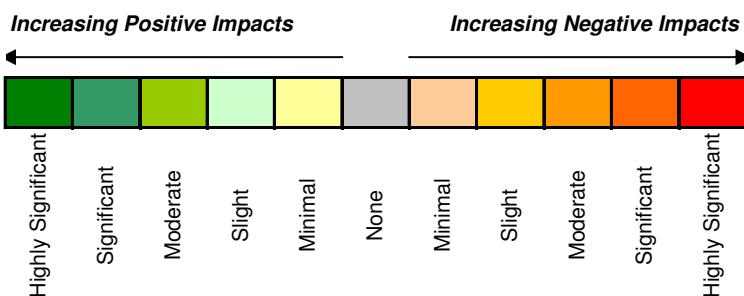
**Athboy** - It has been assessed that the level of risk in Athboy is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Athboy AFA in this SEA Environmental Report.

**Ballivor** - It has been assessed that the level of risk in Ballivor is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Ballivor AFA in this SEA Environmental Report.

**Baltray** - Option 2 - Hard defences (new line). At risk properties would be protected from a series of flood embankments and walls, largely constructed along a new line set back from the existing line of Hard Defences. These hard defences would protect to the 1% AEP fluvial event and the 0.5% AEP coastal event with an average height of 1.33m and a total length of 1.05km.



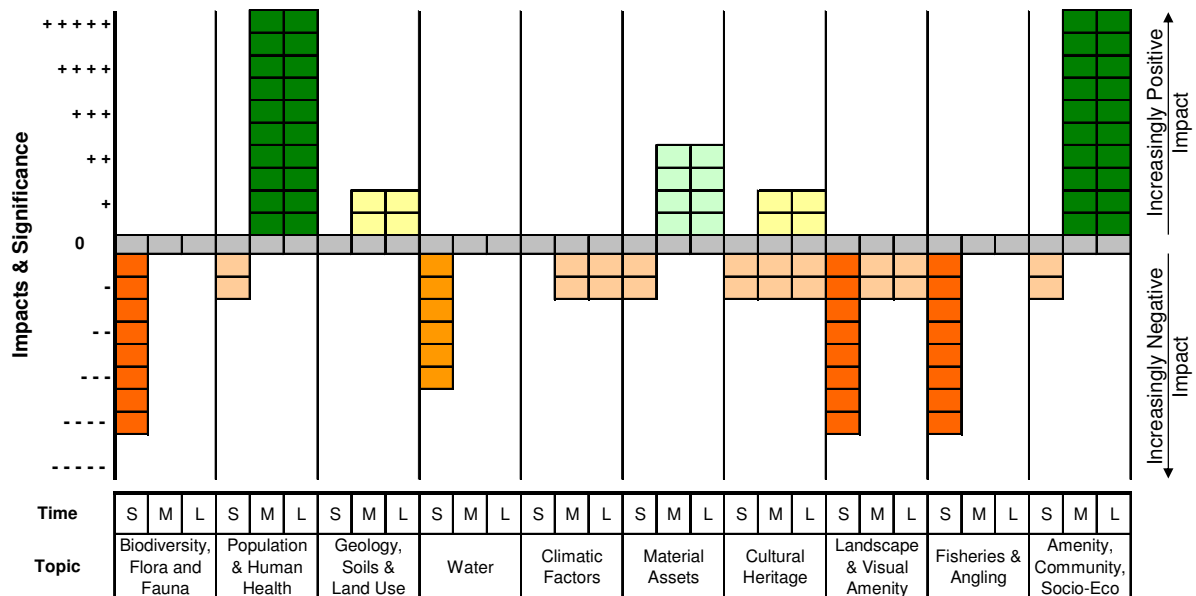
### Key



There is anticipated to be short term, minor negative environmental impacts from construction of hard defences set back from the estuary. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed retreat of the defences at Baltray could provide medium and long term benefits to the environment by providing greater areas of wetland habitat and a greater resilience to the potential impacts of climate change. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and

mitigation measures suggested, the FRM measures at Baltray AFA will not have a significant adverse impact on European sites.

**Drogheda** - Option 1 – Hard Defences and Flow Diversion. At risk properties would be protected by a series of flood embankments and walls and a Flow Diversion channel at Flood Cell 5. These Hard Defences would protect to the 1% AEP flood event with an average height of 2.03 m and a total length of 4.7 km. Some of these Hard Defences would be up to 4 m in height above the existing ground level in Flood Cell 2. The Hard Defences would also require some sealing of manholes and localised raising of roads to provide continuous defence in places.



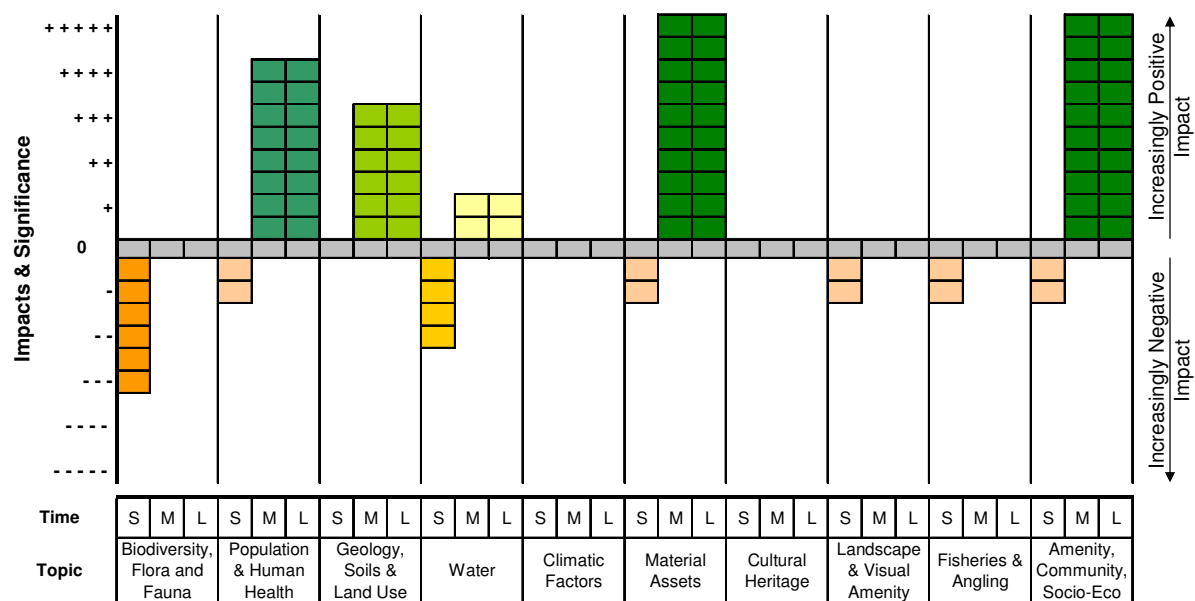
There is anticipated to be short term, slight to significant negative impacts to the biodiversity, water, fisheries and angling with the construction of hard defences and a flow diversion channel adjacent to designated areas and within a sensitive waterbody. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. There is likely to be medium and long term positive impacts with reduced flooding in Flood Cell 5, a greater resilience to the potential impacts of climate change and increased protection to a number of NIAH buildings, monuments and other architectural features from flooding. There is the potential for short term significant negative and medium and long term minimal negative visual impacts on localised views and views in the town of the River Boyne. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be slight to highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Drogheda AFA will not have a significant adverse impact on European sites.

**Edenderry** - It has been assessed that the level of risk in Edenderry is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Edenderry AFA in this SEA Environmental Report.

**Johnstown Bridge** - It has been assessed that the level of risk in Johnstown Bridge is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Johnstown Bridge AFA in this SEA Environmental Report.

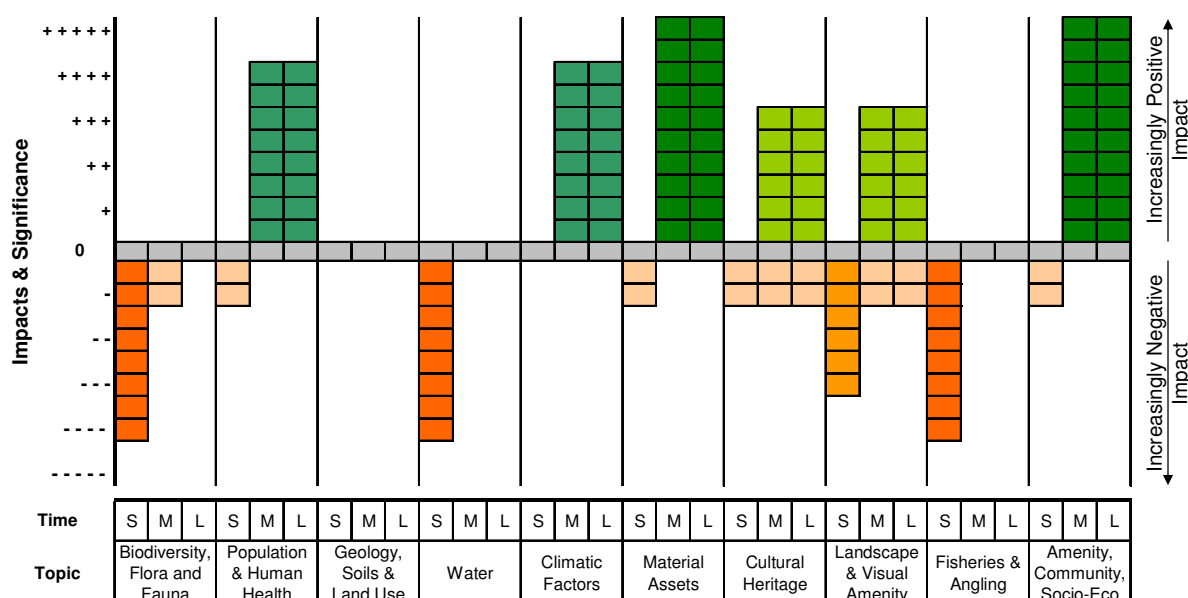
**Longwood** - It has been assessed that the level of risk in Longwood is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Longwood AFA in this SEA Environmental Report.

**Mornington** - Option 1 - Hard Defences. At risk properties would be protected from a series of flood embankments and walls. These hard defences would protect to the 1% AEP fluvial flood event to the 0.5% AEP coastal flood event with an average height of 1.04m and a total length of approximately 530m.



There is anticipated to be short term, minimal to moderate negative impacts to the biodiversity, water, fisheries and angling with the construction of hard defences set back from designated areas. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. There is likely to be medium and long term positive impacts with a significant area of agricultural land being protected from flooding. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be slight to significant to highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Mornington AFA will not have a significant adverse impact on European sites.

**Navan** - Option 1- Hard Defences and do minimum. At risk properties would be protected from a series of flood embankments, walls, road raising and clearance of a 500m reach of the Abbeylands Tributary. The hard defences would protect to the 1% AEP flood event with a total wall length of 889m, a total embankment length of 340 m and a total length of 986 m of road to be raised.



There is anticipated to be short term, significant negative impacts to the biodiversity, water, fisheries and angling with the construction to designated areas and a sensitive waterbody. There is likely to be medium and long term benefits with this option in place, with a greater resilience to the potential impacts of climate change and increased protection from flooding for several NIAH buildings. There is the potential for short term moderate negative visual impacts on local views during the construction phase. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be significant to highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Navan AFA will not have a significant adverse impact on European sites.

**Trim** - This AFA is affected by fluvial flooding, therefore all methods were screened. A number of methods including Individual Property Protection and Hard Defences were deemed potentially viable from the screening process for Trim. One option was identified for the Trim AFA, which consists of individual property protection and flood forecasting and warning. As there is low risk to properties during the 1% AEP fluvial flood event in Trim, and hence a small value of benefit to achieve, no economically viable solution could be found at AFA level.

## APPROPRIATE ASSESSMENT

An AA Screening was undertaken for the Eastern CFRAM Study in late 2015 / early 2016, which demonstrated the potential European sites that may be negatively impacted upon by FRM activities in UoM07. A Stage 2 AA has been undertaken in parallel with the SEA process and a NIS has been

prepared. The findings of the AA were used to guide the development of the alternatives to be considered as part of the SEA. The findings of the NIS have been integrated into this SEA Environmental Report and subsequently into the FRMP. The AA for the FRMP investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified a range of mitigation and avoidance measures have been suggested to help eliminate them by design or reduce them to acceptable levels. As a result of this AA it has been concluded that, provided the avoidance and mitigation measures suggested are adopted at the project stage, the proposed draft FRM measures in the UoM07 FRMP will not have a significant adverse impacts on any European sites.

## **MITIGATION AND MONITORING**

A number of mitigation measures for potential impacts of implementing the FRMP with the available Alternatives have been established for both the SEA and AA. Examples of these are timings of construction activities to prevent disturbance and good design and placement of infrastructure to minimise any long term impacts.

Article 10 of the SEA Directive requires that monitoring be carried out to identify at an early stage any unforeseen adverse effects due to implementation of the FRMP. Monitoring will focus on aspects of the environment that are likely to be significantly impacted by the FRMP. Where possible, indicators have been chosen based on the availability of the necessary information and the degree to which the data will allow the target to be linked directly with the implementation of the FRMP. The proposed monitoring programme is based on the Targets and Indicators established in the SEA Objectives. This proposed monitoring has been adopted into the draft FRMP and will be undertaken during development of the 2<sup>nd</sup> cycle of the FRMP.

## **NEXT STEPS**

The next step in the SEA and FRMP process will be a consultation period, which will take the form of Public Consultation Days, documents being made available for viewing at Local Authority and OPW premises and the documents being made available digitally via the Eastern CFRAM Study website. Comments on the FRMP, SEA and NIS are welcomed throughout this period, so that improvements can be made to the FRMP or environmental assessments.



# **1 INTRODUCTION**

## **1.1 BACKGROUND**

This Strategic Environmental Assessment (SEA) Environmental Report has been prepared in accordance with the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 [S.I. 435/2004] and the Planning and Development (Strategic Environmental Assessment) Regulations 2004 [S.I. 436/2004], and their recent amendments of European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2011 [S.I. 200/2011] and the Planning and Development (Strategic Environmental Assessment) (Amendment) Regulations 2011 [S.I. 201/2011].

The purpose of this Environmental Report is to provide a formal and transparent assessment of the likely significant impacts on the environment arising from the Flood Risk Management Plan (FRMP) for Unit of Management 07 (UoM07) under the Eastern Catchment-based Flood Risk and Management (CFRAM) Study, including consideration of reasonable alternatives.

## 2 FLOOD RISK IN IRELAND

### 2.1 THE FLOODS DIRECTIVE

The EU Directive on the assessment and management of flood risks [2007/60/EC], often referred to as the Floods Directive, came into force in late 2007. This is a framework directive that requires Member States to follow a certain process, namely:

- Undertake a Preliminary Flood Risk Assessment (PFRA) by 22 December 2011, to identify areas of existing or foreseeable future potentially significant flood risk (originally referred to as 'Areas of Potential Significant Risk', or 'APSRs', but now referred to as 'Areas for Further Assessment', or 'AFAs')
- Prepare flood hazard and risk maps for the AFAs by 22 December 2013; and,
- Prepare flood risk management plans by 22 December 2015, setting objectives for managing the flood risk within the AFAs and setting out a prioritised set of measures for achieving those objectives.

The directive requires that the PFRA, flood maps and flood risk management plans are prepared in cooperation and coordination with neighbouring states in cross-border river basins, and with the implementation of the Water Framework Directive (WFD). The directive also requires that the PFRA and flood maps are published, and that public and stakeholder consultation and engagement is undertaken in the preparation of the flood risk management plans.

### 2.2 FLOODS DIRECTIVE APPLICATION IN IRELAND

The Floods Directive is being implemented in Ireland through the European Communities (Assessment and Management of Flood Risks) Regulations 2010 [S.I.122/2010], which appoints the OPW as the Competent Authority for the Plans. The Statutory Instrument also identifies roles for other organisations; such as the Local Authorities, Waterways Ireland and ESB, to undertake certain duties with respect to flood risk within their existing areas of responsibility.

In Ireland, the approach to implementing the directive has focused on a National Flood Risk Assessment and Management Programme. This was developed to meet the requirements of the Floods Directive, as well as to deliver on core components of the 2004 National Flood Policy. Pilot CFRAM studies have been undertaken since 2006 in the Dodder and Tolka catchments, the Lee Catchment, the Suir Catchment and in the Fingal / East Meath area.

CFRAM studies were subsequently commissioned at the scale of the River Basin Districts (RBDs) delineated for the first cycle of the implementation of the Water Framework Directive (WFD). The following eight River Basin Districts have been defined for the island of Ireland:

- North Western International RBD (IRBD);
- Neagh-Bann IRBD;
- North Eastern RBD;
- Western RBD;
- Eastern RBD;
- Shannon IRBD;
- South Eastern RBD;
- South Western RBD.

## 2.3 THE EASTERN CFRAM STUDY

Catchment-based Flood Risk Assessment and Management (CFRAM) Studies and their product – Flood Risk Management Plans (FRMPs) – are at the core of the national policy for flood risk management and the strategy for its implementation. The methodology featured in each CFRAM Study includes the collection of survey data and the assembly and analysis of meteorological, hydrological and tidal data, which are used to develop a suite of hydraulic computer models. Flood maps are one of the main outputs of the study and are the way in which the model results are communicated to end users. The studies assess a range of potential options to manage the flood risk and determine which, if any, is preferred for each area and will be recommended for implementation within the Flood Risk Management Plans (FRMPs). The CFRAM Studies will focus on areas where the risk is understood to be most significant.

Each study will provide for number of key stages:

- Data Collection & Surveying;
- Flood Risk Review;
- Hydrology Analysis;
- Detailed Hydraulic Modelling;
- Flooding Mapping;
- Development of Flood Risk Management (FRM) options;
- Strategic Environmental Assessment & Appropriate Assessment of the FRM options;
- Flood Risk Management Plan.

The objectives of CFRAM Studies are to:

- Identify and map the existing and potential future<sup>1</sup> flood hazard within the Study Area;
- Assess and map the existing and potential future flood risk<sup>2</sup> within the Study Area;

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<sup>1</sup> Potential future flood hazards and risk include those that might foreseeably arise (over the long-term) due to the projected effects of climate change, future development and other long-term developments.

<sup>2</sup> Flood risk is defined as a combination of probability and degree of flooding and the adverse consequences of flooding on human health, people and society, the environment, cultural heritage and economic activity and infrastructure.

- Identify viable structural and non-structural options and measures for the effective and sustainable management of flood risk in the Areas for Further Assessment (AFA) and within the Study Area as a whole, and
- Prepare a set of FRMPs for the Study Area, and undertake associated Strategic Environmental and, as necessary, Appropriate Assessment, that sets out the policies, strategies, measures and actions that should be pursued by the relevant bodies, including the OPW, Local Authorities and other Stakeholders, to achieve the most cost-effective and sustainable management of existing and potential future flood risk within the Study Area, taking account of environmental plans, objectives and legislative requirements and other statutory plans and requirements.

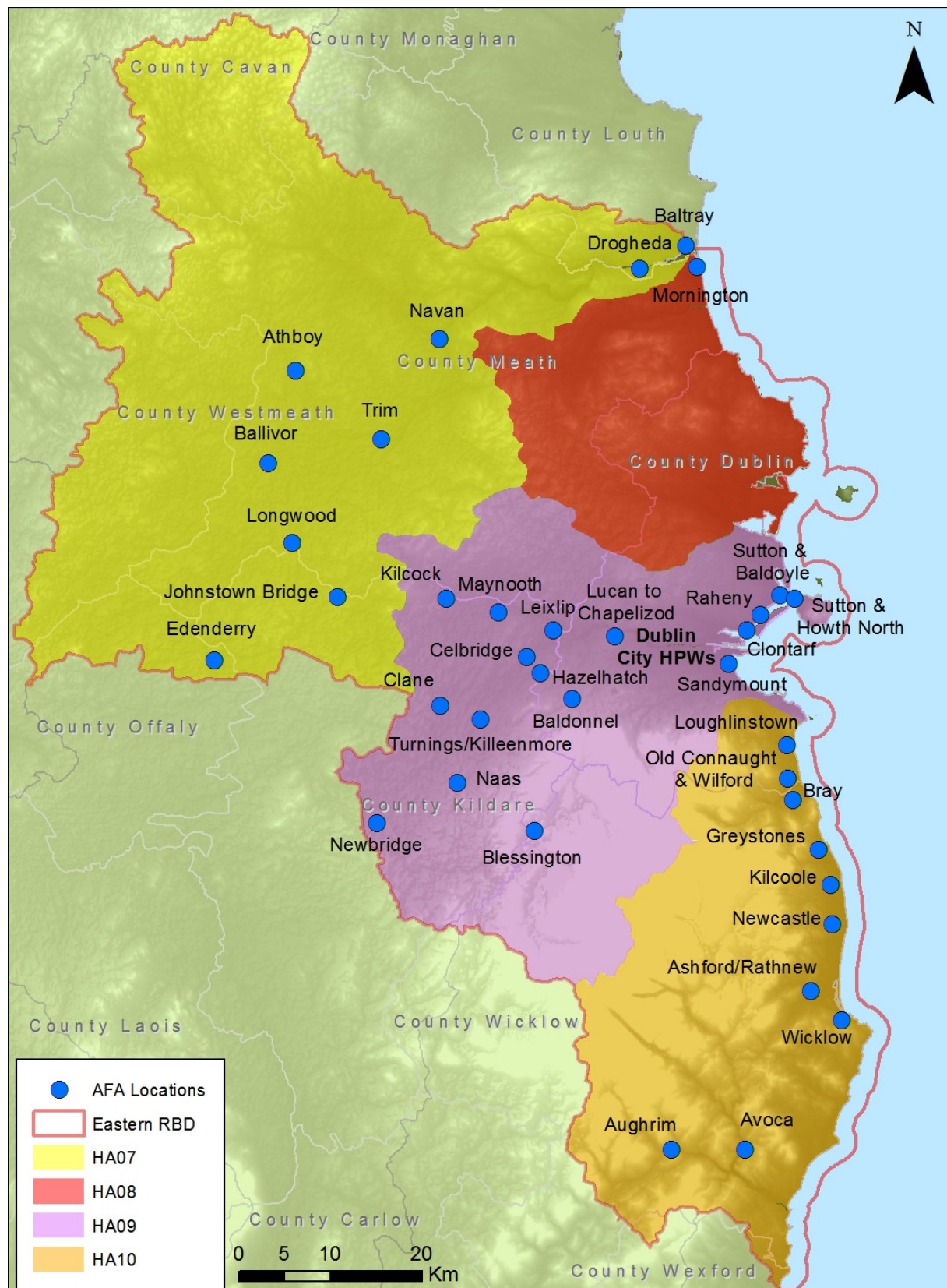
It is not an objective of the study to develop detailed designs for individual risk management measures.

The Eastern CFRAM study commenced in the Eastern District in June 2011 and will run until the end of 2016. With a land area of approximately 6,300 km<sup>2</sup>, the Eastern District accounts for one tenth of the land area of Ireland. It is home to rich agricultural land, holiday coastline, the city of Dublin and the towns which form the Greater Dublin Area and its commuter belt. Around 1.6 million people, 40% of Ireland's population, live in the eastern district with the majority living in the Greater Dublin Area (CSO, 2011).

The Local Authorities within the Eastern CFRAM study area are:

- |   |                                |
|---|--------------------------------|
| • Cavan County Council;                       | • Meath County Council;        |
| • Dublin City Council;                        | • Offaly County Council;       |
| • Dun Laoghaire / Rathdown<br>County Council; | • South Dublin County Council; |
| • Fingal County Council;                      | • Westmeath County Council;    |
| • Kildare County Council;                     | • Wexford County Council;      |
| • Louth County Council;                       | • Wicklow County Council.      |

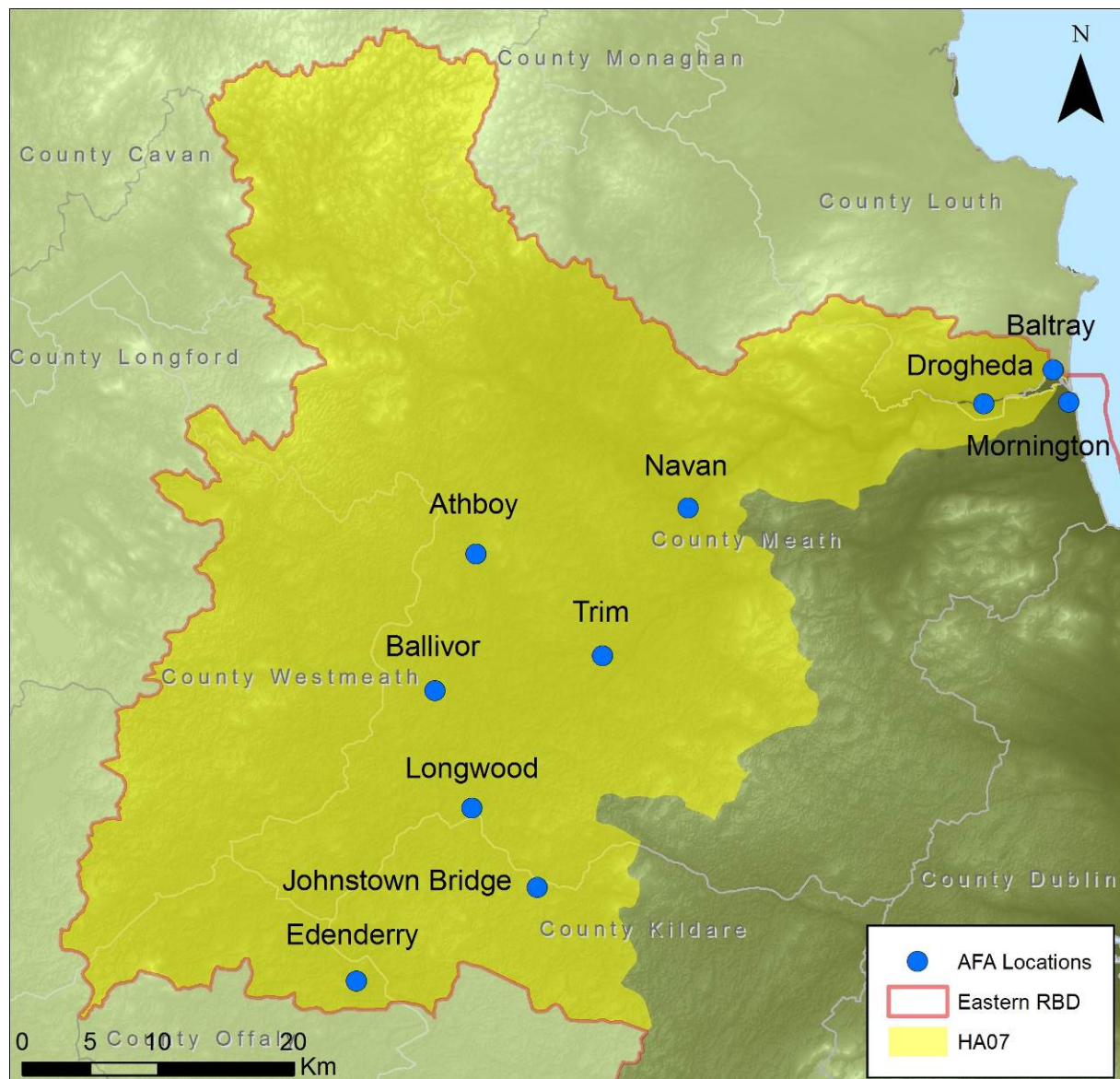
The Eastern CFRAM study area includes four Units of Management (UoM) / Hydrometric Areas (HAs). The UoMs constitute major catchments / river basins (typically greater than 1000km<sup>2</sup>) and their associated coastal areas, or conglomerations of smaller river basins and their associated coastal areas. The UoM boundaries match the HA boundaries within the Eastern CFRAM Study Area. These are UoM07 (Boyne), UoM08 (Nanny–Delvin), UoM09 (Liffey-Dublin Bay) and UoM10 (Avoca-Vartry). There is a high level of flood risk within the Eastern CFRAM Study area with significant coastal and fluvial flooding events having occurred in the past. The UoMs/HAs and the AFAs in the Eastern RBD are shown in **Figure 2.1**.



**Figure 2.1 Eastern CFRAM Study area, UoMs and AFAs**

## 2.4 UOM07

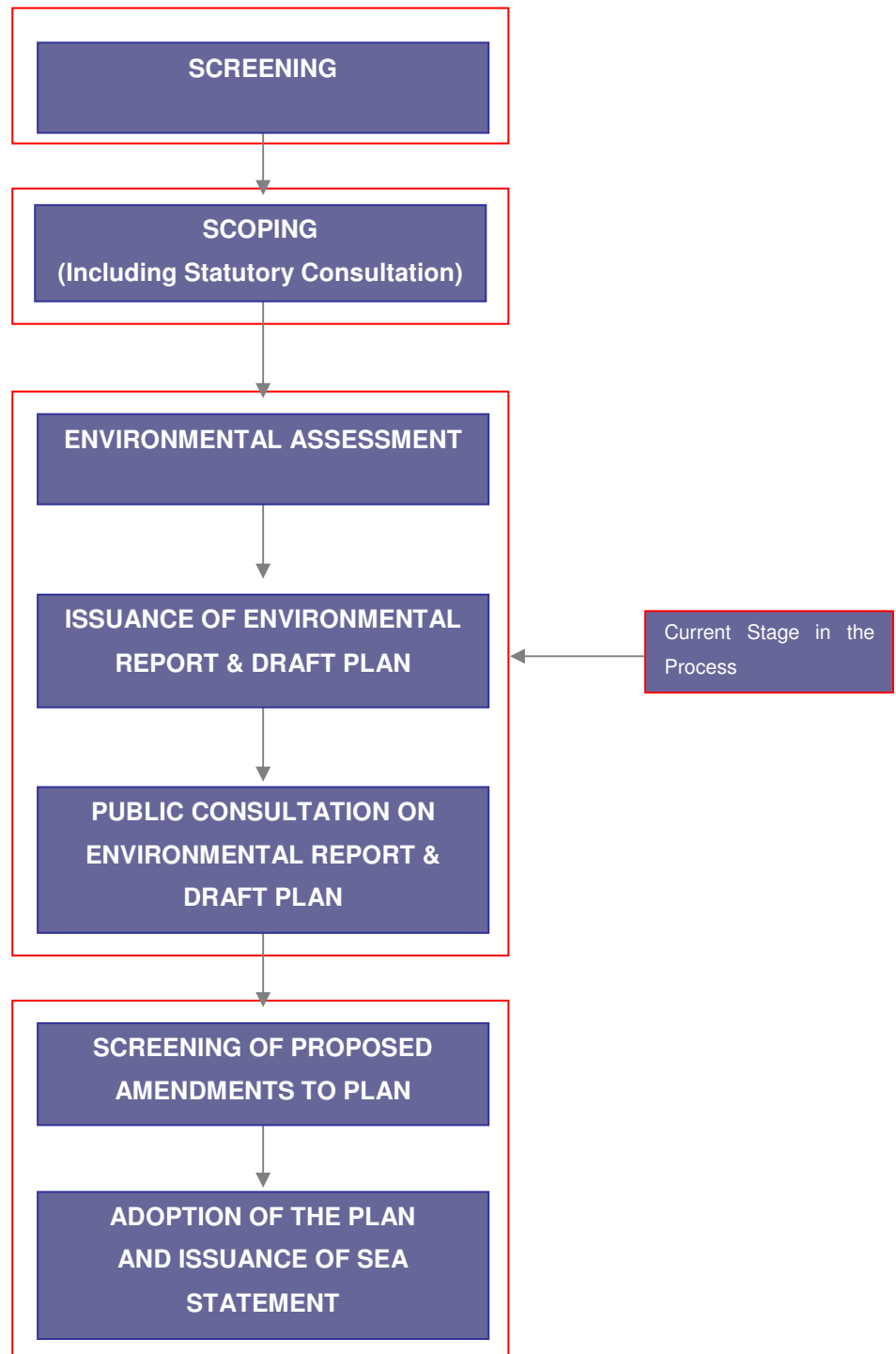
UoM07 covers an area of approximately 2,695 km<sup>2</sup> and includes parts of counties Louth, Cavan, Meath, Westmeath, Offaly, and Kildare. There are two principal rivers within UoM07, the River Boyne which rises in the south west of the area and flows north eastwards through Trim and Navan to its estuary at Drogheda, and the River Blackwater, which rises in the northwest of the area and joins the Boyne in Navan. Other significant rivers within UoM07 are the Skane River, River Deel, Stonyford River, Athboy/Tremblestown River and a second Blackwater River in Co Kildare. Within UoM07 there are 10 AFAs. The principal source of flood risk in UoM07 is fluvial flooding with nine of the ten AFAs being subject to some degree of fluvial flood risk. Tidal flood risk within UoM07 is limited to the Boyne Estuary where three AFAs, Baltray, Mornington and Drogheda are considered to have some element of coastal flood risk. For the remaining seven AFAs within UoM07, Navan, Trim, Athboy, Ballivor, Longwood, Johnstown Bridge, and Edenderry the potential flood risk is purely fluvial. UoM07 and the AFAs in the UoM are shown in **Figure 2.2**.



**Figure 2.2 UoM07 and AFAs**

### 3 STRATEGIC ENVIRONMENTAL ASSESSMENT

The SEA Directive requires that certain Plans and Programmes, prepared by statutory bodies, which are likely to have a significant impact on the environment, be subject to the SEA process. The SEA process is broadly comprised of the stages shown in **Figure 3.1**, which are given a summary description in **Table 3.1**.



**Figure 3.1** Overview of the SEA Process

**Table 3.1 Summary Description of Main Stages in the SEA Process**

Stages	Description	Status
Screening	Determines whether SEA is required for a Plan / Programme, in consultation with the designated statutory consultees.	Completed in 2011
Scoping	Determines the scope and level of detail of the assessment for the SEA, in consultation with the designated statutory consultees.	Completed in 2015
Environmental Assessment	Formal and transparent assessment of the likely significant impacts on the environment arising from the Plan / Programme, including all reasonable alternatives. The output from this is an Environmental Report which must go on public display along with the draft Plan.	Current Stage
SEA Statement	Summarises the process undertaken and identifies how environmental considerations and consultations have been integrated into the final Plan / Programme.	Anticipated Q4 2016

### 3.1 RESPONSIBLE AUTHORITY

The Floods Directive is being implemented in Ireland through the European Communities (Assessment and Management of Flood Risks) Regulations 2010 [S.I.122/2010], which appoints the OPW as the Competent (Responsible) Authority for the Flood Risk Management Plans. The Statutory Instrument also identifies roles for other organisations; such as the Local Authorities, Waterways Ireland and ESB, to undertake certain duties with respect to flood risk within their existing areas of responsibility.

### 3.2 STUDY TEAM

The study team that developed and created the FRMP, the SEA of the FRMP and the Appropriate Assessment (AA) of the FRMP was made up of qualified and experienced civil engineers, environmental engineers, hydrologists, hydraulic modellers, environmental scientists, cartographers, ecologists and surveyors. The SEA and AA professionals were involved throughout the FRMP development process, as outlined within **Figure 3.2**, which ensured that the wider environment was taken into consideration from the very earliest stages of the project, right the way through to the drafting of the FRMP. This iterative and dynamic working between the engineering and environmental professionals was developed with the aim of providing sustainable flood risk management options within the FRMP.



**Figure 3.2 Inter-relationships between the FRMP, SEA and AA Processes**

### 3.3 SCREENING FOR SEA

The OPW carried out a SEA Screening in 2011 for all the CFRAM Studies in Ireland and determined that SEA of the FRMPs would be required due to the following reasons:

- The FRMPs will be carried out for areas typically greater than 1,000km<sup>2</sup> and collectively they will cover the entire landmass of the Republic of Ireland. The outcomes of the FRMPs therefore have the potential to have a significant effect on the environment. Carrying out SEAs would allow for the early consideration of environmental issues and the incorporation of these issues into the formulation of the recommendations for flood risk management within the FRMPs.
- The FRMPs will form a framework for future projects and allocation of resources concerning reduction of flooding risk.
- The FRMPs will influence spatial plans at both regional and local level.

- The FRMPs are likely to require an assessment under Article 6 of the EU Habitats Directive.

The OPW SEA Screening from 2011 for all the CFRAM Studies in Ireland can be found at:

[www.eastcfрамstudy.ie](http://www.eastcfрамstudy.ie)

### 3.4 SCOPING FOR SEA

The SEA Scoping for the Eastern CFRAM Study took place in mid to late 2015. A SEA Scoping Report, a SEA Scoping Summary Report, an Environmental Constraints Report and a table of High Level Impacts of FRM Methods were produced as part of the scoping phase of the SEA for the Eastern CFRAM Study. The purpose of the Scoping Report and associated documents was to provide sufficient information on the Eastern CFRAM Study to enable the consultees to form an opinion on the appropriateness of the scope, format, level of detail, methodology for assessment and the consultation period proposed for the Environmental Report. More information on the Scoping Consultations can be found in **Section 4.7** of this report. All scoping documents for the Eastern CFRAM Study can be found at: [www.eastcfрамstudy.ie](http://www.eastcfрамstudy.ie)

#### 3.4.1 Statutory Consultees for SEA

Under Article 6 of the SEA Directive, the competent authority preparing the Plan or Programme (in this case the OPW) is required to consult with specific environmental authorities (statutory consultees) on the scope and level of detail of the information to be included in the Environmental Report. Under S.I. 200 of 2011 these five statutory consultees are established within the national legislation as being:

- Environmental Protection Agency (EPA);
- Department of Environment, Community and Local Government (DECLG);
- Department of Agriculture, Food and the Marine (DAFM);
- Department of Communications, Energy and Natural Resources (DCENR); and
- Department of Arts, Heritage and the Gaeltacht (DAHG).

There are not anticipated to be any transboundary impacts from implementation of the FRMPs for the Eastern CFRAM Study and therefore transboundary consultations were not undertaken during scoping.

### 3.5 APPROPRIATE ASSESSMENT

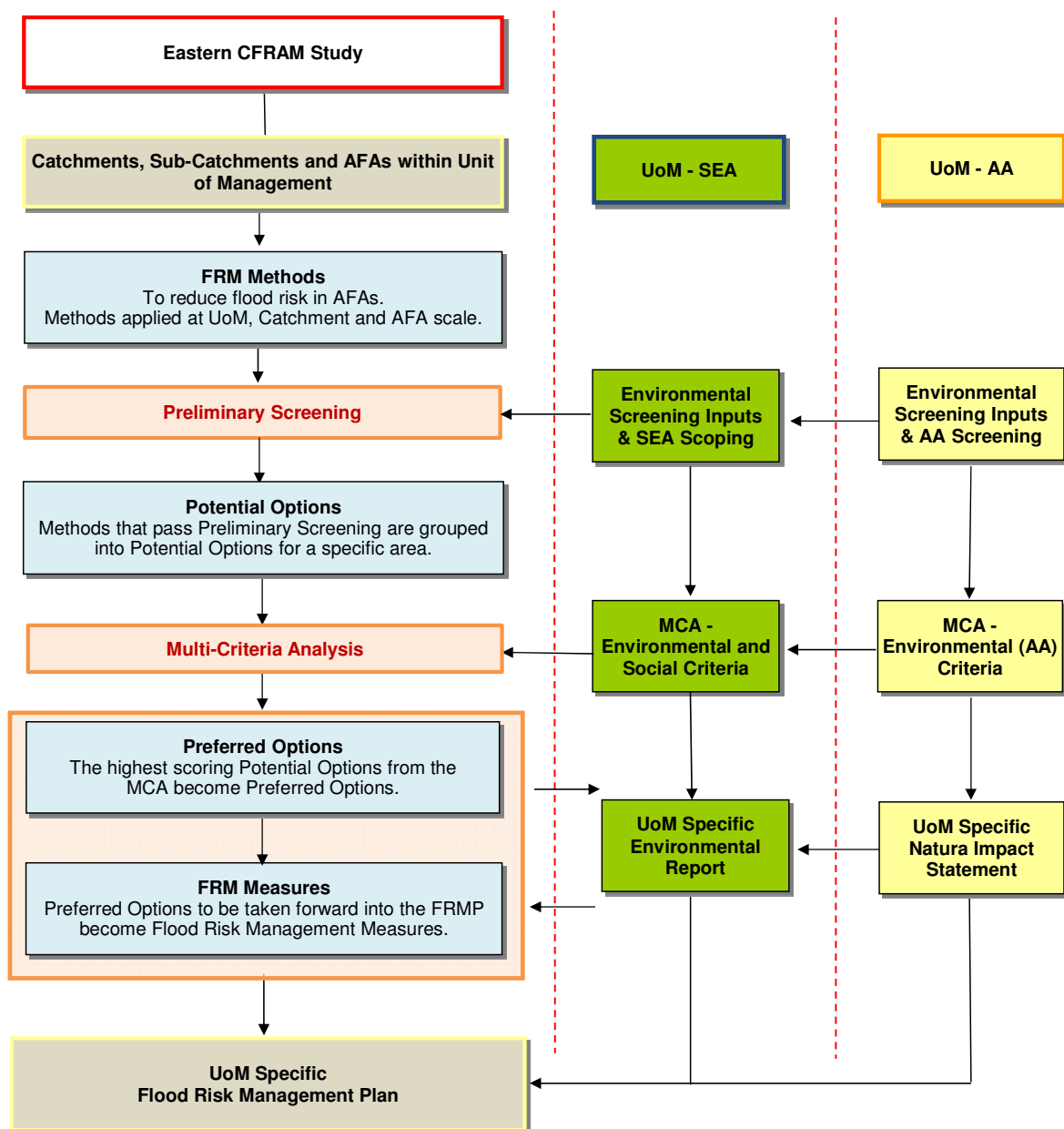
The Habitats Directive (Council Directive 92/43/EEC) on the conservation of natural habitats and of wild fauna and flora obliges member states to designate, protect and conserve habitats and species of importance in a European Union context. Article 6(3) of the Habitats Directive requires that “*Any plan*

*or project not directly connected with or necessary to the conservation of a site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives."* This directive was initially transposed into Irish Law through several pieces of legislation; however these have now been consolidated into the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). Any proposed plan or project in Ireland that has potential to result in a significant effect on a designated European Site will require an Appropriate Assessment. Case law has determined that the likelihood need not be great, merely possible, and that the precautionary principle must apply as set out in European Commission Guidance and as required by CJEU case law (i.e. C 127/02 '*Waddenzee*').

An AA Screening was undertaken for the Eastern CFRAM Study in late 2015 / early 2016, which demonstrated the potential European sites that may be negatively impacted upon by Flood Risk Management (FRM) activities in UoM07. A Stage 2 AA has been undertaken in parallel with the SEA process and a Natura Impact Statement (NIS) has been prepared. The findings of the AA were used to guide the development of the alternatives to be considered as part of the SEA. The findings of the NIS have been integrated into this SEA Environmental Report and subsequently into the FRMP. **Figure 3.2** demonstrates inter-relationships between the FRMP, SEA and AA.

## 4 METHODOLOGY AND CONSULTATIONS

A draft FRMP has been produced for UoM07 within the Eastern CFRAM Study Area. This SEA Environmental Report has been produced to assess the environmental impacts of the FRM options (alternatives) of the FRMP and to provide the environmental guidance to help create a more sustainable FRMP. In parallel to this a NIS has been prepared to inform the decision making process, in terms of the potential for the FRM options to impact the integrity of any European sites, in view of that sites conservation objectives. Both environmental assessments have been central to the development of the draft FRMP for UoM07. The following section demonstrates the interactions between the various levels of environmental assessment and the stages at which these assessments will have influenced the FRMP. A summary graphic of these interactions, and where environmental assessments were incorporated into the Plan process, is shown in **Figure 4.1**.



**Figure 4.1 Environmental Assessment Inputs to the FRMP**

The main steps of environmental input to the FRMP can therefore be summarised as follows:

- 1 - Preliminary Screening of FRM Methods
- 2 - Multi-Criteria Analysis of FRM Options (Alternatives)
- 3 - Environmental Assessment of Preferred Options.

## 4.1 PRELIMINARY SCREENING OF FRM METHODS

For each area of flood risk to be assessed the starting point was to look at a long list of FRM methods that could be implemented to manage this risk. This long list of FRM methods was specified by OPW and included structural and non-structural methods that are available to manage flood risk in Ireland. The long list of methods was considered for each of the flood risk areas identified. A table of the high level environmental / social impacts of these FRM methods was developed early in this process and is included in **Appendix A** of this SEA Environmental Report. This table outlines the main potential likely impacts of implementation of the flood risk management methods on the general environment. These impacts can be positive, negative or neutral. The purpose of producing this information was to develop a streamlined assessment of impacts of flood risk management methods on the general environment, which was then used within the environmental assessments for the FRMP. These are high-level / strategic impacts and are not site or species specific. This is to reflect the strategic nature of the FRMP and the environmental assessments of the FRMP. This information was circulated for consultation to statutory bodies, stakeholders and Local Authorities. Where feedback was received the table was amended accordingly.

The FRM methods went through an initial screening to determine their technical, economic and social / environmental feasibility. In this initial screening, if a FRM method was found to be technically feasible, i.e. it could completely or partially manage flood risk for an area, it was then screened for its economic viability. If the method was found to be economically viable it was then screened for environmental and social feasibility. The environmental and social criteria in the screening stage were based on the potential for impacts on designated European sites (namely special areas of conservation and special protection areas) and UNESCO World Heritage Sites (including tentative sites) in the first instance. Further social criteria were also taken into account for potentially detrimental impacts on socially important sites, e.g. relocation of hospitals would be deemed unacceptable.

**Table 4.1** demonstrates the long list of flood risk management methods that were considered across all areas of flood risk and which were subject to a preliminary screening assessment. The methods highlighted in green are non-structural, which are policy and administrative based, and currently do not include physical works. The methods highlighted in red are considered the structural methods, wherein there will be an engineered scheme with works required on the ground at a specific geographic location.

**Table 4.1 Flood Risk Management Methods**

Method	Description	
<b>Do Nothing</b>	Implement no new flood risk management measures and abandon any existing practices.	<b>Non-Structural Methods</b>
<b>Maintain Existing Regime</b>	Continue with any existing flood risk management practices, such as reactive maintenance.	
<b>Do Minimum</b>	Implement additional minimal measures to reduce the flood risk in specific problem areas without introducing a comprehensive strategy, includes channel or flood defence maintenance works / programme.	
<b>Planning and Development Control</b>	Zoning of land for flood risk appropriate development, prevention of inappropriate incremental development, review of existing Local Authority policies in relation to planning and development and of inter-jurisdictional co-operation within the catchment, etc.	
<b>Building Regulations</b>	Regulations relating to floor levels, flood-proofing, flood resilience, sustainable drainage systems, prevention of reconstruction or redevelopment in flood-risk areas, etc.	
<b>Catchment Wide Sustainable Drainage Systems (SuDS)</b>	Implement SuDS on a catchment wide basis.	
<b>Land Use Management (NFM)</b>	Creation of wetlands, riparian buffer zones, etc.	
<b>Strategic Development Management</b>	Necessary floodplain development (proactive integration of structural measures into development designs and zoning, regulation on developer-funded communal retention, drainage and / or protection systems, etc.)	
<b>Flood Warning / Forecasting</b>	Installation of a flood forecasting and warning system and development of emergency flood response procedures.	
<b>Public Awareness Campaign</b>	Targeted public awareness and preparedness campaign.	
<b>Upstream Storage</b>	Single or multiple site flood water storage, flood retardation, etc.	<b>Structural Methods</b>
<b>Improvement of Channel Conveyance</b>	In-channel works, floodplain earthworks, removal of constraints / constrictions, channel / floodplain clearance, etc.	
<b>Hard Defences</b>	Construct walls, embankments, demountable defences, Rehabilitate and / or improve existing defences, etc.	
<b>Relocation of Properties</b>	Relocation of properties away from flood risk.	
<b>Diversion of Flow</b>	Full diversion / bypass channel, flood relief channel, etc.	
<b>Other works</b>	Minor raising of existing defences / levels, infilling gaps in defences, site specific localised protection works, etc.	
<b>Individual Property Flood Resistance</b>	Protection / flood-proofing and resilience.	

During this preliminary screening the environmental specialists helped to steer the planning team towards more sustainable FRM methods and provided guidance on environmental issues in the areas of interest. This screening process coincided with the development of the SEA Scoping Report and the AA Screening Report for the Eastern CFRAM Study. The outcomes of all Preliminary Screenings for the UoM can be found in **Appendix E** of the FRMP.

## 4.2 MULTI-CRITERIA ANALYSIS OF FRM OPTIONS

The methods that were found to be technically, economically, socially and environmentally acceptable in the preliminary screening were then combined into groups of options, which were then subjected to detailed Multi-Criteria Analysis (MCA), looking at technical, economic, social and environmental criteria.

Multi-Criteria Analysis is based on the numeric, but non-monetised assessment of options against the range of objectives, whereby indicators are set for each objective. These indicators are then used to define scores for that objective on the basis of the degree to which the option being appraised goes beyond the Basic Requirement for that objective towards meeting the Aspirational Target. The sums of the scores, set against the total costs of their achievement, represent the preference for a given option (using all criteria) or the net benefits of an option (using only the economic, social and environmental criteria). These total scores can be used to inform the decision on the selection of (a) preferred option(s) for a given location and the prioritisation of potential schemes between locations. These options are the alternatives available to the FRMP that are likely to have physical impacts in their development and operation. The assessment of alternatives and the preferred alternative are discussed in **Section 8** and **9**.

SEA is particularly suited to the MCA approach to options assessment as the environmental / social criteria developed for the SEA can be directly inputted to the MCA framework and in turn directly influence the decision making process.

The FRM options were assessed against the FRMP Objectives within the MCA. This assessment considered the issues of social and environmental impacts alongside the technical and economic criteria. The MCA framework has been developed to take account of the broader range of issues relevant to delivery of the FRMP in the development and selection of FRM options, and their subsequent prioritisation. The SEA Objectives were developed from these FRMP Objectives, and are discussed in more detail in **Section 4.3** of this Environmental Report.

The MCA used 'Global Weightings' to rank the general importance of the objectives and 'Local Weightings' to determine the importance or relevance of each objective in each individual area of flood risk (e.g. catchment or AFA). Global weightings were developed through a public poll using a structured questionnaire. Local Weightings were determined through the project teams, steering groups, stakeholders and public consultation, using a nationally consistent approach.

The scorings of the options used in the MCA generally range from +5 to -5; however a score of -999 was also used where an option is to be completely removed due to unacceptable impacts. The scoring indicators, along with the global and local score weighting assignments, for the FRMP objectives that have been brought through into the SEA are given in **Appendix B** of this SEA Environmental Report. The local weightings and their justifications can be found in **Appendix D** of the FRMP.

The MCA Scores for all options considered, including the environmental and social scores and justifications, can be found in **Appendix C** of this SEA Environmental Report and **Appendix F** of the FRMP. The highest scoring option for each area of flood risk (e.g. catchment or AFA), along with consideration of feedback from public and stakeholder consultation, has been put forward into the draft FRMP for UoM07 as the preferred option. The SEA process has been critical for this MCA as it has provided the necessary information for the environmental and social inputs.

The MCA of FRM options stage was heavily influenced by the environmental specialists involved in the study. The development of FRM options was an iterative process between the environmental and FRM planning specialists. Where possible, environmental and sustainability criteria were considered in the selection and positioning of FRM options, prior to assessment in the MCA. This MCA stage coincided with the development of this SEA Environmental Report and the NIS.

### 4.3 ENVIRONMENTAL ASSESSMENT OF PREFERRED OPTIONS

The SEA Environmental Report has specifically contributed to the scoring of social and environmental criteria and assessment in the MCA, while also providing qualitative supporting narrative in the environmental report. Expert judgement was used in both methods of assessment. The preferred options assessed in this Environmental Report are scored and reported on in terms of environmental impacts and their significance, which will be from +5 to -5; however there should be no preferred option selected that was scored with unacceptable impacts, and therefore no -999. **Table 4.2** demonstrates the language to be used to describe the SEA scores in the discussion of impacts. The purpose of this further assessment of the preferred FRM Options is to ensure all potential wider environmental impacts have been identified, to provide further transparency on the potential impacts of the preferred options and to ensure the requirements of the SEA Directive are met. The preferred options were assessed against the environmental and social objectives for their potential short, medium and long term impacts on the following environmental topic areas, taking account of any secondary, cumulative, synergistic, permanent and temporary, positive or negative effects:

- |                                    |   |
|------------------------------------|---|
| • Biodiversity, Flora & Fauna      | • Cultural, Architectural & Archaeological Heritage |
| • Population & Human Health        | • Landscape & Visual Amenity                        |
| • Geology, Soils and Landuse       | • Fisheries & Angling                               |
| • Water                            | • Amenity, Community & Socio-Economics              |
| • Climatic Factors                 |   |
| • Material Assets & Infrastructure |   |

Score	Description
+ 5	Highly significant positive environmental impacts
+ 4	Significant positive environmental impacts
+ 3	Moderate positive environmental impacts
+ 2	Slight positive environmental impacts
+ 1	Minimal positive environmental impacts
0	No environmental impacts
- 1	Minimal negative environmental impacts
- 2	Slight negative environmental impacts
- 3	Moderate negative environmental impacts
- 4	Significant negative environmental impacts
- 5	Highly significant negative environmental impacts
- 999	Unacceptable impacts

**Table 4.2 Description of SEA Environmental Impact Scores**

## 4.4 PLAN AND SEA OBJECTIVES

It is a requirement of the EU 'Floods' Directive [Art. 7(2)] as transposed through SI No. 122 of 2010 [Section 15(2)] that Flood Risk Management Objectives are to be established as part of the planning process. The Flood Risk Management Objectives set out the goals that the FRMP is aiming to achieve. They have a key role in the preparation of the FRMP and the measures proposed, as the options that are available to manage flood risk within a given area are appraised against these objectives to determine how well each option will contribute towards meeting the defined goals. The objectives are focussed at considering potential benefits and impacts across a broad range of issues including human health, the environment, cultural heritage and economic activity. This broadly aligns with the environmental considerations defined for SEA.

### 4.4.1 Development of Strategic Environmental Objectives

In order to have a proactive and positive influence on decision making, the SEA has fed into the MCA framework adopted to assist the decision making process for the FRMP. The SEA uses a system of objectives, targets and indicators to assess the benefits and impacts of a given plan or programme. These environmental objectives cover a range of issues including population; human health; water; material assets; cultural heritage; biodiversity etc.

The FRMP also includes specific environmental and social objectives (included on equal weighting and importance as the technical and economic objectives) which broadly correspond to the issues considered in the SEA. As such the two processes offer considerable opportunity to coordinate, allowing the SEA to directly support decision making through the MCA.

Many of the FRMP objectives therefore coordinated directly with the SEA objectives as they were directly compatible. The objectives / sub-objectives that match the SEA issues are shaded green in **Table 4.3**. In this report the environmental assessment of the preferred options will be expanded upon from the MCA, based on these Objectives and Sub-Objectives. The scoring indicators, along with the global and local score weighting assignments, for the FRMP objectives that have been brought through into the SEA are given in **Appendix B** of this SEA Environmental Report.

Although the environmental criteria and assessments have significantly influenced the development of the FRM options, the findings and outcomes of this environmental report and the NIS may still bring further amendments and improvements to the draft FRMP. This iterative process adopted should provide for a more sustainable Plan in the long term.

**Table 4.3 FRMP Objectives used in MCA and their SEA Compatibility**

CRITERIA		OBJECTIVE	SUB-OBJECTIVE		Related SEA Topic
<b>1</b>	<b>Social</b>	<b>a</b> Minimise risk to human health and life	i)	Minimise risk to human health and life of residents	<b>P/HH</b>
			ii)	Minimise risk to high vulnerability properties	<b>P/HH</b>
		<b>b</b> Minimise risk to community	i)	Minimise risk to social infrastructure and amenity	<b>ACS</b>
			ii)	Minimise risk to local employment	<b>ACS</b>
<b>2</b>	<b>Economic</b>	<b>a</b> Minimise economic risk	i)	Minimise economic risk	
		<b>b</b> Minimise risk to transport infrastructure	i)	Minimise risk to transport infrastructure	<b>MA</b>
		<b>c</b> Minimise risk to utility infrastructure	i)	Minimise risk to utility infrastructure	<b>MA</b>
		<b>d</b> Minimise risk to agriculture	i)	Minimise risk to agriculture	<b>S</b>
<b>3</b>	<b>Environmental</b>	<b>a</b> Support the objectives of the WFD	i)	Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives.	<b>W</b>
		<b>b</b> Support the objectives of the Habitats Directive	i)	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones.	<b>BFF</b>
		<b>c</b> Avoid damage to, and where possible enhance, the flora and fauna of the catchment	i)	Avoid damage to or loss of, and where possible enhance, nature conservation sites and protected species or other know species of conservation concern.	<b>BFF</b>

		<b>d</b>	Protect, and where possible enhance, fisheries resource within the catchment	i)	Maintain existing, and where possible create new, fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species.	<b>F</b>
		<b>e</b>	Protect, and where possible enhance, landscape character and visual amenity within the river corridor	i)	Protect, and where possible enhance, visual amenity, landscape protection zones and views into / from designated scenic areas within the river corridor.	<b>L</b>
		<b>f</b>	Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting	i)	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	<b>H</b>
				ii)	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	<b>H</b>
<b>4</b>	<b>Technical</b>	<b>a</b>	Ensure flood risk management options are operationally robust	i)	Ensure flood risk management options are operationally robust	
		<b>b</b>	Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options	i)	Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options	
		<b>c</b>	Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change	i)	Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change	<b>C</b>

BFF – Biodiversity, Flora, Fauna. P/HH – Population, Human Health. S – Soils, Geology, Landuse. W – Water. MA – Material Assets. H – Heritage. L – Landscape. F – Fisheries. ACS – Amenity, Community, Socio-Economics.

## 4.5 GUIDANCE

Key guidance documents used in the SEA for the UoM07 FRMP are listed in **Appendix D** of this SEA Environmental Report.

## 4.6 DIFFICULTIES AND DATA GAPS

Difficulties were encountered in the development of the FRMP and the SEA of the FRMP due to the large scale of the Study. The large scale meant that many stakeholders and organisations, and significant proportions of the public would have inputs to the study. These stakeholders, organisations and the public all have different priorities and are often interested in very specific areas and specific detail. Also with the large geographic area and the extensive number stakeholders there was the collection of vast amounts of data to assist in the studies. This data and its quality varied greatly by source, format, geographic coverage and level of detail. Given that these studies are to be compared on a national basis to meet European and national legislation, the data used had to be robust and nationally consistent to ensure an even level of assessment.

The long timeframe of the studies led to issues with establishment of baseline conditions, as the environment, legislation, policies and even people's opinions, are constantly changing. At certain stages of FRMP and SEA development there had to be cut offs of information, whereby no further updates could be accepted. These would have to be brought forward for consideration in the next cycle of the FRMP.

## 4.7 CONSULTATIONS

Stakeholder and public engagement and consultation have taken place throughout the development of the FRMP, and environmental inputs have been involved at every stage. The full details of all engagement and consultation undertaken for UoM07 can be found in **Section 4** and **Appendix B** of the FRMP. The following section details the specific consultation undertaken for the SEA process.

### 4.7.1 Scoping Consultations

A SEA Scoping Pack for the Eastern CFRAM Study was circulated on the 18<sup>th</sup> September 2015 to the following statutory consultees:

- Environmental Protection Agency (EPA);
- Department of Environment, Community and Local Government (DECLG);
- Department of Agriculture, Food and the Marine (DAFM);
- Department of Communications, Energy and Natural Resources (DCENR); and
- Department of Arts, Heritage and the Gaeltacht (DAHG).

Non-statutory stakeholders were also provided with this Scoping pack and all information was made publically available on the Eastern CFRAM website. The stakeholders contacted for this study are included in **Appendix E** of this SEA Environmental Report. This SEA Scoping Pack consisted of an Eastern CFRAM Study SEA Scoping Report, a table of High Level Impacts of FRM Methods, an Eastern CFRAM Study SEA Scoping Summary and an Eastern CFRAM Study Environmental Constraints Report. All responses received from this and other CFRAM studies have been incorporated into the subsequent environmental assessments where feasible.

#### **4.7.2 Transboundary Consultations**

There are not anticipated to be any transboundary impacts from implementation of the FRMPs for the Eastern CFRAM Study and therefore it was determined that transboundary consultations would not be undertaken as part of this SEA process.

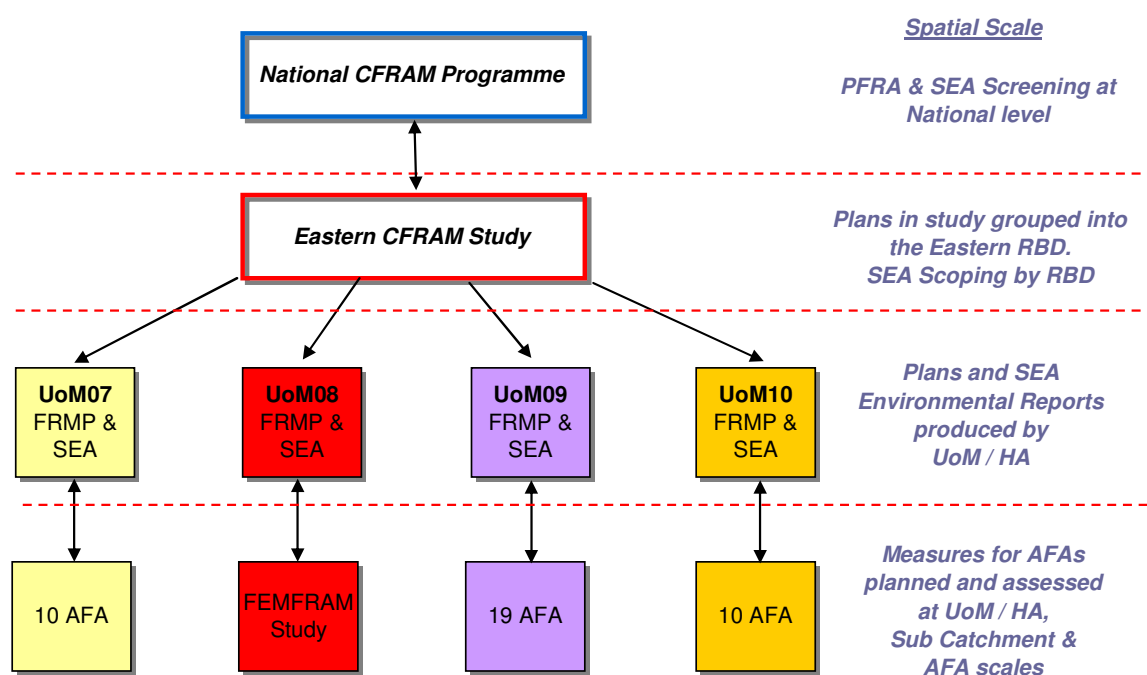
#### **4.7.3 Proposed Consultation on Draft Plan and Environmental Report**

Consultations on the draft FRMP, SEA Environmental Report and NIS are anticipated to commence in July 2016 and run for at least three months. The consultation activities will take the form of Public Consultation Days, documents being made available for viewing at Local Authority and OPW premises and the documents being made available digitally via the Eastern CFRAM Study website: [www.eastcframstudy.ie](http://www.eastcframstudy.ie).

## 5 DESCRIPTION OF THE PLAN

### 5.1 INTRODUCTION

The Eastern CFRAM Study informs the development of the four FRMPs for the eastern region. The Eastern CFRAM study area is the same as the boundary identified for the Eastern RBD under the first cycle of the WFD implementation. The Eastern CFRAM Study and associated FRMPs will cover the period from 2016 to 2021, and will be reviewed every six years. **Figure 5.1** illustrates the structure and spatial scales of the Eastern CFRAM Study, FRMPs and SEAs.



**Figure 5.1 Spatial Scales of Eastern CFRAM Study, FRMPs and SEAs**

The purpose of the FRMP for UoM07 is to set out a proposed strategy, including a prioritised set of actions and measures, for the sustainable, long-term management of flood risk in the UoM. The preparation of the FRMP is required to meet Government policy on flood risk management, and Ireland's obligations under the 2007 EU 'Floods' Directive.

### 5.2 UOM07 FLOOD RISK MANAGEMENT PLAN

**Table 5.1** sets out the proposed elements of the UoM07 FRMP and identifies those to be assessed in this SEA Environmental Report and why.

**Table 5.1 Elements of the FRMP to be Assessed**

	Draft FRMP Section	Is this assessed in this SEA?
<b>I</b>	<b>VOLUME I – FLOOD RISK MANAGEMENT PLAN</b>	See below
<b>1</b>	Provides an overview of the catchment and coastal areas covered by the FRMP.	<b>No</b> – This provides factual information about the general environment in the area. Some of this information will however be included as environmental baseline information.
<b>2</b>	Describes the PFRA undertaken to identify the AFAs that are the focus of this FRMP.	<b>No</b> – This provides factual information about the background to the study and FRMP.
<b>3</b>	Outlines the public and stakeholder consultation and engagement undertaken throughout the National CFRAM Programme and other relevant projects.	<b>No</b> – This is a statement about the consultation arrangements put in place. SEA consultation arrangements however may be incorporated into this. Not being assessed however did help inform the scope of the SEA.
<b>4</b>	Details the existing and potential future flood hazard and risk in areas covered by the FRMP	<b>No</b> – This provides factual information about the flood hazard and risk in the area. Some of this information will however be included as environmental baseline information.
<b>5</b>	Sets out the flood risk management objectives that define what the FRMP is trying to achieve.	<b>Yes</b> – These Strategic Objectives will be assessed within the environmental report, to test the FRMP Objectives compatibility and completeness with the SEA Objectives.
<b>6</b>	Describes the environmental assessments undertaken to ensure that the FRMP complies with relevant environmental legislation to and inform the process of identifying the suitable strategies that will, where possible, enhance the environment.	<b>No</b> – This is a statement about the environmental assessments undertaken for the study and FRMP. This should however include guarantees that the FRMP will comply with recommendations from the environmental assessments.
<b>7</b>	Sets out the strategy for managing flood risk in the area covered by the FRMP.	<b>Yes</b> – These will be the measures proposed to manage flood risk within the UoM / AFAs. FRM alternatives to be assessed.
<b>8</b>	Provides a summary of the measures proposed in the Draft FRMP	<b>Yes</b> – These will be the measures proposed to manage flood risk within the UoM / AFAs. FRM alternatives to be assessed.
<b>9</b>	Outlines how the implementation of the FRMP will be monitored and reported, and then reviewed and updated at regular intervals.	<b>No</b> – This is a statement about future monitoring and reporting for the FRMP. This should include recommendations from the environmental assessments.
<b>A</b>	APPENDIX A – Summary of the Preliminary Flood Risk Assessment	<b>No</b> – This provides factual information about previous studies.
<b>B</b>	APPENDIX B – Public and Stakeholder Consultation Events and Participants.	<b>No</b> – This provides factual information about the consultation events.
<b>C</b>	APPENDIX C – Description of flood risk in each AFA	<b>No</b> – This provides factual information about flood risk in each AFA.
<b>D</b>	APPENDIX D – Local Weightings for the Multi-Criteria Analysis.	<b>No</b> – This provides factual information about the background to the multi-criteria analysis scoring methodology.
<b>E</b>	APPENDIX E – Outcomes of Screening of Flood Risk Management Methods	<b>No</b> – This provides factual information about the flood risk management screening.
<b>F</b>	APPENDIX F – Description of the flood risk management options.	<b>Yes</b> – These will be the measures proposed to manage flood risk within the UoM / AFAs. FRM alternatives to be assessed.
<b>II</b>	<b>VOLUME II – FLOOD MAPS</b>	<b>No</b> – This is mapping of the predicted flood extents and risk in the AFAs

It has been emphasised by OPW that the draft FRMP sets out the proposed strategy, actions and measures that are considered to be the most appropriate at this stage of assessment. The observations and views submitted as part of the consultation on the draft Plan will be reviewed and taken into account before the Plan is submitted for comment, amendment or approval by the Minister. Some changes may arise as a result of the consultation process.

Further, once the FRMP is finalised, measures involving physical works (e.g., flood protection schemes) will need to be further developed at a local, project level before exhibition or submission for planning approval. At this stage, local information that cannot be captured at the Plan-level of assessment, such as ground investigation results and project-level environmental assessments, may give rise to some amendment of the proposed measure to ensure that it is fully adapted, developed and appropriate within the local context.

While the degree of detail of the assessment undertaken to date would give confidence that any amendments should generally not be significant, the measures set out in the draft FRMP may be subject to some amendment prior to implementation, and in some cases may be subject to significant amendment.

In this context, it is stressed that the SEA and AA undertaken in relation to the FRMP are plan-level assessments. The FRMP will inform the progression of the preferred measures, but project-level assessments will need to be undertaken as appropriate under the relevant legislation for consenting to that project for any physical works that may progress in the future. The approval of the Final FRMP does not confer approval or permission for the installation or construction of any physical works. The requirements for EIA and/or AA Screening, including any particular issues such as knowledge gaps or mitigation measures that are expected to be necessary, are set out in the SEA Environmental Report or NIS as relevant.

### 5.3 GEOGRAPHIC SCOPE

The SEA will be limited geographically to activities occurring within the functional area of the UoM07 FRMP. While recognition will be given within the FRMP to issues in the adjacent areas, no separate assessment will be undertaken of these areas in this SEA Environmental Report. A separate SEA Environmental Report has been compiled for the FRMPs for each of the remaining UoMs. The geographic scope of the environmental assessment within the SEA will however have to be flexible, dependent upon the geographic extent of potential impacts from implementing the measures proposed in the FRMP. A full list of the AFAs to be investigated as part of the UoM07 FRMP is given in **Table 5.2**. The draft FRMP is focussed on the AFAs identified through the PFRA. While some measures set out in the FRMP represent the implementation of wider Government policies that should be applied in all locations, this draft FRMP does not specifically address the management of local flood problems outside of the AFAs. These strategic, non-structural, alternatives that are implemented on a national

scale will be policy based with no actual physical action to take place in a specific geographic location following implementation of the FRMP.

**Table 5.2 AFAs within UoM07**

AFA	County	UoM / HA
Athboy	Meath	7
Ballivor	Meath	7
Baltray	Louth	7
Drogheda	Louth & Meath	7
Edenderry & Environs	Offaly	7
Johnstown Bridge	Kildare	7
Longwood	Meath	7
Mornington	Meath	7
Navan	Meath	7
Trim	Meath	7

## 5.4 TEMPORAL SCOPE

The UoM07 FRMP will cover the period from 2016 to 2021, and will be reviewed every six years. In line with the SEA Directive; short, medium and long-term impacts (including reference to secondary, cumulative, synergistic, permanent and temporary, positive or negative effects) will be considered during the assessments of the FRMP. Within the environmental assessment the short, medium and long term will have a slightly different definition than the Plan timescales. The short term defines the construction / installation of a flood risk management option, the medium term will be the immediate operational years (e.g. 0 – 6 years) following the construction / installation of an option, while the long term will be the long term operation of an option (e.g. 6 years onwards). The SEA takes this different temporal scope to demonstrate the potential impact of a development from its construction, through operation and beyond the temporal scope of the Plan.

## 6 BASELINE AND RELEVANT ENVIRONMENTAL ISSUES

### 6.1 INTRODUCTION

Included in the following section is a discussion of the environmental baseline for UoM07 within the Eastern CFRAM study area. The baseline has been divided by topic into the issues requiring assessment under the SEA legislation, including additional topic areas requested by OPW. The purpose of the following section is to demonstrate the level of baseline environmental information to be used in the assessment of potential impacts of the Plan FRM options. This baseline information will form the indicators which the FRM options will have the potential to impact upon. Future variation in these indicators due to the FRMPs will be monitored as part of the Plan and SEA review.

### 6.2 BIODIVERSITY, FLORA & FAUNA

The UoM07 study area is of high ecological value, with a variety of habitats and species of conservation concern which are protected under a number of European and national designations. Areas which have been designated for the protection of habitats and species include the following:

- Special Areas of Conservation (SACs) are designated in accordance with the Habitats Directive (92/43/EEC) for the conservation of certain habitats and species and protected by the European Communities (Birds and Natural Habitats) Regulations 2011. Together with Special Protection Areas (SPAs) these European sites form part of the Natura 2000 Network. There are eight SACs in the UoM07 study area of which two are classed as “water dependent” SACs. Information relating to these SACs is found in **Table 6.1** below. They are illustrated in **Figure 6.1**;

**Table 6.1 SACs within UoM07 and their Qualifying Interests**

SAC	Qualifying Interest(s)
Boyne Coast and Estuary*	Annex I habitats: 1130 Estuaries, 1140 Mudflats and sandflats not covered by seawater at low tide, 1310 Salicornia and other annuals colonizing mud and sand, 1330 Atlantic salt meadows ( <i>Glauco Puccinellietalia maritimae</i> ), 1410 Mediterranean salt meadows ( <i>Juncetalia maritimi</i> ) 2110 Embryonic shifting dunes, 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes') and the priority habitat 2130 Fixed coastal dunes with herbaceous vegetation ('grey dunes').
Killyconny Bog (Cloghbally)	Annex I habitat: Active raised bogs [7110] and Degraded raised bogs still capable of natural regeneration [7120]
Lough Bane and Lough Glass	Annex I Habitats: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] Annex II species <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]
Lough Lene	Annex I habitat: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] Annex II species <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]
Mount Hevey Bog	Annex I habitats: Active raised bogs [7110] Degraded raised bogs still

	capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150]
Raheenmore Bog	Annex I habitats: Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150]
River Boyne and River Blackwater*	Annex I habitats : Alkaline fens [7230] and Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> ) [91E0] Annex II Species: <i>Lampetra fluviatilis</i> (River Lamprey) [1099], <i>Salmo salar</i> (Salmon) [1106] and <i>Lutra lutra</i> (Otter) [1355]
White Lough, Ben Loughs And Lough Doo	Annex I habitat: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140], Annex II species: <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]

\* denotes those SACs that are water dependent.

- SPAs are designated under the EU Birds Directive (79/409/EEC) for the protection of birds of conservation concern and protected by the European Communities (Birds and Natural Habitats) Regulations 2011. Together with SACs these European sites form part of the Natura 2000 Network. There are two SPAs in the UoM07 study area, of which one is classed as “water dependent” SPA. Information relating to these SPAs is found in **Table 6.2** below. They are illustrated in **Figure 6.1**;

**Table 6.2 SPAs within UoM07 and their Qualifying Interests**

SPA	Qualifying Interest(s)
Boyne Coast and Estuary*	“Wetlands” habitat supporting populations of Annex I species Shelduck <i>Tadorna tadorna</i> , Oystercatcher <i>Haematopus ostralegus</i> , Golden Plover <i>Pluvialis apricaria</i> , Grey Plover <i>Pluvialis squatarola</i> , Lapwing <i>Vanellus vanellus</i> , Knot <i>Calidris canutus</i> , Sanderling <i>Calidris alba</i> , Black-tailed Godwit <i>Limosa limosa</i> , Redshank <i>Tringa totanus</i> , Turnstone <i>Arenaria interpres</i> and Little Tern <i>Sterna albifrons</i> .
River Boyne and River Blackwater	Annex I species Kingfisher <i>Alcedo atthis</i> .

\* Denotes those SPAs that are water dependent.

- Ramsar Sites are designated under the Convention on Wetlands of International Importance for the protection of wetland areas (which are important feeding habitats for birds). All Ramsar Sites are also recognised as SPAs and/or SACs and so are afforded protection by the European Communities (Birds and Natural Habitats) Regulations 2011. There is one Ramsar Site in the UoM07 study area (Raheenmore Bog). This site in the UoM07 study area is shown in **Figure 6.1**;
- Natural Heritage Areas (NHAs) are designated under the Wildlife Act (1976 - 2000) as they are considered important habitats which support animals or vegetation of importance. There are eight NHAs in the UoM07 study area (**Table 6.3**). There are a further 23 proposed Natural Heritage Areas (pNHA) in the study area, which were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated. pNHAs are subject to limited statutory protection, but are recognised for their ecological value by planning and

licensing authorities. The NHAs and pNHAs in the UoM07 study area are shown in **Figure 6.2**;

**Table 6.3 NHAs within UoM07**

NHA site	
Black Castle Bog	Jamestown Bog
Carbury Bog	Milltownpass Bog
Girley Bog	Molerick Bog
Hodgestown Bog	Wooddown Bog

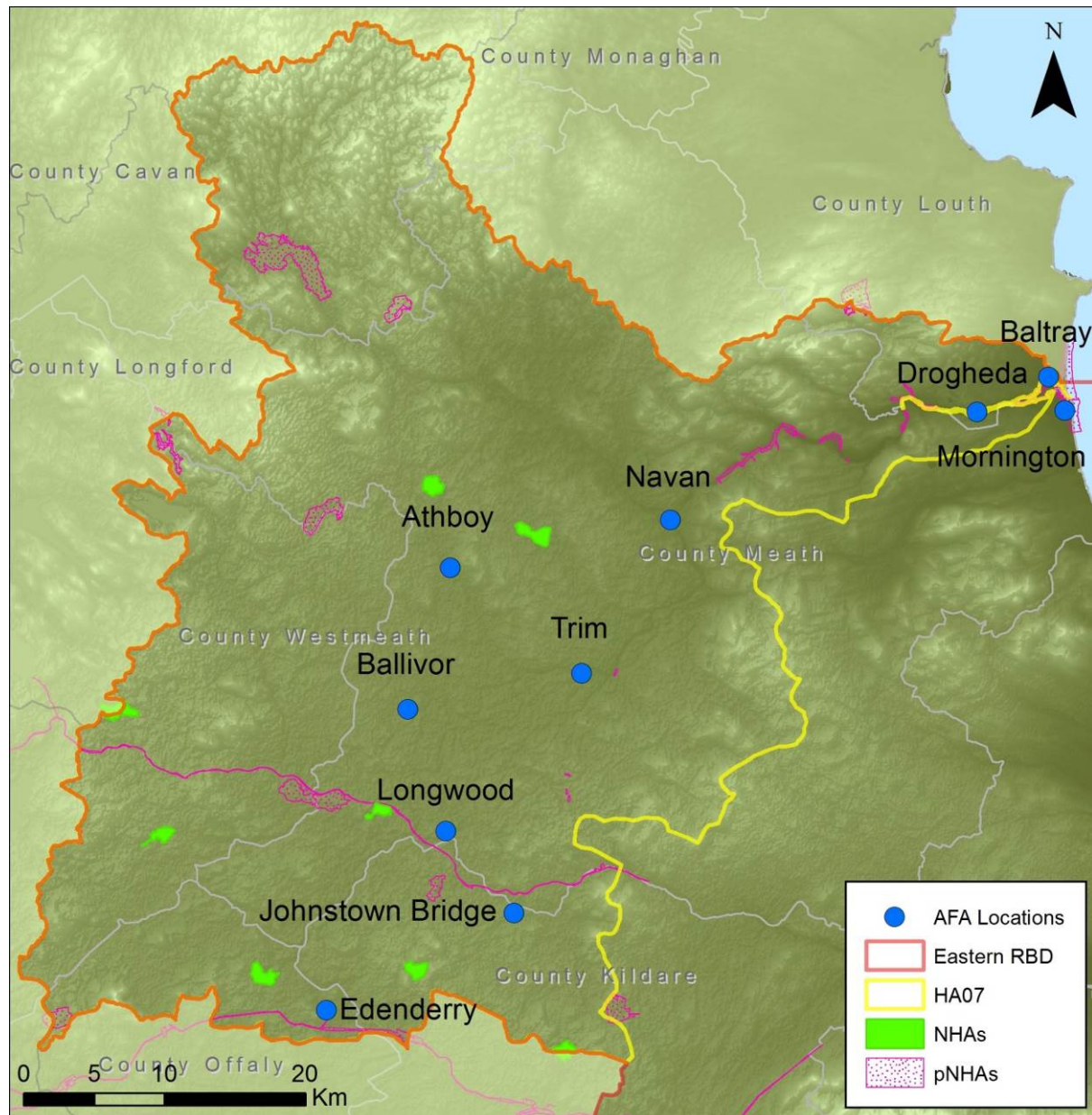
- Wildfowl Sanctuaries are established under the Wildlife Act, 1976 and are excluded from the 'Open Season Order' in which shooting of game birds is permitted. There is one wildfowl sanctuary in the UoM07 study area (Boyne Estuary);
- National Parks are established under the International Union for the Conservation of Nature and are areas identified as not materially altered by human exploitation and occupation, and where steps have been taken to prevent exploitation or occupation in respect of ecological, geomorphological or aesthetic features. There are no national parks in the UoM07 study area;
- Nature Reserves are identified as being important habitats to support wildlife and are protected under Ministerial Order. There is one nature reserve in the UoM07 study area (Raheenmore Bog);
- Freshwater Pearl Mussel Catchments and Sensitive Areas. The Freshwater Pearl Mussel (FPM) is an endangered bivalve which lives in fast-flowing, clean rivers. As filter feeders, freshwater pearl mussels are extremely vulnerable to water pollution and engineering work in rivers such as the construction of weirs or deepening of pools. The species *Margaritifera margaritifera* and *Margaritifera durrovensis* are protected under the Habitats Directive (92/43/EEC) and the Wildlife Acts (1976, amended 2000). There are no FPM catchments or FPM sensitive areas within the UoM07 study area;
- OSPAR Marine Protected Areas (MPA) are sites identified under the OSPAR Convention to protect the marine environment of the North East Atlantic. Ireland has identified a number of its SACs as OSPAR MPAs for marine habitats. There are no OSPAR MPAs in the UoM07 study area.

The biodiversity value of much of the UoM07 study area has been recognised, with a significant proportion of the catchment designated as of European or national importance. The Boyne Coast and Estuary SAC and Boyne Estuary SPA are adjacent to, and downstream of, Baltray AFA. The shallow mudflats and sandflats in this estuary provide important feeding habitats for wintering waterfowl. The River Boyne and River Blackwater are designated as a SAC and SPA upstream of Baltray and pass through the Drogheda, Navan, Trim and Athboy AFAs. This SAC supports salmon, otter and lamprey among its qualifying species.



**Figure 6.1 Sites with International Environmental Designations**

Many of the inland environmental designations are for areas of bog or peatland, such as Mount Hevey Bog SAC and Raheenmore Bog SAC, which are also important biodiversity assets. Intact bogs, which are actively forming peat, play a significant role in combating climate change by removing excess carbon dioxide from the air and placing it into long term storage for thousands of years. They purify water and reduce flooding by their capacity to absorb, hold and slowly release water. Conserving or restoring bogs is a positive action for climate change mitigation, water quality and flood relief.



**Figure 6.2 Sites with National Environmental Designations**

Non-native, invasive species are a particular threat to the native flora and fauna of the UoM07 study area. Dublin City Council, with the assistance of the Heritage Council, undertook a survey of invasive plants in 2009 citywide to determine the extent of invasive species in Dublin. It found the most problematic areas are along the river valleys, however coastal areas are also at risk from aggressive plants such as Hottentot Fig (*Carpobrotus edulis*), which is an aggressive invader of coastal habitats. Although UoM07 is not located within Dublin, the findings of the study indicate that river valleys and coastal areas throughout the country are at high risk from invasive species. As these non-native species, particularly plants, could be spread by flooding or flood risk management measures, they therefore require appropriate mitigation and control strategies.

It should be noted that an Appropriate Assessment Screening has been undertaken for the Eastern CFRAM Study. This Screening exercise established that five European sites (two SACs and three

SPAs) have the potential to experience an impact from FRM methods in ten of the AFAs in UoM07 (Table 6.4). These sites would require further investigation at Stage 2 Appropriate Assessment:

**Table 6.4 SACs and SPAs Screened-In from UoM07 AA Screening**

AFA with Identifiable Impact Pathway to European Site	European Site	Site Code
<b>Athboy</b>	River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA Boyne Coast And Estuary SAC Boyne Estuary SPA	002299 004232 001957 004080
<b>Ballivor</b>	River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA Boyne Coast And Estuary SAC Boyne Estuary SPA	002299 004232 001957 004080
<b>Baltray</b>	Boyne Coast And Estuary SAC Boyne Estuary SPA River Boyne And River Blackwater SAC River Nanny Estuary and Shore SPA	001957 004080 002299 004158
<b>Drogheda</b>	Boyne Coast And Estuary SAC Boyne Estuary SPA River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA River Nanny Estuary and Shore SPA	001957 004080 002299 004232 004158
<b>Edenderry &amp; Environs</b>	River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA Boyne Coast And Estuary SAC Boyne Estuary SPA	002299 004232 001957 004080
<b>Johnstown Bridge</b>	River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA Boyne Coast And Estuary SAC Boyne Estuary SPA	002299 004232 001957 004080
<b>Longwood</b>	River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA Boyne Coast And Estuary SAC Boyne Estuary SPA	002299 004232 001957 004080
<b>Mornington</b>	Boyne Coast And Estuary SAC Boyne Estuary SPA River Boyne And River Blackwater SAC River Nanny Estuary and Shore SPA	001957 004080 002299 004158
<b>Navan</b>	River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA Boyne Coast And Estuary SAC Boyne Estuary SPA	002299 004232 001957 004080
<b>Trim</b>	River Boyne And River Blackwater SAC River Boyne and River Blackwater SPA Boyne Coast And Estuary SAC Boyne Estuary SPA	002299 004232 001957 004080

A Stage 2 AA is being undertaken in conjunction with this SEA Environmental Report. The findings of the Natura Impact Statement are being incorporated into the assessment section of the report.

### ***Future Trends***

In the future, it is likely that there will be benefits to both protected sites and species, and the wider aquatic environment, with the implementation of measures to achieve good ecological status or potential under the WFD.

In addition, the continued development of specific biodiversity action plans under the National Biodiversity Plan and related plans should provide a framework for protecting these increasingly threatened habitats and species.

Changes in land use, such as increasing urbanisation, afforestation or changing agricultural practices, will continue to threaten biodiversity within the UoM07 study area, both within and outside of the designated sites.

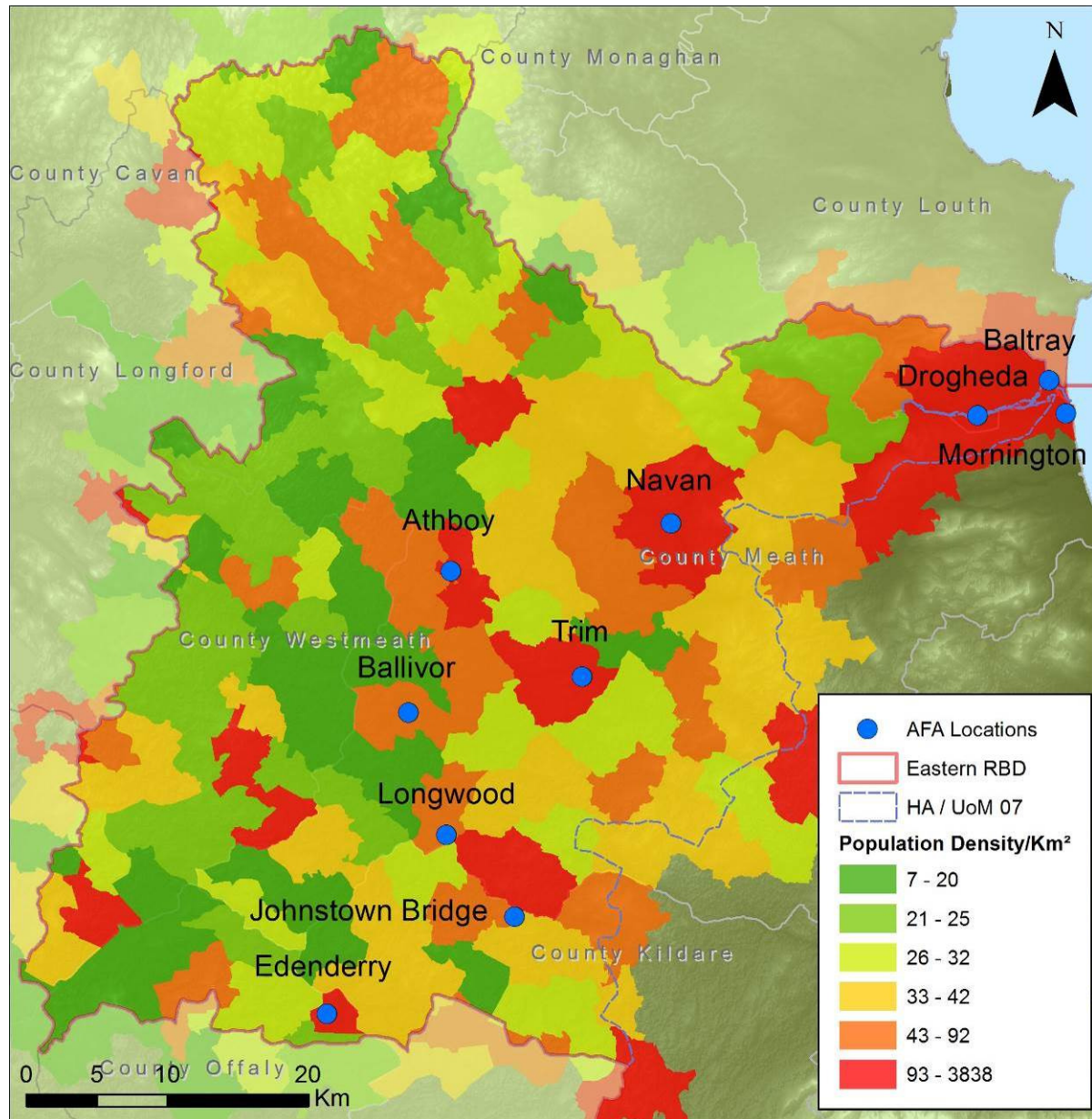
### ***Key Issues***

- Consideration of effects of flood risk management measures on SACs, SPAs, NHAs, (including proposed NHAs), Ramsar Sites and other designated nature conservation sites and National Parks within the UoM07 study area, in addition to those outside the study area that may be impacted by proposals within in;
- Where there is a potential risk to European sites (SPAs and SACs) from the implementation of measures, it will be necessary to undertake appropriate assessment in accordance with the Birds and Natural Habitats Regulations to ensure that adverse impacts on these sites will not arise;
- Consideration must also be given to effects on flora and fauna, such as migratory bird species and invertebrates or sensitive habitats in areas which do not hold designations, to avoid habitat fragmentation or loss;
- Freshwater Pearl Mussel, Atlantic Salmon and Lamprey species are particularly sensitive to pollution and in-channel flood risk management measures; while there are no areas designated for FPM in UoM07, there may be connectivity with designated areas in adjacent catchments. Other protected fish and shellfish species may also be affected by flood risk management measures;
- Changes to the flooding regime may have effects on sensitive habitats, e.g. bogs, fens, peatlands, limestone habitats or wetland areas;
- Changes to the flooding regime can adversely impact upon biodiversity, through nutrient enrichment, detrimental impacts on water quality, siltation and community changes;
- Implementation of flood risk management measures can also contribute towards the spread of invasive/non-native species if not properly managed.

## **6.3 POPULATION & HUMAN HEALTH**

The 2011 census data held by the Central Statistics Office (CSO, 2011) shows a total population for the UoM07 study area of approximately 217,500. Population has increased in the UoM07 study area

since the previous census in 2006, with counties Offaly (+8.2%), Westmeath (+8.6%), Kildare (+12.9%), Louth (+13.1%), Meath (+13.1%), and Cavan (+14.3%) recording significant population growth. The population density by electoral division for the UoM07 study area is shown in **Figure 6.3** (CSO, 2011).



**Figure 6.3 Population Density (population/km²) by Small Area from 2011 Census**

The census also revealed the high rates of emigration which have occurred in Ireland during the economic downturn following the previous census. A decrease of 29% in the population of 19-24 year olds has been recorded from 2010 to 2015. The CSO confirmed that emigration plays a significant role in the diminishing young population, with around 30,000 young people aged between 15 and 24 leaving the country each year to seek work elsewhere. This has left behind a population with a higher proportion of aging (>65) people and particularly young people (<15) than elsewhere in Europe.

The census revealed that the population of pre-school children has increased by 18%, which is up 50% since the last census was conducted and a Eurostat report<sup>3</sup> quotes Ireland as currently having the highest proportion of under-15s in Europe, at 22%. The report speculates that the growing gap between old and young populations in the wider EU could result in labour market shortages and an increased burden supporting the remainder of the population.

In addition, the number of older people (aged over 65) has increased by 14% since the last census, and there are greater numbers of older people now living in nursing homes (20,000) and residential hospitals (5,000). The data has also shown a 7% increase in the number of young adults (19-24) living in the family home rather than moving out.

In terms of people at risk of flooding, the FRMP is using the number of residential properties at risk of flooding as an indicator for the risk to the population and human health. Within UoM07, the average number of persons per household ranges from 2.78 to 2.97 (CSO, 2011). Within each of the AFAs in UoM07 there is also the potential risk of flooding to high vulnerability sites, such as hospitals and schools. **Table 6.5** provides a summary of the number of residential properties at risk and the number of high vulnerability social receptors at risk within each of the AFAs in UoM07 at risk of flooding in a 1% AEP fluvial and/or 0.5% AEP coastal event.

**Table 6.5 Residential Properties and High Vulnerability Sites at Risk within AFAs**

AFA	At Risk of 1% AEP fluvial and/or 0.5% AEP coastal event	
	Residential Properties	Highly Vulnerable Sites
Athboy	0	0
Ballivor	0	0
Baltray	41	0
Drogheda	135	0
Edenderry	0	0
Johnstown Bridge	2	0
Longwood	0	0
Mornington	50	0
Navan	106	2 - Health centre, nursery
Trim	6	0

In terms of human health, impacts relevant to the SEA are those which arise as a result of interactions with environmental vectors (i.e. environmental components such as air, water, food or soil through which contaminants or pollutants, which have the potential to cause harm, can be transported so that they come into contact with human beings). Hazards or nuisances to human health can arise as a result of exposure to these vectors, for example from incompatible adjacent land uses. These issues are also discussed in the Material Assets (6.8) Soils, Geology and Land Use (6.4) and Water (6.5) sections.

<sup>3</sup> Eurostat (2015) "What it Means to be Young 10in the European Union Today" Facts and Figures on Youth and Children in the EU

### ***Future Trends***

The population trend within the UoM07 study area is generally one of increasing growth, broadly matching the national average growth through the last census period of around 8.1%, although the counties adjacent to Dublin, such as Meath are experiencing greater rates of up to 14%. There will be ongoing population pressure on infrastructure and resources and the provision of adequate health care resources for the expanding population, particularly in terms of the expansion of the aging and young populations that are not economically active. The population structure, with its greater proportion of young people (<15) and older people (>65), may lead to increasing demand for schools and elderly care facilities.

### ***Key Issues***

- Ongoing population growth for all counties within the UoM07 study area creating increasing pressures on water resources, e.g. quality of water supply for drinking water abstraction (including private supplies as well as municipal treatment) and waste water treatment;
- Interactions with public use of waterbodies (e.g. bathing, fishing, leisure craft, sailing, watersports);
- Population centres in this UoM tend to be located in urbanised areas such as in Navan and Ballyboggan;
- Certain invasive species (e.g. giant hogweed) can be harmful to human health (relationship with biodiversity).
- Flood events can impact on water quality through the mobilisation of contaminants, pollutants, waste and sediment into contact with the population, e.g. into drinking water supplies and into homes.
- Effects on connectivity of communities. Flooding in the past has caused areas to be “cut off” from surrounding infrastructure. Aging and young populations are particularly vulnerable to these impacts;
- A number of vulnerable receptors (e.g. schools, hospitals, nursing homes) located in lowland areas which are potentially at flood risk.
- In addition to residential properties, schools, hospitals, health service centres and nursing homes (as well as their ancillary services and roads) are recognised as vulnerable receptors to flooding. Impacts on these are key indicators of the UoM07 Study.

## **6.4 GEOLOGY, SOILS & LANDUSE**

The geology of the UoM07 consists of mostly dark limestone and shale, while massive unbedded lime-mudstone has a large presence in the southern half of the UoM. Other major formations include dark quartz greywacke and conglomerate, fine to coarse grained turbidite, and calcareous red-mica Greywacke have large formations in the north, and oolitic limestone in the south. The geological foundation is much more varied in the east of UoM07 with formations of rock including dark micrite and calcarenite and shale, coarse sandstone and shale, black mudstone and siltstone and greywacke,

black mudstone and quartzose greywacke, dark limestone and calcareous shale, calcareous greywacke and banded mudstone, and pale micritised grainstone-wackestone, among other smaller formations.

The GSI and the DAHG are currently identifying sites of geological interest that are in need of protection through NHA designation. A committee of expert geologists provides an initial list of sites which then undergo a process of survey, reporting and review, to provide recommendations regarding NHA status or otherwise. Such sites are named Irish Geological Heritage (IGH) sites. A number of these sites are within or in the vicinity of an AFA in UoM07. For example, the Boyne Valley IGH site is located within and upstream of Drogheda AFA, and within and downstream of Navan AFA. This glacial U-shaped valley has characteristic depositional and erosional features associated with ice flow and glacial meltwater. The Laytown to Gormanston IGH site is located along the coast to the south-east of Drogheda AFA and within the Mornington AFA. This is an example of a flat to gently undulating glacial outwash plain of sandur gravels. Waterunderbridge – Dry Bridge IGH site - is located within Drogheda AFA. This site is a good example of classical karstic drainage, with sinks and risings.

**Table 6.6** below details the mines, quarries and pits found within UoM07. The locations of these sites are illustrated in **Figure 6.4**, along with the areas of unproductive aquifers in the UoM07 study area. These poorly productive aquifer areas can indicate areas of reduced infiltration and rejected groundwater recharge, which could contribute to flood risk.

To date, there is no legislation in Ireland which is specific to the protection of soil resources. However, there is currently an EU Thematic Strategy on the protection of soil which includes a proposal for a Soil Framework Directive, including the proposal of common principles for protecting soils across the EU. Soil, as a resource, has the potential to be impacted upon by implementation of flood risk management measures both directly, through direct footprints of construction works, and indirectly through alterations to flood plains. These alterations of the existing available soil resource to agricultural production from FRM measures will be assessed.

**Table 6.6 Mines, Quarries and Pits located within UoM07**

Operation	Name	Location
Mines	Tara Mine	Navan, Co. Meath
Quarries	Carrickgorman Quarry	Carrickgorman, Co. Cavan
	Donore Quarry	Donore, Co. Meath
	Keegan Quarries Ltd.	Rathmoylan, Co. Meath
	Mullaghcrone Quarry	Drogheda, Co. Meath
	Roadstone Slane Quarry	Slane, Co. Meath
	Roadstone Trim Quarry	Trim, Co. Meath
	Taghart Quarry	Shercock, Co. Cavan
	Tracey Enterprises Ltd.	Enfield, Co. Meath
	Tullykane Quarry	Kilmessan, Co. Meath
Pits	Ballynamona Pit	Summerhill, Co. Meath
	Clondoogan Pit	Summerhill, Co. Meath
	Des Keegan & Sons Sand & Gravel	Trim Road, Co. Meath
	Doherty's Pit	Slane, Co. Meath

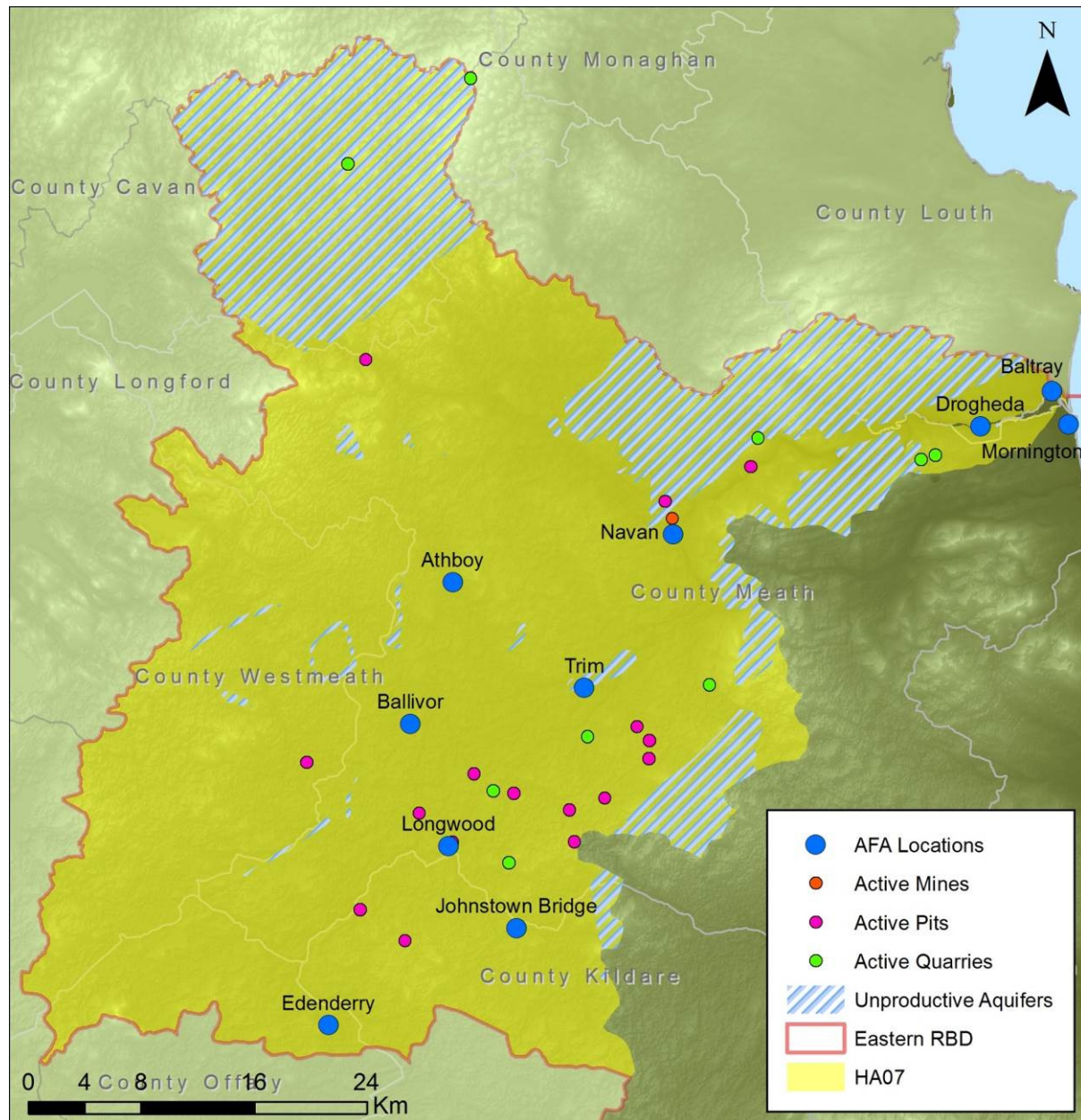
	Fergus Carey & Co. Ltd.	Longwood, Co. Meath
	Foxtown Pit	Summerhill, Co. Meath
	Goode Concrete (Carbury)	Carbury, Co. Kildare
	Hartons Sand & Gravel (Meath)	Kells, Co. Meath
	Isaacstown Pit	Rathmoylan, Co. Meath
	Keegan Quarries Ltd. (Agher)	Summerhill, Co. Meath
	Kilrathmurry Pit	Enfield, Co. Kildare
	Mitchelstown Pit	Dunsany, Co. Meath
	Navan Plant	Navan, Co. Meath
	Roadstone Longwood Pit	Longwood, Co. Meath
	Shay Murtagh Ltd.	Raharney, Co. Westmeath
	Tobertynan Pit	Longwood, Co. Meath

Deep well-drained minerals derived from mainly calcareous parent materials, including grey brown podzolics and brown earth soils, are distributed over significant parts of UoM07 (particularly the southern two thirds of the UoM). Deep poorly drained minerals including surface water and ground water Gleys derived from mainly non-calcareous parent materials, have significant presence in the north and north east, with smaller areas located along the eastern border. Cutaway/cutover basin and blanket peats have a large presence in the south of the UoM, with smaller areas located in the midlands and north-west of UoM07. The other major soil types in the UoM are deep poorly drained minerals including surface water and ground water Gleys derived from mainly calcareous parent materials. Large areas are located south west of Navan towards Trim, west of Athboy, north of Ballivor, south of Longwood, south east of Johnstown Bridge, and north of Edenderry.

Land use directly affects the surface and groundwater environments through processes such as runoff, infiltration and abstraction. The broad pattern of land cover in this UoM has been determined from the CORINE Land Cover Database (2012) from which it can be seen that one land use type dominates the UoM - agriculture. The classification of land cover within the ERBD, based on the CORINE scheme, is shown in **Table 6.7**.

**Table 6.7 Land Use Types by Area and Percentage Cover in UoM07**

Description	Area (Km <sup>2</sup> )	% of UoM07
Pastures	2,956	79
Non-irrigated arable land	365	10
Peat bogs	102	3
Land principally occupied by agriculture	87	2
Transitional woodland shrub	56	2
Discontinuous urban fabric	47	1
Coniferous forest	24	1
Mixed forest	23	1
Complex cultivation patterns	15	0.5
Water bodies	14	0.5



**Figure 6.4 Active Mines, Quarries and Pits and Unproductive Aquifers**

Agricultural lands comprise nearly 90% of the UoM07 with the majority used for pasture (79%) to graze dairy cows, cattle, and sheep. However, there are also large areas of arable land, used for the production of grains, fruit, vegetables, poultry and pigs. Peat bogs comprise the next most common land use, covering around 3% of the land area. Drainage of bog lands and peat extraction activities potentially lead to large quantities of peat silt being discharged to the receiving waters.

The predominance of pasture over arable land suggests that, in general, the level of exposed soil is limited within the UoM. However, there are several pockets of arable land in close proximity to UoM07 study watercourses. Depending on agricultural practices, farming of arable land can lead to increased soil loss to receiving watercourses through ploughing and presence of exposed soils, which will be exacerbated if environmental measures, such as buffer strips along river banks, are not employed. Overgrazing of soils in commonage areas is also a source of exposed soils washing into headwaters,

increasing flashiness through more rapid run-off and erosion increased sediment load to rivers resulting in increased deposition downstream.

If an AFA is within a flashy catchment, this is taken into account in the assessment of options. Flashy catchments are characterised as responding very quickly to rainfall, with the flow of water rising rapidly to a high peak before receding similarly. In order to quantify flashy watercourses within this study, a flood wave travel time of two hours to an AFA was set as the upper limit. This travel time refers to the length of time for the peak water level during a flood event to travel from the upper catchment to the area being assessed. Two hours was considered by OPW to be the minimum time for people to react to a flood event in order to reduce the flood risk. AFAs on watercourses that would have a flood wave travel time of less than two hours are therefore considered to be at risk from flash flooding. The AFAs at risk within UoM07 are Baltray, Drogheda, Longwood, Mornington and Navan.

There are 102 areas of native woodland identified by the NPWS within this UoM, covering an area of over 5km<sup>2</sup>. There are also a further 4km<sup>2</sup> of ancient and long established woodlands across the study area, many of which are in protected areas.

Within the assessment of the FRM Measures the local area plan information on land use zoning will be taken into account for each AFA using myplan data to identify the areas that may be impacted by the placement of the various measures.

### ***Future Trends***

Land cover is dominated by agricultural pastureland within this UoM. While it is unlikely that the general pattern of land use will be substantially changed in the future, the increasing population will continue to drive a requirement for new housing and the expansion of developed areas.

Increases in population pose pressures on agriculture to increase productivity, which coincides with the Irish agricultural industry also aiming to provide more goods to the global market. Land drainage to improve soil quality may have effects on flood risk by increasing the speed at which water reaches the main arterial river networks.

### ***Key Issues***

- Effects of changes in the flooding regime on land vulnerable to erosion;
- Effects of changes in the flooding regime on rates of coastal erosion; waterlogged sands lose their cohesive properties and are at much greater risk of erosion;
- Influence of changes in flooding regime on land use practices (e.g. fertiliser application) or soil quality/productivity;
- Effects on geomorphology such as river channels and landforms;
- Flood management options under consideration in the FRMPs include non-structural options such as planning control and land use management. Publication of the FRMPs may result in the zoning of lands for particular land use practices for the purpose of preventing or protecting

against flooding. Changes in land use zoning may reduce land values by limiting development potential;

- Appropriately managed pasture, rough semi-natural vegetation, wetlands (including peat bogs) and forestry/woodland can all assist in the attenuation and storage of rapid surface runoff and floodplain flows upstream of flood risk receptors;
- The targeted use of appropriate agri-environment scheme agreements could be used for multiple benefits, including flood management and biodiversity gains;
- Natural flood storage and attenuation areas on floodplains including wetlands, should be protected from development pressures;
- Effects of changes in the flooding regime on access to land, many areas have been “cut off” by floods in the past.

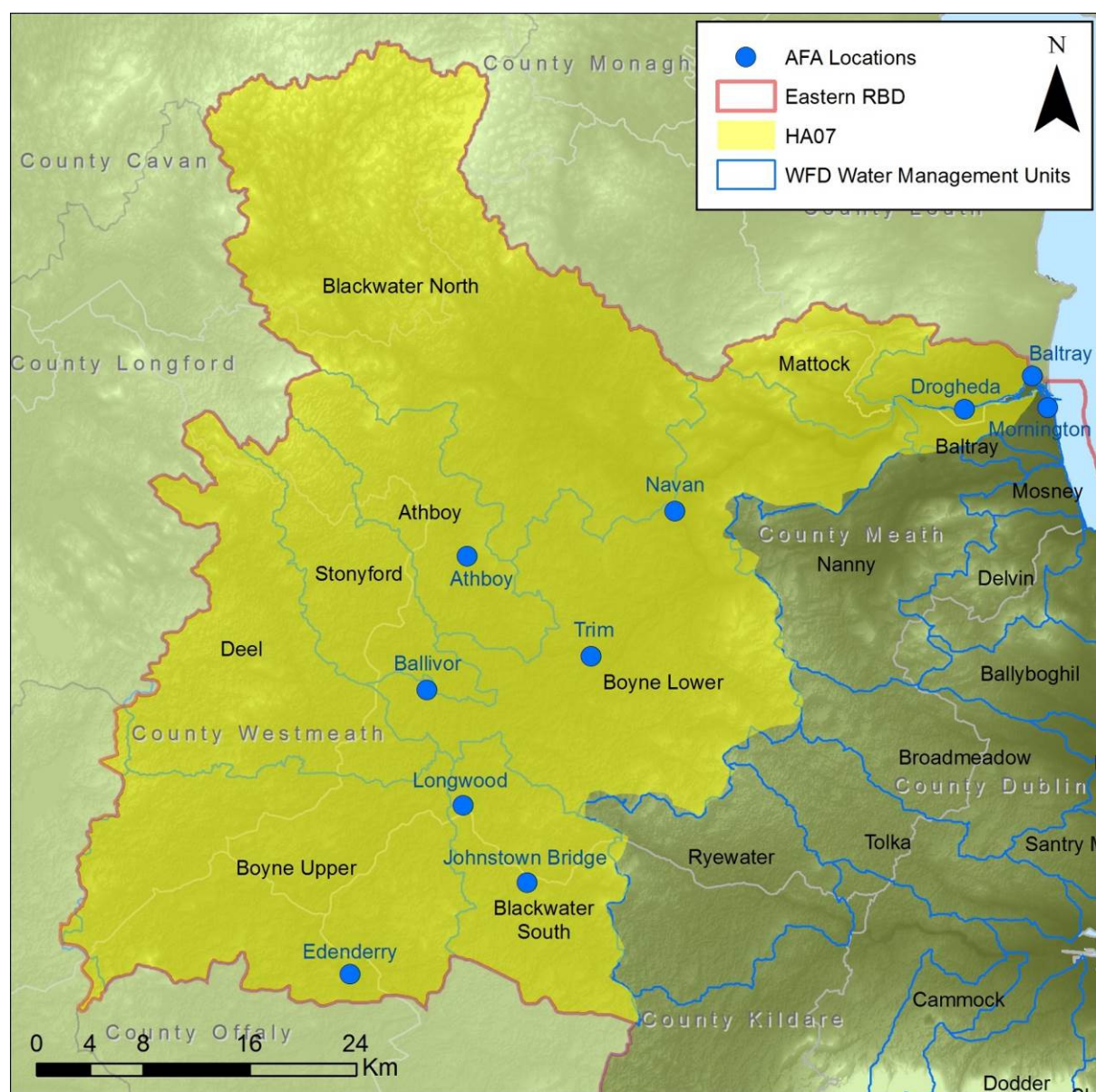
## 6.5 WATER

The UoM07 study area is located within the boundaries of the Eastern RBD, one of the districts delineated in Ireland under the WFD to enable the management of water resources to be undertaken on a catchment wide basis in accordance with the Directive. **Figure 6.5** illustrates both the location of the WFD Management Units within the UoM, and the location of UoM07 within the Eastern RBD.

The Eastern River Basin Management Plan (RBMP) (2009-2015) was developed to satisfy the requirements of the WFD and has classified all waterbodies according to their chemical, biological and hydromorphological status ranging from bad to high, based on monitoring data collected between 2007 and 2009. The RBMP aims to protect all waters within the district, improve all waters so that they reach ‘Good Ecological Status’ by 2015 (where technically feasible), and avoid any deterioration in status. Extended deadlines to achieve good status, to either 2021 or 2027, may be needed in some areas due to technical, economic, environmental or recovery constraints. The status of waterbodies within UoM07, released by the EPA in 2011<sup>4</sup>, are summarised below and shown in **Figure 6.6**.

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<sup>4</sup> Updated results from the 2009-2015 monitoring cycle were not available for use within this study timeframe.



**Figure 6.5 Eastern RBD, UoM07 and Water Management Units**

- Rivers:** Under the WFD, 139 river bodies have been identified in the UoM07 study area in the first cycle RBMPs, though they are being updated for the second cycle. The main river catchment located in UoM07 is the Boyne. Out of these 139 river bodies, 40 are at Good Ecological Status. This leaves 99 river bodies whose status' are required to improve under the WFD.

#### River Water Bodies

<b>139</b>	Total No of RWB
<b>0</b>	High Eco Status
<b>40</b>	Good Eco Status
<b>62</b>	Moderate Eco Status
<b>36</b>	Poor Eco Status
<b>1</b>	Bad Eco Status

- Lakes:** Under the WFD, 11 lake bodies have been identified in the UoM07 study area by the

#### Lake Water Bodies

<b>11</b>	Total No of LWB
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EPA. Of these 11 lake bodies, one is at High Ecological Status and five are at Good Ecological Status. A further five are at less than Good Status, meaning they are required, under the WFD, to have an improvement in their water status. The WFD requires that lakes that exceed 50 hectares, or those which contain protected areas, are reported on.

1	High Eco Status
5	Good Eco Status
2	Moderate Eco Status
2	Poor Eco Status
1	Bad Eco Status

- **Transitional and Coastal Waters:** Within UoM07, the river waters enter the Irish Sea along the coastline from the Boyne estuary. This estuary is at Good Ecological Status. UoM07 contains part of the coastline of Meath (one water body), which is at High Ecological Status.

Transitional Water Bodies	
1	Total No of TWB
0	High Eco Status
1	Good Eco Status
0	Moderate Eco Status
0	Poor Eco Status

Coastal Water Bodies	
1	Total No of CWB
1	High Eco Status
0	Good Eco Status
0	Moderate Eco Status
0	Unassigned

- **Groundwaters:** As with all UoMs, the water system below ground in the UoM07 is complex because of the wide range of rock types and soils. The underground aquifers can cross surface water catchment and boundaries. There are 32 groundwater bodies identified under the WFD in UoM07. Although 27 of these are at Good Overall Quality, five are at Poor Overall Quality and require an improvement in their quality under the WFD.
- **Artificial Waters:** There are no man-made water bodies in UoM07.

Groundwater Water Bodies	
32	Total No of GWB
27	Good Overall Quality
5	Poor Overall Quality

It can be seen **Figure 6.6** that the status of waterbodies in UoM07 varies, with Moderate being the most prevalent waterbody status. Flood risk management activities in the UoM have the potential to impact water quality or quantity and therefore must be sustainably managed.

According to the status results from the EPA in 2011, 29% of rivers and 55% of lakes within the UoM are in satisfactory condition, with high or good ecological status. As part of the WFD work programme, the EPA identified 276 river waterbodies and 17 lakes in Ireland that are predicted to be at risk, or

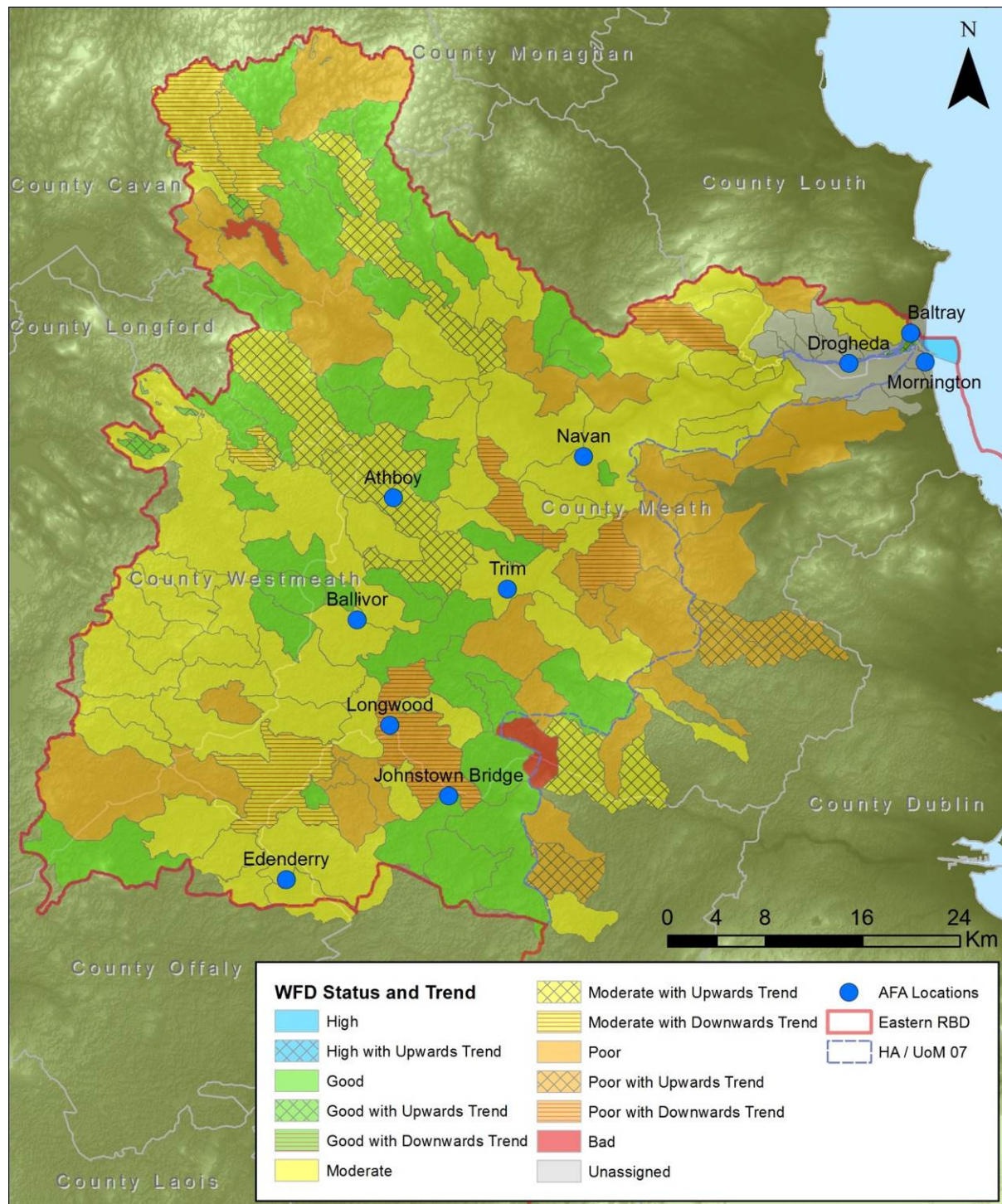
probably at risk, of failing to achieve the required standards of the WFD at the completion of the 2009-2015 monitoring cycle.

**Figure 6.6** also shows that 12 waterbodies in the catchment were observed to be on an upwards trend, improving water quality, however nine were failing to meet WFD objectives of maintaining or improving status and were identified as trending downwards during the mid-cycle surveys.

Within the UoM07 study area there are 69 water treatment plants, 30 waste water treatment plants, seven registered landfill sites and 28 Industrial Emission Directive (IED) sites. Flooding of these potentially contaminative sites has the potential to generate new pathways for pollutants to reach rivers and other waterbodies and result in failure to achieve WFD objectives. Flooding of smaller, more localised sites, such as septic tanks and small wastewater treatment plants can also have an adverse impact. A programme of improvement and upgrade to secure safe water supplies is underway to identify and remedy non-complying septic tanks. The Water Services (Amendment) Act 2012 means that all on-site septic tank systems or domestic wastewater treatment systems now have to be registered, with an Inspection Plan being devised which should lead to water quality improvements

More diffuse pollution pressures can also impact on water quality, for example flooding of agricultural land can introduce nutrients to rivers, such as through washing off slurry applied to fields. Forestry operations and peat cutting in upper catchments can also adversely impact on water quality.

The Seveso III Directive (2012/18/EU) is concerned with the prevention of major accidents that involve dangerous substances and the limitation of their consequences for humans and the environment. It applies to establishments where dangerous substances are produced, used, handled or stored. The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the “COMAH Regulations”) implement this Directive in Irish law. Consideration must be given to these sites and the potential for pollution events arising from flooding.



**Figure 6.6 WFD Status and Trend of UoM07 Waterbodies (2011)**

Hydrogeomorphology refers to the interacting hydrological, geological and surface processes which occur within a watercourse and its floodplain, while river continuity is primarily an environmental concept relating to the linear nature of the river ecosystem and its disruption due to manmade structures such as weirs and dams which alter river flow and can impede fish migration. Morphological pressures have been given consideration under the WFD. As well as catchment based morphological pressures, localised morphological alterations can have an impact on channel capacity and the structural integrity of flood defences due to the effects of scour from high sediment loads within rivers,

e.g. known areas of bank erosion within AFAs can undermine existing channel structures. The impact of hydrogeomorphological changes in the UoM07 study area ultimately applies to the performance of flood risk management options. Any morphological issues identified during field surveys for the hydrometric modelling will be incorporated into the environmental assessment.

In UoM07 the hydrogeomorphology is dominated by the effects of the Boyne arterial drainage scheme which has affected the channel topography and drainage characteristics of the catchment for over 40 years. The main purpose of the Boyne Catchment Drainage scheme is to improve the drainage of agricultural land and as such the scheme is designed to get water off agricultural land and into the surrounding drainage system. The scheme would be expected to increase flows within the surrounding watercourses as the attenuating effect of the land is reduced. The Boyne Catchment Drainage Scheme is on a rolling programme of maintenance with field drains and streams likely to be re-dredged on a 3 to 5 year cycle and main river channels on a much longer cycle of approximately 20 years. As such, it can be considered that the Boyne channels are, to a degree, in a constant state of flux and as such there are likely to be some cyclical variations in run-off over the maintenance period of the arterial drainage scheme, with timing varying from sub-catchment to sub-catchment as the maintenance teams' move through the catchment.

The channel types in UoM07 are typical of Irish catchments. Sediment transport, erosion and deposition are natural morphological processes. In larger catchments it is expected that the upper reaches will be more dynamic, with erosion taking place, and as the river moves to the lower lands sediment is accumulated and transported. Sediment deposition is expected where the channel meanders and loses energy. This only becomes an issue if too much sediment is transported from the upper reaches and deposited downstream, causing channel capacity issues or localised damage to flood defence structures from scour. Taking a closer look at morphological pressures within the catchment provides an indication if natural processes are exacerbated. The steep flashy and erosive nature of the watercourses can create a sediment load such that deposition where the channels near the coast could affect coastal AFAs. Sediment deposition, in flooding terms, only becomes an issue if too much sediment is transported from the upper reaches and deposited causing channel capacity issues or localised damage to flood defence structures from scour.

### ***Future Trends***

The implementation of the measures as required by the WFD, together with other national water legislation (e.g. Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001) as amended 2008 and the European Union (Good Agricultural Practice for Protection of Waters) Regulations 2014. (S.I. No. 31/2014), should bring about improvements in the water environment into the future. The EPA Code of Practice for Wastewater Treatment Systems and Disposal Systems (EPA, 2010) serving single houses will be applied to all new developments to help protect the water environment.

## Key Issues

- All strategic flood risk management options being proposed should fully consider any WFD implications and, wherever possible, link to and support the programme of measures in the UoM to improve the ecological status of water bodies;
- Flooding of key water supply and water treatment facilities would present a pollution risk with associated impacts on human health, water quality and ecology; however flood risk management may provide opportunities to improve water quality;
- Morphological impacts on water bodies from engineering and other works;
- Licensed abstractions and discharges should not be affected by strategic flood risk management options;
- Group Water Schemes and private wastewater treatment systems, where poorly installed, operated or maintained, can be a threat to water quality. Flood risk management options should ensure that water quality is not compromised further;
- The effects of upstream storage on water quality in downstream catchments should be considered.

## 6.6 AIR

The Air Quality Standards Regulations 2011 (S.I. No. 180/2011) make provisions for the implementation of Directive 2008/50/EC on ambient air quality and cleaner air for Europe. The EPA is the competent authority in Ireland for the implementation of the regulations. Due to the lack of potential issues with Air, and in line with all other CFRAM studies in Ireland, the Air topic was scoped out of the SEA process during the SEA Scoping Stage and will not be assessed within this environmental report.

## 6.7 CLIMATE

Within the eastern region of Ireland, annual average air temperatures are around 9.8°C, with an average of 4 hours sunshine (clear sky) per day. Mean annual rainfall at Dublin Airport for the period 1981 to 2010 was 758 mm, with an average of 42 days per year when rainfall amounts exceed 5mm. Rainfall patterns are typical of what might be expected in terms of wind patterns and topography. Areas located in the western portions of the UoM have higher rainfall figures than those to the east. According to the United Nations Intergovernmental Panel on Climate Change (2007) there is “unequivocal” evidence of climate change and furthermore:

*"most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."* (Climate Change 2007, IPCC, Fourth Assessment Report AR4).

Further to this carbon dioxide levels in the atmosphere were observed at over 400 parts per million in Hawaii. This is considered a milestone threshold and is at a level last thought to have occurred several million years ago when the arctic was ice free and sea levels were up to 40m higher.

It is likely that climate change will have a considerable impact on flood risk in Ireland, with sea level rise already being observed and it is anticipated that there will be wetter winters across the island. These potential impacts could have serious consequences for Ireland, where all of the main cities are on the coast and many of the main towns are on large rivers. While there is uncertainty associated with many aspects of potential climate change and its impacts on flood risk, it would be prudent to take the potential for change into account in the development of Flood Risk Management policies and strategies and the design of Flood Risk Management measures.

The effects of climate change on flood risk management are obvious but in terms of fluvial flooding they are not straightforward to quantify. Changes in sea level have direct impact on coastal flooding and a range of predictions on projected rises are available. A number of meteorological projections are also available for changes in rainfall but these have a wide degree of variance particularly from season to season and are difficult to translate into river flow.

Research into climate change in Ireland is coordinated by Met Éireann through the Community Climate Change Consortium for Ireland ([www.c4i.ie](http://www.c4i.ie)). Research summarised in the report 'Ireland in a Warmer World – Scientific Predictions of the Irish Climate in the 21st Century' (Mc Grath *et al.*, 2008) seeks to quantify the impact of climate change on Irish hydrology and considers the impacts of nine Irish catchments. The ensemble scenario modelling from the regional climate change model predicts that between the two periods of 1961 – 2000 and 2021 – 2060 that Ireland is likely to experience more precipitation in autumn and winter (5 – 10%) and less precipitation in summer (5 – 10%). Between the periods of 1961 – 2000 and 2060 – 2099 this trend is likely to continue with increases of 15 – 20% generally, but up to 25% in the northern half of the country in autumn and drier summers of up to 10 – 18%.

Research from c4i indicates that sea levels around Ireland have been rising at an annual rate of 3.5mm per year for the period 1993 – 2003 which is higher than the longer term rate of 1.8mm per year for the period 1963 – 2003. This trend is likely to be more modest in the Irish Sea with a 'net trend' (allowing for isostatic adjustment of the earth's crust) of 2.3 – 2.7mm per year. On top of this the report notes that storm surges are likely to increase in frequency.

The latest UK Climate Projections are covered in UKCP09 and put the central estimate of relative sea level rise at Belfast (to the north of the Boyne catchment), based on a medium emissions scenario for the year 2095 at 31.6cm. The central estimate of a high emissions scenario for 2095 is 40.3cm but the predictions range from approximately 10cm to 70cm. The relative sea level rise detailed in UKCP09 allows for vertical land movement (isostatic adjustment) based on estimates taken from 'Glacial isostatic adjustment of the British Isles: New constraints from GPS measurements of crustal motion' (Bradley *et al.*, 2008).

### **Future Trends**

The predicted impacts of climate change are likely to include:

- Increases in the frequency and intensity of rainfall;
- Increases in peak flows;
- A rise in sea levels and increased storminess;
- Coastal squeeze impacts on biodiversity associated with sea-level rise.
- Increases in urbanisation;
- Implementation of, or lack of, the strategic CFRAM measures is not expected to affect future climate trends.

### ***Key Issues***

- There is a strong likelihood of increased fluvial and coastal flooding resulting from the effects of climate change;
- The carbon footprint of flood risk management options should be a consideration during their development.
- Ability of FRM Measures to adapt to future flood risk.

## **6.8 MATERIAL ASSETS**

Resources that are valued and that are intrinsic to specific places are called ‘material assets’. Material Assets that will be considered by the SEA, due to their potential for interaction with flood risk management, include:

- Drinking water infrastructure;
- Waste water infrastructure;
- Waste infrastructure;
- Roads and Transport infrastructure;
- Energy and other utility infrastructure.

The UoM07 study area has 12 km of designated river waterways for the abstraction of drinking water and five drinking water lakes. There are also 69 water treatment plants and 30 waste water treatment facilities within the study area.

The UoM07 study area is well serviced by transport infrastructure. There are 6,280 km of roads, with 110 km of this being a motorway. There are two train stations within the study area (Drogheda and Innfield). There are two airfields within the UoM – Ballyboy and Trim. There is also one port in the study area (Drogheda).

Flooding of the transport infrastructure has the potential to cause disruption to movements of residents and commuters which could have a short-term impact on the local economy as well as potentially causing damage which could have longer-term impacts as repairs are undertaken. In particular, the potential for flooding to adversely impact on local road networks through the damage or collapse of

bridges over watercourses should be recognised as this has the potential to severely disrupt local communities and potentially poses a risk of injury or death.

Other potentially relevant infrastructure features within the UoM07 study area that could be impacted by flooding and flood risk management include 49 Eircom exchanges and three large renewable projects (wind farms). Flooding of these assets could result in disruptions to the provision of services to communities within the study area.

Within each of the AFAs in UoM07 there is the potential risk of flooding to material asset receptors such as transport infrastructural assets (e.g. road and rail) and utility infrastructural assets (e.g. HV substations and water treatment plants). **Table 6.8** provides a summary of each of the AFAs within UoM07 and the transport and utility receptors at risk of flooding in a 1% AEP fluvial event and/or a 0.5% AEP coastal event.

**Table 6.8 Transport and Utility Receptors at Risk within AFAs**

AFA	Material Assets	
	Transport Receptors	Utility Receptors
Athboy	0	0
Ballivor	2 Local Roads	0
Baltray	1 Regional Road 4 Local Roads	0
Drogheda	6 Regional Roads 23 Local Roads	0
Edenderry	1 Local Road	0
Johnstown Bridge	3 Local Roads	0
Longwood	0	0
Mornington	2 Regional roads 11 Local Roads	1 Waste Water Treatment Plant/Pumping Station
Navan	1 Second Class Single Carriageway 3 Third Class Single Carriageways	1 Kilcarn Treatment Works
Trim	1 Regional Road 7 Local Roads	1 Trim Wastewater Treatment Plant

### **Future Trends**

As described in the amenity and population sections, it is expected that infrastructure development will be necessary to respond to predicted population growth in the region.

As rural and peripheral urban areas develop, improvements in public transport will be required. Proposals such as the Rural Transport Initiative will lead increased service to previously remote areas.

Ports in the region have, for the most part, been highlighted for expansion in the relevant Local Authority Development Plans. Expansion of these facilities will require additional development of coastal areas and associated management of flood risk.

There is likely to be continued investment in renewable energy in Ireland in order to meet climate change targets.

### ***Key Issues***

- Protection and enhancement of water related assets;
- Application of sustainable uses of water;
- Development of roads and other transport assets can alter land drainage run-off characteristics and can result in related changes in river hydrology and therefore flooding;
- Effects on potential future demand for natural resources, such as biofuels, and other renewable energy sources;
- Effects on energy supplies, telecommunications infrastructure, commercial properties, farm assets and personal property.

## **6.9 CULTURAL, ARCHAEOLOGICAL & ARCHITECTURAL HERITAGE**

The UoM07 study area hosts a variety of archaeological and architectural heritage sites which are afforded varying levels of protection under national legislation such as the National Monuments Acts (1930 to 2004) and the Planning and Development Act (2000). These sites include:

- World Heritage Sites – the Department of Arts, Heritage and the Gaeltacht are responsible for the nomination of World Heritage Sites (sites of outstanding heritage value) in Ireland such that they are protected under the World Heritage Convention. There is one World Heritage Site within the study area, the Brú na Bóinne (“Bend of the Boyne”) complex of megalithic sites, including the prehistoric monument at Newgrange. The “Early Medieval Monastic Sites” (including those at Kells (Meath)), and the “Royal Sites of Ireland” including Tara (Meath) are also on the UNESCO “tentative list<sup>5</sup>” for future recognition.
- Records of Monuments and Places (RMP) – the National Monuments Service ([www.archaeology.ie](http://www.archaeology.ie)) holds responsibility for maintaining this inventory of sites of archaeological significance which pre-date the eighteenth Century (including records of those which historically have been destroyed). These sites are established under the National Monuments Acts. There are currently 2,786 recorded monuments within the UoM07 study area.
- National Inventory of Architectural Heritage (NIAH) – is a record of sites of architectural heritage importance in Ireland dating from the start of the eighteenth century up to the present day which are established under the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999. The National Inventory of Architectural Heritage also maintains an inventory of historic gardens and demesnes. There are currently 2,141 records in the NIAH within the UoM07 study area.

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<sup>5</sup> UNESCO (2015) Tentative Lists <http://whc.unesco.org/en/tentativelists/state=ie> accessed 12/08/2015

- Records of Protected Structures – The Planning and Development Act 2000 requires Local Authorities to compile a “Record of Protected Structures” as part of the County Development Plan. These are structures, or part thereof, which are considered to be of architectural value. Many of these structures also appear on the NIAH list and can be water-related features such as bridges, weirs, walls and embankments. The County Development Plans will be reviewed to take these records into consideration in the assessment of FRM Options, where available.
- Architectural Conservation Areas – In accordance with Article 81 of the Planning and Development Act, Local Authority County Development Plans are to identify Architectural Conservation Areas and are to include an objective in the Plan to preserve the character of such areas. The County Development Plans will be reviewed to take these areas into consideration in the assessment of FRM Options, where available.
- Preservation Order sites - available from the Department of Arts, Heritage and the Gaeltacht, are sites protected under the National Monuments Act. There are 53 sites subject to a Preservation Order (including four temporary sites) within the UoM07 study area. Of these, eight are assessed as being at “high” vulnerability and 14 at “moderate” vulnerability.
- Shipwrecks - Wrecks over 100 years old and archaeological objects found underwater are protected under the National Monuments (Amendment) Acts 1987 and 1994. Significant wrecks less than 100 years old can be designated by Underwater Heritage Order (UHO) on account of their historical, archaeological or artistic importance. The Shipwreck Inventory of Ireland includes all known wrecks for the years up to and including 1945 and approximately 12,000 records have been compiled and integrated into the shipwreck database thus far. At present, there are no recorded shipwrecks within this UoM.

Flooding and changes in groundwater levels has the potential to cause physical damage to archaeological and architectural heritage sites. The implementation of flood risk management measures has also the potential to include destruction of features of architectural heritage value, e.g. the destruction of a listed bridge for the purpose of improving the capacity of a river.

### ***Future Trends***

The archaeological heritage of the UoM07 study area also includes unrecorded archaeological sites in addition to the identified designated features. There may be significant archaeological resources in the study area that are as yet undiscovered. The FRMPs will need to take into account potential impacts on undiscovered archaeological features which may be present.

### ***Key Issues***

- Effects on key national sites, such as the Brú na Bóinne complex or the site of the Battle of the Boyne, which are located in river valleys;
- Many RMP sites are associated with watercourses, such as mills, mill races and bridges; these may potentially be impacted by the implementation of flood risk management measures;

- Other features, including churches, religious buildings and country houses, are located in close proximity to watercourses and as such may constrain the application of certain flood risk management measures at these locations;
- Tidal and coastal flood risk management measures may potentially impact upon maritime archaeology;
- Effects of flood risk management measures on historic landscapes or cultural-scapes.

## 6.10 LANDSCAPE & VISUAL AMENITY

The surface of UoM07 is predominantly lowland. The upland areas border the UoM include Monercrom at 338m in south east Cavan, Sliabh na Caillighe at 276m in western Meath, and Mount Oriel at 244m in southern Louth.

There is no national database of designated landscape areas in Ireland. Sensitive areas of landscape are identified at Local Authority level through City / County Development Plans. Landscape Character Assessments are produced by Local Authorities as part of their development plans which identify areas of high, moderate and low sensitivity within the county. The Local Authority approach to identifying sensitive landscape areas is based on DoEHLG<sup>6</sup> guidance on landscape and landscape assessment. The determination of landscape sensitivity takes the initial approach of identifying landscape character (based on landform / landcover and visual distinctiveness e.g. river valleys and water corridors, upland areas etc.). Following this landscape value is assigned (historical, cultural, religious, ecological), and finally landscape sensitivity is determined (a measure of the ability of the landscape to accommodate change without suffering unacceptable effects to its character and values).

Areas which can be most sensitive to visual impacts include:

- Lands with an elevation of >200m;
- Forested areas;
- Lands with a slope of >30 Degrees;
- Open landscapes like lakes and estuaries; and,
- Other natural land cover types.

The Planning and Development Act, 2000 requires that planning authorities shall set out in their County Development Plans objectives for the preservation of the character of the landscape including the preservation of views and prospects and the amenities of places and features of natural beauty or interest within their functional area. There are 33 Sensitive Landscape Areas/Landscape Character Assessment Areas in the study area, the majority of which surround lakes, rivers and coastal areas.

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<sup>6</sup> Department of Environment, Heritage and Local Government

The AFAs within UoM07 are within the landscapes of counties Kildare, Offaly, Meath and Louth. The Brú na Bóinne UNESCO site is just upstream of the Drogheda AFA, which has a development buffer zone. The Boyne and Mattock Valleys, and the Lower Boyne Valley are considered to be sensitive landscapes of international importance that are to be conserved.

The Meath County Development Plan 2013-2019 Landscape Character Assessment designated the Longwood AFA as being within the Central Lowlands. This is a high value landscape of regional importance and medium sensitivity. Views within this area are however generally limited by the complex topography and mature vegetation. Longwood is described as a large village with small-scale attractive centre, although through traffic is considerable. No new development in centre but large housing developments on the outskirts.

The Mornington AFA is within the Meath coastal plain, which is defined as being of moderate landscape value, high sensitivity and of regional importance, by the Meath Landscape Character Assessment from the Meath County Development Plan 2013 - 2019. The Meath Landscape Character Assessment also recognises the importance of the Boyne and Blackwater river corridors for scenic value, recreation, ecology, history and culture and look to preserve historic features and their landscape settings. The Navan AFA is within this area. The assessment recognises the potential constraints on development created by river flood plains and the value of these flood plains as increasingly rare habitats. The Boyne valley is assessed as being of exceptional landscape value, high sensitivity and international importance.

### ***Future Trends***

The existing landscape is not expected to change significantly in the immediate future, however if population targets under the National Spatial Strategy are reached, urban expansion is likely to place localised pressure on the landscape. County Development Plans identify objectives and strategies for landscape protection which aim to restrict away from areas of significant beauty or interest.

### ***Key Issues***

- Effects on areas of designated high landscape quality and scenic views in CDPs and other plans, e.g. the Hill of Tara;
- Effect on local parks, gardens, amenity walks and designed landscapes. Flood protection measures can intrude upon views and prospects;
- Effects on the general landscape as well as riverscapes, lakescapes and seascapes. Flood risk management options need to be sympathetic towards landscape character and opportunities to enhance landscape character should be explored.

## **6.11 FISHERIES, AQUACULTURE & ANGLING**

The responsibility of monitoring fish for the purpose of assigning waterbody status in accordance with the Water Framework Directive has been assigned to Inland Fisheries Ireland (IFI). Monitoring for the

Eastern RBD (in which UoM07 is located) in 2011<sup>7</sup> showed a total of ten fish species recorded in rivers within the study area (Lamprey sp., Minnow, Salmon, Nine-spined stickleback, Stone loach, Three-spined stickleback, Brown trout, Roach, Eel and Pike). The three-spined stickleback was the most commonly encountered species in the ERBD, being recorded in 16 of the 21 sites, followed by brown trout and eels. In Ireland the WFD Freshwater Morphology Programme of Measures and Standards has identified barriers to fish migration as one of the principal issues placing channels at risk in terms of failing to achieve good hydromorphology status. Such barriers can adversely impact on fish community composition and population structure. Under the Fish Classification Scheme 2 (FCS2) tool each river was assigned a draft fish classification status. The first Eastern RBD RBMP has detailed the fish status of rivers within this RBD. Within UoM07, one site (Boyne Lower) is classified as “Moderate”.

Flooding and flood risk management will need to consider the impact upon fish habitat. Flood-related threats include siltation due to changes in flow affecting erosion and deposition patterns, pollution from flooding episodes and displacement of fish. Flood risk management operations, particularly in-channel working, has the potential to cause disturbance, habitat damage, in particular to spawning gravels, and cause a temporary or permanent impediment to fish and eel passage. Any options selected for flood risk management should not permanently restrict fish passage.

Environmental Rivers Enhancement Programmes (EREP) are funded by OPW and administered by IFI. These programmes include capital enhancement and maintenance: river bank protection, fish passage improvements, spawning enhancement, in-stream structures, fencing and riparian zone improvement. These measures will enhance the environment in support of fisheries. There has been a recent ERE in this study area at the Boyne.

The River Boyne is a designated salmonid river. Lamprey is also known to be present in the river. In addition, it is also known as a good fishing spot for sea trout. Licensed mussel beds are found in the lower stretches of the River Boyne. In the transitional waters of this UoM at the River Boyne Estuary, 23 species of fish were captured during 2012, including five-bearded rockling, flounder, lesser sandeel, pollack, sand goby and three-spined stickleback. Other commercially important fish recorded included brown trout, sea trout, flounder, pollack, salmon and cod. The Boyne was classified as “good” status under the Transitional Fish Classification Index (TFCI) in 2012. The Blackwater, a tributary of the Boyne, is known for good stocks of wild brown trout. Another area within UoM07 popular for fishing is in the Royal Canal, where coarse fishing takes place.

The Irish Sea is an important fishery and the nearshore area is fished for several species including scallops, lobsters, prawns, whelks and periwinkles. Although there is only a small amount of coastline within the UoM07, it offers sea angling. Anglers have a variety of fishing types available, including inshore, small boat, charter boat, rock fishing or flyfishing.

**Figure 6.7** shows the designated salmonids rivers, main sea angling areas and main inshore fisheries in the UoM07 study area.

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<sup>7</sup> Inland Fisheries Ireland (2012) Water Framework Directive Fish Stock Survey of Rivers in the Eastern River Basin District, 2011



**Figure 6.7 Fisheries and Designated Rivers in UoM07**

### ***Future Trends***

There are existing on-going programmes for the protection and management of fisheries, such as EREP, which will continue to operate and to contribute towards the enhancement of fisheries in Ireland.

Improvements to be introduced as part of the Programme of Measures to allow achievement of WFD objectives will assist in protecting and enhancing the fisheries resource of the UoM.

### ***Key Issues***

- Flood risk management measures should give consideration to the protection and enhancement of fishery habitat and should have regard to any fishery management

programmes. Also fish migration needs to be considered in the identification of flood risk management options;

- Consideration should be given to the enhancement and preservation of commercial and tourism fishery facilities;
- Implementation of flood risk management measures may contribute towards the spread of invasive species if not properly managed.

## 6.12 AMENITY, COMMUNITY AND SOCIO-ECONOMICS

In the 2011 census, over 75,000 residential properties were identified in the UoM07 study area. The most densely populated areas are found in Navan and Ballyboggan (south of Kinnegad). Health care facilities in the UoM07 study area include five hospitals and 26 health centres distributed throughout the region. Given the relatively high number of health centres, there is a predictable range of localities, although the majority are associated with lowland areas due to the necessity to serve population centres. The study area also includes 11 nursing homes and seven residential care homes for the elderly, many of which are also associated with hospitals or health centres. There are 122 primary schools and 24 post-primary schools in the UoM07. There are no third-level education institutions. There are seven fire stations, 22 Garda stations and one civil defence site in the UoM07 study area. The effectiveness of these assets has a strong link to transport infrastructure, through the necessity to travel rapidly and directly throughout the region.

The UoM07 study area is an important amenity, tourism and recreation resource, with neighbouring counties of Dublin including Cavan, Kildare, Louth, Meath, Offaly (East), Westmeath, and Wicklow (only county not located within this UoM) enjoying revenues in excess of €298 million from international tourism. The UoM07 study area offers a variety of natural coastal and inland landscapes, which provide tourism and recreation opportunities and have created a number of tourist attractions. Key recreational sporting activities in the region include golf, horse racing, football and hurling. There are around 123 km of amenity walks within the study area and around 8 km of on-road cycle trails. There are cycle paths and greenways alongside many of the waterways within the UoM. There is one designated bathing water in the study area, which is inland (freshwater) at Lough Lene. There is one statutory Nature Reserves within the study area (Raheenmore Bog), which provides valuable amenity areas. There is one main horse racecourse within the study area, at Navan. Although there are no airports within this UoM, there is one seaport in Drogheda.

The Brú na Bóinne complex of megalithic sites, including the prehistoric monument at Newgrange, which attracts up to 200,000 visitors a year, has been granted status as a UNESCO World Heritage Site, one of only two in Ireland. The UoM07 study area encompasses many popular tourist attractions, including Battle of the Boyne Visitor Centre (Newgrange and Knowth), Solstice Arts Centre, Knowth Passage Tombs and The TLT Concert Hall & Theatre. There are 17 galleries, museums and theatres in the study area.

In addition to hotels, guesthouses and bed and breakfasts, camping/caravanning sites and hostels are also available to visitors to the UoM07 study area. These are frequently associated with coastal areas, but also loughs and rivers.

From the County development plans and Local Area Plans that make up UoM07 there are 54 sites designated as conservation / amenity or buffer space / corridor/belt / landscape, there are 13 sites designated as active open space, there are 1,239 sites designated as mixed / general 'green' / recreation & conservation and there are 231 sites designated as mixed / general community services / facilities.

Within each of the AFAs in UoM07 there is the potential risk of flooding to social infrastructure receptors and social amenity sites (e.g. parks). **Table 6.9** provides a summary of each of the AFAs within UoM07 and the social receptors at risk of flooding in a 1% AEP fluvial event and/or a 0.5% AEP coastal event.

**Table 6.9 Social Infrastructure and Amenity Sites at Risk within AFAs**

AFA	Social Infrastructure Assets	Social Amenity Sites
Athboy	0	1 Area of High Natural Beauty; 4 Open Spaces for active and passive recreational amenities
Ballivor	0	0
Baltray	0	7 open space areas
Drogheda	1 homeless centre 1 post office 1 library 1 police station	2 CCI civic community, institutional areas; 1 community recreational & educational facility; 2 areas of high natural beauty; 13 OS open spaces recreational areas; 1 F1 area
Edenderry	0	2 open space areas; 1 public/community/educational area
Johnstown Bridge	0	0
Longwood	0	2 community, recreational and educational facilities; 1 open space for active and passive recreational amenities
Mornington	0	2 community, recreational and educational facility areas; 1 area of high natural beauty; 4 open space areas for active and passive recreational amenities
Navan	0	8 open spaces for active and passive recreational amenities; 7 areas of high natural beauty
Trim	0	Multiple amenity areas along River Boyne Corridor; 3 open space areas for active and passive recreational amenities; 2 community recreational and educational facility areas.

Within each of the AFAs in UoM07 there is the potential risk of flooding to economic receptors, such as commercial properties. **Table 6.10** provides a summary of each of the AFAs within UoM07 and the commercial receptors at risk of flooding in a 1% AEP fluvial event and/or a 0.5% AEP coastal event. Also included for each AFA is the present value damages (pvD), which is the predicted monetary damage to flooding within the AFA over a 50 year time period.

**Table 6.10 Non-Residential Properties at Risk and PVD within AFAs**

AFA	Non-Residential Properties	PVD
Athboy	0	€23,037
Ballivor	0	€4,502
Baltray	4	€17,771,595
Drogheda	214	€111,483,259
Edenderry	0	€47,081
Johnstown Bridge	1	€262,526
Longwood	1	€816,769
Mornington	1	€2,922,658
Navan	21	€12,014,526
Trim	6	€1,666,605

### **Future Trends**

Tourism Ireland's Corporate Plan 2014-2016 aims to increase Ireland's share in European tourism and be a strong driver for economic growth. Growth targets include increasing overseas visitor numbers by 15% and spending by 24%, focusing on "the experience" of visiting Ireland, including its people and its natural assets. A new initiative to attract visitors to the east coast, complementing the west coast's "Wild Atlantic Way" is being promoted, called "Ireland's Ancient East" which focuses attention on prehistoric and medieval heritage sites such as Newgrange.

The population structure described in **Section 6.1.2**, with its greater proportion of young people (<15) and older people (>65), may lead to increasing demand for schools, nursing facilities and other social infrastructure. Communities will need more facilities to meet the demands of the growing population. An increasing fertility rate and decreasing mortality rate dictate that there is an increasing dependency upon health care provisions throughout Ireland. For this reason, it is anticipated that the number of healthcare facilities is likely to increase. With that being said, economic constraints facing this sector dictate that, in spite of increasing demand for these services, resources may not increase to the same extent.

This increasing population will need more facilities to work in, otherwise will face unemployment. Planning permission granted to non-residential properties throughout Ireland continues to increase steadily. Permission is primarily granted to new constructions closely followed by the addition of extensions. Adhering to this trend, it is anticipated that the number of non-residential/commercial properties will continue to increase at a steady rate. The existing and required commercial properties

will need protected from flood risk to prevent financial losses and to assist in the successful long term operation of a business.

### ***Key Issues***

- Protecting and promoting heritage and amenity assets;
- Maintenance and enhancement of beaches and coastal assets;
- Development and promotion of existing and new quality visitor accommodation and business facilities.
- Effects on connectivity of communities. Flooding in the past has caused areas to be “cut off” from surrounding infrastructure. Aging and young populations are particularly vulnerable to these impacts;
- Social infrastructure facilities tend to be at the heart of communities, however not always built on the best land to save cost. These facilities may be more vulnerable to flooding as located in low lying areas.
- Loss of local revenue from flooding of non-residential / commercial properties.
- Non-residential / commercial properties, social amenity and social infrastructure properties are key indicators of the UoM07 Study.

## **6.13 EVOLUTION OF THE ENVIRONMENT IN THE ABSENCE OF THE PLAN**

In the absence of the Plan, i.e. the Do Nothing Scenario, flood risk management in the UoM would continue to be addressed on an ad hoc basis, with no prioritisation and overarching management of flood risk management activities. There would also be no establishment of flood risk and flood hazard with detailed hydrological and hydraulic modelling for all areas at risk in the UoM.

In the absence of the FRMP it is likely that there will still be benefits to both protected sites and species, and the wider aquatic environment, with the implementation of measures to achieve good ecological status or potential under the WFD. There would be the continued development of specific biodiversity action plans under the National Biodiversity Plan and related plans which should provide a framework for protecting these increasingly threatened habitats and species. Changes in land use, such as increasing urbanisation, afforestation or changing agricultural practices, will continue to threaten biodiversity within the study area, both within and outside of the designated sites. Habitats that are currently protected by FRM defences in the UoM may suffer in the future if there is no maintenance or improvement of the defences in the absence of the Plan. Without the FRMP the risk of flooding to these habitats and species will remain and may adversely impact biodiversity.

The population trend within UoM09 is likely to be one of increasing growth, broadly matching the national average. There will be ongoing population pressure on infrastructure and resources and the provision of adequate health care resources for the expanding population, particularly in terms of the expansion of the aging and young populations that are not economically active. In the absence of the

FRMP there will be increasing risk to human health and high vulnerability properties as the population expands and development increases, as there will likely be increased development in areas of potential flood risk, as the risk has never been established and quantified. This risk to life is heightened with higher numbers of vulnerable young and old people in the UoM.

While it is unlikely that the general pattern of land use will be substantially changed in the future, the increasing population will continue to drive a requirement for new housing and the expansion of developed areas. Increases in population pose pressures on agriculture to increase productivity, which coincides with the Irish agricultural industry also aiming to provide more goods to the global market. Land drainage to improve soil quality may have effects on flood risk by increasing the speed at which water reaches the main arterial river networks. In the absence of the FRMP this trend of increasing land drainage for agriculture is likely to continue as there will be no formal management of FRM activities across the UoM, which may lead to exacerbation of flood risk and in turn may result in an increase in erosion of vulnerable agricultural land.

In the absence of the FRMP there will still be the implementation of the measures required by the WFD, together with other national water legislation, which should bring about improvements in the water environment into the future. The risk of flooding to water quality will however remain without the implementation of the FRMP. The areas and waterbodies at risk of these pollution incidents will not have been identified and are therefore less likely to be managed in the future.

The implementation of, or lack of, the FRMP is not expected to affect future climate trends, such as increases in the frequency and intensity of rainfall, increases in peak flows, a rise in sea levels and increased storminess. However any future flood risk management activities planned without the FRMP may not be taking into account of the required adaptability to climate change, which could lead to the development of inadequate designs for flood risk management. Current FRM activities may have reducing standards of protection in the future with the predicted change in climatic trends, which may not be addressed and upgraded in the absence of the FRMP.

In the absence of the FRMP it is still expected that infrastructure development will be necessary to respond to predicted population growth in the region. As rural and peripheral urban areas develop, improvements in public transport will be required. Proposals such as the Rural Transport Initiative will lead increased service to previously remote areas. However, without the FRMP there is the risk that flood risk is not understood or adequately taken into account in the development of future infrastructure. In the absence of the FRMP the existing flood risk to infrastructure will also not have been established and the management of this risk will be done on an ad hoc or reactionary basis by the relevant authority.

In the absence of the FRMP there may be some archaeological and architectural heritage features within AFAs that will be lost or damaged from flood events. There may also be some archaeological and architectural heritage features along river banks and river beds within AFAs that will remain in situ and undiscovered, as there is less likely to be the development of FRM measures in these areas.

The existing landscape is not expected to change significantly in the future, however if population targets under the National Spatial Strategy are reached, urban expansion is likely to place localised pressure on the landscape. In the absence of the FRMP the flood risk will not be fully established and appreciated. The flood zones from the FRMP will not have been established which would have assisted in preventing development in the floodplain and helped to preserve this landscape.

In the absence of the FRMP there would still be the on-going programmes for the protection and management of fisheries, such as EREP, which will continue to operate and to contribute towards the enhancement of fisheries in Ireland. There would be improvements introduced as part of the WFD Programme of Measures to allow achievement of WFD objectives, which will assist in protecting and enhancing the fisheries resource of the UoM. There is likely to be the continued improvement of fisheries habitat on the local scale by angling clubs. Any future FRM activities that take place in the absence of the FRMP may however be carried out on a local basis, without an appreciation of activities in the wider UoM.

The absence of the FRMP is unlikely to influence the future tourism trends in Ireland. The future demands of the growing population will however need more amenity areas, community facilities and places of employment. The existing and required amenity areas, community facilities, commercial properties and tourist destinations such as museums and galleries will need to be protected from flood risk. In the absence of the FRMP the existing flood risk to these sites will not have been established and the management of this risk will be done on an ad hoc or reactionary basis by the relevant authority. Also these areas, facilities and properties may be planned in inappropriate locations, putting them at a higher risk of flooding.

## 7 REVIEW OF RELEVANT, PLANS, PROGRAMMES AND POLICIES

### 7.1 INTERACTION WITH OTHER RELEVANT PLANS AND PROGRAMMES

As part of the SEA process the context of the FRMP for UoM07 must be established with regard to other Plans and Programmes that have been adopted at International, European and National levels. In particular the interaction of the environmental protection objectives and standards included within these Plans and Programmes with the FRMP requires consideration.

**Table 7.1** identifies the main significant environmental plans, programmes and legislation, adopted at International, European Community or Member State level, which would be expected to influence, or be influenced by, the UoM07 FRMP. While it is recognised that there are many Plans, Programmes and legislation that will relate to the FRMP it is considered appropriate to only deal with those significant texts, to keep the assessment at a strategic level. More information on these Plans, Programmes and legislation, along with their potential interaction with the FRMPs is given in **Appendix F**.

**Table 7.1 Summary of Key Plans, Programmes and Legislation Relevant to the FRMP**

Level	Plan / Programme / Legislation
<b>EU Level</b>	<ul style="list-style-type: none"> <li>• <b>EU Floods Directive [2007/60/EC]</b></li> <li>• A Blueprint to Safeguard Europe's Water Resources [COM(2012)673]</li> <li>• Bathing Water Directive [2006/7/EC]</li> <li>• Birds Directive [2009/147/EC]</li> <li>• Bonn Convention [L210, 19/07/1982 (1983)]</li> <li>• Drinking Water Directive [98/83/EC]</li> <li>• EIA Directive [85/337/EEC] [2014/52/EU]</li> <li>• Environmental Liability Directive [2004/35/EC]</li> <li>• Environmental Quality Standards Directive [2008/105/EC]</li> <li>• EU Biodiversity Strategy to 2020 [COM(2011)244]</li> <li>• European Landscape Convention [ETS No. 176]</li> <li>• Groundwater Directive [80/68/EEC] and Daughter Directive [2006/118/EC]</li> <li>• Habitats Directive [92/43/EEC]</li> <li>• Marine Strategy Framework Directive [2008/56/EC]</li> <li>• Nitrates Directive [91/676/EEC]</li> <li>• Renewable Energy Directive [2009/28/EC]</li> <li>• SEA Directive [2001/42/EC]</li> <li>• Second European Climate Change Programme [ECCP II] 2005.</li> <li>• Sewage Sludge Directive [86/278/EEC]</li> <li>• Soils Thematic Strategy [COM(2006) 231]</li> <li>• Urban Wastewater Treatment Directive [91/271/EEC]</li> <li>• Water Framework Directive [2000/60/EC]</li> <li>• World Heritage Convention [WHC-2005/WS/02]</li> </ul>
	<ul style="list-style-type: none"> <li>• Arterial Drainage Maintenance and High Risk Designation Programme 2011-</li> </ul>

<b>National Level</b>	<p>2015 (OPW, 2011)</p> <ul style="list-style-type: none"> <li>• Fisheries Acts 1959 to 2007 (S.I. No. 14 of 1959 and No. 17 of 2007)</li> <li>• Food Harvest 2020 (DAFM, 2010)</li> <li>• Capital Investment Programme 2014-2016 (Irish Water, 2014)</li> <li>• Grid 25 Implementation Plan 2011-2016 (EIRGIRD, 2010)</li> <li>• Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland (Inter-Departmental Marine Coordination Group 2012)</li> <li>• Irish Geological Heritage (IGH) Programme (GSI 1998-)</li> <li>• National Biodiversity Plan (2nd Revision 2011-2016) (DAHG, 2011)</li> <li>• National Climate Change Adaptation Framework (DEHLG, 2012)</li> <li>• National Climate Change Strategy 2007-2012 (DEHLG, 2007)</li> <li>• National (Climate) Mitigation Plan (DECLG, 2012)</li> <li>• National Development Plan 2007-2013 (DECLG, 2007)</li> <li>• National Forestry Programme 2014-2020 (DAFM, 2015)</li> <li>• National Forest Policy Review (DAFM, 2014)</li> <li>• National Landscape Strategy for Ireland (Draft) 2014 – 2024 (DAHG, 2014)</li> <li>• National Monuments Acts (1930 to 2004) (S.I. No. 2 of 1930 &amp; No. 22 of 2004)</li> <li>• National Renewable Energy Action Plan (DCENR, 2010)</li> <li>• National Secondary Road Needs Study 2011 (NRA, 2011)</li> <li>• National Spatial Strategy 2002-2020 (DELG, 2002)</li> <li>• National Sludge Wastewater Sludge Management Plan (Draft) (Irish Water, 2015)</li> <li>• National Strategic Plan for Sustainable Aquaculture Development (DAFM, 2015)</li> <li>• Offshore Renewable Energy Development Plan (DCENR, 2014)</li> <li>• Planning System and Flood Risk Management (OPW, 2009)</li> <li>• Raised Bog SAC Management Plan (Draft) (DAHG, 2014),</li> <li>• National Peatland Strategy (Draft) (NPWS, 2014)</li> <li>• Review of Raised Bog Natural Heritage Area Network (NPWS, 2014)</li> <li>• Report of the Flood Policy Review Group (OPW, 2004)</li> <li>• Rural Development Programme 2014-2020 (DAFM, 2015)</li> <li>• Water Services Strategic Plan (Irish Water, 2014)</li> </ul>
<b>Regional Level</b>	<ul style="list-style-type: none"> <li>• <b>UoM07 Flood Risk Management Plan (OPW, 2016)</b></li> <li>• Eastern River Basin District Management Plan 2009-2015 (DEHLG, 2010)</li> <li>• Draft Transport Strategy for the Greater Dublin Area 2016-2035 (NTA, 2015)</li> <li>• Midlands BAU (Business Area Unit) 2016-2020 (Coillte, 2016)</li> <li>• Regional Planning Guidelines for the Border Region 2010-2022, Regional Planning Guidelines Office, 2010)</li> <li>• Regional Planning Guidelines for the Greater Dublin Area 2010-2022, (Regional Planning Guidelines Office, 2010)</li> <li>• Regional Planning Guidelines for the Midland 2010-2022, (Regional Planning Guidelines Office, 2010)</li> </ul>
<b>Sub-Regional</b>	<ul style="list-style-type: none"> <li>• Cavan County Development Plan 2014-2020 (Cavan County Council, 2014)</li> <li>• Kildare County Development Plan 2011-2017 (Kildare County Council, 2011)</li> <li>• Louth County Development Plan 2015-2021 (Louth County Council, 2015)</li> <li>• Meath County Development Plan 2013-2019 (Meath County Council, 2013)</li> <li>• Offaly County Development Plan 2014-2020 (Offaly County Council, 2014)</li> <li>• Westmeath County Development Plan 2014-2020 (Westmeath County</li> </ul>

	<p>Council, 2014)</p> <ul style="list-style-type: none"> <li>• Drogheda Borough Council Development Plan 2011-2017 (Louth County Council, 2011)</li> <li>• Navan Development Plan 2009-2015 (Meath County Council, 2009)</li> <li>• Trim Development Plan 2008-2014 (Meath County Council, 2008)</li> <li>• Louth County Council Landscape Character Assessment (LCC, 2002)</li> <li>• The Geological Heritage of Cavan (GSI, 2013)</li> <li>• Offaly Historic Landscape Characterisation (Offaly County Council, 2006)</li> <li>• County Offaly Wind Strategy (Offaly County Council, 2009)</li> <li>• Cavan Economic Plan 2009-2012 (Cavan County Council, 2009)</li> <li>• Kildare Local and Economic &amp; Community Plan 2016-2021 (Kildare County Council, 2015)</li> <li>• Meath Economic Development Strategy 2014-2022 (Meath County Council, 2014)</li> <li>• Offaly Local and Economic &amp; Community Plan 2016-2021 (Offaly County Council, 2015)</li> <li>• County Cavan Groundwater Protection Scheme (GSI, 2008)</li> <li>• Couth Offaly Groundwater Protection Scheme (GSI and Offaly County Council, 1998)</li> <li>• County Kildare Groundwater Protection Scheme (GSI and Kildare County Council, 2002)</li> <li>• County Meath Groundwater Protection Scheme (GSI and Meath County Council, 1996)</li> <li>• Ballmakenny Group Water Scheme (GSI and Louth County Council, 2011)</li> <li>• Cavan Draft Heritage Plan 2016-2021 (Cavan County Council, 2015)</li> <li>• Kildare Heritage Plan 2014-2018 (Kildare County Council, 2013)</li> <li>• Louth Heritage Plan 2015-2020 (Louth County Council, 2014)</li> <li>• Draft County Meath Heritage Plan 2016-2021 (Meath County Council, 2015)</li> <li>• Offaly Heritage Plan 2012-2016 (Offaly County Council, 2011)</li> <li>• Westmeath Heritage Plan 2010-2015 (Westmeath County Council, 2009)</li> <li>• Housing Strategy for County Cavan 2008-2014 (Appendix 26) (Cavan County Council, 2007)</li> <li>• Offaly Housing Strategy 2008-2015 (Offaly County Council, 2007)</li> <li>• Athboy Local Area Plan 2009-2015 (Meath County Council, 2009)</li> <li>• East Meath Local Area Plan 2014-2020 (Meath County Council, 2014)</li> <li>• Edenderry Local Area Plan 2011-2017 (Offaly County Council, 2011)</li> <li>• Longwood Local Area Plan 2009-2015 (Meath County Council, 2009)</li> <li>• Local Biodiversity Action Plan Louth (Louth County Council, 2014)</li> <li>• (Draft) County Meath Biodiversity Action Plan 2015-2021 (Meath County Council, 2015)</li> <li>• Westmeath Biodiversity Action Plan 2014-2020 (Westmeath County Council, 2013)</li> <li>• Kildare Biodiversity Plan 2009-2014 (Kildare County Council, 2008)</li> </ul>
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## 8 PROPOSED OPTIONS / ALTERNATIVES

### 8.1 INTRODUCTION TO PROPOSED OPTIONS / ALTERNATIVES

The long list of FRM Methods considered for identified flood risk areas have been presented previously in **Section 4**. These are the basic alternatives available to the FRMP and were screened for technical and economic viability, along with the potential for high level environmental / social impacts. The following section splits these into the non-structural (policy) options and structural (engineering) options. These options are the viable alternatives that are available to the FRMP to manage flood risk.

### 8.2 DO NOTHING ALTERNATIVE

The Do-Nothing scenario was considered from the outset as one of the FRM methods considered. Each area to be assessed from UoM to AFA scale has therefore had the Do-Nothing method assessed as a potential alternative to the Plan. This was generally ruled out as an option however as it would not achieve the stated objectives of the FRMP to manage flood risk within the UoM.

### 8.3 NON-STRUCTURAL OPTIONS / ALTERNATIVES

The majority of the non-structural methods proposed do not in their own right manage flood risk as a stand-alone method have been brought forward as complimentary options. These options are generally applied across a larger scale, e.g. the whole UoM. However, flood forecasting and warning, and land use management will only be applicable to suitable catchments of the UoM.

#### 8.3.1 UoM Scale Measures

There are certain prevention and preparedness measures related to flood risk management, as described in **Section 4**, that form part of wider Government policy. These measures should be applied across the whole UoM, including all AFAs. These methods are listed below from **8.3.1.1** to **8.3.1.13**. Please note that the non-structural, policy based measures will have no physical outcome or are an existing process and so they have not been assessed for impacts on the wider environment within this SEA Environmental Report. The next stage of development of these future plans and policies would be environmentally neutral, however in some cases they may need taken into account for in-combination and cumulative impacts.

##### 8.3.1.1 Sustainable Planning and Development Management

The proper application of the Guidelines on the Planning System and Flood Risk Management by the planning authorities is essential to avoid inappropriate development in flood prone areas, and hence avoid unnecessary increases in flood risk into the future. The flood mapping provided as part of the FRMP will facilitate the application of the Guidelines. The Planning Authorities will ensure proper application of the Guidelines on the Planning System and Flood Risk Management (DECLG/OPW,

2009) in all planning and development management processes and decisions in order to support sustainable development.

#### **8.3.1.2 Sustainable Urban Drainage Systems (SuDS)**

Sustainable Urban Drainage Systems (SuDS) can play a role in reducing and managing run-off from new developments to surface water drainage systems, reducing the impact of such developments on flood risk downstream, as well as improving water quality and contributing to local amenity. In accordance with the Guidelines on the Planning System and Flood Risk Management (DECLG/OPW, 2009), planning authorities should seek to reduce the extent of hard surfacing and paving and require the use of sustainable drainage techniques.

#### **8.3.1.3 Voluntary Home Relocation**

In extreme circumstances, the flood risk to an area where there is already some development may be such that continuing to live in the area is not acceptable to the owners, and it may not be viable or acceptable to take measures to reduce the flooding of the area. The home-owner may choose to relocate out of such areas removing the risk.

At present, there is no Scheme to provide financial assistance to home-owners wishing to relocate due to flood risk where the risk might warrant financial assistance from the State for the home-owner to relocate.

The Inter-Departmental Flood Policy Coordination Group will consider the policy options around voluntary home relocation for consideration by Government.

#### **8.3.1.4 Local Adaptation Planning**

The consultation document on the NCCAF recognises that local authorities also have an important role to play in Ireland's response to climate adaptation. Given the potential impacts of climate change on flooding and flood risk, the local authorities should take fully into account these potential impacts in the performance of their functions, in particular in the consideration of spatial planning and the planning and design of infrastructure. Local authorities should take into account the potential impacts of climate change on flooding and flood risk in their planning for local adaptation, in particular in the areas spatial planning and the planning and design of infrastructure.

#### **8.3.1.5 Land Use Management and Natural Flood Risk Management Measures**

The OPW is liaising with the EPA on the potential impact of WFD measures on flood risk, which are typically neutral (no impact), or may have some benefit in reducing runoff rates and volumes (e.g., through agricultural measures such as minimising soil compaction, contour farming or planting, or the installation of field drain interception ponds). The OPW will continue to work with the EPA and other agencies implementing the WFD to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures, and also

biodiversity and potentially other objectives. It is anticipated that this is most likely to be achieved in areas where phosphorous loading is a pressure on ecological status in a sub-catchment where there is also an identified potentially significant flood risk (i.e., an AFA). This coordination will also address measures that may otherwise cause conflict between the objectives of the two Directives.

#### **8.3.1.6 Maintenance of Arterial Drainage Schemes**

There is one Arterial Drainage Scheme within the UoM07, namely the Boyne Arterial Drainage Scheme. The OPW has a statutory duty to maintain the Arterial Drainage Schemes, and this Draft FRMP does not amend these responsibilities. The OPW shall continue to maintain the Arterial Drainage Schemes in accordance with legislation.

#### **8.3.1.7 Maintenance of Drainage Districts**

There are ten Drainage Districts (DD) within the Boyne Catchment, namely the Owenroe & Moynalty DD, Lough Crew DD, Nanny Upper DD, Ballytracey DD, Rathangan DD, Kilcock DD, Ballycowan DD, Carbury Hill Stream DD, Foranwell DD and Garr DD. The Local Authorities have a statutory duty to maintain the Drainage Districts, and this Draft FRMP does not amend these responsibilities. The local authorities shall continue to maintain the Drainage Districts in their jurisdictional area in accordance with legislation.

#### **8.3.1.8 Flood Forecasting and Warning**

A Government decision was taken on the 5<sup>th</sup> January 2016 to establish a national flood forecasting and warning service. Flood Forecasting and Warning was assessed as a method of flood risk management throughout UoM07. This method would utilise data from the existing hydrometric and meteorological networks to develop predictive models enabling alerts/warnings to be issued in sufficient time to flood prone receptors for action to be taken to manage the consequences of the flood event.

#### **8.3.1.9 Review of Emergency Response Plans for Severe Weather**

The local authorities should review their severe weather emergency response plans with respect to flood events, making use of the information on flood hazards and risks provided through the CFRAM Programme and this FRMP, once finalised, and then regularly review the plans taking account of any changes or additional information, as appropriate. The local authorities should update and then regularly review their severe weather emergency response plans with respect to flood events, making use of all available information on flood hazards and risks.

#### **8.3.1.10 Promotion of Individual and Community Resilience**

While the State, through the OPW, local authorities and other public bodies can take certain actions to reduce and manage the risk of flooding, individual home-owners, businesses and farmers also have a responsibility to manage the flood risk to themselves and their property and other assets to reduce

damages and the risk to personal health in the event of a flood. All people at flood risk should make themselves aware of the potential for flooding in their area, and take long-term and short-term preparatory actions to manage and reduce the risk to themselves and their properties and other assets.

#### **8.3.1.11 Individual Property Protection**

Individual Property Protection can be effective in reducing the damage to the contents, furniture and fittings in a house or business, but are not applicable in all situations (for example, they may not be suitable in areas of deep or prolonged flooding, or for some types of property with pervious foundations and flooring). Property owners considering the use of such method should seek the advice of an appropriately qualified expert on the suitability of the measures for their property. At present, there is no Scheme to provide financial assistance to property-owners wishing to install Individual Property Protection measures where the risk might warrant financial assistance from the State for such measures. The Inter-Departmental Flood Policy Review Group will consider the policy options around installation of Individual Property Protection measures for consideration by Government.

#### **8.3.1.12 Flood-Related Data Collection**

Ongoing collection of hydrometric and meteorological data, and data on flood events as they occur, will help us to continually improve our preparation for, and response, to flooding. The OPW, local authorities / EPA and other organisations collecting hydro-meteorological data should continue to do so, and post-event event flood data should continue to be collected, to improve future flood risk management.

#### **8.3.1.13 Minor Works Scheme**

The Minor Flood Mitigation Works and Coastal Protection Scheme (the 'Minor Works Scheme') is an administrative scheme operated by the OPW under its general powers and functions to support the local authorities through funding of up to €500k to address qualifying local flood problems with local solutions. The OPW will continue the Minor Works Scheme until such time as it is deemed no longer necessary or appropriate.

### **8.4 STRUCTURAL OPTIONS / ALTERNATIVES**

As discussed in **Section 4**, the FRM methods that came through the preliminary screening were grouped into FRM options that would help manage flood risk at a UoM, catchment or AFA scale. **Table 8.1** demonstrates the structural options (alternatives) that were considered for UoM07. In each case the preferred option has been highlighted in green. As discussed previously in **Section 4** there were several layers of environmental inputs to the FRMP assessments. The full MCA Scores for all options considered have been given in **Appendix C** of this SEA Environmental Report, along with these scores organised by environmental topic area.

If an AFA was discovered to have no flood risk, or no options could be found that were technically and economically feasible, no further assessment took place for the FRMP and therefore no further assessment took place for the SEA.

**Table 8.1 FRM Options for UoM07**

Spatial Scale	Name	Option Number	Description
Sub-Catchment	Boyne	0	No Options Technically and Economically feasible.
AFA	Athboy	0	No Options Technically and Economically feasible.
AFA	Ballivor	0	No Options Technically and Economically feasible
AFA	Baltray	1	Hard Defences (Improve existing)
AFA	Baltray	2	Hard Defences (New)
AFA	Drogheda	1	Hard Defences and Flow Diversion
AFA	Drogheda	2	Hard Defences, Flow Diversion and Improving Channel Conveyance
AFA	Drogheda	3	Hard defences, flow diversion and storage
AFA	Edenderry	0	No Options Technically and Economically feasible
AFA	Johnstown Bridge	0	No Options Technically and Economically feasible
AFA	Longwood	0	No Options Technically and Economically feasible
AFA	Mornington	1	Hard Defences
AFA	Navan	1	Hard Defences and Do Minimum
AFA	Trim	0	No Options Technically and Economically feasible

## 9 ASSESSMENT

### 9.1 METHODOLOGY

The methodologies for the many levels of environmental assessment that have been undertaken for the UoM07 FRMP have been described in **Section 4** of this Environmental Report. This following Section will provide an extended assessment and narrative of the preferred options for UoM07 that are being brought forward in the FRMP. The MCA outputs for all options considered, including the environmental and social scores and justifications, can be found in **Appendix C** of this SEA Environmental Report and **Appendix F** of the FRMP.

### 9.2 UOM SCALE OPTIONS

#### 9.2.1.1 Sustainable Planning and Development Management

This method is applicable throughout UoM07. This option is considered environmentally neutral as it is a policy option to prevent inappropriate development. No further environmental assessment was considered for this option.

#### 9.2.1.2 Sustainable Urban Drainage Systems (SuDS)

This method is applicable throughout UoM07. This option is considered environmentally neutral as it is a policy option to improve the sustainability of future development. No further environmental assessment was considered for this option.

#### 9.2.1.3 Voluntary Home Relocation

This method is applicable throughout UoM07. This option is considered environmentally neutral as it is a potential assessment of policy options. No further environmental assessment was considered for this option.

#### 9.2.1.4 Local Adaptation Planning

This method is applicable throughout UoM07. This option is considered environmentally neutral as it is a policy option to prepare Adaptation Plans at local scale. No further environmental assessment was considered for this option.

#### 9.2.1.5 Land Use Management and Natural Flood Risk Management Measures

This method is applicable throughout UoM07. This option has the potential for both positive and negative environmental impacts; however the next stage of implementation of land use management and natural flood management following from the FRMP will be further assessment and feasibility studies. No further environmental assessment was therefore considered for this option at this stage of the MCA and SEA.

#### **9.2.1.6 Maintenance of Arterial Drainage Schemes**

Please note that the OPW have undertaken separate environmental assessments of the maintenance of their arterial drainage schemes and no further assessment is being undertaken as part of this SEA, unless the information needs to be taken into account for in-combination impacts with the FRMP.

#### **9.2.1.7 Maintenance of Drainage Districts**

It is the responsibility of the Local Authorities to undertake environmental assessments for the maintenance of their drainage districts and no further assessment is being undertaken as part of this SEA, unless the information needs to be taken into account for in-combination impacts with the FRMP.

#### **9.2.1.8 Flood Forecasting and Warning**

Progression of a Flood Forecasting and Warning System, comprising gauging stations and a forecasting model system, to project-level development and assessment for refinement and preparation for planning / Exhibition and, as appropriate, implementation.

This option is considered environmentally neutral as is a communication option to provide advance notice to communities of impending flood events. No further assessment was considered for this option.

#### **9.2.1.9 Review of Emergency Response Plans for Severe Weather**

This method is applicable throughout UoM07. This option is considered environmentally neutral as it is a policy option Review Emergency Response Plans. No further environmental assessment was considered for this option.

#### **9.2.1.10 Promotion of Individual and Community Resilience**

This method is applicable throughout UoM07. This option is considered environmentally neutral as it is a policy option to promote resilience to flooding. No further environmental assessment was considered for this option.

#### **9.2.1.11 Individual Property Protection**

An environmental assessment has been carried out for this option where applicable to an AFA.

#### **9.2.1.12 Flood-Related Data Collection**

The OPW, local authorities / EPA and other organisations collecting hydro-meteorological data should continue to do so, and post-event event flood data should continue to be collected, to improve future flood risk management.

This data collection option has been considered as environmentally neutral provided best practice is undertaken in the planning and installation of new gauges. No further assessment was considered for this option.

#### **9.2.1.13 Minor Works Scheme**

This method is applicable throughout UoM07. This option has the potential for both positive and negative environmental impacts; however the next stage of implementation of minor works will be outside the FRMP and the CFRAM studies, and will be further assessment and feasibility studies. No further environmental assessment was therefore considered for this option at this stage of the MCA and SEA.

### **9.3 CATCHMENT OPTIONS**

No methods were found to be feasible from the Boyne Sub-catchment screening. Storage and Improvement of Channel Conveyance methods were screened and found to be technically feasible however these were uneconomically viable. Full details of the screening outcomes can be found in **Appendix E of the FRMP**. As no methods have been deemed potentially viable, the next steps in the process, such as identification of options or MCA appraisal have not been implemented.

### **9.4 ATHBOY**

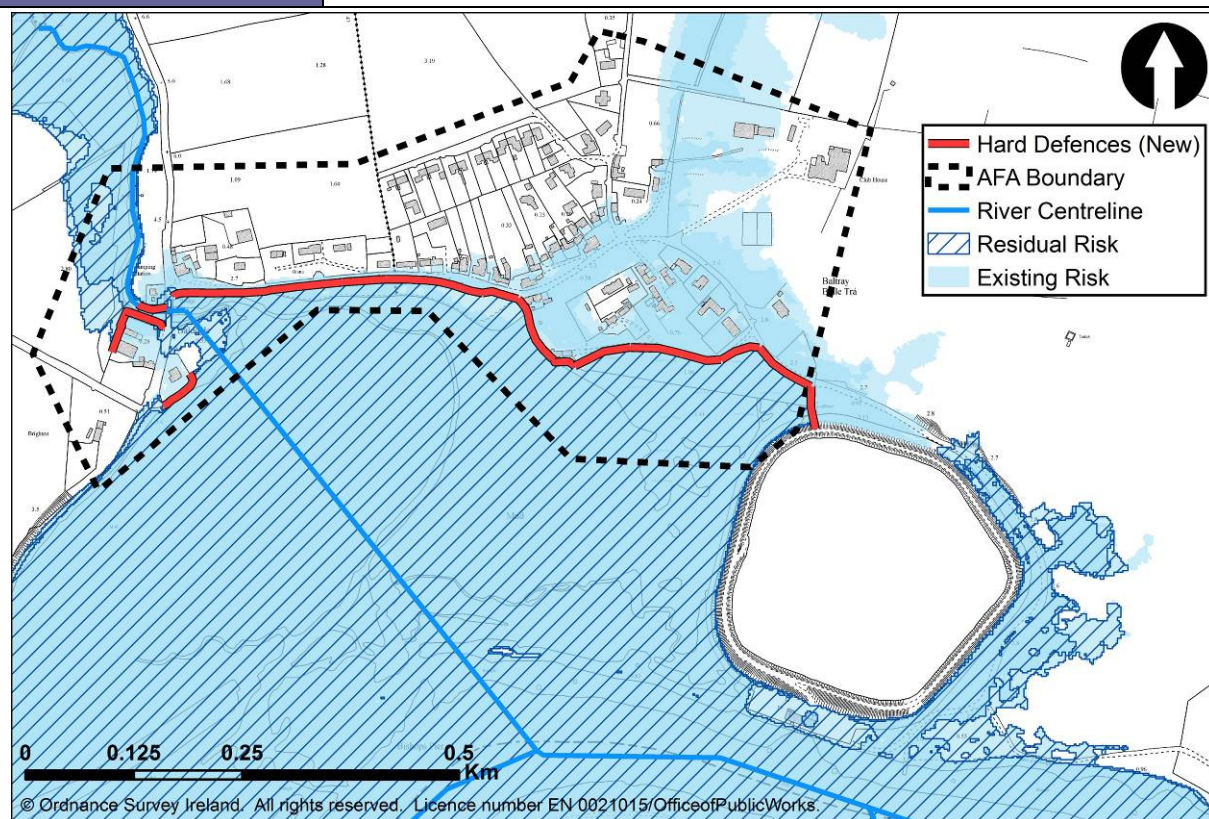
It has been assessed that the level of risk in Athboy is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Athboy AFA in this SEA Environmental Report.

### **9.5 BALLIVOR**

It has been assessed that the level of risk in Ballivor is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Ballivor AFA in this SEA Environmental Report.

## 9.6 BALTRAY

<b>UoM</b>	UoM07
<b>Area / Location</b>	Baltray AFA
<b>Option</b>	Option 2 - Hard defences (new line)
<b>Code</b>	IE07-IE-AFA-070030-M33
<b>Description</b>	At risk properties would be protected from a series of flood embankments and walls, largely constructed along a new line set back from the existing line of Hard Defences. These hard defences would protect to the 1% AEP fluvial event and the 0.5% AEP coastal event with an average height of 1.33m and a total length of 1.05km.



Total MCA-Benefit Score	Option Cost (€millions)		MCA-Benefit Score / Cost Ratio
2075.265	1.934		1073.019
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
€17,394,008	€1,934,043	€12,077,541	6.24

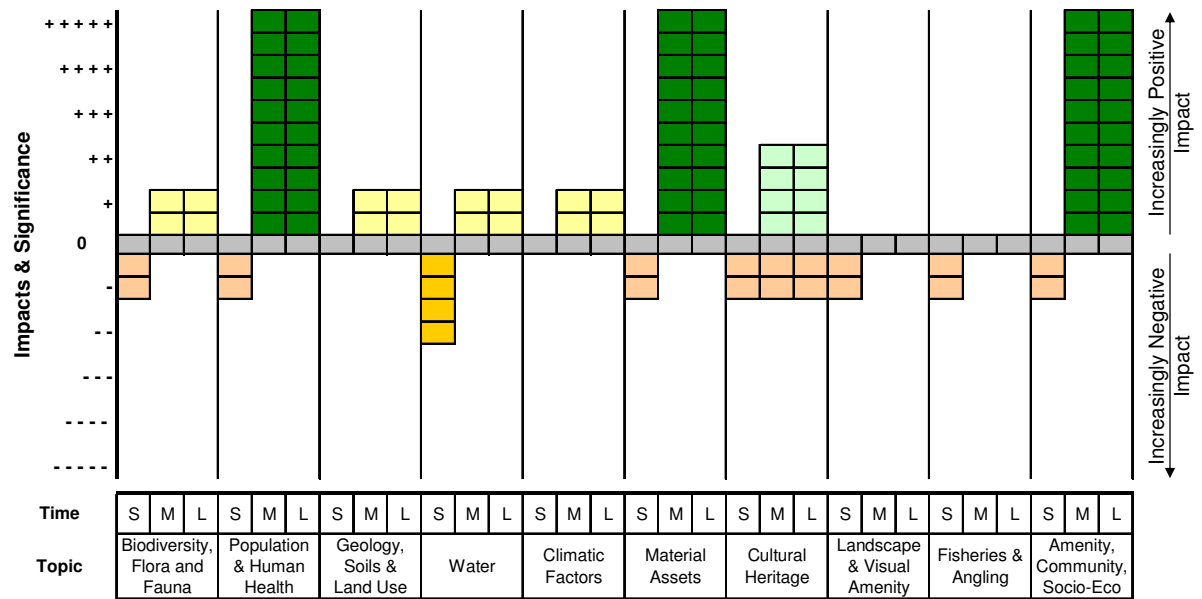
### Key Environmental Issues

- Agricultural production is relatively important to the local economy with arable and pasture land to the west and north of the AFA. Much of the surrounding area is however taken up with estuarine areas and golf courses. No agricultural activity in the urban centre of the AFA.
- The Boyne Coast and Estuary SAC and Boyne Estuary SPA are adjacent to and downstream of Baltray. The River Boyne and River Blackwater are designated as SAC and SPA upstream of the AFA, around Drogheda. The River Nanny Estuary and Shore SPA are 5km south of Baltray on the coast, while the Clogher Head SAC is 6km north along the coast.
- The Boyne Coast and Estuary pNHA borders on and is downstream of Baltray. The Laytown Dunes / Nanny Estuary are 5km south of Baltray on the coast, while the Clogher Head pNHA is 6km north along the coast. The Boyne River Island pNHA is upstream of Drogheda. Crewbane Marsh pNHA is 11km upstream of Drogheda. Mellifont Woods pNHA are 6km upcatchment of Drogheda, close to the Mattock River.
- The River Boyne is a designated salmonid river. Lamprey known to be present in the River. Also known as good fishing for sea trout. Licensed mussel beds in the lower stretches of the River Boyne. Hook and line fishing in the estuary and Irish Sea.
- The Brú na Bóinne UNESCO site is just upstream of Drogheda, which has a development buffer zone. The Boyne and Mattock Valleys, and the Lower Boyne Valley are considered to be sensitive landscapes of international importance that are to be conserved.
- There are seven NIAH buildings within the AFA of regional importance.
- There are no archaeological heritage features within the vicinity of the AFA.

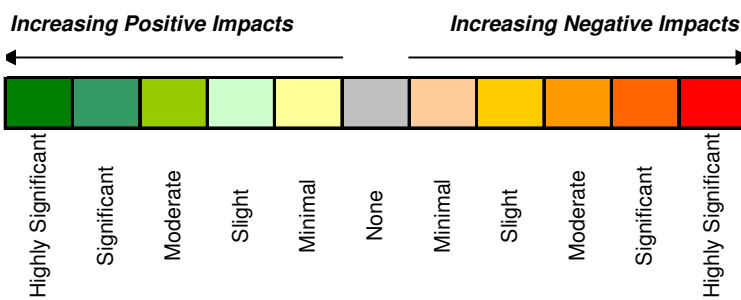
### Environmental Assessment

Environmental Topic	Short Term Impacts	Medium Term Impacts	Long Term Impacts
Biodiversity, Flora & Fauna (BFF)	-1	1	1
Population & Human Health (PHH)	-1	5	5
Geology, Soils and Landuse (S)	0	1	1
Water (W)	-2	1	1
Climatic Factors (C)	0	1	1
Material Assets & Infrastructure (MA)	-1	5	5
Cultural, Architectural & Archaeological Heritage (H)	-1	-1/2	-1/2
Landscape & Visual Amenity (L)	-1	0	0
Fisheries & Angling (F)	-1	0	0
Amenity, Community & Socio-Economics (ACS)	-1	5	5

## Summary Chart of Impacts



### Key



## Discussion of Impacts

### Biodiversity, Flora & Fauna

Potential for temporary, indirect negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during construction of flood walls and embankments, set back from the designated areas. Potential for temporary negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works. Potential for increased area of wetland and estuarine habitat. Reconnection with more land to the natural floodplain. There is the potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences, in undesignated areas. Potential for increased area of wetland and estuarine habitat. Reconnection with more land to the natural floodplain.

There is unlikely to be any further negative impacts on biodiversity, flora and fauna following the completion of construction works.

The NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Baltray AFA on the following European sites:

- Boyne Coast and Estuary SAC (001957)
- Boyne Coast and Estuary SPA (004080)
- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)
- River Nanny Estuary and Shore SPA (004158)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them. As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Baltray AFA will not have a significant adverse impact on the above European sites.

### Population & Human Health

There is the potential for short term disturbance impacts to local population during construction phase. In the medium and long term there are up to 68 ground floor properties that would benefit with this option in place, with potentially 108 individual property flooding events being avoided from up to 1% AEP fluvial and 0.5% AEP coastal flooding events. There are no additional highly vulnerable properties benefitting with this option in place. There is unlikely to be any further negative impacts on population and human health following the completion of construction works.

### Geology, Soils & Landuse

There is unlikely to be any impacts on the soil resource in the short term. In the medium and long term there is some low value agricultural land to the south and west of the golf club protected by the option. This area will be particularly protected against salt water inundation. There is unlikely to be any further negative impacts on population and human health following the completion of construction works.

### Water

There is the potential for slight negative, short term construction phase impacts, including excavation and restoration of banks, from flood walls and embankments, mostly set back from sensitive waterbodies. Potential for indirect sedimentation and water quality impacts during the construction phase. Reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flooding events. The areas for works are mostly already impacted upon. During flood events there may be increased flows in the vicinity of the hard defences and localised erosion and deposition.

### Climatic Factors

There is unlikely to be any impacts on climatic factors in the short term construction phase. This Option is adaptable to climate change, however only at significant cost. Option 2 is slightly more adaptable than Option 1 in that it allows more room in front of the defence for natural erosion management measures or wetland habitat. Increased wetland habitats in the area will provide for greater sequestration of CO<sub>2</sub>.

#### **Material Assets & Infrastructure**

There is the potential for short term disturbance impacts to local infrastructure during the construction phase. There are 15 transport links and 3 utilities that will benefit with this option in place in the medium and long term, through protection from up to 1% AEP fluvial and 0.5% AEP coastal flooding events.

#### **Cultural, Architectural & Archaeological Heritage**

There is the potential for minimal temporary and permanent negative impacts on the setting of several NIAH buildings within Baltray from the construction of hard defences. However, there is also the increased protection of these NIAH buildings for the 1% AEP fluvial and 0.5% AEP coastal flooding events. Score marked down by 1 in the MCA to reflect the proximity of potential defences to NIAH buildings. There is not anticipated to be any effects on archaeological heritage, as there are no known sites or monuments in the vicinity of works. Given the riverside / coastal location of construction works however there is the potential for the discovery of features of heritage value.

#### **Landscape & Visual Amenity**

There is the potential for minimal short term negative impacts during the construction / extension of flood walls at Baltray. There is likely to be localised negative impacts on views of the estuary to the properties to be protected. There are however unlikely to be any impacts on the landscape of the Boyne Valley. There is the potential for loss of one type of amenity area; however this will be replaced with a more natural amenity area. There are unlikely to be any further negative landscape and visual impacts in the medium to long term.

#### **Fisheries & Angling**

Potential for minimal negative, short term, construction impacts from excavation and restoration of banks and construction of walls, which are mostly set well back from sensitive waterbodies. Seasonality of works important to minimise any potential impacts on the salmonid river. There are unlikely to be any further negative impacts in the medium to long term, given the positioning of the defences.

#### **Amenity, Community and Socio-Economics**

There is the potential for minimal negative, short term, disturbance impacts to the local community during construction phase with potential minimal negative impacts on access to amenity areas and access for commercial activity. In the medium and long term there are 17 social infrastructure/amenity sites and 5 commercial properties benefitting with this option in place, with a reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flooding events.

Potential sources of in-combination effects identified as part of this assessment include:

- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. These activities could potentially result in adverse cumulative impacts on habitats or species. Ongoing maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out on the lower reaches of the Boyne River while FRM work is being undertaken during the construction phase.
- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of

FRM measures and agricultural operations is not likely to be significant.

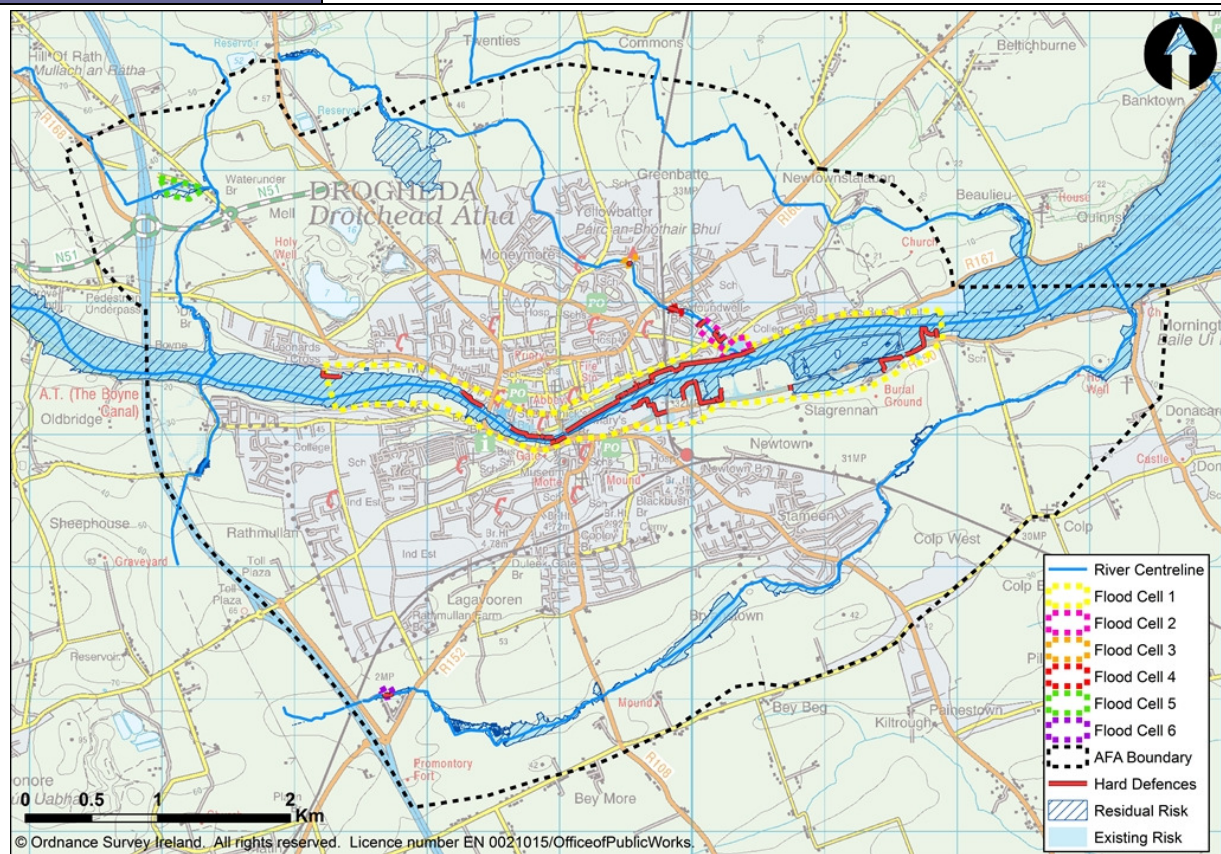
- FRM measures have been proposed at the nearby sites of Mornington and Navan. There may be cumulative impacts on habitats or species from measures taken at all three sites. FRM measures at these sites are expected to have local- rather than catchment-scale impacts, however it is recommended that FRM measures at these three AFAs are not carried out simultaneously, in order to ensure there are no significant in-combination effects.

#### **Key Conclusions:**

There is anticipated to be short term, minor negative environmental impacts from the construction of hard defences set back from the estuary. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed retreat of the defences at Baltray could provide medium and long term benefits to the environment by providing greater areas of wetland habitat and a greater resilience to the potential impacts of climate change. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Baltray AFA will not have a significant adverse impact on European sites.

## 9.7 DROGHEDA

UoM	UoM07
Area / Location	Drogheda AFA
Option	Option 1 – Hard Defences and Flow Diversion
Code	IE07-IE-AFA-070033-M61
Description	At risk properties would be protected by a series of flood embankments and walls and a Flow Diversion channel at Flood Cell 5. These Hard Defences would protect to the 1% AEP flood event with an average height of 2.03 m and a total length of 4.7 km. Some of these Hard Defences would be up to 4 m in height above the existing ground level in Flood Cell 2. The Hard Defences would also require some sealing of manholes and localised raising of roads to provide continuous defence in places.



Total MCA-Benefit Score		Option Cost (€millions)		MCA-Benefit Score / Cost Ratio			
570.969		13.528		42.205			
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions							
Area NPVd (uncapped)		Option Cost		Option NPVb (capped)		Benefit - Cost Ratio	
111.48		13.53		50.12		3.71	

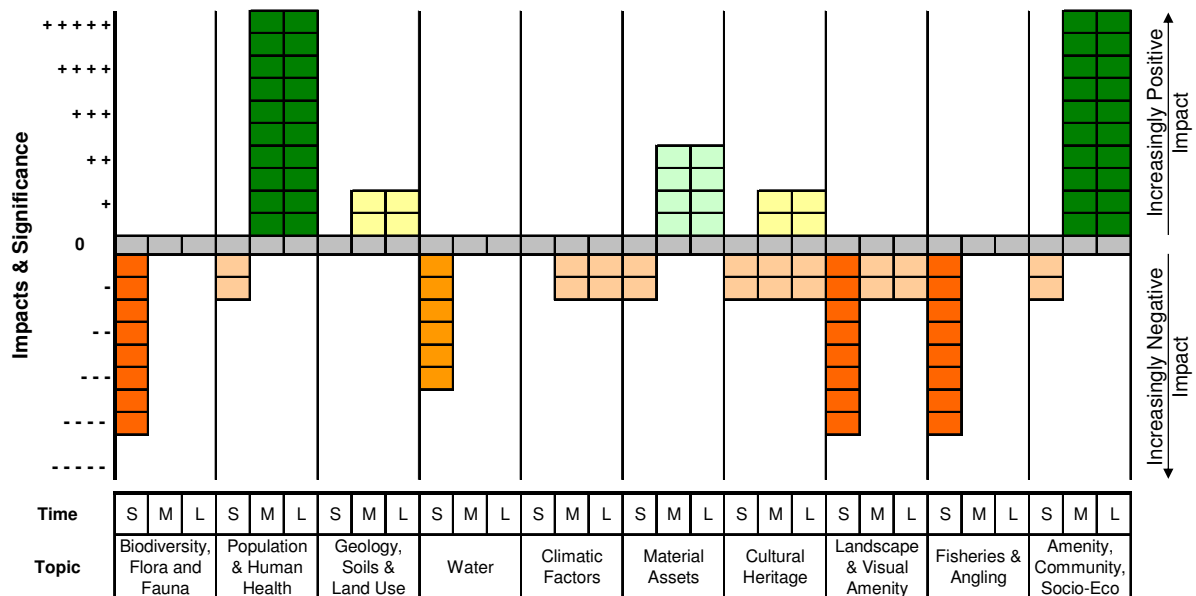
## Key Environmental Issues

- Drogheda is surrounded by arable and pasture land. Agricultural production is important to the local economy. No agricultural activity in the urban centre of the AFA.
- The River Boyne and River Blackwater are designated as SAC and SPA within, upstream of and downstream of the Drogheda AFA. Boyne Coast and Estuary SAC and Boyne Estuary SPA are downstream of Drogheda. Boyne Coast and Estuary SAC and Boyne Estuary SPA are adjacent to and downstream of Baltray. The River Nanny Estuary and Shore SPA are 5km south of Baltray on the coast, while the Clogher Head SAC is 6km north along the coast.
- The Boyne River Island pNHA is upstream of Drogheda, while the Boyne Coast and Estuary pNHA is downstream of the AFA, bordering and downstream of Baltray. The Laytown Dunes / Nanny Estuary are 5km south of Baltray on the coast, while the Clogher Head pNHA is 6km north along the coast. Crewbane Marsh pNHA is 11km upstream of Drogheda. Mellifont Woods pNHA are 6km upcatchment of Drogheda, close to the Mattock River.
- The River Boyne is a designated salmonid river. Lamprey known to be present in the River. Also known as good fishing for sea trout. Licensed mussel beds in the lower stretches of the River Boyne. Hook and line fishing downstream of the AFA in the estuary and Irish Sea.
- The Brú na Bóinne UNESCO site is just upstream of Drogheda, which has a development buffer zone. The Boyne and Mattock Valleys, and the Lower Boyne Valley are considered to be sensitive landscapes of international importance that are to be conserved.
- The Brú na Bóinne UNESCO site is just upstream of Drogheda. There are many NIAH buildings within the AFA of national and regional importance. There is one building (medieval house) within the AFA that has a preservation order.
- The Brú na Bóinne UNESCO site is just upstream of Drogheda. There is one monument in state care within the AFA. There are many archaeological features within the AFA with no preservation status that are of low vulnerability to flooding.

## Environmental Assessment

Environmental Topic	Short Term Impacts	Medium Term Impacts	Long Term Impacts
Biodiversity, Flora & Fauna (BFF)	-4	0	0
Population & Human Health (PHH)	-1	4	4
Geology, Soils and Landuse (S)	0	1	1
Water (W)	-4	0	0
Climatic Factors (C)	0	-1	-1
Material Assets & Infrastructure (MA)	-1	2	2
Cultural, Architectural & Archaeological Heritage (H)	-1	-1/1	-1/1
Landscape & Visual Amenity (L)	-4	-1	-1
Fisheries & Angling (F)	-4	0	0
Amenity, Community & Socio-Economics (ACS)	-1	5	5

### Summary Chart of Impacts (Example)



### Discussion of Impacts

#### Biodiversity, Flora & Fauna

There is the potential for temporary, direct, negative impacts on the River Boyne and River Blackwater SAC and SPA during the construction of the flood walls and embankments, which will border the designated areas. There is the potential for short term impacts downstream from sedimentation during construction on the Boyne Coast and Estuary pNHA. There is the potential for a short term, direct local loss of flora and displacement of fauna in the footprint of defences and flow diversion, in areas not already impacted by development. It should be possible to mitigate for the significance of impacts with good construction works and good timing of works. There is unlikely to be any permanent or recurring negative impacts in the medium and long term.

The NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Drogheda AFA on the following European sites:

- Boyne Coast and Estuary SAC (001957)
- Boyne Estuary SPA (004080)
- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)
- River Nanny Estuary and Shore SPA (004158)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them. As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Drogheda AFA will not have a significant adverse impact on the above European sites.

#### Population & Human Health

There is the potential for temporary minimal disturbance impacts during the construction phase of this

option. However in the medium and long term there will likely be significant positive impacts as 267 ground floor properties and 369 upper floor properties will benefit due to the increased protection from up to 0.5% AEP coastal and 1% AEP fluvial flooding events. There are no additional highly vulnerable properties benefiting with this option in place.

#### **Geology, Soils & Landuse**

There is unlikely to be any short term impacts on the soil resource. There is the potential for medium and long term minimal positive impacts with reduced flooding in Flood Cell 5 due to flow diversion.

#### **Water**

There is the potential for short term in-stream and on-bank construction phase impacts, the including excavation and restoration of banks, from flood walls and embankments in a sensitive waterbody. Flow diversion is likely to occur within the same river, in a non-sensitive waterbody. There is unlikely to be any permanent or recurring negative impacts in the medium and long term with this option in place. There will be a reduced flood risk to the 0.5% AEP coastal and 1% AEP fluvial flooding events.

#### **Climatic Factors**

There is unlikely to be any impacts on climatic factors in the short term construction phase. There is the potential for medium and long term minimal negative impacts as this option is not adaptable to climate change.

#### **Material Assets & Infrastructure**

There is the potential for short term disturbance impacts to local infrastructure during the construction phase of this option. In the medium and long term there is the potential for slight positive impacts, as there are 43 transport links benefiting through protection from up to 0.5% AEP and 1% AEP fluvial flooding events. There are no additional utilities benefiting from this option.

#### **Cultural, Architectural & Archaeological Heritage**

There is the potential for short, medium and long term direct physical impacts and impacts on the setting of many NIAH buildings, recorded monuments and other architectural heritage within Drogheda. It is unlikely that any feature will require removal with this option in place. There is the potential for medium and long term increased protection of these NIAH buildings, monuments and other architectural heritage within the AFA from flooding.

#### **Landscape & Visual Amenity**

There is the potential for short term negative impacts during the construction of flood walls in Drogheda and localised negative impacts on views in the town of the River Boyne. There is unlikely to be any impacts on the upstream UNESCO designation or the landscape of the Boyne Valley. There is the potential for medium and long term, minimal negative, localised impacts in the vicinity of any proposed high walls, such as at Flood Cell 2, however it is not high value landscape.

#### **Fisheries & Angling**

There is the potential for short term construction phase impacts with the excavation and restoration of banks and the construction of walls in and adjacent to a sensitive waterbody. There is likely to be a flow diversion in the same river, in a non-sensitive waterbody. Seasonality of works is important. There is unlikely to be any permanent or recurring negative impacts in the medium and long term.

#### **Amenity, Community and Socio-Economics**

There is the potential for short term, minimal, negative, disturbance impacts to the local community during construction phase and minimal negative impacts on access to amenity areas and access for commercial activity. There are 51 social infrastructure/amenity sites and 272 commercial properties benefiting through protection from up to 0.5% AEP coastal and 1% AEP fluvial flooding events, resulting in a highly significant positive impact of this option on amenities and commercial properties in the medium and long term.

Potential sources of in-combination effects identified as part of this assessment include:

- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. Ongoing

maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out in the channels where FRM work is being undertaken during the construction phase.

- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Aquatic habitat enhancement is planned within the Boyne catchment through the EREP (Environmental River Enhancement Programme) of Inland Fisheries Ireland, with the aim of enhancing the spawning, nursery and adult habitat within the channel for Salmonids. This is an environmental enhancement plan and will therefore have no negative impacts in combination with FRM measures.
- The draft Louth County Development Plan 2015-2021 has the potential for impacts in relation to planned new infrastructure. However, the plan has undergone appropriate assessment. It has been concluded that the proposed works in Drogheda AFA will have no significant residual impacts on European sites. Therefore there is no scope for in-combination effects.

#### Key Conclusions:

There is anticipated to be short term, slight to significant negative impacts to the biodiversity, water, fisheries and angling with the construction of hard defences and a flow diversion channel adjacent to designated areas and within a sensitive waterbody. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. There is likely to be medium and long term positive impacts with reduced flooding in Flood Cell 5, a greater resilience to the potential impacts of climate change and increased protection to a number of NIAH buildings, monuments and other architectural features from flooding. There is the potential for short term significant negative and medium and long term minimal negative visual impacts on localised views and views in the town of the River Boyne. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be slight to highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Drogheda AFA will not have a significant adverse impact on European sites.

## 9.8 EDENDERRY

It has been assessed that the level of risk in Edenderry is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Edenderry AFA in this SEA Environmental Report.

## 9.9 JOHNSTOWN BRIDGE

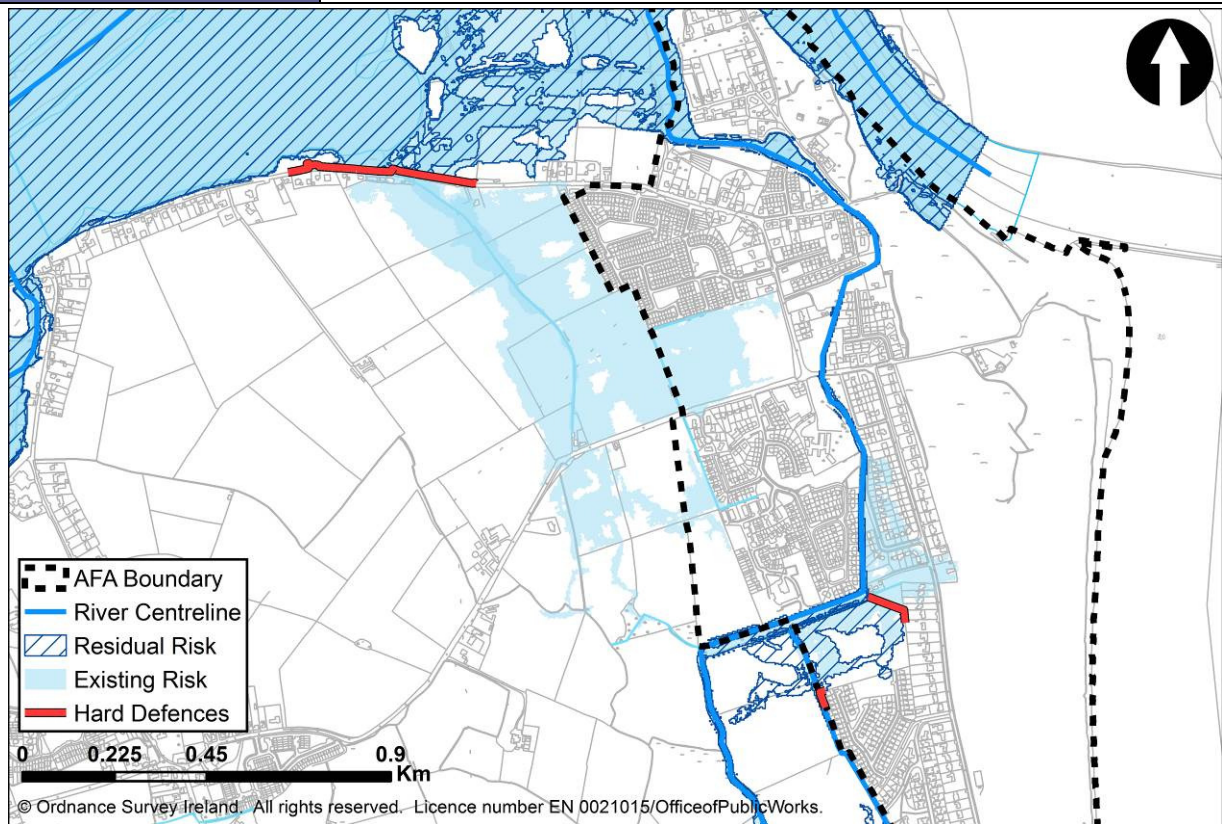
It has been assessed that the level of risk in Johnstown Bridge is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Johnstown Bridge AFA in this SEA Environmental Report.

## 9.10 LONGWOOD

It has been assessed that the level of risk in Longwood is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA appraisal have not been implemented and therefore there is no assessment for the Longwood AFA in this SEA Environmental Report.

## 9.11 MORNINGTON

<b>UoM</b>	UoM07
<b>Area / Location</b>	Mornington AFA
<b>Option</b>	Option 1 - Hard Defences
<b>Code</b>	IE07-IE-AFA-070880-M61
<b>Description</b>	At risk properties would be protected from a series of flood embankments and walls. These hard defences would protect to the 1% AEP fluvial flood event to the 0.5% AEP coastal flood event with an average height of 1.04m and a total length of approximately 530m.



Total MCA-Benefit Score	Option Cost (€millions)	MCA-Benefit Score / Cost Ratio	
1089.307	0.527	2067.958	
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
€1.85	€0.53	€1.85	3.52

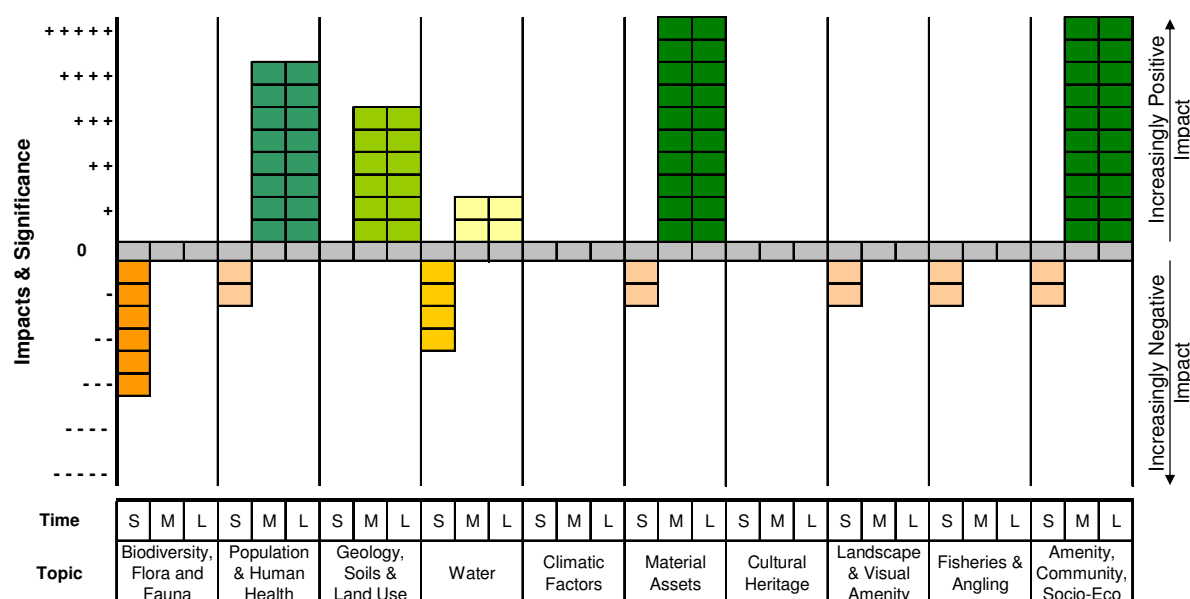
### Key Environmental Issues

- Agricultural production is relatively important to the local economy with arable and pasture land to the west of the AFA. Much of the surrounding area is however taken up with estuarine areas, golf courses and urban areas. No agricultural activity in the urban centre of the AFA.
- The Boyne Coast and Estuary SAC and Boyne Estuary SPA are within and downstream of Mornington. River Boyne and River Blackwater SAC and SPA are upstream of the Mornington AFA. The River Nanny Estuary and Shore SPA are 2km south of the AFA on the coast, while the Clogher Head SAC is 7km north along the coast.
- The Boyne Coast and Estuary pNHA is adjacent to and within Mornington AFA. The Boyne River Islands pNHA are upstream of Mornington. The Laytown Dunes / Nanny Estuary are 2km south of the AFA on the coast, while the Clogher Head pNHA is 7km north along the coast.
- The River Boyne is a designated salmonid river. Lamprey known to be present in the River. Also known as good fishing for sea trout. Licensed mussel beds in the lower stretches of the River Boyne. Hook and line fishing in the estuary and Irish Sea.
- The Meath coastal plain is defined as being of moderate landscape value, high sensitivity and of Regional importance, by the Meath Landscape Character Assessment from the Meath County Development Plan 2013 - 2019.
- There are several NIAH buildings within the AFA of regional importance.
- There are two archaeological heritage features (monuments) within the vicinity of the AFA, both of which are of low vulnerability to flooding. There are no archaeological heritage features within the AFA within state care or with preservation orders.

### Environmental Assessment

Environmental Topic	Short Term Impacts	Medium Term Impacts	Long Term Impacts
Biodiversity, Flora & Fauna (BFF)	-3	0	0
Population & Human Health (PHH)	-1	4	4
Geology, Soils and Landuse (S)	0	3	3
Water (W)	-2	1	1
Climatic Factors (C)	0	0	0
Material Assets & Infrastructure (MA)	-1	5	5
Cultural, Architectural & Archaeological Heritage (H)	0	0	0
Landscape & Visual Amenity (L)	-1	0	0
Fisheries & Angling (F)	-1	0	0
Amenity, Community & Socio-Economics (ACS)	-1	5	5

## Summary Chart of Impacts



## Discussion of Impacts

### Biodiversity, Flora & Fauna

There is the potential for temporary, indirect moderate negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during the construction of flood walls and embankments, set back from the designated areas. There is the potential for temporary negative impacts downstream from sedimentation during construction. It should be possible to mitigate for the significance of impacts with good construction works and good timing of works.

There is also the potential for slight negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction of flood walls and embankments, set back from the designated areas. There is likely to be the direct local loss of local flora and displacement of fauna in the footprint of defences, in undesignated areas.

There is unlikely to be any further negative impacts on biodiversity, flora and fauna following the completion of construction works.

The NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Mornington AFA on the following European sites:

- Boyne Coast and Estuary SAC (001957)
- Boyne Coast and Estuary SPA (004080)
- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)
- River Nanny Estuary and Shore SPA (004158)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them. As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Mornington AFA will not have a significant adverse impact on the above European sites.

**Population & Human Health**

There is the potential for short term disturbance impacts to local population during the construction phase. In the medium and long term there are up to 47 ground floor properties that would benefit with this option in place. There are no additional upper floor properties benefitting with this option in place. There are no additional highly vulnerable properties benefitting with this option in place.

**Geology, Soils & Landuse**

There is unlikely to be any impacts on the soil resource in the short term. In the medium and long term there are significant areas of agricultural land to the west of Mornington that would be protected up to a 0.5% AEP SoP from coastal and fluvial flooding from Boyne Estuary, which will provide moderate positive impacts.

**Water**

There is the potential for slight negative, short term construction phase impacts, including excavation and restoration of banks, from flood walls and embankments, mostly set back from sensitive waterbodies. Reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flooding events. During flood events there may be increased flows in the vicinity of the hard defences and localised erosion and deposition.

**Climatic Factors**

There is unlikely to be any impacts on climatic factors in the short term construction phase. The Option in its current form is not adaptable as it would require significant additional lengths of Hard Defences and raising of the existing Mornington defences to provide the required SoP.

**Material Assets & Infrastructure**

There is the potential for short term disturbance impacts to local infrastructure during the construction phase. There are 15 transport links and one utility that will benefit with this option in place in the medium and long term, through protection from up to 1% AEP fluvial and 0.5% AEP coastal flooding events.

**Cultural, Architectural & Archaeological Heritage**

There is not anticipated to be any effects on architectural or archaeological heritage, as there are no known sites or monuments in the vicinity of works. Given the riverside / coastal location of construction works however there is the potential for the discovery of features of heritage value.

**Landscape & Visual Amenity**

There is the potential for minimal short term negative impacts during the construction of flood walls and embankments at Mornington. There is likely to be localised negative impacts on views of the estuary and countryside to properties to be protected. There are unlikely to be any impacts on the landscape of the Boyne Valley or coastal plain.

**Fisheries & Angling**

There is the potential for minimal negative, short term, construction impacts from excavation and restoration of banks and construction of walls, mostly set well back from sensitive waterbodies. Seasonality of works important to minimise any potential impacts on the salmonid river. There are unlikely to be any further negative impacts in the medium to long term, given the positioning of the defences.

**Amenity, Community and Socio-Economics**

There is the potential for minimal negative, short term, disturbance impacts to the local community during construction phase with potential minimal negative impacts on access to amenity areas and access for commercial activity. In the medium and long term there are 6 social infrastructure/amenity sites benefitting with this option in place, with a reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flooding events. There are no additional commercial properties benefitting with this option in place.

Potential sources of in-combination effects identified as part of this assessment include:

- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. These

activities could potentially result in adverse cumulative impacts on habitats or species. Ongoing maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out on the lower reaches of the Boyne River while FRM work is being undertaken during the construction phase.

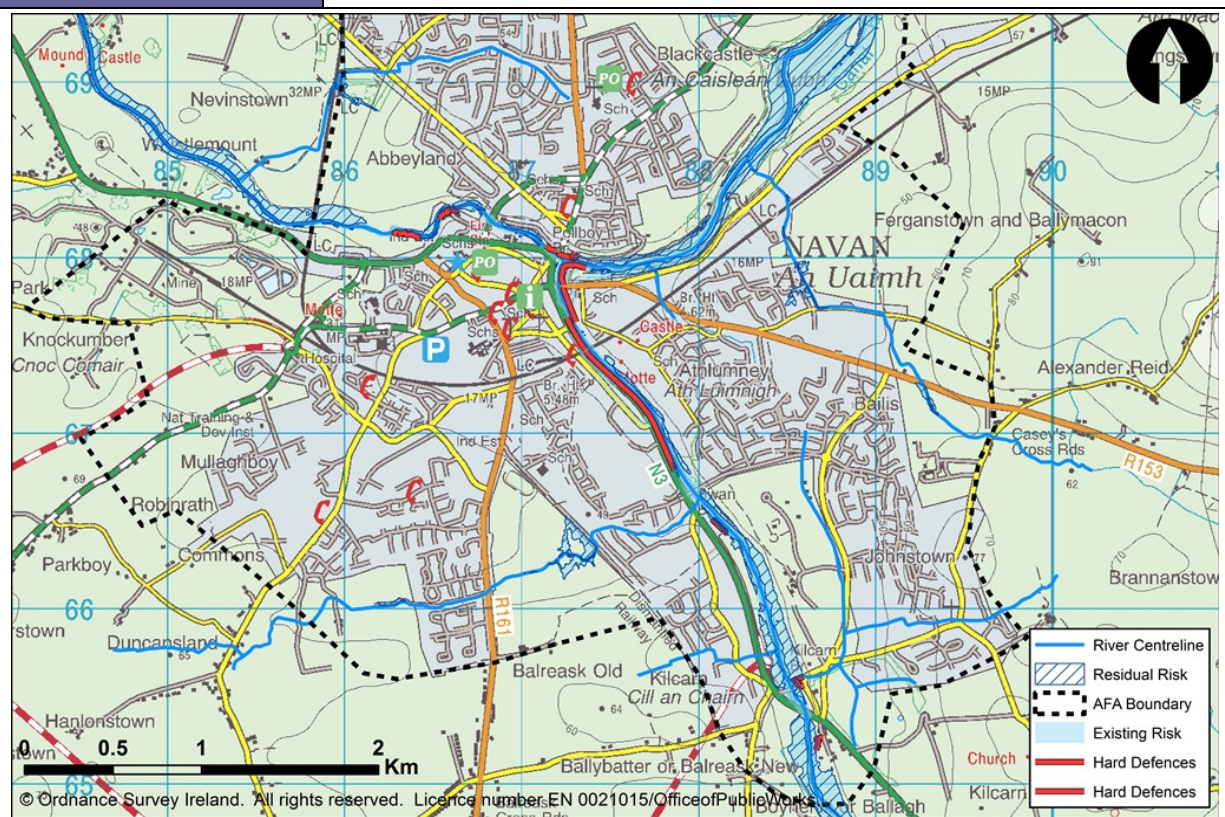
- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- FRM measures have been proposed at the nearby sites of Baltray and Navan. There may be cumulative impacts on habitats or species from measures taken at all three sites. FRM measures at these sites are expected to have local-scale rather than catchment-scale impacts, however it is recommended that FRM measures at these three AFAs are not carried out simultaneously, in order to ensure there are no significant in-combination effects.
- Mornington River and its tributaries are subject to a flood alleviation scheme. These activities could potentially result in adverse cumulative impacts on habitats or species.

#### Key Conclusions:

There is the potential for to be short term, minimal to moderate negative impacts to the biodiversity, water, fisheries and angling with the construction of hard defences set back from designated areas. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. There is likely to be medium and long term positive impacts with a significant area of agricultural land being protected from flooding. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be slight to significant to highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Mornington AFA will not have a significant adverse impact on European sites.

## 9.12 NAVAN

<b>UoM</b>	UoM07
<b>Area / Location</b>	Navan AFA
<b>Option</b>	Option 1- Hard Defences and do minimum
<b>Code</b>	IE07-IE-AFA-070039-M61
<b>Description</b>	At risk properties would be protected from a series of flood embankments, walls, road raising and clearance of a 500m reach of the Abbeylands Tributary. The hard defences would protect to the 1% AEP flood event with a total wall length of 889m, a total embankment length of 340 m and a total length of 986 m of road to be raised.



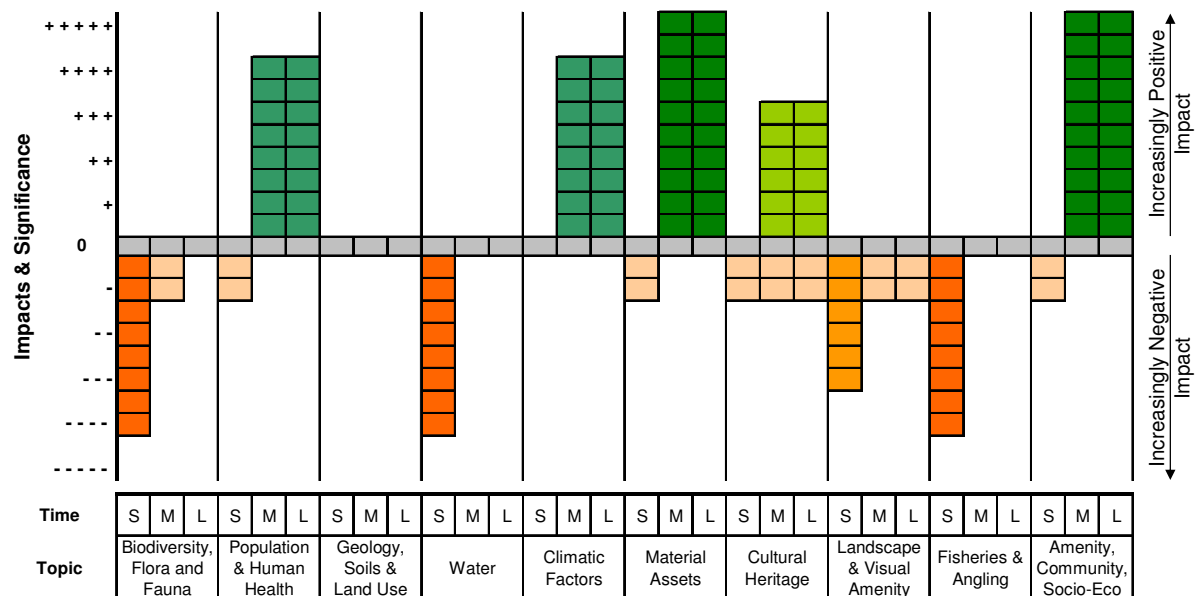
Total MCA-Benefit Score	Option Cost (€millions)	MCA-Benefit Score / Cost Ratio	
1447.941	6.324	228.953	
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
€ 12.01	€6.32	€5.54	0.88

### Key Environmental Issues

- The majority of the AFA is urban or industrial; however the surrounding area is dominated by productive pasture and arable land.
- The River Boyne and River Blackwater are designated as SAC and SPA within, upstream of and downstream of the Navan AFA. The Brú na Bóinne UNESCO site is over 10km downstream of Navan off the River Boyne. The Tara Complex UNESCO site (tentative list) is 5km upcatchment of Navan, near the River Skane. The Kells UNESCO site (tentative list) is 13km upcatchment of Navan off the River Blackwater.
- Jamestown Bog NHA is over 5km upcatchment from the AFA. The Boyne Woods pNHA is 2km downstream of Navan on the River Boyne. The Slane Riverbank pNHA and Crewbane Marsh pNHA are over 9km downstream of the AFA on the River Boyne. IWeBS key sites in the vicinity.
- The River Boyne is a designated salmonid river. Lamprey known to be present in the River. The Boyne is one of the country's premium wild brown trout angling waters. The Boyne from Longwood to Navan is generally deep and slow flowing but holds extensive stocks of wild brown trout.
- The Meath Landscape Character Assessment recognises the importance of the Boyne and Blackwater river corridors for scenic value, recreation, ecology, history and culture, and look to preserve historic features and their landscape settings. The assessment recognises the potential constraints on development created by river flood plains and the value of these flood plains as increasingly rare habitats. The Boyne valley is assessed as being of exceptional landscape value, high sensitivity and international importance.
- Navan is a heritage town. There are 228 NIAH buildings / structures in Navan, which are of national and regional importance.
- The Hill of Tara, 5km south of Navan was the home of the High Kings of Ireland for many centuries. The Brú na Bóinne UNESCO site development buffer zone is over 10km downstream of Navan. Navan is a heritage town. There are 3 monuments in state care within Navan and 46 monuments with no protection.

Environmental Assessment			
Environmental Topic	Short Term Impacts	Medium Term Impacts	Long Term Impacts
Biodiversity, Flora & Fauna (BFF)	-4	-1	0
Population & Human Health (PHH)	-1	4	4
Geology, Soils and Landuse (S)	0	0	0
Water (W)	-4	0	0
Climatic Factors (C)	0	4	4
Material Assets & Infrastructure (MA)	-1	5	5
Cultural, Architectural & Archaeological Heritage (H)	-1	-1 / 3	-1 / 3
Landscape & Visual Amenity (L)	-3	-1	-1
Fisheries & Angling (F)	-4	0	0
Amenity, Community & Socio-Economics (ACS)	-1	5	5

### Summary Chart of Impacts



## Discussion of Impacts

### Biodiversity, Flora & Fauna

There is potential for significant direct, temporary, construction phase impacts to River Boyne and River Blackwater SAC and SPA, from in-stream and on-bank works creating/upgrading embankments and walls. Most works would be adjacent to and not within the designated areas. There is the potential for temporary slight negative impacts downstream from sedimentation during construction. There is unlikely to be permanent or recurring impacts to designated sites following construction, however some areas may require re-establishment.

There is the potential for minimal negative, direct, temporary construction phase impacts to local flora and fauna in footprint of works and clearance in the Abbeylands Tributary. There will be the temporary and localised loss of and disturbance to flora/fauna, the impacts of which are limited by the modified nature of the channel and banks. There is the slight potential for minimal negative, temporary, indirect sedimentation impacts downstream to Boyne Woods pNHA. There is unlikely to be any permanent or recurring impacts following construction on national or local environmental designations

There is unlikely to be any further negative impacts on biodiversity, flora and fauna following the completion of construction works.

The NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Navan AFA on the following European sites:

- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them. As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Navan AFA will not have a significant adverse impact on the above European sites.

### Population & Human Health

There is the potential for short term disturbance impacts to local population during the construction phase. In the medium and long term there are 135 ground floor properties and 57 upper floor properties that would benefit with this option in place. There are 2 highly vulnerable properties that would benefit with this option in place.

### Geology, Soils & Landuse

There is unlikely to be any impacts on the soil resource in the short term. In the medium and long term there is no increase of flood risk within the AFA to agricultural land, and therefore unlikely to be impacts on the soil resource.

### Water

There is the potential for significant negative, direct, temporary construction phase impacts from in-stream and on-bank works creating/upgrading embankments and walls. Activities may include excavation and restoration of banks in a sensitive waterbody. There is the potential for indirect negative, temporary sedimentation impacts downstream during works. There are unlikely to be permanent or recurring impacts to waterbody, however during flood events there may be increased flows in the vicinity of the hard defences and localised erosion and deposition. Reduced flood risk for the 1% AEP fluvial event.

### Climatic Factors

There is unlikely to be any impacts on climatic factors in the short term construction phase. This Option is however readily adaptable to climatic change at limited cost.

#### **Material Assets & Infrastructure**

There is the potential for short term disturbance impacts to local infrastructure during the construction phase. There are 15 transport links and 1 utility that will benefit with this option in place in the medium and long term, through protection from up to 1% AEP fluvial flooding events.

#### **Cultural, Architectural & Archaeological Heritage**

There is the potential for minimal negative, permanent impacts on the setting of NIAH bridges, weirs and mills on the Boyne and Blackwater from embankments and walls. There is the potential for minimal negative, direct physical impacts to NIAH bridges and weirs during construction. There is the potential for increased protection from flooding for several NIAH buildings.

There is not anticipated to be any effects on archaeological heritage, as there are no known sites or monuments in the vicinity of works

#### **Landscape & Visual Amenity**

There is the potential for minimal negative, short term, temporary impacts on local views from construction of extension to local flood embankment prior to establishment of screening. Some localised, permanent negative impacts on views of the river; however these areas are already impacted. River corridor is however considered a high value landscape and is highly sensitive.

#### **Fisheries & Angling**

There is the potential for direct negative, short term, temporary construction phase impacts from in-stream and on-bank works from creating/upgrading embankments and walls. Activities may include excavation and restoration of banks in a sensitive waterbody. There is the potential for indirect sedimentation impacts downstream during works. There is unlikely to be permanent or recurring impacts to fisheries potential from this Option.

#### **Amenity, Community and Socio-Economics**

There is the potential for minimal negative, short term, disturbance impacts to the local community during construction phase with potential minimal negative impacts on access to amenity areas and access for commercial activity. In the medium and long term there are 32 social infrastructure/amenity and 15 commercial properties benefitting with this option in place, with a reduced flood risk for the 1% AEP fluvial flooding events.

Potential sources of in-combination effects identified as part of this assessment include:

- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. Ongoing maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out in the channels where FRM work is being undertaken during the construction phase.
- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Aquatic habitat enhancement is planned within the Boyne catchment through the EREP (Environmental River Enhancement Programme) of Inland Fisheries Ireland, with the aim of enhancing the spawning, nursery and adult habitat within the channel for Salmonids. This is an environmental enhancement plan and will therefore have no negative impacts in combination with FRM measures.

**Key Conclusions:**

There is the potential for short term, significant negative impacts to the biodiversity, water, fisheries and angling with the construction to designated areas and a sensitive waterbody. There is likely to be medium and long term benefits with this option in place, with a greater resilience to the potential impacts of climate change and increased protection from flooding for several NIAH buildings. There is the potential for short term, moderate negative visual impacts on local views during the construction phase. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be significant to highly significant, medium and long term positive impacts on these topic areas from reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Navan AFA will not have a significant adverse impact on European sites.

**9.13 TRIM**

This AFA is affected by fluvial flooding; therefore all methods were screened for this AFA. A number of methods including Individual Property Protection and Hard Defences were deemed potentially viable from the screening process for Trim. One option was identified for the Trim AFA, which consists of individual property protection and flood forecasting and warning. As there is low risk to properties during the 1% AEP fluvial flood event in Trim, and hence a small value of benefit to achieve, no economically viable solution could be found at AFA level.

## 10 MITIGATION AND MONITORING

### 10.1 MITIGATION

Mitigation measures have been recommended where potential negative impacts from flood risk management options on environmental topic areas have been identified. These mitigation measures aim to prevent, reduce and as fully as possible offset any significant adverse effects on the environment due to implementation of the FRMP.

#### 10.1.1 General Mitigation

The principal mitigation recommendation is that the predicted negative effects should be considered further during the next stage of option development, when details of the option (e.g. visual appearance, alignment of flood defences) can be optimised through detailed feasibility studies and design in order to limit identified impacts on sensitive receptors.

Further environmental studies based on the detailed design and construction methodology should be undertaken as appropriate. These studies may involve, but are not limited to, aquatic and terrestrial ecology surveys, ornithological and bat surveys, fish surveys, landscape and visual assessments, WFD assessments, geotechnical investigations and heritage surveys. Further Appropriate Assessment, to meet the requirements of the Habitats Directive, of the preferred option detailed design and construction methodology will be required at the project level, where potential impacts have been identified in this SEA and accompanying NIS for the FRMP.

Before any works are carried out, detailed method statements and management plans (construction and environmental) should be prepared, including timing of works and information on the specific mitigation measures to be employed for each works area. Works should only be carried out once the method statements have been agreed with competent authorities such as the NPWS and Inland Fisheries Ireland (IFI). At the project level it will not be sufficient to defer the production of construction method statements. These should be completed in the detailed design stage and may be subject to further Appropriate Assessment where potential impacts have been identified in this SEA and accompanying NIS for the FRMP.

Direct instream works such as culvert upgrades or proposed measures along the riverbank have the greatest potential for negative impacts during spawning / breeding and early nursery periods for aquatic protected species. No instream or potentially significantly damaging out of river works should occur during restricted periods for relevant species and consultation should be undertaken with IFI in this regard.

All works and planning of works will be undertaken with regard to the OPW Environmental Management Protocols (EMP) and Standard Operating Procedures (SOP) and recommended best practice guidelines.

### 10.1.2 Mitigation by SEA Topic

**Table 10.1** demonstrates mitigation measures that should be adopted within the FRMP to minimise the potential for any negative impacts on the wider environment of implementing the preferred options. These mitigation measures should be implemented and further developed at the next detailed design stage and project level study stage.

**Table 10.1 Proposed Mitigation Measures**

SEA Topic	Impact	Proposed Mitigation
<b>BFF</b>	Temporary disturbance and destruction of existing habitats and flora, and the displacement of fauna, along the river corridors.	Replanting and landscaping following construction should be done in line with appropriate guidelines that aim to improve local biodiversity and wildlife, therefore will give medium and long term benefits to the biodiversity, flora and fauna of the working areas. Good planning and timing of works to minimise footprint impacts. Where applicable, prior to any vegetation clearance an ecologist should be contracted to undertake a 'pre-vegetation clearance' survey for signs of nesting birds and important species. Should important species be found during surveys the sequential approach of avoid, reduce or mitigate should be adopted to prevent significant impacts. Vegetation clearance should only occur outside the main breeding bird season - September to March. Adhere to OPW EMP and SOP.
<b>BFF</b>	Temporary displacement of otters, birds, fish and other fauna during the construction period	Good planning and timing, prior to sensitive construction methods is essential. Potentially using NRA construction guidelines, e.g. On Crossing of Watercourses, On Treatment of Otters etc, Eastern Regional Fisheries Board Requirements for 'Protection of Fisheries Habitat during Construction and Development Works at River Sites' and IFI 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters'. Adhere to OPW EMP and SOP.
<b>BFF</b>	Impact on European sites, habitats and species from construction works.	Good planning and timing of works and good construction and management practices to keep impacts to a minimum. Adhere to OPW EMP and SOP.
<b>BFF</b>	Impact on European sites, habitats and species from construction or operation of FRM scheme.	Site and species specific mitigation provided in NIS for the FRMP.
<b>BFF</b>	Spread of invasive species during construction.	Cleaning of equipment and machinery along with strict management protocols to combat the spread of invasive species. Adhere to OPW EMP and SOP.
<b>BFF</b>	Culverting impacts on faunal passage, where applicable.	Ledges and adequate access may be required for some culverts to allow continued passage of fauna. Adhere to OPW EMP and SOP.
<b>BFF / F / W</b>	Dredging impacts on biodiversity, flora and fauna.	Minimise requirement for in-stream works through good planning. Good dredging practices, with appropriate timing to cause the least amount of damage, habitat loss, and sedimentation. Dredging works should be carried out during low flow conditions and should cease during heavy rainfall and flood conditions, to reduce suspended solids in the river. Spoil and removed vegetation material from the river should be stored back from the river and a vegetation buffer zone is to be retained, in order to reduce the run-off of

		suspended solids back into the watercourse. No machinery should be allowed to operate within the river flow without full consultation and approval of the methodology of the proposed works by the relevant statutory bodies. Adhere to OPW EMP and SOP.
<b>P / HH</b>	Construction disturbance to the local population.	Disturbances can be kept to a minimum with good working practices, planning and timing. Adoption of Construction Best Practice.
<b>P / HH</b>	Health and Safety risk to the local population during construction works.	Good construction management practices and planning of works. Adoption of Construction Best Practice.
<b>S</b>	Increased flood risk to or loss of access to agricultural soil resource.	Consultation and agreement with local landowners on detailed designs and residual impacts of flooding. Potential for requirement for compensation for increased inundation.
	Removal of soil and rock material via dredging and excavation works during construction.	Re-use material where possible on site for either embankments or landscaping. Where applicable it is recommended that coarse aggregates (cobble and gravel) removed from the river channel should be stockpiled for replacement and rehabilitation in the reformed river bed. Such material will be stored away from the river bank to ensure that runoff from the material does not affect water quality in the river in the form of increased suspended solids.
	De-watering during construction may cause temporary draw down of water table close to works.	Ensure that only small areas of excavation works are open at any one time to reduce the potential volumes of groundwater to be removed.
<b>W / BFF / F</b>	Temporary disturbances of water quality during the construction phase	Good management and planning to keep water quality disturbance to a minimum. Any potential water quality issues from construction should be contained and treated to ensure no damage to natural waterbodies. Dredging and construction will have to be planned appropriately, using Best Available Techniques / Technology (BAT) at all times, to ensure water quality issues are kept to a minimum, with no significant adverse effects. Guidelines such as CIRIA Document C532 - Control of Water Pollution from Construction Sites and CIRIA documents C521 - SUDS - Design manual for Scotland and NI, and C523 - SUDS - Best Practice Manual to be adhered to. Development and consenting of environmental management plan prior to commencement of works. Adhere to OPW EMP and SOP.
<b>W / BFF / F</b>	Potential for pollution incidents during the construction phase.	Minimise requirement for in-stream works through good planning. Strict management and regulation of construction activities. Provision of good facilities in construction areas to help prevent pollution incidents. Preparation of emergency response plans. Good work practices including; channelling of discharges to settlement ponds, construction of silt traps, construction of cut-off ditches to prevent run-off from entering watercourse, hydrocarbon interceptors installed at sensitive outfalls, appropriate storage of fuel, oils and chemicals, refuelling of plant and vehicles on impermeable surfaces away from drains / watercourses, provision of spill kits, installation of wheelwash and plant washing facilities, implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste and regular monitoring of surface water quality. Adhere to OPW EMP and SOP.
<b>W</b>	Potential requirement for maintenance dredging as siltation of the channel	Adhering to good work practices including; channelling of discharges to settlement ponds, construction of silt traps, construction of cut-off ditches to prevent run-off from

	and excess vegetative growth will naturally occur.	entering excavations, granular materials placed over bare soils. If a channel is maintained on an as required basis, using good planning, timing and BAT, there should be only minimal temporary disturbance to the local water quality. Adhere to OPW EMP and SOP.
<b>MA</b>	Disturbances to local infrastructure during the construction phase, e.g. traffic, water and electricity.	Good site management practices, traffic and construction management plans and consultation with the competent and statutory authorities prior to any works should enable all impacts to be kept to a minimum over a short timescale. Adoption of Construction Best Practice.
<b>H</b>	In the short term construction period there is the potential for damage to heritage features.	Construction supervision by qualified archaeologists, combined with sensitive construction methods and restoration would mean this damage could be kept to a minimum. Heritage features discovered could be restored / preserved. Review of draft detailed designs in areas of potential impacts by qualified archaeological / architectural heritage expert.
<b>H</b>	Medium and long term impacts on the setting of heritage features	Impacts could be kept to a minimum through sensitive design and planning. Planning and design advice from qualified archaeologists. Statutory consents may be required prior to works.
<b>H</b>	Potential for undiscovered heritage to be impacted upon by construction and dredging operations.	Interpretation of side-scan sonar and bathymetry information, along with supervision of construction and dredging operations by qualified archaeologists will minimise any impacts or the possibility of destruction of underwater and undiscovered heritage features in areas of heritage potential.
<b>L</b>	Extent and severity of short term negative impacts on landscape from construction.	Impacts could be kept to a minimum through good site practice and planning (eg. screened laydown areas and traffic management). Adoption of Construction Best Practice.
<b>L</b>	Extent and severity of medium to long term negative impacts on landscape from preferred FRM options.	Impacts could be kept to a minimum through sensitive design and planning (e.g. vegetative screening and landscape management planning). Landscape and visual assessment and advice during detailed design. Public consultation on draft designs.
<b>F / W</b>	Culverting, dredging and impoundment impacts on fisheries and potential to impede fish passage.	Culverting and dredging operations to be undertaken outside the spawning and early life stages of salmonids i.e. October to May inclusive. All works affecting any watercourse both temporary and permanent will be agreed with the relevant drainage and fishery authorities. Project level aquatic ecology and fisheries surveys and assessment, based on detailed design, to be undertaken prior to consenting. Where possible bottomless culverts should be used so the natural stream bed can be retained. Adhere to OPW EMP and SOP.
<b>ACS / F / HH</b>	Restricted access to river for recreational activities due to FRM scheme.	Sensitive design of the FRM scheme. Potential to improve recreational access, safety of access and improve local recreational and ecological linkages in the detailed design. Public and stakeholder consultation on draft designs.
<b>ACS</b>	Disturbances to local amenity, community and social infrastructure during the construction phase, e.g. shops and amenity areas.	Good site management practices, traffic and construction management plans and consultation with the competent and statutory authorities prior to any works should enable all impacts to be kept to a minimum over a short timescale. Adoption of Construction Best Practice.

BFF – Biodiversity, Flora, Fauna. P/HH – Population, Human Health. S – Soils, Geology, Landuse. W – Water. MA – Material Assets. H – Heritage. L – Landscape. F – Fisheries. ACS – Amenity, Community, Socio-Economics.

### 10.1.3 Mitigation Guidelines

The following guidelines should be consulted in further development of the preferred FRM options in the next detailed planning phase.

- 'Arterial Drainage Maintenance Service – Environmental Management Protocols and Standard Operating Procedures' (OPW, 2011).
- 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites', Eastern Regional Fisheries Board.
- 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters', IFI 2016.
- Best practice toolkit of freshwater morphology measures developed by the Freshwater Morphology Programmes of Measures and Standards (POMS) study under the Shannon International River Basin District (ShIRBD) project.
- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA).
- Pollution prevention guidelines and Best Practice Guidance in relation to a variety of activities developed by the Environmental Agency (EA), the Scottish Environmental Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA).

## 10.2 MONITORING

The SEA Directive requires that the significant environmental effects of the implementation of a Plan are monitored in order to identify at an early stage unforeseen adverse effects and in order to undertake appropriate remedial action. The proposed monitoring programme in **Table 10.2** is based on the Targets and Indicators established in the SEA Objectives (given in **Section 4.4** and further described in **Appendix B**). This proposed monitoring has been adopted into **Section 10** of the draft FRMP and will be undertaken during development of the 2<sup>nd</sup> cycle of the FRMP.

**Table 10.2 Environmental Monitoring of FRMP**

SEA Topic	Objective	Sub-Objective		Indicator	Possible Data and Responsible Authority
<b>Biodiversity, Flora and Fauna</b>	Support the objectives of the Habitats Directive	i)	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones	Area, condition and trend of European sites in the UoM  (European sites to review are those identified by AA Screening.)	NPWS – Conservation Action Plans  NPWS reporting on Irelands Habitats and Species – Article 17 Reports.  NPWS reporting on the status of Irelands Birds – Article 12 Reports.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	i)	Avoid damage to or loss of, and where possible enhance, nature conservation sites and protected species or other know species of conservation concern	Area, condition and trend of national, regional or local conservation sites in the UoM  (National sites to review are those identified in SEA Environmental Report.)	Local Authority – Local Area Plans and County Development Plans.  NPWS - Status of Protected Sites and Species in Ireland Reporting
<b>Population and Human Health</b>	Minimise risk to human health and life	i)	Minimise risk to human health and life of residents	Residential property flooding in the UoM	OPW, Local Authority and Emergency Services Reporting.
		ii)	Minimise risk to high vulnerability properties	High vulnerability sites impacted by flooding in the UoM	OPW, Local Authority and Emergency Services Reporting.
<b>Geology, Soils and Landuse</b>	Minimise risk to agriculture	i)	Minimise risk to agriculture	Area of soil resource lost due to flooding and flood risk management in the UoM.	EPA - CORINE landcover mapping.  Local Area Plans and County Development Plans – myplan.ie

<b>Water</b>	Support the objectives of the WFD	i)	Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives	Status and status trend of waterbodies, where FRM activities are within and upstream of a waterbody.	EPA / ERBD – WFD status reporting and RBMPs.
<b>Climate</b>	Ensure flood risk management options are adaptable to future flood risk	i)	Ensure flood risk management options are adaptable to future flood risk	Requirement for adaptation of FRM management activities for climate change in the UoM.	OPW and Local Authority reporting.
<b>Material Assets</b>	Minimise risk to transport & utility infrastructure	i)	Minimise risk to transport infrastructure	Number and type of transport routes that have flooded in the UoM.	OPW, Local Authority and NRA reporting.
		ii)	Minimise risk to utility infrastructure	Number and type of utilities that have flooded in the UoM.	OPW, Local Authority, ESB, Eirgrid, Eircom, BGE, Irish Water and EPA reporting.
<b>Cultural Heritage</b>	Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting	i)	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	Number of designated architectural heritage features, institutions and collections that have flooded in the UoM.	OPW, Local Authority and DAHG reporting.
		ii)	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	Number of designated archaeological heritage features, institutions and collections that have flooded in the UoM.	OPW, Local Authority and DAHG reporting.
<b>Landscape and Visual</b>	Protect, and where possible enhance, landscape character and visual amenity within the river corridor	i)	Protect, and where possible enhance, visual amenity, landscape protection zones and views into / from designated scenic areas within the river corridor.	Length of waterway corridor qualifying as a landscape protection zone within urban areas of UoM.  Change of quality in existing scenic areas and routes in the UoM.  Loss of public landscape amenities in the UoM.	Local Authority – Landscape Character Assessments, County Development Plans and Local Area Plans.  EPA - CORINE Landcover.

<b>Fisheries, Aquaculture &amp; Angling</b>	Protect, and where possible enhance, fisheries resource within the catchment	i)	Maintain existing, and where possible create new, fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species.	Improvement or decline in fish stocks and habitat quality in the UoM.  Barriers to fish movement within the UoM.	IFI and WFD fish surveys and reports.  Local fisheries reporting.
<b>Amenity, Community &amp; Socio-Economics</b>	Minimise risk to community	i)	Minimise risk to social infrastructure and amenity	Social infrastructure and amenity assets impacted by flooding in the UoM.	OPW and Local Authority reporting.
		ii)	Minimise risk to local employment	Non-residential properties impacted by flooding in the UoM.	OPW and Local Authority reporting.

## 11 SUMMARY AND CONCLUSIONS

This SEA Environmental Report has been prepared to provide a formal and transparent assessment of the likely significant impacts on the environment arising from the FRMP for UoM07 under the Eastern CFRAM Study, including consideration of reasonable alternatives. As the FRMP has the potential to impact upon European sites there is a requirement under the EU Habitats Directive to carry out an AA and to produce a NIS.

The draft FRMP identifies and quantifies the flood risk areas for UoM07, and aims to manage this risk in the most appropriate and sustainable manner through the development and assessment of FRM methods and options. Environmental and social criteria were central to this assessment and selection of appropriate FRM methods and options, with the main significant environmental contributions being during the Preliminary Screening of FRM Methods, the Multi-Criteria Analysis of FRM Options (Alternatives) and in the Environmental Assessment of Preferred Options via this SEA Environmental Report and NIS. In these key stages of the FRMP development environmental specialists helped to steer the planning team towards more sustainable FRM methods, provided guidance on environmental issues in the areas of interest, assisted in the development of FRM alternatives, provided positional improvements of methods and advised on the incorporation of methods into options to enhance sustainability. The development of FRM options was an iterative process between the environmental and FRM planning specialists, with the MCA of FRM options stage being heavily influenced by the environmental specialists. Where possible, environmental and sustainability criteria were considered in the selection and positioning of FRM options, prior to assessment in the MCA.

The highest scoring option for each area of flood risk (e.g. catchment or AFA), along with consideration of feedback from public and stakeholder consultation, has been put forward into the draft FRMP for UoM07 as the preferred option.

Following the various levels of assessment of FRM options to manage flood risk in UoM07, it was recommended that the following non-structural options should be implemented across the UoM:

- Sustainable Planning and Development Management;
- Sustainable Urban Drainage Systems (SuDS);
- Voluntary Home Relocation;
- Preparation of Local Adaptation Plans by Local Authorities;
- Land Use Management and Natural Flood Risk Management Measures;
- Maintenance of Arterial Drainage Schemes;
- Maintenance of Drainage Districts;
- Flood Forecasting and Warning;
- Review of Emergency Response Plans for Severe Weather by Local Authorities;
- Promotion of Individual and Community Resilience;
- Individual Property Protection;
- Flood-Related Data Collection, and

- Minor Works Scheme.

The non-structural options are considered to have no physical outcome or are an existing process and so they have not been assessed for impacts on the wider environment within this SEA Environmental Report.

The following preferred options were recommended at AFAs within the UoM that were assessed to have a significant flood risk:

- Baltray – Hard Defences (New)
- Drogheda – Hard Defences and Flow Diversion
- Mornington – Hard Defences
- Navan – Hard Defences and Do Minimum

**Section 9** of this SEA Environmental Report details the environmental assessment of these preferred engineering options. There was found to be the potential for minimal to significant negative environmental impacts from construction of these preferred engineering options on the wider environment; however in the medium to long term, following the completion of works and the re-establishment of areas, the impacts are generally significantly positive with only minor residual negative impacts. These medium to long term, positive impacts are anticipated due to the increased management of flood risk and protection of people, property, water quality, heritage features, infrastructure and amenity. **Section 10** of this SEA Environmental Report recommends environmental mitigation measures to avoid or minimise these potential negative impacts of implementing the engineering options. It is recommended that these measures are adopted in full at the next detailed stage of design and assessment of these preferred options.

This NIS details the findings of the Stage 2 Appropriate assessment conducted to further examine the potential direct and indirect impacts of the FRM Options advanced in the draft FRMP for UoM07 incorporating the AFAs of Baltray, Drogheda, Mornington and Navan on the following European sites:

- Boyne Coast And Estuary SAC
- Boyne Estuary SPA
- River Boyne And River Blackwater SAC
- River Boyne and River Blackwater SPA
- River Nanny Estuary and Shore SPA

As a result of this Appropriate Assessment it has been concluded that, provided the avoidance and mitigation measures suggested in the NIS are adopted at the project stage, the proposed draft FRM measures in the UoM07 FRMP will not have a significant adverse impact on the above European sites.

**Section 10** details environmental monitoring to be undertaken during development of the 2<sup>nd</sup> cycle of the FRMP. This should identify at an early stage any unforeseen adverse effects due to implementation of the plan. This environmental monitoring has been adopted into Section 10 of the draft FRMP.

## 12 NEXT STEPS

Consultations on the draft FRMP, SEA Environmental Report and Natura Impact Statement (NIS) are anticipated to commence in July 2016 and run for at least three months. The consultation activities will take the form of Public Consultation Days, documents being made available for viewing at Local Authority and OPW premises and the documents being made available digitally via the Eastern CFRAM Study website: [www.eastcframstudy.ie](http://www.eastcframstudy.ie).

Following completion of the consultation period, all comments will be collated and the FRMP, SEA Environmental Report and NIS will be reviewed and revised as necessary. Provided there are no objections or comments that will significantly alter the FRMP, the final version of the FRMP can be drafted and adopted. This is anticipated to be in early 2017. Following release of the adopted Final FRMP a SEA Statement will be drafted to summarise the process undertaken and identify how environmental considerations and consultations have been integrated into the final FRMP. **Table 12.1** demonstrates the proposed upcoming time stages for the Plan, SEA and AA.

**Table 12.1 Draft Anticipated Milestones**

FRMP	Dates	Strategic Environmental Assessment / Appropriate Assessment
Public and statutory consultation on draft FRMP for UoM07	July 2016 – October 2016	Statutory, Non Statutory and Public Consultation on SEA Environmental Report and Natura Impact Statement
Release of Final FRMP for UoM07	Early 2017	SEA Environmental Statement

The contact for any information regarding the SEA of the FRMP for UoM07 is as follows:

By post	Sophie Mathews Eastern CFRAM Study SEA RPS Enterprise Fund Business Centre Ballyraine Letterkenny Co Donegal Ireland
By email	<a href="mailto:info@eastcframstudy.ie">info@eastcframstudy.ie</a>
Via the national and Eastern CFRAM Study websites	<a href="http://www.cfram.ie">www.cfram.ie</a> <a href="http://www.eastcframstudy.ie">www.eastcframstudy.ie</a> Will be forwarded automatically to the communications coordinator
Via direct consultation with team members at events	The Eastern CFRAM Study communications coordinator and various relevant team members will be on hand at Eastern CFRAM Study events as well as national events.

## REFERENCES

Bradley, S.L., Milne, G.A., Teferle, F.N., Bingley, R.M. & Orliac, E.J. (2009) Glacial isostatic adjustment of the British Isles: new constraints from GPS measurements of crustal motion. *Geophysical Journal International*, **178**, 14-22.

Central Statistics Office (CSO, 2011) Available at <http://data.cso.ie/> [Accessed 17/05/16].

Climate Change 2007, IPCC, Fourth Assessment Report AR4. IPCC, 2007: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E.Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp.

Eastern River Basin District – River Basin Management Plan 2009-2015 (2010). DEHLG. Available at: [http://www.wfdireland.ie/docs/1\\_River%20Basin%20Management%20Plans%202009%20-%202015/ERBD%20RBMP%202010/ERBD%20RBMP%206%20July%202010.pdf](http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plans%202009%20-%202015/ERBD%20RBMP%202010/ERBD%20RBMP%206%20July%202010.pdf) [Accessed 17/05/16].

Eurostat (2015) “What it Means to be Young in the European Union Today” Facts and Figures on Youth and Children in the EU. Available at <http://ec.europa.eu/eurostat/documents/2995521/6783798/1-16042015-AP-EN.pdf/5d120b02-c8df-4181-9b27-2fe9ca3c9b6b> [Accessed 17/05/16].

McGrath, R. & Lynch P. (2008). *Ireland in a Warmer World – Scientific Predictions of the Irish Climate in the 21st Century*. Dublin: C4I

Meath County Development Plan 2013-2019 (2013). Meath County Council. Available at: <https://countydevelopmentplan.meath.ie/adoptedplan/> [Accessed 13/06/16].

Met Eireann (2015) *30 Year Averages*. Available at: <http://www.met.ie/climate-ireland/30year-averages.asp> [Accessed 14/09/15].

Tourism Ireland's Corporate Plan (2014-2016) Available at: <https://www.tourismireland.com/TourismIreland/media/Tourism-Ireland/About%20Us/Corporate%20Publications/Tourism-Ireland-s-Corporate-Plan-2014-2016.pdf?ext=.pdf> [Accessed 17/05/16].

## 13 GLOSSARY OF TERMS

**Appropriate Assessment** An assessment of the effects of a plan or project on European sites. European sites comprise Special Protection Areas under the Birds Directive and Special Areas of Conservation under the Habitats Directive.

**Areas for Further Assessment (AFAs)** Existing urban areas with quantifiable flood risk.

**Assessment Unit** Defines the spatial scale at which flood risk management options are assessed. Assessment Units are defined on four spatial scales ranging in size from largest to smallest as follows: catchment scale, Assessment Unit (AU) scale, Areas for Further Assessment (APSR) and Individual Risk Receptors (IRR).

**Biodiversity** Word commonly used for biological diversity and defined as assemblage of living organisms from all habitats including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.

**Birds Directive** Council Directive of 2<sup>nd</sup> April 1979 on the conservation of wild birds (79/409/EEC).

**Catchment** A surface water catchment is the total area of land that drains into a watercourse.

**Catchment Flood Risk Management Plan (CFRMP)** A large-scale strategic planning framework for the integrated management of flood risks to people and the developed and natural environment in a sustainable manner.

**Estuary** A semi-enclosed coastal body of water with one or more rivers or streams flowing into it, and with an open connection to the sea.

**Flood** An unusual accumulation of water above the ground caused by high tide, heavy rain, melting snow or rapid runoff from paved areas. In this Study a flood is marked on the maps where the model shows a difference between ground level and the modelled water level. There is no depth criterion, so even if the water depth is shown as 1mm, it is designated as flooding.

**Flood Defence** A structure (or system of structures) for the alleviation of flooding from rivers or the sea.

**Flood Risk** Refers to the potential adverse consequences resulting from a flood hazard. The level of flood risk is the product of the frequency or likelihood of flood events and their consequences (such as loss, damage, harm, distress and disruption).

**Flood Risk Management Method** Structural and non-structural interventions that modify flooding and flood risk either through changing the frequency of flooding, or by changing the extent and consequences of flooding, or by reducing the vulnerability of those exposed to flood risks.

**Flood Risk Management Option** Can be either a single flood risk management method in isolation or a combination of more than one method to manage flood risk.

**Floodplain** Any area of land over which water flows or is stored during a flood event or would flow but for the presence of flood defences.

**Geographical Information System (GIS)** a computer-based system for capturing, storing, checking, integrating, manipulating, analysing and displaying data that are spatially referenced.

**Geomorphology** The science concerned with understanding the form of the Earth's land surface and the processes by which it is shaped, both at the present day as well as in the past.

**Groundwater** All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil. This zone is commonly referred to as an aquifer which is a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow a significant flow of groundwater or the abstraction of significant quantities of groundwater.

**Habitats Directive** European Community Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Flora and Fauna and the transposing Irish regulations (The European Union (Natural Habitats) Regulations, SI 94/1997 as amended).. It establishes a system to protect certain fauna, flora and habitats deemed to be of European conservation importance.

**Heavily Modified Water Body** Surface waters that have been substantially changed for such uses as navigation (ports), water storage (reservoirs), flood defence (flood walls) or land drainage (dredging).

**Individual Risk Receptors (IRR)** Essential infrastructure assets such as a motorway or potentially significant environmentally polluting sites.

**Mitigation Measures** Measures to avoid/prevent, minimise/reduce, or as fully as possible, offset/compensate for any significant adverse effects on the environment, as a result of implementing a plan or project.

**Natura 2000** European network of protected sites which represent areas of the highest value for natural habitats and species of plants and animals which are rare, endangered or vulnerable in the European Community. The Natura 2000 network will include two types of area. Areas may be designated as Special Areas of Conservation (SAC) where they support rare, endangered or vulnerable natural habitats and species of plants or animals (other than birds). Where areas support significant numbers of wild birds and their habitats, they may become Special Protection Areas (SPA). SACs are designated under the Habitats Directive and SPAs are classified under the Birds Directive. Some very important areas may become both SAC and SPA.

**Natural Heritage Area** An area of national nature conservation importance, designated under the Wildlife Act 1976 (as amended), for the protection of features of high biological or earth heritage value or for its diversity of natural attributes.

**Non Structural Options** Include flood forecasting and development control to reduce the vulnerability of those currently exposed to flood risks and limit the potential for future flood risks.

**Ramsar Site** Wetland site of international importance designated under the Ramsar Convention on Wetlands of International Importance 1971, primarily because of its importance for waterfowl.

**River Basin Districts** Administrative areas for coordinated water management and are comprised of multiple river basins (or catchments), with cross-border basins (i.e. those covering the territory of more than one Member State) assigned to an international RBD.

**Scoping (AA)** the process of deciding the content and level of detail of an Appropriate Assessment under the Habitats Directive, including the key environmental issues, likely significant environmental effects and alternatives which need to be considered, the assessment methods to be employed, and the structure and contents of the Natura Impact Statement.

**Scoping (SEA)** the process of deciding the content and level of detail of a SEA under the SEA Directive, including the key environmental issues, likely significant environmental effects and alternatives which need to be considered, the assessment methods to be employed, and the structure and contents of the Environmental Report.

**Screening (AA)** The determination of whether implementation of a plan or project would be likely to have significant environmental effects on the Natura 2000 network.

**Screening (SEA)** The determination of whether a plan or programme is likely to require a SEA.

**SEA Directive** Directive 2001/42/EC 'on the assessment of the effects of certain plans and programmes on the environment'.

**Sedimentation** The deposition by settling of a suspended material.

**Significant Effects** Effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors.

**Special Area of Conservation (SAC), Candidate Special Area of Conservation (cSAC)** A SAC is an internationally important site, protected for its habitats and non-bird species. It is designated, as required, under the EC Habitats Directive. A cSAC is a candidate site, but is afforded the same status as if it were confirmed.

**Special Protection Area (SPA)** A SPA is a site of international importance for breeding, feeding and roosting habitat for bird species. It is designated, as required, under the EC Birds Directive.

**Statutory Instrument** Any order, regulation, rule, scheme or byelaw made in exercise of a power conferred by statute.

**Structural Options** Involve the application of physical flood defence measures, such as flood walls and embankments, which modify flooding and flood risk either through changing the frequency of flooding, or by changing the extent and consequences of flooding.

**Surface Water** Means inland waters, except groundwater, which are on the land surface (such as reservoirs, lakes, rivers, transitional waters, coastal waters and, under some circumstances, territorial waters) which occur within a river basin.

**Sustainability** A concept that deals with mankind's impact, through development, on the environment. Sustainable development has been defined as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland, 1987). Sustainability in the flood risk management context could be defined as the degree to which flood risk management options avoid tying future generations into inflexible or expensive options for flood defence. This usually includes consideration of other defences and likely developments as well as processes within a catchment.

**The Office of Public Works (OPW)** The lead agency with responsibility for flood risk management in Ireland.

**Tidal** Related to the sea and its tide.

**Transitional waters** Bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their vicinity to coastal waters, but which are substantially influenced by freshwater flows.

**Water Body** A discrete and significant element of surface water such as a river, lake or reservoir, or a distinct volume of groundwater.

**Water Course** Any flowing body of water including rivers, streams etc.

**Zone of Influence** the area over which ecological features may be subject to significant effects as a result of the proposed Plan and associated activities. This may extend beyond the Plan area, for example where there are ecological or hydrological links beyond the Plan boundary. The zone of influence may vary for different ecological features depending on their sensitivity to an environmental change.



## **APPENDIX A**

### **High Level Impacts of FRM Methods**



### **High Level Impacts of Flood Risk Management Methods**

This document outlines the main potential likely impacts of implementation of the CFRAM flood risk management methods on the general environment. These impacts can be positive or negative.

The purpose of producing this information and requesting feedback from consultees is to develop a streamlined assessment of impacts of flood risk management methods on the general environment, which will be used within the environmental assessments for the CFRAM studies.

These are high-level / strategic impacts and are not site or species specific. This is to reflect the strategic nature of the Flood Risk Management Plans and environmental assessments of the Plans.

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
<b>Do Nothing</b> No new flood risk management measures and abandon existing defences and maintenance		
<i>Do Nothing</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level, however there is the potential for local improvements to habitats and biodiversity in the vicinity of previously maintained defences.</li> </ul>	<ul style="list-style-type: none"> <li>Potential for significantly increased flood risk to human health, properties and infrastructure.</li> </ul>
<b>Existing Regime</b> Continue existing flood risk management practices		
<i>Existing Regime</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level.</li> </ul>	<ul style="list-style-type: none"> <li>Potential for increased flood risk to human health, properties and infrastructure due to climate change.</li> </ul>
<b>Do Minimum</b> Additional minimum measures to reduce flood risk in specific areas. Includes channel or flood defence maintenance works / programme.		
<i>Do Minimum</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level. However method is non-specific.</li> </ul>
<i>Maintenance Programme</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level.</li> </ul>	<ul style="list-style-type: none"> <li>The maintenance of existing flood defence measures is unlikely to have significant negative environmental impacts upon designated sites; however works may need to be done outside of certain seasons in sensitive areas.</li> <li>Unlikely to be significant negative impacts at a strategic level.</li> </ul>
<b>Planning and Development</b> Zoning of land for flood risk appropriate development, prevention of inappropriate development, and / or review of Local Areas Plan (LAP).		
<i>Planning and Development</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level, however will prevent future additional flood risk from being created.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level, however will prevent some developments which may curtail economic growth in certain areas.</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
<b>Building Regulations</b> Regulations on finished floor levels, flood proofing, flood resilience and SuDS.		
<i>Building Regulations</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level, however will prevent future additional flood risk from being created.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level.</li> </ul>
<b>Catchment Wide Sustainable Drainage Systems (SuDS)</b> Recommendations for future development drainage systems.		
<i>SuDS</i>	<ul style="list-style-type: none"> <li>Slight direct positive impacts through reduction of flood risk and impacts to property and infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>Likely to be temporary negative impacts through disturbance and inconvenience to the local population during construction.</li> </ul>
<b>Land Use Management (NFM)</b> Runoff Control – Overland flow management through changes in land use and / or agricultural practices. River / Floodplain Restoration - Creation of wetlands, restoration of meanders, in-channel flow retardation, floodplain flow retardation and riparian buffer zones. Coastal Restoration - Attenuation waves and coastal surge through the creation and restoration of natural habitats.		
<i>Runoff Control</i>	<ul style="list-style-type: none"> <li>Implementation of runoff control would slow down and store some potential flood waters, which will benefit the downstream population through reduction of flood risk and impacts to property and infrastructure during high frequency flood events.</li> <li>Done correctly in the appropriate locations, non-structural land use management has the potential to have positive environmental benefits through habitat creation, increased biodiversity and natural flood management.</li> <li>The creation of habitat and / or land management practices can help to improve attenuation of nutrients and reduce the loss of sediments, leading to improvements in water quality.</li> </ul>	<ul style="list-style-type: none"> <li>If misplaced, non-structural land use management has the potential to be either ineffective or actually detrimental to the local environment, through loss or displacement of native species.</li> <li>Some areas of productive agricultural land may be lost.</li> <li>An increase in the wetness of cultivated land and semi-natural grassland ecosystems may increase the prevalence of some livestock pests.</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
	<ul style="list-style-type: none"> <li>By increasing habitats such as woodland and wetland, there is potential to increase carbon storage.</li> <li>Enhancing and restoring wetlands may lead to benefits to habitats and species.</li> <li>Runoff control may enhance the productivity of cultivated land and semi natural grassland by protecting soils from erosion and loss of nutrients, and through providing a more diverse habitat for pollinators and biological control of pests and disease.</li> <li>Run off control in drinking water catchments may help to reduce treatment requirements for drinking water.</li> <li>There may be benefits to freshwater fisheries from improved water quality and reduced sedimentation.</li> <li>The effects on recreation, wildlife watching and landscape are generally likely to be positive, as runoff control should improve habitat diversity and biodiversity.</li> <li>The introduction of riparian buffer zones is unlikely to have negative impacts on habitats and species.</li> </ul>	
<i>River / Floodplain Restoration</i>	<ul style="list-style-type: none"> <li>Reconnection of the river with the floodplain will enhance the natural storage capacity and provide slight direct positive social impacts through reduction of flood risk and impacts to property and infrastructure during high frequency flood events.</li> <li>Restoration of habitat within the river and floodplain, and reduced erosion of the river bed and banks can help to filter nutrients and reduce sediments; which can lead to improved water quality.</li> <li>There is the potential for improved fish habitats.</li> <li>Greater areas of river and floodplain wetland habitat will provide increased biodiversity.</li> <li>River and floodplain restoration in drinking water catchments may</li> </ul>	<ul style="list-style-type: none"> <li>There is the potential for the direct loss of agricultural land with this method.</li> <li>The existing ecosystems in the area for restoration will be directly impacted in the short term through a potential change of land use, habitat and hydromorphology. These impacts could be positive or negative in the long term.</li> <li>If parkland areas are used the land could become unsuitable for some types of recreation, temporarily during a flood event or in the medium to long term through changing the wetness of the land.</li> <li>There could be reduced seasonal access to riparian areas for recreational activities from floodplain re-connection.</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
	<p>help to reduce treatment requirements for drinking water.</p> <ul style="list-style-type: none"> <li>The effects on recreation, wildlife watching and landscape are generally likely to be positive, with improved habitat diversity and biodiversity.</li> <li>With improvements to biodiversity and water quality, this method may help to improve WFD status.</li> <li>With wetland enhancement there may be benefits to the connectivity and health of wetland ecosystems, and there may be benefits to carbon storage.</li> <li>There may be local improvements in recreational fishing in the area with a more natural river course and improved water quality.</li> </ul>	<ul style="list-style-type: none"> <li>In-stream works can release fine sediments which adversely affect fish spawning gravels.</li> <li>There is the potential for impacts on the local landscape from this; however these could be positive or negative, depending on the finished look of established vegetation.</li> </ul>
<i>Coastal Restoration</i>	<ul style="list-style-type: none"> <li>Coastal restoration can attenuate waves and coastal surge through the creation and restoration of natural habitats, reducing the potential flood risk.</li> <li>Enhancement of coastal natural habitats can help to protect from coastal erosion, provide carbon storage, and help to adapt to future climate change.</li> <li>Restoration and creation of intertidal areas may help to provide nurseries for fish.</li> <li>By improving the coastal environment there is likely to be benefits to recreation, amenity and wildlife experience.</li> </ul>	<ul style="list-style-type: none"> <li>Works could cause disturbance to feeding and breeding birds.</li> <li>Restoration and creation of intertidal areas could lead to some loss of productive land.</li> <li>Works could restrict or alter access to coastal areas which could cause short or long term, local negative effects.</li> <li>In areas of longshore drift, works in one location can have implications for sediment distribution in others.</li> <li>Beach re-charge could affect sediment sources for offshore sand banks.</li> </ul>
<b>Strategic Development Management</b>  For necessary floodplain development, with integration of structural measures into development design and zoning.		
<i>Strategic Development</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level, however will reduce flood risk to human health.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level.</li> </ul>
<b>Upstream Storage</b>		

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
<p>Online or offline, single or multiple storage areas, with potential for embankments / engineered walls. Online storage refers to creating a dam and reservoir across the floodplain of a river, often with an outlet control structure such as an undershot culvert or sluices, to control outlet flow, and with an overflow weir and spillway. Offline storage is an area of floodplain that is embanked to prevent or control flooding within the storage area or wash-land during minor events.</p>		
Storage	<ul style="list-style-type: none"> <li>There will be slight direct positive social impacts through the regulation of flow and reduction of flood risk and impacts to property and infrastructure.</li> <li>Recreational access to the waterway for some activities could be improved with sensitive scheme design.</li> <li>Offline storage areas should ideally be located away from the existing riparian zone and can then provide environmental benefits through the creation of high biodiversity wetlands.</li> <li>Prolonged flooding in offline storage could increase the sediment store in the floodplain and reduce sediments stored in rivers, reducing downstream sedimentation and potential flood risk.</li> </ul>	<ul style="list-style-type: none"> <li>Online storage dams should not be placed in areas of high biodiversity or on migratory routes, therefore not within SACs or SPAs. However if the normal discharge volume is to be maintained they should be able to be placed upstream of an SAC or SPA.</li> <li>Offline storage areas should not be developed within an SAC or SPA where the designated habitat and / or species are vulnerable to flooding. This method could be further investigated within designated areas that require or are not sensitive to periodic inundation.</li> <li>Storage is likely to cause or exacerbate the disconnection between the river and the floodplain.</li> <li>There is the potential for disruption to natural processes, loss of habitat and potentially negative effects on water quality (due to loss of habitat to filter nutrients) and carbon storage.</li> <li>Erosion can be exacerbated upstream and / or downstream of storage areas with potentially significant negative effects.</li> <li>There is the potential for a reduction in pollinating services and pest and disease control due to the loss of natural habitat from direct footprint impacts.</li> <li>Embankment of rivers to create storage areas can result in the loss of natural riparian habitat that filters and removes nutrients from agriculture.</li> <li>There is the potential for long term changes to land use from direct footprint impacts.</li> <li>Loss of natural habitat and reduced biodiversity can impact recreational activities like angling and wildlife watching.</li> <li>Some storage areas may use parkland and recreational grounds</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
		<p>which could render the land unsuitable for some types of activities, either temporarily during a flood event, or in the medium to long term through changing accessibility to the area.</p> <ul style="list-style-type: none"> <li>Changes to river flow and water levels could affect navigation channels.</li> <li>Prolonged flooding in offline storage could increase the sediment store in the floodplain and reduce sediments stored in rivers, disrupting the natural sediment regime.</li> <li>Drinking water quantity may be negatively impacted if using reservoirs for flood storage, as retaining lower water levels could affect water supply.</li> <li>There is likely to be temporary negative impacts through disturbance and inconvenience to the local population during construction of storage areas.</li> </ul>
<b>Improvement of Channel Conveyance</b>  Deepening channel, widening channel, realigning long section, removing constraints and / or lining smoothing channel.		
<i>Increase Conveyance</i>	<ul style="list-style-type: none"> <li>There will be slight direct positive social impacts from increasing conveyance through the regulation of flow and reduction of flood risk and impacts to property and infrastructure.</li> <li>Removal of channel constraints provides the opportunity to remove barriers to fish migration. This could improve production of salmon when combined with other river restoration actions. The design of the new structures should build in requirements for migratory fish and to diversify in-stream habitat where possible.</li> <li>Daylighting culverts may reduce barriers to fish barriers and improve habitats.</li> </ul>	<ul style="list-style-type: none"> <li>It may be possible to use this method within some designated areas depending on the species and habitats present. Short sections of increased channel conveyance are unlikely to have significant impacts upon species and habitats, however over long sections of river where there may be significant in-channel losses of protected vegetation and habitat this may be unacceptable. The SAC and SPA designation criteria will need to be investigated in this instance for important in-channel habitats and species.</li> <li>Culverting of an entire AFA has the potential for significant negative environmental impacts within a designated site, as it replaces the natural hydrological and ecological regime with an artificial bypass. Culverting is unlikely to be an acceptable standalone method within a designated site. Culverting however should have no hydraulic impacts</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
		<p>upstream of a designated site.</p> <ul style="list-style-type: none"> <li>Increasing conveyance modifies the storage and flow of water, causing or exacerbating disconnection between the river and the floodplain. There can be disruption to natural processes, the loss of habitat and potentially negative effects on water quality, due to loss of habitat to filter nutrients, and reduced carbon storage.</li> <li>There is the potential for increased downstream flood risk.</li> <li>Erosion can be exacerbated upstream and / or downstream of modified conveyance areas with potentially significant negative effects.</li> <li>There is likely to be the direct loss of habitat and displacement of species in the vicinity of works, however these may re-establish in the medium to long term.</li> <li>There is the potential for a reduction in pollinating services and pest and disease control due to the loss of natural habitat from direct footprint impacts.</li> <li>There is the potential for long term changes to land use from direct footprint impacts.</li> <li>Loss of natural habitat and reduced biodiversity can impact recreational activities like angling and wildlife watching.</li> <li>There is the potential for reduced water quality during construction from increased sediments.</li> <li>There may be temporary negative visual impacts during in-channel works.</li> </ul>
<p><b>Hard Defences</b></p> <p>Fluvial flood walls or flood embankments. Rehabilitate and / or improve existing defences</p> <p>Tidal Barrages</p>		

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
Coastal Flood walls		
<i>Fluvial flood walls or flood embankments</i>	<ul style="list-style-type: none"> <li>Hard river defences can deliver benefits by regulating water flow and reducing flood risk; therefore protecting human health, properties and infrastructure.</li> <li>Depending on their design, some defences can improve access for some types of recreation.</li> </ul>	<ul style="list-style-type: none"> <li>Hard defences can interfere with natural process, by causing some or all of the floodplain to be disconnected from the river, which can lead to the loss of natural habitat to capture, filter and recycle nutrients or pollutants. This can lead to a reduction in water quality.</li> <li>There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. There may be indirect negative downstream impacts from sedimentation during construction.</li> <li>Erosion may also increase either side of the defences due to changes in river processes.</li> <li>Defences could impact negatively on river morphology and sediment dynamics, and affect WFD status and classification.</li> <li>Loss of natural habitat and biodiversity can reduce the quality of the environment for recreation and wildlife watching.</li> <li>Within the urban landscape, direct defences have potentially negative effects through disrupting the setting and view of the river and floodplain.</li> <li>Defences may alter the setting of heritage sites.</li> <li>There is the potential for downstream increased flood risk.</li> <li>Direct defences have the potential for negative effects on freshwater fisheries due to the loss of in river and riparian habitat and sedimentation.</li> <li>There may be temporary negative impacts through disturbance and inconvenience to the local population during engineering works.</li> <li>Flood walls and embankments are unlikely to have negative impacts upon designated sites, unless the footprint of the structure is directly on the designated feature, or if they cause a greater flood</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
		hazard downstream of the feature in a vulnerable designated area.
<i>Tidal Barriers</i>	<ul style="list-style-type: none"> <li>Tidal barrages can deliver benefits by regulating water flow and reducing flood risk, therefore protecting human health, properties and infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>Tidal barrages should ideally not be placed within a designated site, however probably all estuaries where a tidal barrage could be incorporated within Ireland are designated Natura 2000 sites. This measure has the potential to have significant ecological impacts, particularly on migratory fish and other water dependent species.</li> <li>New tidal barriers could have potentially significant negative effects on water quality (including morphology) and erosion.</li> <li>Tidal barriers could impede fish passage and impact on upstream protected sites.</li> </ul>
<i>Coastal Flood walls</i>	<ul style="list-style-type: none"> <li>Hard coastal defences can deliver benefits by regulating water flow and reducing flood risk, therefore protecting human health, properties and infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>New hard coastal defences on undeveloped shoreline or tidal barriers could have potentially significant negative effects on water quality, coastal morphology and erosion.</li> <li>In areas of longshore drift, defences in one location can have implications for sediment distribution in other areas.</li> <li>Coastal defences may reduce access for recreational activities.</li> <li>There are potential negative visual effects on urban and coastal landscapes.</li> <li>There are potential negative visual effects on the seascape from artificial structures offshore or on the beach.</li> <li>Flood walls and embankments on coastal areas should not be on protected habitats and cannot alter coastal processes where a protected habitat requires inundation.</li> </ul>
<i>Rehabilitation of Existing Defences</i>	<ul style="list-style-type: none"> <li>Changes to existing defences could potentially deliver significant positive environmental effects, for example, by setting back defences from the shoreline or river.</li> <li>Sensitively rehabilitated defences may help to improve amenity, particularly if the shoreline is already modified.</li> </ul>	<ul style="list-style-type: none"> <li>Rehabilitation of existing defences is unlikely to have negative impacts upon designated sites as the structures currently exist, have an established footprint and have an established hydraulic impact.</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
<b>Relocation</b> Abandoning existing properties and relocating to existing or new properties outside the floodplain.		
<i>Relocation</i>	<ul style="list-style-type: none"> <li>Reduced flood risk to human health and properties.</li> </ul>	<ul style="list-style-type: none"> <li>Potential for direct, significant, long term social impacts to those required to relocate. These impacts could however be positive or negative depending on the occupant's attitude to relocating. There is the potential for indirect, significant social impacts to residents through fragmentation of neighbourhoods. There is the potential for indirect, significant social impacts to relocated commercial properties if old customers do not frequent the new premises.</li> <li>There are unlikely to be any significant impacts on the environment from the relocation of properties/infrastructure away from flood risk areas, provided the new properties / infrastructure are not relocated to environmentally sensitive areas.</li> </ul>
<b>Flow Diversion</b> Diversion of Flow - Realignment of entire river, diversion channel out of river basin and/or bypass channel to return flow downstream. Overland Floodways - Using roads or linear floodways to convey flow to a determined discharge point.		
<i>Diversion of Flow</i>	<ul style="list-style-type: none"> <li>There will be direct positive social impacts from diversion of flow through the reduction of flood risk and impacts to property and infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>Flow diversion includes realigning the entire river or creating bypass channels. They are usually implemented in the immediate vicinity of the AFA and any impacts are likely to be localised. There will however be direct negative impacts on local existing habitats in the footprint of the diversion channel.</li> <li>Full diversion of a watercourse should not be proposed within a designated site, as is likely to impact upon the designation criteria.</li> <li>There should be limited impact from bypass channels if the normal flow in the original channel is maintained and the bypass channel is not created in a habitat that is sensitive to flooding.</li> <li>Diversion of flow may just transfer the flood risk to another</li> </ul>

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
		location.
<i>Overland Floodways</i>	<ul style="list-style-type: none"> <li>There will be direct positive social impacts from using overland floodways through the reduction of flood risk and impacts to property and infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>Overland floodways should not be proposed within designated sites where the designated habitat and / or species are vulnerable to flooding, as there is the potential for significant negative environmental impacts during a flood event. This measure may be further investigated within designated areas that require or are not sensitive to periodic inundation.</li> <li>Overland floodways may just transfer the flood risk to another location.</li> </ul>
<b>Other Works</b> Minor raising of existing defences / levels, infilling gaps in defences, site specific localised protection works, etc.		
<i>Other Works</i>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>
<i>Site Specific Protection Works</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level. However method is non-specific.</li> </ul>
<b>Flood Forecasting</b> Monitoring rain and flows and alerting relevant recipients of flood risk likely to occur.		
<i>Flood Forecasting</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level, however will reduce flood risk to human health.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level.</li> </ul>
<b>Public Awareness</b> Make public aware of risk and advice on measures to protect themselves and properties.		
<i>Public Awareness</i>	<ul style="list-style-type: none"> <li>Unlikely to be significant positive impacts at a strategic level, however will reduce flood risk to human health.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level.</li> </ul>
<b>Individual Property Protection</b>		

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
Flood proofing, flood gates, capping vents and / or resilience measures.		
<i>Individual Property Protection</i>	<ul style="list-style-type: none"> <li>Property level protection may provide positive impacts to those provided with protective equipment by giving them more peace of mind. There will be positives for the public that can protect themselves from small flood events, reducing or even eliminating damages that would otherwise cause disturbance and inconvenience.</li> </ul>	<ul style="list-style-type: none"> <li>Unlikely to be significant negative impacts at a strategic level, provided property protection does not impact on protected structures or monuments and their setting.</li> </ul>



## **APPENDIX B**

### **MCA Scorings and Weightings used in SEA**



<b>OBJECTIVE 1 (i) Biodiversity, Flora and Fauna</b>	
<b>Objective</b>	<b>Support the objectives of the Habitats and Birds Directives</b>
<b>Sub-Objective</b>	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones
<b>Scoring</b>	Area of Natura 2000 site at risk of flooding and qualitative assessment of impact (flooding may have a positive, neutral or negative impact)  Loss of, or significant changes to habitat of, riverine and wetland species associated with Natura 2000 sites.
<b>Basic Requirement</b>	No deterioration in the conservation status of designated sites as a result of flood risk management measures
<b>Aspirational Target</b>	Improvement in the conservation status of designated sites as a result of flood risk management measures
<b>Global Weighting</b>	10
<b>Local Weighting</b>	By professional judgement, taking account of local advice
<b>Guidance on Assignment of Local Weightings</b>	
<p>The local weighting may not exceed a ceiling value of 5. Professional judgement should be applied in assigning this weighting. After consultations with progress group, steering group and members of the stakeholder group, this weighting may change.</p> <p>The presence of Annex IV (Habitats Directive) species of flora and fauna, and their key habitats, which are strictly protected wherever they occur, whether inside or outside the SAC/SPA, will have an impact on this score.</p>	
<b>Guidance on Option Scoring</b>	
<p>Scoring by professional judgement, based upon the following key datasets:</p> <ul style="list-style-type: none"> <li>- Natura 2000 sites (SACs, SPAs)</li> <li>- Ramsar Sites</li> <li>- Annex IV (Habitats Directive) species of flora and fauna, and their key habitats</li> </ul> <p>Note that the scoring allows a negative score of -5 to reflect the importance of avoiding environmental impacts. The positive scores reflect the opportunities for environmental enhancement. <u>The network of sites must also be considered together with the impact upon the individual site.</u></p>	
Score	Description
+5	Potential to create new candidate SAC, SPA or Ramsar sites or enhance NHA sites to SAC, SPA or Ramsar status, which extend the existing network of international and European designations as a result of flood risk management measures.
+3	Improvement or enhancement of the condition or management of existing SAC, SPA or Ramsar sites and network as a result of flood risk management measures.
+1	Localised improvement or enhancement of the condition or management of existing SAC, SPA or Ramsar sites and network as a result of flood risk

	management measures.
0	No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.
-1	Any detrimental impact upon existing SAC or SPA site, including a delay in recovery of the site, but excluding impacts on the conservation objectives of the site, as a result of flood risk management measures, where suitable mitigation measures are technically feasible.
-3	Any detrimental impact upon existing SAC or SPA site, including a delay in recovery of the site, but excluding impacts on the conservation objectives of the site, as a result of flood risk management measures, where there are no suitable mitigation measures.
-5	Any detrimental impact upon conservation objectives of existing SAC, SPA or Ramsar site, including a delay in recovery of the site, as a result of flood risk management measures, where suitable mitigation measures are technically feasible.
-999	Any detrimental impact upon existing conservation objectives of SAC, SPA or Ramsar site, as a result of flood risk management measures, where there are no suitable mitigation measures.

<b>OBJECTIVE 2 (i) Biodiversity, Flora and Fauna</b>	
<b>Objective</b>	<b>Avoid damage to, and where possible enhance, the flora and fauna of the catchment</b>
<b>Sub-Objective</b>	Avoid damage to, and where possible enhance, legally protected sites / habitats and other sites / habitats of national, regional and local nature conservation importance
<b>Scoring</b>	<p>Area of national, regional or local conservation designations at risk of flooding and qualitative assessment of impact (flooding may have a positive, neutral or negative impact)</p> <p>Loss of, or significant changes to habitat of, riverine and wetland species associated with national, regional and local conservation designations.</p>
<b>Basic Requirement</b>	No deterioration of in condition of existing sites due to the implementation of flood risk management option
<b>Aspirational Target</b>	Creation of new or improvement in condition of existing sites due to the implementation of flood risk management option
<b>Global Weighting</b>	5
<b>Local Weighting</b>	By professional judgement, taking account of local advice
<b>Guidance on Assignment of Local Weightings</b>	
The local weighting may not exceed a ceiling value of 5. Professional judgement should be applied in assigning this weighing. After consultations with progress group, steering group and members of the stakeholder group, this weighting may change.	
<b>Guidance on Option Scoring</b>	
<p>Scoring by professional judgement, based upon the following key datasets:</p> <ul style="list-style-type: none"> <li>- Natural Heritage Areas (&amp; proposed Natural Heritage Areas)</li> <li>- Nature Reserves</li> <li>- Wildfowl Sanctuary</li> <li>- OSPAR</li> <li>- National Parks</li> </ul> <p>Note that the scoring allows a negative score of -5 to reflect the importance of avoiding environmental impacts. The positive scores reflect the opportunities for environmental enhancement. The network of sites must also be considered together with the impact upon the individual site.</p>	
Score	Description
+5	Potential to create new national, regional and local conservation sites as a result of flood risk management measures.
+3	Improvement or enhancement of the condition or management of existing national, regional and local sites as a result of flood risk management measures.
+1	Potential for localised improvement of flora/fauna
0	No impact on existing national, regional and local sites as a result of flood risk management measures.
-1	Potential localised loss of or disturbance to flora/fauna limited by the already

	modified nature of the channel/shoreline.
-3	Potential localised loss of or disturbance to flora/fauna
-5	Any detrimental impact upon the condition of existing national, regional or local sites as a result of flood risk management measures, where suitable mitigation measures are technically feasible.
-999	Any detrimental impact upon national, regional or local sites as a result of flood risk management measures, where there are no suitable mitigation measures.

<b>OBJECTIVE 3 (i) Population and Human Health</b>	
<b>Objective</b>	<b>Minimise risk to human health and life – Residents</b>
<b>Indicator</b>	Annual Average Number of residential properties at risk from flooding
<b>Scoring</b>	Based on calculated assessment, adjusted by professional judgement
<b>Basic Requirement</b>	Number of properties at risk is not increased
<b>Aspirational Target</b>	100% reduction in number of residential properties at risk
<b>Global Weighting</b>	27
<b>Local Weighting</b>	Based on calculated assessment, adjusted by professional judgement
<b>Guidance on Assignment of Local Weightings</b>	
<p>The local weightings should be calculated based on a score derived from the number of residential properties potentially affected by flooding, and the highest probability (lowest magnitude) of flood event that causes flooding of each property.</p> <p><b>Receptor Scoring</b></p> <p>All residential properties should be treated as equal for the purposes of the calculated score. To ensure that the local weighting on this category is appropriately scaled, each ground floor property should be afforded a score of 2, and each property above ground floor may be afforded a score of 1.</p> <p><b>Probability Factoring</b></p> <p>For each property, the score (2) is then factored by the probability of the highest probability (least severe) flood event that causes flooding of that property, where the factor applied is calculated as:</p> $\text{Factor} = \text{Probability of flooding (expressed as the AEP, e.g., 0.01 for 1\%)}$ <p><b>Total AFA Score (Local Weighting)</b></p> <p>For the given AFA, the total AFA score is calculated as the sum of the factored scores for all of the residential properties at risk from flooding, subject to a maximum score of 5.</p> <p><b>Other Factors</b></p> <p><i>Known Areas of Highly Vulnerable People</i></p> <p>The risk to life associated with the flooding of residential properties is related to the vulnerability of the people living in that property, with the elderly and very young particularly vulnerable.</p> <p>The scoring should typically assume that a reasonable cross section of society exists in those that inhabit all of the properties at risk within an AFA. However, if it is known that an area is occupied by particularly vulnerable or resilient set of people then professional judgement should be applied to increase or decrease the score accordingly.</p> <p><i>Rate of Onset</i></p> <p>The risk to health and life is associated with the flooding of residential properties is related to the rate of onset of flooding and hence the time available to evacuate the vulnerable people. It is assumed that typically it will be evident that flooding may occur with a 1 to 2 hours available to then evacuate the vulnerable people before the depth / velocity of flood water creates difficulties for evacuation and / or a moderate risk to life. However, if the rate of onset is significantly greater or less than this, then professional judgement should be applied to decrease or increase the score</p>	

accordingly.

#### *Flood Depths and Velocities (Risk to Life)*

The risk to life associated with the flooding of residential properties is related to the projected depths of flooding and the velocity of overland flood flow (i.e., the risk to life). It is assumed that typically a Low risk to life will exist for the community in general and residential areas within a community in particular. However, if the risk to life is greater than this, then professional judgement should be applied to increase or the score accordingly.

#### *Existing Flood Warning Schemes*

Where an existing flood warning scheme is in place, then the local weighting should be multiplied by a factor of 0.5, 0.7 and 0.9 for effective advance warning periods in excess of 6 hours, 4 hours and 2 hours respectively.

#### **Final Local Weighting**

Note that final local weighting taking into account the application of the factors for known areas of highly vulnerable people, the rate of onset, flood depths and velocities and the presence of existing flood warning schemes should still not exceed a maximum of 5.

The above provides guidance on the setting of local weightings for this objective. However, professional judgement should also be applied as per Section 3.3, and should take into account other factors that may influence the risk to life, such as the presence of basement properties.

### **Guidance on Option Scoring**

#### **Residual Risk Score**

The residual risk score for a flood risk management option should be calculated in the same manner as the local weighting, but based on the flood hazard with the option applied.

In the case of measures providing flood defence, then the residual risk score can be calculated simply by adjusting the factor for probability to that of the standard of protection (following the simplistic assumption that once the standard of protection is exceeded for a given flood defence, then no defence is provided).

#### **Option Scoring**

Options are scored based on the degree of reduction in the risk to residential properties, calculated using the residual risk score as determined for the relevant option, and the final local weighting, and multiplied by a factor of 5.

The score for a given option should be calculated as:

$$\text{Option Score} = 5 \times [ (\text{Local Weighting} - \text{Residual Risk Score}) / \text{Local Weighting} ]$$

The other factors detailed under the guidance on the assignment of Local Weighting should also be taken into account in assigning the score for a measure.

#### **Standard of Protection Factor**

A Standard of Protection Factor is not applicable to this objective, as it is implicit within the scoring process.

#### **Non-Structural Option Risk Reduction**

Flood warning does not reduce hazard, but generally can reduce risk. In the case of risk to people in residential properties, advance warning of an impending flood can be vital in providing sufficient time to evacuate the residents, and so flood forecasting and warning can significantly reduce the risk to life. The option score for non-structural warnings involving advance warning should therefore be 4, 2 and 1 for effective advance warning periods in excess of 6 hours, 4 hours and 2 hours respectively.

The above provides guidance on the setting of local weightings and scoring for this objective. However, professional judgement should also be applied.

OBJECTIVE 3 (ii) Population and Human Health													
<b>Objective</b>	<b>Minimise risk to human health and life – High vulnerability properties</b>												
<b>Indicator</b>	Number and type of high vulnerability properties at risk from flooding												
<b>Scoring</b>	Based on calculated assessment, adjusted by professional judgement												
<b>Basic Requirement</b>	Number of high vulnerability properties at risk not increased												
<b>Aspirational Target</b>	100% reduction in number of high vulnerability properties at risk												
<b>Global Weighting</b>	17												
<b>Local Weighting</b>	Based on calculated assessment, adjusted by professional judgement												
Guidance on Assignment of Local Weightings													
<p>The local weightings should be calculated based on a score derived from the number and type of high vulnerability properties potentially affected by flooding, and the highest probability (lowest magnitude) of flood event that causes flooding of that property.</p> <p><b>Property Scoring</b></p> <p>Each type of high vulnerability property is assigned a score. The types of high vulnerability properties are categorised and scored as follows:</p> <table border="1"> <thead> <tr> <th>Property Type</th><th>Score</th></tr> </thead> <tbody> <tr> <td>Hospitals</td><td>500 (IRR)</td></tr> <tr> <td>Nursing / Residential Homes</td><td>250</td></tr> <tr> <td>Prisons</td><td>250</td></tr> <tr> <td>Camping / Caravan / Halting Sites</td><td>100</td></tr> <tr> <td>Schools</td><td>50</td></tr> </tbody> </table> <p><b>Probability Factoring</b></p> <p>For each property, the score is then factored by the probability of the highest probability (least severe) flood event that causes flooding of that property, where the factor applied is calculated as:</p> $\text{Factor} = \text{Probability of flooding (expressed as the AEP, e.g., 0.01 for 1\%)}$ <p><b>Other Factors</b></p> <p><i>Rate of Onset of Flooding</i></p> <p>The risk to life associated with the flooding of high vulnerability properties is related to the rate of onset of flooding and hence the time available to evacuate the vulnerable people. It is assumed that typically it will be evident that flooding may occur with a 1 to 2 hours available to then evacuate the vulnerable people before the depth / velocity of flood water creates difficulties for evacuation and / or a moderate risk to life. However, if the rate of onset is significantly greater or less than this, then professional judgement should be applied to decrease or increase the score accordingly.</p> <p><i>Flood Depths and Velocities (Risk to Life)</i></p> <p>The risk to life associated with the flooding of high vulnerability properties is related to the projected depths of flooding and the velocity of overland flood flow (i.e., the risk to life). It is assumed that typically a <u>Low</u> risk to life will exist for high vulnerability properties. However, if the risk to life is greater than this, then professional judgement should be applied to increase or the score</p>		Property Type	Score	Hospitals	500 (IRR)	Nursing / Residential Homes	250	Prisons	250	Camping / Caravan / Halting Sites	100	Schools	50
Property Type	Score												
Hospitals	500 (IRR)												
Nursing / Residential Homes	250												
Prisons	250												
Camping / Caravan / Halting Sites	100												
Schools	50												

accordingly.

#### *Calculation of Other Factors*

The rate of onset of flooding and the risk to life at the high vulnerability property can be determined from the outputs of the hydraulic modelling and flood mapping.

#### **Total AFA Score (Local Weighting)**

For the given AFA, the total AFA score is calculated as the sum of the factored scores for each property at risk from flooding, subject to a maximum score of 5.

Note that final local weighting taking into account the application of the factors for Rate of Onset of Flooding and Flood Depths and Velocities (Risk to Life) should still not exceed a maximum of 5.

The above provides guidance on the setting of local weightings for this objective. However, professional judgement should also be applied.

### **Guidance on Option Scoring**

#### **Residual Risk Score**

The residual risk score for a flood risk management option should be calculated in the same manner as the local weighting, but based on the flood hazard with the option applied.

In the case of measures providing flood defence, then the residual risk score can be calculated simply by adjusting the factor for probability to that of the standard of protection (following the simplistic assumption that once the standard of protection is exceeded for a given flood defence, then no defence is provided).

#### **Option Scoring**

Options are scored based on the degree of reduction in the risk to high vulnerability properties, calculated using the residual risk score as determined for the relevant option, and the final local weighting, and multiplied by a factor of 5.

The score for a given option should be calculated as:

$$\text{Option Score} = 5 \times [ (\text{Local Weighting} - \text{Residual Risk Score}) / \text{Local Weighting} ]$$

The other factors detailed under the guidance on the assignment of Local Weighting should also be taken into account in assigning the score for a measure.

#### **Standard of Protection Factor**

A Standard of Protection Factor is not applicable to this objective, as it is implicit within the scoring process.

#### **Non-Structural Option Risk Reduction**

Flood warning does not reduce hazard, but generally can reduce risk. In the case of high vulnerability properties, advance warning of an impending flood can be vital in providing sufficient time to evacuate the vulnerable people, and so flood forecasting and warning can significantly reduce the risk to life. The option score for non-structural warnings involving advance warning should therefore be 4, 2 and 1 for effective advance warning periods in excess of 6 hours, 4 hours and 2 hours respectively.

The above provides guidance on the setting of local weightings and scoring for this objective. However, professional judgement should also be applied.

<b>OBJECTIVE 4 (i) Geology, Soils and Landuse</b>	
<b>Objective</b>	<b>Manage risk to agriculture</b>
<b>Indicator</b>	Agricultural production
<b>Scoring</b>	By professional judgement, taking account of local advice
<b>Basic Requirement</b>	No increase in the negative impact of flooding on agricultural production
<b>Aspirational Target</b>	Provide the potential for enhanced agricultural production
<b>Global Weighting</b>	10
<b>Local Weighting</b>	By professional judgement, taking account of local advice
<b>Guidance on Assignment of Local Weightings</b>	
Setting of the Local Weighting is to be by professional judgement, taking account of the value and social importance of the agricultural industry in the area guided by advice from the steering and progress groups and via submissions from the public.	
<b>Guidance on Scoring</b>	
<p><b>Option Scoring</b></p> <p>Scoring is to be professional judgement, taking into account local advice.</p> <p>Consideration in setting the scores for an option should include:</p> <ul style="list-style-type: none"> <li>- An increase or decrease in the area of agricultural land subject to flooding</li> <li>- The frequency and seasonality of flooding, and the seasonality of agricultural production and land use in the area</li> <li>- The duration of flooding</li> <li>- The source of floodwaters, noting that salt water flooding can cause significantly more damage to agricultural production than river flooding</li> <li>- The overland flow velocity</li> <li>- The existing and potential other agricultural uses of the land</li> <li>- The potential for flood warning to mitigate the impacts of flooding on agriculture</li> <li>- Factors that may not affect the area of land flooding but that could otherwise impact positively or negatively on agricultural production (e.g., risk to local dairy factory, long-term isolation of farms, etc.)</li> <li>- The potential to enhanced agricultural production, such as through the reduction of the frequency or extent of flooding of agricultural land.</li> </ul>	

<b>OBJECTIVE 5 (i) Water</b>	
<b>Objective</b>	<b>Support the objectives of the WFD</b>
<b>Sub-Objective</b>	Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives.
<b>Scoring</b>	<p>Likelihood to impact on water body status elements:</p> <ul style="list-style-type: none"> <li>– Biology;</li> <li>– Physico-chemical;</li> <li>– Hydrology and morphology;</li> <li>– Priority substances and priority hazardous substances.</li> </ul>
<b>Basic Requirement</b>	Provide no constraint to the achievement of water body objectives.
<b>Aspirational Target</b>	Contribute to the achievement of water body objectives.
<b>Global Weighting</b>	16
<b>Local Weighting</b>	5
<b>Guidance on Assignment of Local Weightings</b>	
The Local Weighting to be applied for this objective is constant, and should always be set equal to 5 as WFD objectives must be achieved and are relevant to all waterbodies.	
<b>Guidance on Option Scoring</b>	
<p>Scoring should be guided by professional judgement with reference to the scoring guidance below and the generic description of the likely impacts of measures on water body status.</p> <p>The scoring of the options for this objective should take into account the <u>duration and permanence</u> of the likely impact(s) of the options on water body status elements, the <u>sensitivity</u> of the receiving water bodies, and the <u>potential sources of pollution</u> in the flood extent area.</p>	
<p><b>Duration is defined in terms of:</b></p> <ul style="list-style-type: none"> <li>• long term;</li> <li>• medium term;</li> <li>• short term.</li> </ul>	<p><b>Permanence is defined in terms of:</b></p> <ul style="list-style-type: none"> <li>• permanent;</li> <li>• recurring;</li> <li>• intermittent.</li> </ul>
<p><b>Sensitive water bodies include:</b></p> <ul style="list-style-type: none"> <li>• water bodies listed in the register of protected areas;</li> <li>• high status water bodies.</li> </ul>	<p><b>Significant polluting sources include:</b></p> <ul style="list-style-type: none"> <li>• plants licensed under Directives 96/61/EC and 91/271/EC;</li> <li>• septic tanks greater than 500 PE;</li> <li>• significant slurry storage facilities.</li> <li>• establishments defined under Directive 2012/18/EU</li> </ul>
<b>Combining positive and negative scores</b>	
<p>Most options will have the potential for both positive and negative impacts on water body status as, regardless of the nature of the options, they will all be designed to reduce flood risk which in turn will reduce pollution risk (by reducing the occurrence of flood waters carrying pollutants from inundated areas back into the river – the significance of this positive impact varies depending on the potential sources of pollution within the inundated area and the sensitivity of the water body). Therefore, the overall score applied should be a combination of the best case positive score and</p>	

the worst case negative score.

### **Example of combining scores**

Option = hard defences and flow diversion

- +2 due to reduction of pollution risk to sensitive water bodies
- -2 due to construction stage impacts associated with walls
- -5 associated with diversion of flow into another river

In this case, the overall score should be '-3', combining the best case positive score and the worst case negative score.

### **Comparing options**

When scoring multiple options for one AFA, it may happen that the options score the same even if they have varying degrees of impact. Professional judgement should be used to ensure that the scores reflect the varying degrees of impact between the options i.e. the scores should be manually adjusted to reflect the different degrees of impact associated with the different options.

### **Example of manual adjustment**

Option 1 = flow diversion

- +2 due to reduction of pollution risk to sensitive water bodies
- -5 associated with diversion of flow into another river

Overall score = -3

Option 2 = flow diversion plus walls

- +2 due to reduction of pollution risk to sensitive water bodies
- -2 due to construction stage impacts to sensitive water bodies associated with walls
- -4 due to excavation and restoration of natural banks in sensitive water bodies
- -5 associated with diversion of flow into another river

Overall score = -3 (combining best case positive score and worst case negative score)

These options score the same even though Option 2 has more negative impacts associated with it. In this example, using professional judgement, Option 2 should be manually adjusted downwards by 1 point to reflect the comparative difference in impacts between the options. If more than two options are being compared, and all differ in terms of the severity of their likely impacts on this objective, but all score the same using this methodology, the options should be manually adjusted upwards or downwards by a maximum of two points in either direction to reflect the comparative difference in impacts between the options. Such adjustments will ensure that the overall MCA scores for the options reflect their differing degree of potential impact on this objective and will therefore ensure that this objective will have an influence in terms of the choice of a preferred option. In such cases a clear rationale should be recorded for the adjustment. It should be noted that such adjustments may have a significant impact on the overall MCA score of the preferred option (perhaps up to 10% of the overall MCA score).

### **Scoring Table**

Score	Duration of impact	WB sensitivity	Examples
5	Permanent or long-term contribution to the achievement of wb objectives	All	Reinstatement of natural hydrological or morphological regime.
4	Medium-term or recurring contribution to the achievement of wb objectives	Sensitive	Reduced flooding in area with significant polluting sources in 1% AEP extent.
3		Non-sensitive	
2	Short-term or intermittent contribution to the achievement of wb objectives	Sensitive	Reduced flooding in area with no significant polluting sources in 1% AEP extent.
1		Non-sensitive	
0	No constraint to the	All	No connectivity between measure

	achievement of wb objectives		and channel or flow.
-1	Short-term or intermittent impediment to the achievement of wb objectives	Non-sensitive	Construction phase impacts. In-stream or on-bank maintenance impacts.
-2		Sensitive	Overland floodways. Off-line storage. Rehabilitation of existing in-stream or on-bank defences.
-3	Medium-term or recurring impediment to the achievement of wb objectives	Non-sensitive	Excavation and restoration of banks.
-4		Sensitive	Flow diversion within the same river. One-off or very occasional dredging. Short culverts (e.g. under a road).
-5	Permanent or long-term impediment to the achievement of wb objectives	All	Channelisation / realignment that does not constitute a reinstatement of natural hydrological or morphological regimes. Regular dredging. Flow diversion to a different river (See further guidance in table below). Extensive culverting. Tidal barrage. On-line storage (dams and reservoirs). Improvement of channel conveyance. Permanent removal of natural banks.
-999	Unacceptable negative impact where feasible alternative exists		

<b>OBJECTIVE 6 (i) Climate</b>	
<b>Objective</b>	<b>Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change</b>
<b>Indicator</b>	Sustainability and adaptability of the flood risk management measure in the face of potential future changes, including the potential impacts of climate change
<b>Scoring</b>	By professional judgement, based on the guidance and criteria set out below
<b>Basic Requirement</b>	Option to provide for, or be adaptable to, the MRFS in terms of maintaining the standard of protection at acceptable cost
<b>Aspirational Target</b>	Option to provide for, or be adaptable to, the HEFS in terms of maintaining the standard of protection at negligible cost
<b>Global Weighting</b>	20
<b>Local Weighting</b>	Constant 5, i.e., no amendment to local weighting
<b>Guidance on Assignment of Local Weightings</b>	
<p>The Local Weighting to be applied for this objective is constant, and should always be set equal to 5, as it always a consideration in option design and selection.</p> <p>It is recognised that the impacts of, and vulnerability to, potential future changes will vary significantly from community to community. However, this objective is used only for option selection, and is not used for prioritisation, and so the relative significance of the impacts and vulnerability to potential future change between communities is not relevant. As promoting adaptability is always important, the local weighting is to be kept constant.</p>	
<b>Guidance on Scoring</b>	
<p>Scoring is to be by professional judgement, taking into account the guidance and criteria set out below. The scoring for a given measure should reflect the cost and the degree of difficulty and potential impacts (technically, socially, environmentally, legislatively, etc.) of potential future adaptations that would be necessary to maintain the Standard of Protection of the measure under the MRFS and/or HEFS, whereby the greater the cost, difficulty and impact, the lower the score.</p> <p>This assignment of a score should reflect the findings of the application of GN29 on climate change adaptation, and account should be taken of the robustness of the option in terms of the need for possible future interventions that may be through additional measures as well direct adaptation of the option under consideration. For example, an option may not be, nor need to, adaptable itself, but may nonetheless score highly if it is shown through a decision-tree analysis this it is very robust in terms of options for future interventions.</p> <p>The guidance given below gives examples for certain scores. Other scores (between 5 and -5) should also be used, where appropriate, interpolating between the scores for which examples are given, where the costs and degree of difficulty and impact may be at the high or low relative to the examples given.</p>	

Score	Description / <i>Examples</i>
5	<p>Option is inherently adaptable at no / negligible cost, difficulty and impact and provides no impediment to future interventions to address new potential future risk areas (i.e., that are separate from the area benefitting from the option in question).</p> <p>This would include Non-Structural measures, and Structural measures designed using the assumptive approach to the HEFS and / or that would be able to maintain the standard of protection / risk reduction under the HEFS with no or negligible further cost or intervention</p>
4	<p>Option is readily adaptable at limited cost, difficulty and impact, and provides no impediment to future interventions to address new potential future risk areas, e.g.:</p> <ul style="list-style-type: none"> <li>• <i>Walls where the foundations and wall are built to permit an extension in height to maintain the required level of protection / risk reduction for the HEFS, which would be acceptable locally (e.g., typically less than 1.2-1.5m height in public areas after being raised)</i></li> <li>• <i>Structural measures (e.g., walls) designed using the assumptive approach to the MRFS and / or that would be able to maintain the standard of protection / risk reduction under the MRFS with no or negligible further cost or intervention</i></li> <li>• <i>Embankments, earth flow diversion channels or other such structures that could be readily topped-up / enhanced</i></li> </ul>
3	<p>Option is adaptable at moderate cost, difficulty and impact, and provides no impediment to future interventions to address new potential future risk areas, e.g.:</p> <ul style="list-style-type: none"> <li>• <i>Walls where the foundations and wall are built to permit an extension in height to maintain the required standard of protection / risk reduction for :</i> <ul style="list-style-type: none"> <li>○ <i>the HEFS, which would be acceptable locally but where adaptation would have other negative implications / costs (e.g., more than 1.2-1.5m height in public areas after being raised, but with demountable defences necessary to provide protection above 1.2-1.5m)</i></li> <li>○ <i>the MRFS, which would be acceptable locally (e.g., typically less than 1.2-1.5m height in public areas after being raised)</i></li> </ul> </li> <li>• <i>Conveyance enhancement, major earth storage structures or similar measures where substantial earthworks would be required to enhance performance, but where adaptation would not require replacement of structural works</i></li> </ul>
2	<p>Option is adaptable at moderate to significant cost, difficulty and impact, and provides no impediment to future interventions to address new potential future risk areas, e.g.:</p> <p><i>Walls where the foundations and wall are built to permit an extension in height to maintain the required standard of protection / risk reduction for the MRFS, which would be acceptable locally but where adaptation would have other negative implications / costs (e.g., more than 1.2-1.5m height in public areas after being raised, but with demountable defences necessary to provide protection above 1.2-</i></p>

	1.5m)
1	<p>Option is adaptable only at significant cost, difficulty and impact, and provides no impediment to future interventions to address new potential future risk areas, e.g.:</p> <ul style="list-style-type: none"> <li>• <i>Conveyance enhancement (including flow diversions), flow retention or similar measures where significant structural replacement works would be required</i></li> <li>• <i>Protection measures which, once adapted, would exceed 1.2-1.5m in height in public areas with no scope for demountable barriers</i></li> </ul>
0	<p>Option is not adaptable, but provides no impediment to future interventions to address new potential future risk areas.</p> <p><i>Options that are not adaptable, although additional works (e.g., separate measures) may need to be undertaken to address potential future increases in risk to the area benefitting from the option in question, e.g.,:</i></p> <ul style="list-style-type: none"> <li>• <i>Coastal / tidal defence walls that can not be raised (e.g., due to visual impact, and / or where demountables are not a viable option), but where a tidal barrage could be implemented as a separate future intervention</i></li> <li>• <i>Option does not hinder future interventions to address new potential future risk areas</i></li> </ul>
-1	<p>Option is not adaptable, and will create a minor interference or impediment to with potential future measures</p> <p><i>Options that will cause a minor impediment and some additional cost to future interventions that may be needed to address the MRFS or HEFS.</i></p>
-3	<p>Option is not adaptable, and will create a moderate interference with or impediment to potential future measures</p> <p><i>Options that will cause a moderate impediment and additional cost to future interventions that may be needed to address the MRFS or HEFS.</i></p>
-5	<p>Option is not adaptable, and will create a major interference with or impediment to potential future measures</p> <p><i>Options that will cause a major impediment and substantial additional cost to future interventions that may be needed to address the MRFS or HEFS.</i></p>
-999	Unacceptable interference with potential future measures

OBJECTIVE 7 (i) Material Assets				
Objective	Minimise risk to transport infrastructure			
Indicator	Number and type of transport routes at risk from flooding			
Scoring	Based on calculated assessment, adjusted by professional judgement			
Basic Requirement	No increase in risk to transport infrastructure			
Aspirational Target	Reduce risk to transport infrastructure to zero			
Global Weighting	10			
Local Weighting	Based on calculated assessment, adjusted by professional judgement			
Guidance on Assignment of Local Weightings				
The local weightings should be calculated based on a score derived from the number and type of transport routes potentially blocked by flooding, and the highest probability (lowest magnitude) of flood event that causes flooding of that route, taking account of the duration of flooding and the diversion time (in relation to road flooding).				
<b>Route and Airport Scoring</b>				
Each type of transport route and airport is assigned a score. The types of transport routes and airports are categorised and scored as follows:				
Type	Road	Rail	Airports	Score
IRR			International	500
A	Motorway	Main line / DART / Luas		250
B	National Primary		Regional	150
C	National Secondary	Branch Line		75
D	Regional			25
E	Local Rural			10
F	Local Urban (Street)			See below
<b>Local Urban Roads (Streets)</b>				
Within an AFA there may be multiple local roads (streets) at risk from flooding, and the flooding of these does not necessarily have a proportional cumulative effect in terms of impact on transport. As such, a maximum value of 25 should be applied with respect to the flooding of urban streets, with professional judgement applied in determining the score up to this maximum score.				
Note that each road joining a junction should be treated as an individual road, and similarly train stations / rail junctions prone to flooding might reflect interruption to multiple routes.				

**Probability Factoring**

For each route, the score is then factored by the probability of the highest probability (least severe) flood event that causes flooding of that route, where the factor applied is calculated as:

$$\text{Factor} = \text{Probability of flooding (expressed as the AEP, e.g., 0.01 for 1\% / 100-yr)}$$

*For example, a National Primary road at risk from flooding in events of probability of 0.02 and less, then the factored score would be =  $150 \times 0.02 = 3$*

**Other Factors***Duration of Flooding*

The damages associated with the flooding of transport routes are related to the duration of the flooding. It is assumed that substantive flooding of the route will last approximately 6 to 12 hours. However, if the duration of flooding, and hence disruption, is significantly greater or less than this, then professional judgement should be applied to increase or decrease the score accordingly, noting amended or compensatory behaviours when flooding is known but also the impact of long-term isolation of properties.

*Diversion Time for Road Flooding*

The damages associated with the flooding of roads are related to the length of diversion in terms of additional journey time. It is assumed that diversion would typically increase journey time by approximately 15 to 30 minutes. However, if the duration of flooding, and hence disruption, is significantly greater or less than this, then professional judgement should be applied to increase or decrease the score accordingly. In determining diversion time, advice should be sought on which routes are likely to remain open during a flood.

*Calculation of Other Factors*

Note that the factors for duration and diversion time do **NOT** need to be calculated based on distance, speed, etc., but may be estimated based on professional judgement taking into account local anecdotal information derived from local authority staff and public observations.

**Total AFA Score (Local Weighting)**

For the given AFA, the total AFA score is calculated as the sum of the factored scores for each transport route at risk from flooding, subject to a maximum score of 5.

*For example, an AFA with a national secondary road and regional road at risk from flooding in events of probability of 0.01 and 0.05 respectively, and multiple urban streets at risk from flooding in events of probability from 0.1, then the factored score would be:*

$$\begin{aligned} &(\text{National secondary road: } 75 \times 0.01 = 0.75) + (\text{Regional road: } = 25 \times 0.05 = 1.25) + \\ &(\text{Multiple urban streets}) = 25 \times 0.1 = 2.5 = \text{Total AFA Score (i.e., Local Weighting)} = 4.50 \end{aligned}$$

Note that final local weighting taking into account the application of the factors for duration and diversion time should still not exceed a maximum of 5.

The above provides guidance on the setting of local weightings for this objective. However, professional judgement should also be applied as per Section 3.3, taking account of other local factors.

**Guidance on Option Scoring**

**Residual Risk Score**

The residual risk score for a flood risk management option should be calculated in the same manner as the local weighting, but based on the flood hazard with the option applied.

In the case of measures providing flood defence, then the residual risk score can be calculated simply by adjusting the factor for probability to that of the standard of protection (following the simplistic assumption that once the standard of protection is exceeded for a given flood defence, then no defence is provided).

**Option Scoring**

Options are scored based on the degree of reduction in the risk to transport routes, calculated using the residual risk score as determined for the relevant option, and the final local weighting, and multiplied by a factor of 5.

The score for a given option should be calculated as:

$$\text{Option Score} = 5 \times [ (\text{Local Weighting} - \text{Residual Risk Score}) / \text{Local Weighting} ]$$

The other factors detailed under the guidance on the assignment of Local Weighting should also be taken into account in assigning the score for a measure.

**Standard of Protection Factor**

A Standard of Protection Factor is not applicable to this objective, as it is implicit within the scoring process.

**Non-Structural Option Risk Reduction**

Flood warning does not reduce hazard, but generally can reduce risk. While transport routes will still be blocked in the event of a flood regardless of the advance warning of the flooding, and the negative impact (delay and disruption) could be slightly reduced if advance warning were available. As such, non-structural measures should be afforded the percentage reduction in score as set out below:

Non-Structural Measure	% Reduction in Factored Score
Flood Forecasting and Warning: Warning Period > 12 hrs	10%
Flood Forecasting and Warning: Warning Period 6 - 12 hrs	6%
Flood Forecasting and Warning: Warning Period 2 - 6 hrs	4%
Flood Forecasting and Warning: Warning Period < 2 hrs	0%

Professional judgement should be applied to review and confirm scores.

OBJECTIVE 7 (ii) Material Assets																			
<b>Objective</b>	<b>Minimise risk to utility infrastructure</b>																		
<b>Indicator</b>	Number and type of infrastructure assets at risk from flooding																		
<b>Scoring</b>	Based on calculated assessment, adjusted by professional judgement																		
<b>Basic Requirement</b>	No increase in risk to utility infrastructure																		
<b>Aspirational Target</b>	Reduce risk to utility infrastructure to zero																		
<b>Global Weighting</b>	10																		
<b>Local Weighting</b>	Based on calculated assessment, adjusted by professional judgement																		
Guidance on Assignment of Local Weightings																			
<p>The local weightings should be calculated based on a score derived from the number and type of utility infrastructure receptors potentially affected by flooding, and the highest probability (lowest magnitude) of flood event that causes flooding of that receptor.</p> <p><b>Receptor Scoring</b></p> <p>Each type of utility receptor is assigned a score. The types of utility receptors are categorised and scored as follows:</p> <table border="1"> <thead> <tr> <th>Receptor Type</th><th>Score</th></tr> </thead> <tbody> <tr> <td>Power Stations</td><td>500</td></tr> <tr> <td>HV Sub-Stations</td><td>250</td></tr> <tr> <td>Gas Assets – High Priority</td><td>100</td></tr> <tr> <td>Gas Assets – Medium Priority</td><td>25</td></tr> <tr> <td>Water Treatment Plants &amp; Primary Pumping Facilities</td><td>250</td></tr> <tr> <td>Waste Water Treatment Plants &amp; Primary Pumping Facilities</td><td>250</td></tr> <tr> <td>Core Telecommunication Exchanges</td><td>100</td></tr> <tr> <td>Non-Core Telecommunication Exchanges</td><td>25</td></tr> </tbody> </table> <p><b>Probability Factoring</b></p> <p>For each receptor, the score is then factored by the probability of the highest probability (least severe) flood event that causes flooding of that receptor, where the factor applied is calculated as:</p> <p style="padding-left: 40px;">Factor = Probability of flooding (expressed as the AEP, e.g., 0.01 for 1%)</p> <p><i>For example, a Water Treatment Plant at risk from flooding in events of probability of 0.02 and less, then the factored score would be:</i></p> <p style="padding-left: 40px;"><i>Factored score = 250 X 0.02 = 5</i></p> <p><b>Other Factors</b></p>		Receptor Type	Score	Power Stations	500	HV Sub-Stations	250	Gas Assets – High Priority	100	Gas Assets – Medium Priority	25	Water Treatment Plants & Primary Pumping Facilities	250	Waste Water Treatment Plants & Primary Pumping Facilities	250	Core Telecommunication Exchanges	100	Non-Core Telecommunication Exchanges	25
Receptor Type	Score																		
Power Stations	500																		
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Water Treatment Plants & Primary Pumping Facilities	250																		
Waste Water Treatment Plants & Primary Pumping Facilities	250																		
Core Telecommunication Exchanges	100																		
Non-Core Telecommunication Exchanges	25																		

***Service Area / Population***

The impact of flooding of a utility asset, and the associated damage and disruption of service, is related to the population and/or area it serves. It is assumed that an asset would be typical of its classification. However, if the population and/or area served is significantly greater or less than this, then professional judgement should be applied to increase or decrease the score accordingly.

***Calculation of Other Factors***

Note that the factors for service area / population do **NOT** need to be calculated based on the area or population served, but may be estimated based on professional judgement taking into account local anecdotal information derived from local authority staff and public observations. (Note: The OPW will seek industry standard data re typical service numbers).

***Total AFA Score (Local Weighting)***

For the given AFA, the total AFA score is calculated as the sum of the factored scores for each receptor at risk from flooding, subject to a maximum score of 5.

Note that final local weighting taking into account the application of the factors for service area / population should still not exceed a maximum of 5.

The above provides guidance on the setting of local weightings for this objective. However, professional judgement should also be applied.

**Guidance on Option Scoring*****Residual Risk Score***

The residual risk score for a flood risk management option should be calculated in the same manner as the local weighting, but based on the flood hazard with the option applied.

In the case of measures providing flood defence, then the residual risk score can be calculated simply by adjusting the factor for probability to that of the standard of protection (following the simplistic assumption that once the standard of protection is exceeded for a given flood defence, then no defence is provided).

***Option Scoring***

Options are scored based on the degree of reduction in the risk to utility receptors, calculated using the residual risk score as determined for the relevant option, and the final local weighting, and multiplied by a factor of 5.

The score for a given option should be calculated as:

$$\text{Option Score} = 5 \times [ (\text{Local Weighting} - \text{Residual Risk Score}) / \text{Local Weighting} ]$$

The other factors detailed under the guidance on the assignment of Local Weighting should also be taken into account in assigning the score for a measure.

***Standard of Protection Factor***

A Standard of Protection Factor is not applicable to this objective, as it is implicit within the scoring process.

**Non-Structural Option Risk Reduction**

Flood warning does not reduce hazard, but generally can reduce risk. While utility receptors could still be flooded in the event of a flood regardless of the advance warning of the flooding, and the negative impact (damage to the utility and disruption to the service the utility provides) could be slightly reduced if advance warning were available. As such, non-structural measures should be afforded the percentage reduction in score as set out below:

<b>Non-Structural Measure</b>	<b>% Reduction in Factored Score</b>
Flood Forecasting and Warning: Warning Period > 12 hrs	10%
Flood Forecasting and Warning: Warning Period 6 - 12 hrs	6%
Flood Forecasting and Warning: Warning Period 2 - 6 hrs	4%
Flood Forecasting and Warning: Warning Period < 2 hrs	0%

The above provides guidance on the setting of local weightings and scoring for this objective. However, professional judgement should also be applied.

<b>OBJECTIVE 8 (i) Cultural Heritage - Architectural</b>	
<b>Objective</b>	<b>Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting, and improve their protection from extreme floods.</b>
<b>Sub-Objective</b>	Avoid damage to or loss of features, institutions and collections of <b>architectural</b> value and their setting, and improve their protection from extreme floods where this is beneficial.
<b>Scoring</b>	a) The number of architectural features, institutions and collections subject to flooding. b) The impact of flood risk management measures on architectural features, institutions and collections.
<b>Basic Requirement</b>	a) No increase in risk to architectural features, institutions and collections at risk from flooding. b) No detrimental impacts from flood risk management measures on architectural features, institutions and collections.
<b>Aspirational Target</b>	a) Complete removal of all relevant architectural features, institutions and collections from the risk of harm by extreme floods. b) Enhanced protection and value of architectural features, institutions and collections importance arising from the implementation of the selected measures.
<b>Global Weighting</b>	4
<b>Local Weighting</b>	By professional judgement, taking account of local advice
<b>Guidance on Assignment of Local Weightings</b>	
<p>The local weighting may not exceed a ceiling value of 5. Professional judgement should be applied in assigning a value to this weighting but some guidance has been provided below. After consultations with progress group, steering group and members of the stakeholder group, this weighting may change.</p> <p>Reference should be made to the PRFA Methodology for Classifying the Vulnerability of National Monuments from Flooding in the Republic of Ireland (OPW, 2011).</p>	
<b>Score</b>	<b>Description</b>
5	Internationally important feature(s) (i.e. Structures or sites of sufficient architectural heritage importance to be considered in an international context. These are exceptional structures that can be compared to and contrasted with the finest architectural heritage in other countries) present and potentially affected .
4	Nationally important feature(s) (e.g. Structures or sites that make a significant contribution to the architectural heritage of Ireland. These are structures and sites that are considered to be of great architectural heritage significance in an Irish context) present and potentially affected with a high to moderate vulnerability.
3	A number of sites/features listed on the Record of Protected Structures and/or Recorded by NIAH are present and potentially affected with a high to moderate vulnerability.
2	A number of sites/features listed on the Record of Protected Structures and/or Recorded by NIAH are present and potentially affected with a moderate to low vulnerability.

1	No architectural features are at risk from flooding but potential effects on the settings of designated architectural features.
0	No sites/features at risk.

### Guidance on Option Scoring

FRM measures may have both positive and negative effects on features of cultural heritage, and these need to be taken into account when identifying and scoping potential effects. Scoring should be based on professional judgement guided by the criteria provided below.

Score	Description / <i>Examples</i>		
5	No negative effects on architectural features and a number of architectural features (Internationally and Nationally important features) completely saved from what would otherwise have been inevitable loss from flooding.	Creation of elements which significantly enhance the setting of architectural features (Internationally and Nationally important features).	Creation of amenity value for a number of architectural features (Internationally and Nationally important features) which was previously not present.
4	Architectural features (Nationally important features, Record of Protected Structures and NIAH) partially saved from what would otherwise have been inevitable loss from flooding.	Creation of elements which enhance the setting of architectural features (Nationally important features, Record of Protected Structures and NIAH).	Creation of amenity value for a number of architectural features (Nationally important features, Record of Protected Structures and NIAH).which was previously not present.
3	Increase in the level of protection for a number of architectural features (Record of Protected Structures and NIAH) from extreme flooding, such that they are substantially less vulnerable to flood damage.	Removal of negative elements from the setting of architectural features (Record of Protected Structures and NIAH) so that the setting of the features is significantly enhanced.	Protection of the existing amenity for a number of architectural features (Record of Protected Structures and NIAH).
2	Increase in the level of protection for a number of architectural features (Record of Protected Structures and NIAH) from extreme flooding, such that they are significantly less vulnerable to flood damage.	Removal of negative elements from the setting of a number architectural features (Record of Protected Structures and NIAH) so that the setting of the architectural features is noticeably enhanced.	Partial protection of the existing amenity for a number architectural features (Record of Protected Structures and NIAH).

1	Increase in the level of protection for architectural features (Record of Protected Structures and NIAH) from extreme flooding, such that it is less vulnerable to flood damage.	Removal of negative elements from the setting of architectural features (Record of Protected Structures and NIAH) so that its setting is enhanced.	Protection of the existing amenity for architectural features (Record of Protected Structures and NIAH).
0	<b>No effects on architectural features</b>		
-1	No physical effects on architectural features (Record of Protected Structures and NIAH)	Changes to the setting of architectural features (Record of Protected Structures and NIAH) such that it is slightly changed.	Partial loss of access to architectural features (Record of Protected Structures and NIAH) which does not affect their existing amenity value.
-2	Multiple effects which score -1 individually  and/or  Physical effects on architectural features (Record of Protected Structures and NIAH) such that the structure is partially removed.	Changes to the setting of architectural features (Record of Protected Structures and NIAH) such that it is clearly modified.	Loss of access to architectural features (Record of Protected Structures and NIAH) such that its current amenity value is altered.
-3	Multiple effects which score -2 individually  and/or  Physical effects on architectural features (Record of Protected Structures and NIAH) such that the structure is completely removed.	Changes to the setting of architectural features (Record of Protected Structures and NIAH) such that it is completely altered.	Loss of access to architectural features (Record of Protected Structures and NIAH) such that its current amenity value is completely lost.
-4	Multiple effects which score -3 individually  and/or  Physical effect on architectural features (Nationally important features, Record of Protected Structures and NIAH) such that the structure is partially removed.	Changes to the setting of architectural features (Nationally important features, Record of Protected Structures and NIAH) such that it is clearly modified.	Loss of access to architectural features (Nationally important features, Record of Protected Structures and NIAH) such that its current amenity value altered.

-5	Physical effect on architectural features (Nationally important features, Record of Protected Structures and NIAH) such that the structure is completely removed.	Changes to the setting of architectural features (Nationally important features, Record of Protected Structures and NIAH) such that it is completely altered.	Loss of access to architectural features (Nationally important features, Record of Protected Structures and NIAH) such that its current amenity value is completely lost.
-999	Physical effects on architectural features (Internationally important) such that its Outstanding Universal Value (OUV) is altered.	Effects on the setting of an architectural features (Internationally important) such that its Outstanding Universal Value (OUV) is altered.	

<b>OBJECTIVE 8 (ii) Cultural Heritage - Archaeological</b>	
<b>Objective</b>	<b>Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting, and improve their protection from extreme floods.</b>
<b>Sub-Objective</b>	Avoid damage to or loss of features, institutions and collections of <b>archaeological</b> value and their setting, and improve their protection from extreme floods where this is beneficial.
<b>Scoring</b>	a) The number of archaeological features, institutions and collections subject to flooding. b) The impact of flood risk management measures on archaeological features, institutions and collections.
<b>Basic Requirement</b>	a) No increase in risk to archaeological features, institutions and collections at risk from flooding. b) No detrimental impacts from flood risk management measures on archaeological features, institutions and collections.
<b>Aspirational Target</b>	a) Complete removal of all relevant archaeological features, institutions and collections from the risk of harm by extreme floods. b) Enhanced protection and value of archaeological features, institutions and collections arising from the implementation of the selected measures.
<b>Global Weighting</b>	4
<b>Local Weighting</b>	By professional judgement, taking account of local advice
<b>Guidance on Assignment of Local Weightings</b>	
<p>The local weighting may not exceed a ceiling value of 5. Professional judgement should be applied in assigning a value to this weighting but some guidance has been provided below. After consultations with progress group, steering group and members of the stakeholder group, this weighting may change.</p> <p>Reference should be made to the PRFA Methodology for Classifying the Vulnerability of National Monuments from Flooding in the Republic of Ireland (OPW, 2011).</p>	
<b>Score</b>	<b>Description</b>
5	Internationally important archaeological feature(s) (i.e. World Heritage Site including those on the tentative list present and potentially affected.
4	Nationally important archaeological feature(s) (e.g. National Monument in State Care, sites on which Preservation Orders or Temporary Preservation Orders have been served) present and potentially affected.
3	A number of sites listed on the RMP/RPS present and potentially affected. (high to moderate vulnerability)
2	A number of sites listed on the RMP/RPS present and potentially affected. (moderate to low vulnerability)
1	Limited potential for effects on the settings of designated archaeological features due to proposed works.
0	No archaeological features at risk.

### Guidance on Option Scoring

FRM measures may have both positive and negative effects on archaeological features, and these need to be taken into account when identifying and scoping potential effects. Scoring should be based on professional judgement guided by the criteria provided below

Score	Description / <i>Examples</i>		
5	No negative effects on archaeological features, and,  A number of archaeological features (Recorded Monuments or National Monuments) completely saved from what would otherwise have been inevitable loss from flooding.	Creation of elements which significantly enhance the setting of archaeological features (Recorded Monuments or National Monuments).	Creation of amenity value for a number of archaeological features (Recorded Monuments or National Monuments) which was previously not present.
4	Archaeological features (Recorded Monuments or National Monuments) partially saved from what would otherwise have been inevitable loss from flooding.	Creation of elements which enhance the setting of an archaeological feature (Recorded Monuments or National Monuments).	Creation of amenity value for a number archaeological feature (Recorded Monuments or National Monuments) which was previously not present.
3	Increase in the level of protection for a number of archaeological features (Recorded Monuments) from extreme flooding, such that they are substantially less vulnerable to flood damage.	Removal of negative elements from the setting of archaeological features (Recorded Monuments) so that the setting of the features is significantly enhanced.	Protection of the existing amenity for a number of archaeological features (Recorded Monuments).
2	Increase in the level of protection for a number of archaeological features (Recorded Monuments) from extreme flooding, such that they are significantly less vulnerable to flood damage.	Removal of negative elements from the setting of a number archaeological features (Recorded Monuments) so that the setting of the archaeological features is noticeably enhanced.	Partial protection of the existing amenity for a number of archaeological features (Recorded Monuments).
1	Increase in the level of protection for archaeological features (Recorded Monuments) from extreme flooding, such that it is less vulnerable to flood damage.	Removal of negative elements from the setting of archaeological features (Recorded Monuments) so that it's setting is enhanced.	Protection of the existing amenity for archaeological features (Recorded Monuments).

<b>0</b>	<b>No effects on archaeological features</b>		
-1	No physical effects on archaeological features (Recorded Monuments or National Monuments)	Changes to the setting of archaeological features (Recorded Monument or National Monument) such that it is slightly changed.	Partial loss of access to archaeological features (Recorded Monuments or National Monuments) which does not affect their existing amenity value.
-2	Multiple effects which score -1 individually  and/or  Physical effects on archaeological features (Recorded Monuments) such that the monument is partially removed.	Changes to the setting of archaeological features (Recorded Monuments) such that it is clearly modified.	Loss of access to archaeological features (Recorded Monuments) such that its current amenity value is altered.
-3	Multiple effects which score -2 individually  and/or  Physical effects on archaeological features (Recorded Monuments) such that the monument is completely removed.	Changes to the setting of archaeological features (Recorded Monuments) such that it is completely altered.	Loss of access to archaeological features (Recorded Monuments) such that its current amenity value is completely lost.
-4	Multiple effects which score -3 individually  and/or  Physical effect on archaeological features (National Monuments) such that the monument is partially removed.	Changes to the setting of archaeological features (National Monuments) such that it is clearly modified.	Loss of access to archaeological features (National Monuments) such that its current amenity value altered.
-5	Physical effect on archaeological features (National Monuments) such that the monument is completely removed.	Changes to the setting of archaeological features (National Monuments) such that it is completely altered.	Loss of access to archaeological features (National Monuments) such that its current amenity value is completely lost.
-999	Physical effects on archaeological features (a World Heritage Site) such that its Outstanding Universal Value (OUV) is altered.	Effects on the setting of an archaeological feature (a World Heritage Site) such that its Outstanding Universal Value (OUV) is altered.	

OBJECTIVE 9 (i) Landscape and Visual							
Objective	Protect, and where possible enhance, landscape character and visual amenity within the zone of influence.						
Sub-Objective	Protect, and where possible enhance, visual amenity, landscape protection zones and views into/from designated scenic areas within the zone of influence.						
Scoring	<div>1. Length of waterway corridor qualifying as a landscape protection zone within urban areas</div> <div>2. Change of quality in existing scenic areas and routes</div> <div>3. Loss of public landscape amenities</div>						
Basic Requirement	<div>1. No significant impact on landscape designation (protected site, scenic route/amenity, natural landscape form) within zone of visibility of measures</div> <div>2. No significant change in the quality of existing landscape characteristics of the receiving environment</div>						
Aspirational Target	<div>1. No change to the existing landscape form</div> <div>2. Enhancement of existing landscape or landscape feature</div>						
Global Weighting	8						
Local Weighting	By professional judgement, taking account of local advice						
Guidance on Assignment of Local Weightings							
<p>The local weighting may not exceed a ceiling value of 5. Professional judgement should be applied in assigning this weighing. After consultations with progress group, steering group and members of the stakeholder group, and with the local community, this weighting may change.</p> <p>Consideration may be given to the following items:</p> <ul style="list-style-type: none"><li>Public use of landscape.</li><li>Cultural associations, history and memories</li></ul> <p>The following scoring system may be adopted.</p> <table><tr><td>5 = landscape designated as a internationally/nationally important landscape and potentially affected</td></tr><tr><td>4 = landscape character type designated at a county level as highly sensitive and/or exceptional/high value and potentially affected</td></tr><tr><td>3 = landscape character type designated at a county level as moderate sensitivity and/or medium value; protected views present that could be affected</td></tr><tr><td>2 = landscape character type designated at a county level as low sensitivity and/or low value and potentially affected</td></tr><tr><td>1 = no specific landscape sensitivity/value, but landscape features/views are important at a local level and potentially affected</td></tr><tr><td>0 = no specific landscape designation, and no landscape value/sensitivity</td></tr></table>		5 = landscape designated as a internationally/nationally important landscape and potentially affected	4 = landscape character type designated at a county level as highly sensitive and/or exceptional/high value and potentially affected	3 = landscape character type designated at a county level as moderate sensitivity and/or medium value; protected views present that could be affected	2 = landscape character type designated at a county level as low sensitivity and/or low value and potentially affected	1 = no specific landscape sensitivity/value, but landscape features/views are important at a local level and potentially affected	0 = no specific landscape designation, and no landscape value/sensitivity
5 = landscape designated as a internationally/nationally important landscape and potentially affected							
4 = landscape character type designated at a county level as highly sensitive and/or exceptional/high value and potentially affected							
3 = landscape character type designated at a county level as moderate sensitivity and/or medium value; protected views present that could be affected							
2 = landscape character type designated at a county level as low sensitivity and/or low value and potentially affected							
1 = no specific landscape sensitivity/value, but landscape features/views are important at a local level and potentially affected							
0 = no specific landscape designation, and no landscape value/sensitivity							
Guidance on Option Scoring							
<p>Scoring should be guided by professional judgement with reference to the scoring guidance below and the generic description of the likely impacts of measures.</p> <p>The scoring of the options for this objective should take into account the duration and permanence</p>							

of the likely impact(s) of the options on landscape value and the sensitivity of the landscape to change.

<b>Duration is defined in terms of;</b> <ul style="list-style-type: none"> <li>• Long term;</li> <li>• Medium term;</li> <li>• Short term.</li> </ul>	<b>Permanence is defined in terms of;</b> <ul style="list-style-type: none"> <li>• Permanent;</li> <li>• Recurrent;</li> <li>• Intermittent.</li> </ul>
<b>Range of Sensitivities include;</b> <ul style="list-style-type: none"> <li>• High (International/National);</li> <li>• Moderate (Regional/County/City);</li> <li>• Low (County/City/Local)</li> </ul>	<b>Permanence is defined in terms of;</b> <ul style="list-style-type: none"> <li>• Permanent;</li> <li>• Recurrent;</li> <li>• Intermittent.</li> </ul>

#### **Examples of Sensitive Landscapes include;**

- World Heritage Sites (International);
- National Parks (International/National);
- Sensitive/Vulnerable Landscapes (National/Regional/County);
- High Amenity Landscapes/Areas (County);
- Scenic Views/Prospects and Routes (County/Local);
- Sensitive Riverscapes/Seascapes/Streetscapes/Local Amenity Walks (County/City/Local).

#### **Combining Positive and Negative Scores**

Constructing hard defences adjacent to watercourses has the potential to impact positively and negatively on landscape. A negative impact may arise from the construction of a visible man-made structure on the opposite bank of a river with a scenic walkway. A positive impact may arise from the removal of invasive species encroaching on the river bank.

+2 due to enhancement of local landscape feature (e.g. removal of invasive vegetative species)

-5 due to construction of hard defence where no defence existed prior

In the above example the overall score should be '-3', combining the best positive score with the worst negative score.

#### **Comparing Options**

When scoring multiple options for one AFA, it may happen that the options score the same even if they have varying degrees of impact. Professional judgement should be used to ensure that the scores reflect the varying degrees of impact between the options, i.e. the scores should be manually adjusted to reflect the different degrees of impact associated with the different options.

#### ***Example of manual adjustment***

Option 1 = flood storage

- +1 due to clearance of natural flood storage area
- -1 short term construction stage impacts
- -4 due to change in existing landscape form in the locality

*Overall Score = -3 (highest positive added to highest negative)*

Option 2 = river morphology changes

- -3 due to construction stage impacts in a riverscape recognised as being of high value in a

County/City Development Plan  
Overall Score = -3

The above options score the same even though Option 2 is more likely to be perceived to have the more significant negative impact arising from the inclusion of the riverscape in a County or City Development Plan. Option 2 should then be manually adjusted downwards by 1 point to reflect the comparative difference in impacts between the options. If more than two options are being compared, and all differ in terms of the severity of their likely impacts on this objective, but all score the same using this methodology, the options should be manually adjusted upwards or downwards by a maximum of 2 points in either direction to reflect the comparative difference between the options.

### Scoring Table

Score	Duration of Impact	Sensitivity	Examples
5	Permanent significant enhancement of high sensitivity landscape character/feature in the zone of visibility of the selected measure	High	Reinstatement of natural river corridor morphology in a riverscape recognised as being of high value included in a County/City Development Plan
4	Permanent significant enhancement of moderate sensitivity landscape character/feature in the zone of visibility of the selected measure	Moderate	Clearance of significant extent of riparian vegetation/man-made obstructions in a river corridor of high landscape/amenity value included in a County/City Development Plan
3	Permanent localised enhancement of high value landscape/feature in the zone of visibility of the selected measure	High	Channel widening and deepening at specific location on a watercourse of high landscape value removing risk of flow restriction and visual impacts from blockages with detritus (vegetative/rubbish).
2	Permanent localised enhancement of moderate value landscape character/feature in the zone of visibility of the selected measure	Medium	Clearance of local area for use as temporary overland flow storage returning land-use to natural function.
1	Permanent localised enhancement of local sensitivity landscape character/feature in the zone of visibility of the selected measure	Low	Removal of artificial visible man-made flow restriction from local amenity view (screens from under bridge on local amenity walk).
0	No change to existing landscape character/feature in the zone of influence of the selected measure	-	No change to existing landscape character or features.
-1	Short term impact (construction) on local sensitivity landscape character/feature in the zone of visibility of the selected measure.	Low	Construction of extension to local flood embankment prior to establishment of vegetative mitigation (i.e. screening).
-2	Short term impact (construction) on moderate sensitivity landscape character/feature in the zone of	Low	Construction of significant flood storage area in large area of natural landscape prior

	visibility of the selected measure.		to mitigation establishment
-3	Short term impact (construction) on high/moderate value landscape character/feature in the zone of visibility of the selected measure	Medium	Re-establishment of natural river corridor morphology in a riverscape recognised as being of high value in a County/City Development Plan
-4	Permanent impact on local/moderate value landscape character/feature in the zone of influence of the selected measure	Medium	Construction of permanent hard defences (flood walls) adjacent to a local amenity walkway in a historic garden/demesne
-5	Permanent impact on high value landscape character/feature in the zone of influence of the selected measure	High	Construction of tidal barrage in high amenity seascape which is the subject matter of a protected view/prospect
-999	Unacceptable negative impact where feasible options exist	High	Site specific.

OBJECTIVE 10 (i) Fisheries							
Objective	Protect and where possible enhance fisheries resource within the catchment						
Sub-Objective	Maintain existing and where possible create new fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species.						
Scoring	<ul style="list-style-type: none"><li>• Area of suitable habitat supporting salmonid and other fish species</li><li>• Number of upstream barriers</li></ul>						
Basic Requirement	<ul style="list-style-type: none"><li>• No loss of integrity of fisheries habitat</li><li>• Maintenance of upstream accessibility</li></ul>						
Aspirational Target	<ul style="list-style-type: none"><li>• No loss of fisheries habitat</li><li>• Improvement in habitat quality / quantity</li><li>• Enhanced upstream accessibility</li></ul>						
Global Weighting	13						
Local Weighting	By professional judgement, taking account of local advice						
Guidance on Assignment of Local Weightings							
<p>The local weighting may not exceed a ceiling value of 5. Professional judgement should be applied in assigning this weighing. After consultations with progress group, steering group and members of the stakeholder group, this weighting may change.</p> <p>The following scoring system may be adopted.</p> <table><tr><td>5 = where there are designated waters (e.g. under EU Shellfish Waters Directive; EU Freshwater Fish Directive)</td></tr><tr><td>4 = waterbody supports substantial salmonid fisheries/shellfisheries and is of national value for fishing/angling</td></tr><tr><td>3 = waterbody supports substantial fisheries/shellfisheries and is of regional value for fishing/angling</td></tr><tr><td>2 = waterbody supports fisheries/shellfisheries and is of local value for fishing/angling</td></tr><tr><td>1 = fisheries could be present but unlikely given the modified nature of the channel/presence of barriers to movement; no known angling/fishing activities</td></tr><tr><td>0 = no fisheries or angling areas present</td></tr></table>		5 = where there are designated waters (e.g. under EU Shellfish Waters Directive; EU Freshwater Fish Directive)	4 = waterbody supports substantial salmonid fisheries/shellfisheries and is of national value for fishing/angling	3 = waterbody supports substantial fisheries/shellfisheries and is of regional value for fishing/angling	2 = waterbody supports fisheries/shellfisheries and is of local value for fishing/angling	1 = fisheries could be present but unlikely given the modified nature of the channel/presence of barriers to movement; no known angling/fishing activities	0 = no fisheries or angling areas present
5 = where there are designated waters (e.g. under EU Shellfish Waters Directive; EU Freshwater Fish Directive)							
4 = waterbody supports substantial salmonid fisheries/shellfisheries and is of national value for fishing/angling							
3 = waterbody supports substantial fisheries/shellfisheries and is of regional value for fishing/angling							
2 = waterbody supports fisheries/shellfisheries and is of local value for fishing/angling							
1 = fisheries could be present but unlikely given the modified nature of the channel/presence of barriers to movement; no known angling/fishing activities							
0 = no fisheries or angling areas present							
Guidance on Option Scoring							
<p>Scoring by professional judgement with reference to the scoring guidance below and the generic description of the likely impacts of measures.</p> <p>It is noted that this objective only relates to inland fisheries and not marine fisheries. Shellfish waters in particular are included under the register of protected areas under the WFD and as such are included in Objective 4a.</p> <p>The scoring of the options for this objective should take into account the <u>duration and permanence</u> of the likely impact(s) of the options on fisheries and fisheries potential, the sensitivity of the</p>							

receiving water bodies, and species e.g. salmonid sp. and designated salmonid waters.

<b>Duration is defined in terms of:</b> <ul style="list-style-type: none"> <li>• long term;</li> <li>• medium term;</li> <li>• short term.</li> </ul>	<b>Permanence is defined in terms of:</b> <ul style="list-style-type: none"> <li>• permanent;</li> <li>• recurring;</li> <li>• intermittent.</li> </ul>
<b>Sensitive waters include:</b> <ul style="list-style-type: none"> <li>• designated salmonid waters</li> </ul>	<b>Sensitive species include*:</b> <ul style="list-style-type: none"> <li>• Atlantic Salmon</li> <li>• Lamprey</li> <li>• Shad</li> <li>• Pollan</li> <li>• Arctic Char</li> <li>• Smelt</li> </ul>

\*Based on 2011 IFI National Programme: Habitats Directive and Red Data Book Fish species

### Combining positive and negative scores

Instream and bank options have the greatest potential to impact negatively on fisheries, however some options may offer improvements and as such the overall score applied should be a combination of the positive and negative scores with reference to the worst case and best case scores.

### Example of combining scores

Option = hard defences and flow diversion

- +2 due to reduction of pollution risk to sensitive water bodies and sensitive species
- -2 due to construction stage impacts associated with walls
- -5 associated with diversion of flow into another river

In this case, the overall score should be '-3', combining the best case positive score and the worst case negative score.

### Comparing options

When scoring multiple options for one AFA, it may happen that the options score the same even if they have varying degrees of impact. Professional judgement should be used to ensure that the scores reflect the varying degrees of impact between the options i.e. the scores should be manually adjusted to reflect the different degrees of impact associated with the different options.

### Example of manual adjustment

Option 1 = flow diversion

- +2 due to improved fisheries potential as a result of reduction of pollution risk to sensitive water bodies and species
- -5 associated with diversion of flow into another river

Overall score = - 3

Option 2 = flow diversion plus walls

- +2 due to improved fisheries potential as a result of reduction of pollution risk to sensitive water bodies and species
- -2 due to construction stage impacts to sensitive water bodies and species associated with walls
- -4 due to excavation and restoration of natural banks in sensitive water bodies
- -5 associated with diversion of flow into another river

Overall score = - 3 (combining best case positive score and worst case negative score)

These options score the same even though Option 2 has more negative impacts associated with it. In this example, using professional judgement, Option 2 should be manually adjusted downwards by 1 point to reflect the comparative difference in impacts between the options. If more than two options are being compared, and all differ in terms of the severity of their likely impacts on this objective, but all score the same using this methodology, the options should be manually adjusted upwards or downwards by a maximum of two points in either direction to reflect the comparative difference in impacts between the options. Such adjustments will ensure that the overall MCA scores for the options reflect their differing degree of potential impact on this objective and will therefore ensure that this objective will have an influence in terms of the choice of a preferred option. In such cases a clear rationale should be recorded for the adjustment. It should be noted that such adjustments may have a significant impact on the overall MCA score of the preferred option (perhaps up to 10% of the overall MCA score).

### Scoring Table

Score	Duration of impact	Sensitivity	Examples
5	Creation of fisheries habitat or removal of barrier to upstream migration for wb where sensitive species are known to be present e.g. salmonids	Any wb	Reinstatement of natural hydrological or morphological regime.
4	Creation of fisheries habitat or removal of barrier to upstream migration for wb where other species are present e.g. coarse fish	Any wb	Reinstatement of natural hydrological or morphological regime.
3			
2	Creation of fisheries potential	Any wb	Land Use Management
1			
0	No change to fisheries potential of the wb	Any wb	Measures with no connection to channel, flow, bank side vegetation
-1	Short-term minor impacts to fisheries habitat	Non-sensitive wb	Construction phase impacts.
-2		Sensitive wb	
-3	Medium to long-term alternation of fisheries habitat	Non-sensitive wb	In-stream or on-bank maintenance impacts.
-4		Sensitive wb	Walls that require excavation and restoration of banks.  Flow diversion within the same river.  Rehabilitation of existing in-stream or on-bank defences.  Dredging
-5	Permanent loss or removal of fisheries habitat and / or introduction of barriers to	Any wb	Channelisation/realignment.

	upstream migration.		<p>Regular dredging.</p> <p>Extensive culverting.</p> <p>Tidal barrage.</p> <p>On-line storage (dams).</p> <p>Improvement of channel conveyance.</p> <p>Walls that replace natural banks.</p> <p>Flow diversion to a different river.</p>	
-999	Unacceptable impact where alternative exists	negative feasible		

<b>OBJECTIVE 11 (i) Amenity, Community &amp; Socio-Economics</b>	
<b>Objective</b>	<b>Minimise risk to community – Social Infrastructure and Amenity</b>
<b>Indicator</b>	Number of social infrastructure assets at risk from flooding
<b>Scoring</b>	Based on calculated assessment, adjusted by professional judgement
<b>Basic Requirement</b>	Number of social infrastructure assets at risk not increased
<b>Aspirational Target</b>	100% reduction in number of social infrastructure assets at risk
<b>Global Weighting</b>	9
<b>Local Weighting</b>	Based on calculated assessment, adjusted by professional judgement
<b>Guidance on Assignment of Local Weightings</b>	
<p>The local weightings should be calculated based on a score derived from the number of social infrastructure and amenity assets potentially affected by flooding, and the highest probability (lowest magnitude) of flood event that causes flooding of each asset.</p> <p><b>Receptor Scoring</b></p> <p>All social infrastructure and amenity assets should be treated as equal for the purposes of the calculated score. To ensure that the local weighting on this category is appropriately scaled, each asset should be afforded a score of 25.</p> <p>A weighing has not been applied to the scores, as all social infrastructure and amenity assets (where included) were designated during the PFRA vulnerability assessment as being of ‘moderate’ vulnerability, except for schools where a ‘high’ vulnerability classification was assigned due to elevated risk to human health and life arising from the concentration of children, which is provided for under Objective 3.A. (ii).</p> <p>The relevant social infrastructure and amenity assets include:</p> <ul style="list-style-type: none"> <li>– Schools and educational facilities</li> <li>– Libraries</li> <li>– Community centres</li> <li>– Local and central government offices, including post offices</li> <li>– Emergency services facilities (fire, Garda, civil defence, RNLi and coast guard stations)</li> <li>– Health centres (other than hospitals and nursing homes)</li> <li>– Churches and other religious centres</li> <li>– Parks and public gardens, sports facilities, playgrounds</li> <li>– Local cultural heritage sites or collections, sites of ecological interest or other sites of social amenity</li> </ul> <p><b>Probability Factoring</b></p> <p>For each asset, the score (25) is then factored by the probability of the highest probability (least severe) flood event that causes flooding of that asset, where the factor applied is calculated as:</p> <p style="padding-left: 40px;">Factor = Probability of flooding (expressed as the AEP, e.g., 0.01 for 1%)</p> <p><b>Total AFA Score (Local Weighting)</b></p> <p>For the given AFA, the total AFA score is calculated as the sum of the factored scores for all of the</p>	

social infrastructure and amenity assets at risk from flooding, subject to a maximum score of 5.

### **Other Factors**

#### *Assets of Particular Social Value*

A particular social infrastructure and amenity asset may be of exceptional local importance, i.e., where the loss of the asset (permanently or over a long period of time) would have a very severe detrimental impact on the functioning of the community as a whole and on the day-to-day lives of the people in the community (i.e., well beyond the normal expected impact that the loss of one of the listed social infrastructure assets might have). In such cases, professional judgement should be applied to increase the weighting accordingly.

Note that final local weighting taking into account the application of the factors for assets of particular social value should still not exceed a maximum of 5.

The above provides guidance on the setting of local weightings for this objective. However, professional judgement should also be applied.

### **Guidance on Option Scoring**

#### **Residual Risk Score**

The residual risk score for a flood risk management option should be calculated in the same manner as the local weighting, but based on the flood hazard with the option applied.

In the case of measures providing flood defence, then the residual risk score can be calculated simply by adjusting the factor for probability to that of the standard of protection (following the simplistic assumption that once the standard of protection is exceeded for a given flood defence, then no defence is provided).

#### **Option Scoring**

Options are scored based on the degree of reduction in the risk to social infrastructure and amenity, calculated using the residual risk score as determined for the relevant option, and the final local weighting, and multiplied by a factor of 5.

The score for a given option should be calculated as:

$$\text{Option Score} = 5 \times [ (\text{Local Weighting} - \text{Residual Risk Score}) / \text{Local Weighting} ]$$

The other factors detailed under the guidance on the assignment of Local Weighting should also be taken into account in assigning the score for a measure.

#### **Standard of Protection Factor**

A Standard of Protection Factor is not applicable to this objective, as it is implicit within the scoring process.

#### **Non-Structural Option Risk Reduction**

Flood warning does not reduce hazard, but generally can reduce risk. However, social infrastructure and amenity assets will still be damaged in the event of a flood regardless of the advance warning of the flooding (unless combined with individual protection measures), and so the negative impact (damage to the fabric and disruption to the service the asset provides) will still occur. While it is recognised that advance warning gives more time to prepare damage reduction measures, etc., it is considered that such mitigation measures should be part of a well-formed flood event emergency response plan, and so the advance warning will bring limited benefit. As such, a zero degree of reduction of risk to social infrastructure and amenity should be assumed in relation to non-structural options.

#### **Enhancement or Creation of Social Amenity Sites**

Where an option would enhance an existing social amenity site, or involve the creation of a new

site, then professional judgement should be used to increase the score afforded that option under this Objective, taking account of the number and value of the sites involved.

The above provides guidance on the setting of local weightings and scoring for this objective. However, professional judgement should also be applied.

<b>OBJECTIVE 11 (ii) Amenity, Community &amp; Socio-Economics</b>	
<b>Objective</b>	<b>Minimise risk to community - Local Employment</b>
<b>Indicator</b>	Number of non-residential (i.e., commercial) properties at risk from flooding
<b>Scoring</b>	Based on calculated assessment, adjusted by professional judgement
<b>Basic Requirement</b>	Number of non-residential properties at risk not increased
<b>Aspirational Target</b>	100% reduction in number of non-residential properties at risk
<b>Global Weighting</b>	7
<b>Local Weighting</b>	Based on calculated assessment, adjusted by professional judgement
<b>Guidance on Assignment of Local Weightings</b>	
<p>The local weightings should be calculated based on a score derived from the number of non-residential properties (taken as a place of employment) potentially affected by flooding, and the highest probability (lowest magnitude) of flood event that causes flooding of each property.</p> <p><b>Receptor Scoring</b></p> <p>All non-residential properties that are not derelict should be treated as equal for the purposes of the calculated score. To ensure that the local weighting on this category is appropriately scaled, each property should be afforded a score of 5.</p> <p>A differential weighting has not been applied to the count, as reliable information would not be available as to the number of employees for any given property, nor of the indirect employment associated with that property / business</p> <p>The relevant non-residential properties include:</p> <ul style="list-style-type: none"> <li>– Offices</li> <li>– Shops</li> <li>– Services (Restaurants, Pubs, Hotels, etc.)</li> <li>– Factories, Workshops and other Manufacturing Facilities</li> <li>– Warehouses</li> <li>– Health Centres (including hospitals and nursing homes)</li> <li>– Other places of employment</li> </ul> <p><b>Probability Factoring</b></p> <p>For each property, the score (5) is then factored by the probability of the highest probability (least severe) flood event that causes flooding of that property, where the factor applied is calculated as:</p> $\text{Factor} = \text{Probability of flooding (expressed as the AEP, e.g., 0.01 for 1\%)}$ <p><b>Total AFA Score (Local Weighting)</b></p> <p>For the given AFA, the total AFA score is calculated as the sum of the factored scores for all of the non-residential properties at risk from flooding, subject to a maximum score of 5.</p> <p><b>Other Factors</b></p>	

***Properties of Particular Importance for Local Employment***

A particular non-residential property may be of exceptional local importance, i.e., where the property is the location for the employment of a particularly large number of people or a very high proportion of the people employed within the local area. Flooding of such a property (and the interruption to business and potential closure) would have a very severe detrimental impact on the community and could lead to a significant rise in local unemployment. In such cases, professional judgement should be applied to increase the weighting accordingly.

***Local Employment Generated through Tourism***

Local employment may be generated through local features and assets that are not based in particular buildings (and hence not included as non-residential properties). Such features may include local angling sites, tourist features or walks, sites of ecological value, heritage sites, etc. Flooding of such features and assets may negatively impact on local employment. In such cases, professional judgement should be applied to increase the weighting accordingly.

Note that final local weighting taking into account the application of the factors for properties of particular importance for local employment should still not exceed a maximum of 5.

The above provides guidance on the setting of local weightings for this objective. However, professional judgement should also be applied.

**Guidance on Option Scoring*****Residual Risk Score***

The residual risk score for a flood risk management option should be calculated in the same manner as the local weighting, but based on the flood hazard with the option applied.

In the case of measures providing flood defence, then the residual risk score can be calculated simply by adjusting the factor for probability to that of the standard of protection (following the simplistic assumption that once the standard of protection is exceeded for a given flood defence, then no defence is provided).

***Option Scoring***

Options are scored based on the degree of reduction in the risk to local employment, calculated using the residual risk score as determined for the relevant option, and the final local weighting, and multiplied by a factor of 5.

The score for a given option should be calculated as:

$$\text{Option Score} = 5 \times [ (\text{Local Weighting} - \text{Residual Risk Score}) / \text{Local Weighting} ]$$

The other factors detailed under the guidance on the assignment of Local Weighting should also be taken into account in assigning the score for a measure.

***Standard of Protection Factor***

A Standard of Protection Factor is not applicable to this objective, as it is implicit within the scoring process.

***Non-Structural Option Risk Reduction***

Flood warning does not reduce hazard, but generally can reduce risk. However, non-residential properties will still be damaged in the event of a flood regardless of the advance warning of the flooding (unless combined with individual property protection measures), and so the negative impact (damage to the fabric and disruption to the employment the property provides) will still occur. While it is recognised that advance warning gives more time to prepare damage reduction measures, etc., it is considered that such mitigation measures should be part of a well-formed flood

event emergency response plan, and so the advance warning will bring limited benefit. As such, a zero degree of reduction of risk to local employment should be assumed in relation to non-structural options.

The above provides guidance on the setting of local weightings and scoring for this objective. However, professional judgement should also be applied.



## **APPENDIX C**

### **MCA Options Appraisal by AFA and by SEA Topic**



**Baltray AFA – Option 1**

<b>MCA Appraisal Outcomes</b>		
<b>Objective</b>	<b>Score</b>	<b>Comment</b>
1.a.i	4.96	<i>There is a combined number of 108 ground floor properties and no additional upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.i	4.58	<i>There is a combined number of 17 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.ii	4.97	<i>There is a combined number of 5 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.a	4.89	<i>With this option in place the total economic damages have been reduced from €392095.7 to €8334.18.</i>
2.b	4.97	<i>There is a combined number of 15 transport links benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.c	4.97	<i>There is a combined number of 3 utilities benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.d	1.00	<i>Some low value agricultural land to the south and west of the golf club protected by the option. Particularly protected against salt water inundation.</i>
3.a	-4.00	<i>Potential for in-stream and on-bank construction phase impacts, including excavation and restoration of banks, from flood walls and embankments in / adjacent to sensitive waterbody.</i>
3.b	-4.00	<i>Potential for temporary, direct negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during construction of flood walls and embankments, which will border / be within the designated habitats. Potential for negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.</i>

3.c	-4.00	<i>Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences, in areas not already impacted by existing walls and development.</i>
3.d	-4.00	<i>Potential for excavation and restoration of banks and construction of walls in and adjacent to sensitive waterbody. Short term construction impacts. Rehabilitation of existing on-bank defences. Seasonality of works important.</i>
3.e	-1.00	<i>Short term negative impacts during the construction / extension of flood walls at Baltray. Localised negative impacts on views of the estuary to properties to be protected. Unlikely to be any impacts on the landscape of the Boyne Valley.</i>
3.f.i	2.00	<i>Potential for slight negative impacts on the setting of several NIAH buildings within Baltray. Potential for the increased protection of these NIAH buildings.</i>
3.f.ii	0.00	<i>No effects on archaeological heritage</i>
4.a	5.00	<i>No operational risk</i>
4.b	4.00	<i>The following hazard has been identified: Working near water</i>
4.c	1.00	<i>Option is adaptable only at significant cost</i>

**Baltray AFA – Option 2**

<b>MCA Appraisal Outcomes</b>		
<b>Objective</b>	<b>Score</b>	<b>Comment</b>
1.a.i	4.96	<i>There is a combined number of 108 ground floor properties and no additional upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.i	4.58	<i>There is a combined number of 17 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.ii	4.97	<i>There is a combined number of 5 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.a	4.89	<i>With this option in place the total economic damages have been reduced from €392095.7 to €8334.18.</i>
2.b	4.97	<i>There is a combined number of 15 transport links benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.c	4.97	<i>There is a combined number of 3 utilities benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.d	1.00	<i>Some low value agricultural land to the south and west of the golf club protected by the option. Particularly protected against salt water inundation.</i>
3.a	-2.00	<i>Potential for construction phase impacts, including excavation and restoration of banks, from flood walls and embankments, mostly set back from sensitive waterbody.</i>

3.b	1.00	<i>Potential for temporary, indirect negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during construction of flood walls and embankments, set back from the designated habitats. Potential for temporary negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works. Potential for increased area of wetland and estuarine habitat. Reconnection with more land to the natural floodplain.</i>
3.c	1.00	<i>Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences, in undesignated areas. Potential for increased area of wetland and estuarine habitat. Reconnection with more land to the natural floodplain.</i>
3.d	-1.00	<i>Potential for excavation and restoration of banks and construction of walls, mostly set well back from sensitive waterbody. Short term construction impacts. Seasonality of works important.</i>
3.e	-1.00	<i>Short term negative impacts during the construction / extension of flood walls at Baltray. Localised negative impacts on views of the estuary to properties to be protected. Unlikely to be any impacts on the landscape of the Boyne Valley.</i>
3.f.i	1.00	<i>Potential for slight negative impacts on the setting of several NIAH buildings within Baltray. Potential for the increased protection of these NIAH buildings. Score marked down by 1 to reflect proximity to buildings.</i>
3.f.ii	0.00	<i>No effects on archaeological heritage</i>
4.a	5.00	<i>No operational risk</i>
4.b	4.00	<i>The following hazard has been identified: Working near water</i>
4.c	1.00	<i>Option is adaptable only at significant cost</i>

**Drogheda AFA – Option 1**

<b>MCA Appraisal Outcomes</b>		
<b>Objective</b>	<b>Score</b>	<b>Comment</b>
1.a.i	4.30	<i>There is a combined number of 267 ground floor properties and there are 369 upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.i	4.87	<i>There is a combined number of 51 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.ii	4.82	<i>There is a combined number of 272 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.a	4.43	<i>With this option in place the total economic damages have been reduced from €2619354.14 to €300508.05.</i>
2.b	1.67	<i>There is a combined number of 43 transport links benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.c	0.00	<i>There are no additional utilities benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.d	1.00	<i>No agricultural activity in the urban centre of the AFA FC1 - 4. Reduced flooding in FC5 due to flow diversion.</i>
3.a	-4.00	<i>Potential for in-stream and on-bank construction phase impacts, including excavation and restoration of banks, from flood walls and embankments in sensitive waterbody. Flow diversion within the same river, in non-sensitive waterbody. Reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flood events.</i>

3.b	-4.00	<i>Potential for temporary, direct negative impacts on the River Boyne and River Blackwater SAC and SPA during construction of flood walls and embankments, which will border the designated areas. Potential for negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.</i>
3.c	-4.00	<i>Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences and flow diversion, in areas not already impacted by development.</i>
3.d	-4.00	<i>Potential for excavation and restoration of banks and construction of walls in and adjacent to sensitive waterbody. Short term construction impacts. Flow diversion in the same river, in non-sensitive waterbody. Seasonality of works important.</i>
3.e	-4.00	<i>Mainly short term negative impacts during the construction of flood walls in Drogheda, otherwise localised negative impacts on views in the town of the River Boyne. Unlikely to be any impacts on the upstream UNESCO designation or the landscape of the Boyne Valley. Permanent negative localised impacts in the vicinity of any proposed high walls, such as at Flood Cell 2, however not high value landscape.</i>
3.f.i	-1.00	<i>Potential for direct physical impacts and impacts on the setting of many NIAH buildings and other architectural heritage within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these NIAH buildings and other architectural heritage within the AFA from flooding.</i>
3.f.ii	-1.00	<i>Potential for direct physical impacts and impacts on the setting of many recorded monuments within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these monuments within the AFA from flooding.</i>
4.a	3.00	<i>Negligible operational risk</i>

4.b	0.00	<i>The following hazards have been identified: Working near water, Maintenance near water, Heavy plant and machinery, Work at heights, Work at heights</i>
4.c	0.00	<i>Option is not adaptable</i>

**Droghede AFA – Option 2**

<b>MCA Appraisal Outcomes</b>		
<b>Objective</b>	<b>Score</b>	<b>Comment</b>
1.a.i	4.62	<i>There is a combined number of 267 ground floor properties and there are 369 upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.i	4.87	<i>There is a combined number of 51 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.ii	4.82	<i>There is a combined number of 272 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.a	4.43	<i>With this option in place the total economic damages have been reduced from €2619354.14 to €300508.05.</i>
2.b	1.67	<i>There is a combined number of 43 transport links benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.c	0.00	<i>There are no additional utilities benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.d	1.00	<i>No agricultural activity in the urban centre of the AFA FC1 - 4. Reduced flooding in FC5 due to flow diversion. No change in FC6.</i>
3.a	-4.00	<i>Potential for in-stream and on-bank construction phase impacts, including excavation and restoration of banks, from flood walls and embankments in sensitive waterbody. Flow diversion within the same river, in non-sensitive waterbody. Improvement of channel conveyance by minimal dredging and new constructed offline, overflow culvert section in non-sensitive, urbanised, trib stream which discharges to the River Boyne. Reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flood events.</i>

3.b	-4.00	<i>Potential for temporary, direct negative impacts on the River Boyne and River Blackwater SAC and SPA during construction of flood walls and embankments, which will border the designated areas. Potential for negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.</i>
3.c	-4.00	<i>Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences and flow diversion, in areas not already impacted by development.</i>
3.d	-4.00	<i>Potential for excavation and restoration of banks and construction of walls in and adjacent to sensitive waterbody. Short term construction impacts. Flow diversion in the same river, in non-sensitive waterbody. Seasonality of works important.</i>
3.e	-3.00	<i>Mainly short term negative impacts during the construction of flood walls in Drogheda, otherwise localised negative impacts on views in the town of the River Boyne. Unlikely to be any impacts on the upstream UNESCO designation or the landscape of the Boyne Valley. Potential for permanent negative localised impacts in the vicinity of any proposed high walls.</i>
3.f.i	-1.00	<i>Potential for direct physical impacts and impacts on the setting of many NIAH buildings and other architectural heritage within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these NIAH buildings and other architectural heritage within the AFA from flooding.</i>
3.f.ii	-1.00	<i>Potential for direct physical impacts and impacts on the setting of many recorded monuments within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these monuments within the AFA from flooding.</i>
4.a	4.00	<i>Option includes fixed flood defence walls and embankments. Negligible operational risk, i.e., no reliance on systems or intervention, with more regular monitoring and intermittent, but potentially substantial, maintenance requirements</i>
4.b	2.00	<i>The following hazards have been identified: Working near water, Maintenance near water, Heavy plant and machinery</i>

4.c	0.00	<i>Option is not adaptable</i>
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**Drogheda AFA – Option 3**

<b>MCA Appraisal Outcomes</b>		
<b>Objective</b>	<b>Score</b>	<b>Comment</b>
1.a.i	4.62	<i>There is a combined number of 267 ground floor properties and there are 369 upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.i	4.87	<i>There is a combined number of 51 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.ii	4.82	<i>There is a combined number of 272 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.a	4.43	<i>With this option in place the total economic damages have been reduced from €2619354.14 to €300508.05.</i>
2.b	1.67	<i>There is a combined number of 43 transport links benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.c	0.00	<i>There are no additional utilities benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.d	0.00	<i>No agricultural activity in the urban centre of the AFA FC1 - 4. Reduced flooding in FC5 but increased flooding of agricultural land at The Twenties due to storage option. Therefore considered neutral.</i>
3.a	-4.00	<i>Potential for in-stream and on-bank construction phase impacts, including excavation and restoration of banks, from flood walls and embankments in sensitive waterbody. Flow diversion within the same river, in non-sensitive waterbody. Temporary and permanent upstream off-line storage and downstream on-line storage on undesignated, non-sensitive, urbanised, trib stream which discharges to the River Boyne. On-line storage area already impacted with cascading weirs. Reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flood events.</i>

3.b	-4.00	<i>Potential for temporary, direct negative impacts on the River Boyne and River Blackwater SAC and SPA during construction of flood walls and embankments, which will border the designated areas. Potential for negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.</i>
3.c	-4.00	<i>Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences and flow diversion, in areas not already impacted by development.</i>
3.d	-4.00	<i>Potential for excavation and restoration of banks and construction of walls in and adjacent to sensitive waterbody. Short term construction impacts. Flow diversion in the same river, in non-sensitive waterbody. Upstream off-line storage and downstream on-line storage on non-sensitive, urbanised, trib stream which discharges to the River Boyne. On-line storage area already impacted with cascading weirs. Seasonality of works important.</i>
3.e	-3.00	<i>Mainly short term negative impacts during the construction of flood walls in Drogheda, otherwise localised negative impacts on views in the town of the River Boyne. Unlikely to be any impacts on the upstream UNESCO designation or the landscape of the Boyne Valley. Reduced permanent negative localised impacts in the vicinity of any proposed walls compared to Option 1, scored up one. Storage areas are in non-sensitive landscapes and would only be periodically inundated.</i>
3.f.i	-1.00	<i>Potential for direct physical impacts and impacts on the setting of many NIAH buildings and other architectural heritage within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these NIAH buildings and other architectural heritage within the AFA from flooding.</i>
3.f.ii	-1.00	<i>Potential for direct physical impacts and impacts on the setting of many recorded monuments within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these monuments within the AFA from flooding.</i>

4.a	4.00	<i>Option includes fixed flood defence walls and embankments. Negligible operational risk, i.e., no reliance on systems or intervention, with more regular monitoring and intermittent, but potentially substantial, maintenance requirements</i>
4.b	2.00	<i>The following hazards have been identified: Working near water, Maintenance near water, Heavy plant and machinery</i>
4.c	0.00	<i>Option is not adaptable</i>

**Mornington AFA – Option 1**

<b>MCA Appraisal Outcomes</b>		
<b>Objective</b>	<b>Score</b>	<b>Comment</b>
1.a.i	4.42	<i>There is a combined number of 47 ground floor properties and no additional upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.a.ii	0.00	<i>There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.i	4.85	<i>There is a combined number of 6 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.ii	0.00	<i>There are no additional commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.a	3.11	<i>With this option in place the total economic damages have been reduced from €65852.9 to €24936.28.</i>
2.b	4.79	<i>There is a combined number of 15 transport links benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.c	4.75	<i>There is a combined number of 1 utility benefiting from the option's SoP from fluvial and coastal flood sources..</i>
2.d	3.00	<i>Significant area of agricultural land to the west of Mornington now protected up to 0.5% AEP SoP from coastal flooding and fluvial flooding from Boyne Estuary.</i>
3.a	-2.00	<i>Potential for construction phase impacts, including excavation and restoration of banks, from flood walls and embankments, mostly set back from sensitive waterbody.</i>
3.b	-3.00	<i>Potential for temporary, indirect negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during construction of flood walls and embankments, set back from the designated areas. Potential for temporary negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.</i>

3.c	-2.00	<i>Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction of flood walls and embankments, set back from the designated areas. Direct local loss of flora and displacement of fauna in footprint of defences, in undesignated areas.</i>
3.d	-1.00	<i>Potential for excavation and restoration of banks and construction of walls, mostly set well back from sensitive waterbody. Short term construction impacts. Seasonality of works important.</i>
3.e	-1.00	<i>Short term negative impacts during the construction of flood walls and embankments at Mornington. Localised negative impacts on views of the estuary and countryside to properties to be protected. Unlikely to be any impacts on the landscape of the Boyne Valley or coastal plain.</i>
3.f.i	0.00	<i>No effects on architectural heritage</i>
3.f.ii	0.00	<i>No effects on architectural heritage</i>
4.a	4.00	<i>Option includes fixed flood defence walls and embankments. Negligible operational risk, i.e., no reliance on systems or intervention, with more regular monitoring and intermittent, but potentially substantial, maintenance requirements</i>
4.b	4.00	<i>The following hazard has been identified: Working near water</i>
4.c	0.00	<i>Option is not adaptable</i>

**Navan AFA – Option 1**

<b>MCA Appraisal Outcomes</b>		
<b>Objective</b>	<b>Score</b>	<b>Comment</b>
1.a.i	4.30	<i>There are 135 ground floor properties and there are 57 upper floor properties benefiting with this option in place.</i>
1.a.ii	2.50	<i>There are 2 highly vulnerable properties benefiting with this option in place.</i>
1.b.i	4.88	<i>There are 32 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.12	<i>There are 15 commercial properties benefiting with this option in place.</i>
2.a	4.17	<i>With this option in place the total economic damages have been reduced from €818883.04 to €136366.17.</i>
2.b	5.00	<i>There are 15 transport links benefiting with this option in place.</i>
2.c	4.95	<i>There is 1 utility benefiting with this option in place.</i>
2.d	0.00	<i>There is no increase of flood risk within the AFA to agricultural land.</i>
3.a	-4.00	<i>Potential for direct construction phase impacts from in-stream and on-bank works creating/upgrading embankments and walls. Excavation and restoration of banks in sensitive waterbody. Potential for indirect sedimentation impacts downstream during works. Unlikely to be permanent or recurring impacts to waterbody.</i>
3.b	-4.00	<i>Potential for direct construction phase impacts to River Boyne and River Blackwater SAC and SPA, from in-stream and on-bank works creating/upgrading embankments and walls. Most works adjacent to and not within designated area. Potential for indirect sedimentation impacts downstream during works. Unlikely to be permanent or recurring impacts to designated sites following construction.</i>
3.c	-1.00	<i>Potential for direct construction phase impacts to local flora and fauna in footprint of works and clearance in the Abbeylands Tributary. Localised loss and disturbance to flora/fauna limited by the modified nature of the channel and banks. Slight potential for indirect sedimentation impacts downstream to Boyne Woods pNHA. Unlikely to be permanent or recurring impacts following construction.</i>

3.d	-4.00	<i>Potential for direct construction phase impacts from in-stream and on-bank works creating/upgrading embankments and walls. Excavation and restoration of banks in sensitive waterbody. Potential for indirect sedimentation impacts downstream during works. Unlikely to be permanent or recurring impacts to fisheries potential.</i>
3.e	-3.00	<i>Temporary impacts from construction of extension to local flood embankment prior to establishment of screening. Localised impacts on views of the river, which are already impacted. River corridor is however considered a high value landscape and is highly sensitive.</i>
3.f.i	2.00	<i>Potential for negative impacts on the setting of NIAH bridges, weirs and mill on the Boyne and Blackwater from embankments and walls. Potential for direct physical impacts to NIAH bridges and weirs during construction. Potential for increased protection from flooding for several NIAH buildings.</i>
3.f.ii	0.00	<i>No effects on archaeological features.</i>
4.a	4.00	<i>Option includes fixed flood defence walls and embankments. Negligible operational risk, i.e., no reliance on systems or intervention, with more regular monitoring and intermittent, but potentially substantial, maintenance requirements</i>
4.b	2.00	<i>The following hazards have been identified: Working near water, Maintenance near water, Heavy plant and machinery</i>
4.c	4.00	<i>Option is readily adaptable at limited cost</i>

**SEA - Baltray Option 1**

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-4.00	Potential for temporary, direct negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during construction of flood walls and embankments, which will border / be within the designated areas. Potential for negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-4.00	Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences, in areas not already impacted by existing walls and development.
Population and Human Health	Minimise risk to human health and life - Residents.	4.96	There is a combined number of 108 ground floor properties and no additional upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to human health and life - High vulnerability properties.	0.0	There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.
Geology, Soils and Landuse	Manage risk to agriculture.	1.00	Some low value agricultural land to the south and west of the golf club protected by the option. Particularly protected against salt water inundation.
Water	Support the objectives of the WFD.	-4.00	Potential for in-stream and on-bank construction phase impacts, including excavation and restoration of banks, from flood walls and embankments in / adjacent to sensitive waterbody.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	1.00	Option is adaptable only at significant cost
Material Assets	Minimise risk to transport infrastructure.	4.97	There is a combined number of 15 transport links benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to utility infrastructure.	4.97	There is a combined number of 3 utilities benefiting from the option's SoP from fluvial and coastal flood sources.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	2.00	Potential for slight negative impacts on the setting of several NIAH buildings within Baltray. Potential for the increased protection of these NIAH buildings.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on archaeological heritage
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term negative impacts during the construction / extension of flood walls at Baltray. Localised negative impacts on views of the estuary to properties to be protected. Unlikely to be any impacts on the landscape of the Boyne Valley.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Potential for excavation and restoration of banks and construction of walls in and adjacent to sensitive waterbody. Short term construction impacts. Rehabilitation of existing on-bank defences. Seasonality of works important.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.58	There is a combined number of 17 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to community - Local Employment.	4.97	There is a combined number of 5 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.

**SEA - Baltray Option 2**

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	1.00	Potential for temporary, indirect negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during construction of flood walls and embankments, set back from the designated areas. Potential for temporary negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works. Potential for increased area of wetland and estuarine habitat. Reconnection with more land to the natural floodplain.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	1.00	Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences, in undesignated areas. Potential for increased area of wetland and estuarine habitat. Reconnection with more land to the natural floodplain.
Population and Human Health	Minimise risk to human health and life - Residents.	4.96	There is a combined number of 108 ground floor properties and no additional upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to human health and life - High vulnerability properties.	0.0	There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.
Geology, Soils and Landuse	Manage risk to agriculture.	1.00	Some low value agricultural land to the south and west of the golf club protected by the option. Particularly protected against salt water inundation.
Water	Support the objectives of the WFD.	-2.00	Potential for construction phase impacts, including excavation and restoration of banks, from flood walls and embankments, mostly set back from sensitive waterbody.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	1.00	Option is adaptable only at significant cost
Material Assets	Minimise risk to transport infrastructure.	4.97	There is a combined number of 15 transport links benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to utility infrastructure.	4.97	There is a combined number of 3 utilities benefiting from the option's SoP from fluvial and coastal flood sources.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	1.00	Potential for slight negative impacts on the setting of several NIAH buildings within Baltray. Potential for the increased protection of these NIAH buildings. Score marked down by 1 to reflect proximity to buildings.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on archaeological heritage
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term negative impacts during the construction / extension of flood walls at Baltray. Localised negative impacts on views of the estuary to properties to be protected. Unlikely to be any impacts on the landscape of the Boyne Valley.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-1.00	Potential for excavation and restoration of banks and construction of walls, mostly set well back from sensitive waterbody. Short term construction impacts. Seasonality of works important.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.58	There is a combined number of 17 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to community - Local Employment.	4.97	There is a combined number of 5 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.

SEA - Drogheda Option 1

Topic	Objective	Score	Justification
<b>Biodiversity, Flora and Fauna</b>	Support the objectives of the Habitats and Birds Directives	-4.00	Potential for temporary, direct negative impacts on the River Boyne and River Blackwater SAC and SPA during construction of flood walls and embankments, which will border the designated areas. Potential for negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-4.00	Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences and flow diversion, in areas not already impacted by development.
<b>Population and Human Health</b>	Minimise risk to human health and life - Residents.	4.30	There is a combined number of 267 ground floor properties and there are 369 upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to human health and life - High vulnerability properties.	0.0	There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.
<b>Geology, Soils and Landuse</b>	Manage risk to agriculture.	1.00	No agricultural activity in the urban centre of the AFA FC1 - 4. Reduced flooding in FC5 due to flow diversion.
<b>Water</b>	Support the objectives of the WFD.	-4.00	Potential for in-stream and on-bank construction phase impacts, including excavation and restoration of banks, from flood walls and embankments in sensitive waterbody. Flow diversion within the same river, in non-sensitive waterbody. Reduced flood risk for the 1% AEP fluvial and 0.5% AEP coastal flood events.
<b>Climate</b>	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	0.00	Option is not adaptable
<b>Material Assets</b>	Minimise risk to transport infrastructure.	1.67	There is a combined number of 43 transport links benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to utility infrastructure.	0.00	There are no additional utilities benefiting from the option's SoP from fluvial and coastal flood sources.
<b>Cultural Heritage - Architectural &amp; Archaeological</b>	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	-1.00	Potential for direct physical impacts and impacts on the setting of many NIAH buildings and other architectural heritage within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these NIAH buildings and other architectural heritage within the AFA from flooding.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	-1.00	Potential for direct physical impacts and impacts on the setting of many recorded monuments within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these monuments within the AFA from flooding.
<b>Landscape and Visual</b>	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-4.00	Mainly short term negative impacts during the construction of flood walls in Drogheda, otherwise localised negative impacts on views in the town of the River Boyne. Unlikely to be any impacts on the upstream UNESCO designation or the landscape of the Boyne Valley. Permanent negative localised impacts in the vicinity of any proposed high walls, such as at Flood Cell 2, however not high value landscape.
<b>Fisheries, Aquaculture and Angling</b>	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Potential for excavation and restoration of banks and construction of walls in and adjacent to sensitive waterbody. Short term construction impacts. Flow diversion in the same river, in non-sensitive waterbody. Seasonality of works important.
<b>Amenity, Community and Soci-economics</b>	Minimise risk to community - Social Infrastructure and Amenity.	4.87	There is a combined number of 51 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to community - Local Employment.	4.82	There is a combined number of 272 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.

SEA - Drogheda Option 2

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-4.00	Potential for temporary, direct negative impacts on the River Boyne and River Blackwater SAC and SPA during construction of flood walls and embankments, which will border the designated areas. Potential for negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-4.00	Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction. Direct local loss of flora and displacement of fauna in footprint of defences and flow diversion, in areas not already impacted by development.
Population and Human Health	Minimise risk to human health and life - Residents.	4.62	There are 104 ground floor properties and FALSE
	Minimise risk to human health and life - High vulnerability properties.	0.0	There are no additional highly vulnerable properties benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	1.00	No agricultural activity in the urban centre of the AFA FC1 - 4. Reduced flooding in FC5 due to flow diversion. No change in FC6.
Water	Support the objectives of the WFD.	-4.00	Potential for in-stream and on-bank construction phase impacts, including excavation and restoration of banks, from flood walls and embankments in sensitive waterbody. Flow diversion within the same river, in non-sensitive waterbody. Improvement of channel conveyance by dredging and then long culvert section in non-sensitive, urbanised, tributary stream which discharges to the River Boyne.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	0.00	Option is not adaptable
Material Assets	Minimise risk to transport infrastructure.	1.67	There are 15 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	0.00	There are no additional utilities benefiting with this option in place.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	-1.00	Potential for direct physical impacts and impacts on the setting of many NIAH buildings and other architectural heritage within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these NIAH buildings and other architectural heritage within the AFA from flooding.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	-1.00	Potential for direct physical impacts and impacts on the setting of many recorded monuments within Drogheda. Unlikely that any feature will require removal. Potential for the increased protection of these monuments within the AFA from flooding.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-3.00	Mainly short term negative impacts during the construction of flood walls in Drogheda, otherwise localised negative impacts on views in the town of the River Boyne. Unlikely to be any impacts on the upstream UNESCO designation or the landscape of the Boyne Valley. Potential for permanent negative localised impacts in the vicinity of any proposed high walls.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Potential for excavation and restoration of banks and construction of walls in and adjacent to sensitive waterbody. Short term construction impacts. Flow diversion in the same river, in non-sensitive waterbody. Seasonality of works important.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.52	There are 8 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	4.82	There are 111 commercial properties benefiting with this option in place.

SEA - Longwood Option 1

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	0.00	No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	0.00	No impact on existing national, regional and local sites as a result of flood risk management measures.
Population and Human Health	Minimise risk to human health and life - Residents.	5.00	There is 1 ground floor property and there are no additional upper floor properties benefiting with this option in place.
	Minimise risk to human health and life - High vulnerability properties.	2.50	There is 1 highly vulnerable property benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	4.00	There will only be a minor change to the flood extent with the option in place which will have no significant impact on the risk to agriculture.
Water	Support the objectives of the WFD.	1.00	Reduced flooding in area with no significant polluting sources in 1% AEP extent. Walls set well back from non-sensitive waterbody.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	3.00	Option is adaptable at moderate cost
Material Assets	Minimise risk to transport infrastructure.	0.57	There are 2 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	0.00	There are no additional utilities benefiting with this option in place.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	0.00	No effects on architectural heritage features.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on archaeological heritage features.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Construction phase impacts of creating flood wall, prior to establishment of screening. Local impacts on those to be protected. No impacts on the wider landscape.
Fisheries. Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	0.00	No change to fisheries potential of the waterbody.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	0.02	There is 1 social infrastructure/amenity site benefiting with this option in place.
	Minimise risk to community - Local Employment.	2.50	There is 1 commercial property benefiting with this option in place.

**SEA - Mornington Option 1**

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-3.00	Potential for temporary, indirect negative impacts on the Boyne Coast and Estuary SAC and Boyne Estuary SPA during construction of flood walls and embankments, set back from the designated areas. Potential for temporary negative impacts downstream from sedimentation during construction. Should be possible to mitigate for the significance of impacts with good construction works and good timing of works.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-2.00	Potential for negative impacts downstream on the Boyne Coast and Estuary pNHA from sedimentation during construction of flood walls and embankments, set back from the designated areas. Direct local loss of flora and displacement of fauna in footprint of defences, in undesignated areas.
Population and Human Health	Minimise risk to human health and life - Residents.	4.42	There is a combined number of 47 ground floor properties and no additional upper floor properties benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to human health and life - High vulnerability properties.	0.00	There are no additional highly vulnerable properties benefiting from the option's SoP from fluvial and coastal flood sources.
Geology, Soils and Landuse	Manage risk to agriculture.	3.00	Significant area of agricultural land to the west of Mornington now protected up to 0.5% AEP SoP from coastal flooding and fluvial flooding from Boyne Estuary.
Water	Support the objectives of the WFD.	-2.00	Potential for construction phase impacts, including excavation and restoration of banks, from flood walls and embankments, mostly set back from sensitive waterbody.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	0.00	Option is not adaptable
Material Assets	Minimise risk to transport infrastructure.	4.79	There is a combined number of 15 transport links benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to utility infrastructure.	4.75	There is a combined number of 1 utility benefiting from the option's SoP from fluvial and coastal flood sources.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	0.00	No effects on architectural heritage
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on architectural heritage
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term negative impacts during the construction of flood walls and embankments at Mornington. Localised negative impacts on views of the estuary and countryside to properties to be protected. Unlikely to be any impacts on the landscape of the Boyne Valley or coastal plain.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-1.00	Potential for excavation and restoration of banks and construction of walls, mostly set well back from sensitive waterbody. Short term construction impacts. Seasonality of works important.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.85	There is a combined number of 6 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to community - Local Employment.	0.00	There are no additional commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.

**SEA – Nayan Option 1**

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-4.00	Potential for direct construction phase impacts to River Boyne and River Blackwater SAC and SPA, from in-stream and on-bank works creating/upgrading embankments and walls. Most works adjacent to and not within designated area. Potential for indirect sedimentation impacts downstream during works. Unlikely to be permanent or recurring impacts to designated sites following construction.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-1.00	Potential for direct construction phase impacts to local flora and fauna in footprint of works and clearance in the Abbeylands Tributary. Localised loss and disturbance to flora/fauna limited by the modified nature of the channel and banks. Slight potential for indirect sedimentation impacts downstream to Boyne Woods pNHA. Unlikely to be permanent or recurring impacts following construction.
Population and Human Health	Minimise risk to human health and life - Residents.	4.30	There are 135 ground floor properties and there are 57 upper floor properties benefiting with this option in place.
	Minimise risk to human health and life - High vulnerability properties.	2.50	There are 2 highly vulnerable properties benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	0.00	There is no increase of flood risk within the AFA to agricultural land.
Water	Support the objectives of the WFD.	-4.00	Potential for direct construction phase impacts from in-stream and on-bank works creating/upgrading embankments and walls. Excavation and restoration of banks in sensitive waterbody. Potential for indirect sedimentation impacts downstream during works. Unlikely to be permanent or recurring impacts to waterbody.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	4.00	Option is readily adaptable at limited cost
Material Assets	Minimise risk to transport infrastructure.	5.00	There are 15 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	4.95	There is 1 utility benefiting with this option in place.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	2.00	Potential for negative impacts on the setting of NIAH bridges, weirs and mill on the Boyne and Blackwater from embankments and walls. Potential for direct physical impacts to NIAH bridges and weirs during construction. Potential for increased protection from flooding for several NIAH buildings.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on archaeological features.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-3.00	Temporary impacts from construction of extension to local flood embankment prior to establishment of screening. Localised impacts on views of the river, which are already impacted. River corridor is however considered a high value landscape and is highly sensitive.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Potential for direct construction phase impacts from in-stream and on-bank works creating/upgrading embankments and walls. Excavation and restoration of banks in sensitive waterbody. Potential for indirect sedimentation impacts downstream during works. Unlikely to be permanent or recurring impacts to fisheries potential.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.88	There are 32 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	4.12	There are 15 commercial properties benefiting with this option in place.

SEA - Trim Trim\_Op1

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	0.00	0
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	0.00	0
Population and Human Health	Minimise risk to human health and life - Residents.	0.0	There are no additional ground floor properties and there are no additional upper floor properties benefiting with this option in place.
	Minimise risk to human health and life - High vulnerability properties.	0.0	There are no additional highly vulnerable properties benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	0.00	No agricultural land will be affected by this option
Water	Support the objectives of the WFD.	0.00	0
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	3.00	Option is adaptable at moderate cost
Material Assets	Minimise risk to transport infrastructure.	0.00	There are no additional transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	1.25	There is 1 utility benefiting with this option in place.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	0.00	No effects on architectural heritage features.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	0
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	0.00	0
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	0.00	0
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	0.00	There are no additional social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	0.0	There are no additional commercial properties benefiting with this option in place.



## **APPENDIX D**

### **SEA Guidance**

**Ireland**

Article 8 (Decision Making) of EU Directive 2001/42/EC on Strategic Environmental Assessment (SEA) as amended. DoECLG Circular (PL 9/2013).

Development of Strategic Environmental Assessment (SEA) Methodologies for Plans and Programmes in Ireland. Synthesis Report. 2003. Environmental Protection Agency. <http://www.epa.ie/downloads/advice/ea/name,13547,en.html>

Further Transposition of EU Directive 2001/42/EC on Strategic Environmental Assessment (SEA). DoECLG Circular (PSSP 6/2011).

Implementation of SEA Directive (2001/42/EC). Assessment of Certain Plans and Programmes on the Environment. Guidelines for Regional Planning Authorities. November 2004. Department of Environment, Heritage and Local Government. <http://www.envron.ie/en/Publications/DevelopmentandHousing/Planning/FileDownload,1616,en.pdf>

Strategic Environmental Assessment (SEA) Checklist - Consultation Draft. January 2008. Environmental Protection Agency. [http://www.epa.ie/downloads/consultation/strategic\\_environmental\\_assessment\\_jan086.pdf](http://www.epa.ie/downloads/consultation/strategic_environmental_assessment_jan086.pdf)

Guidelines on SEA. Department of Communications, Energy and Natural Resources. Available at: <http://www.dcmnr.gov.ie/Marine/Environmental+Assessment/Environmental+Assessment.htm>

**Northern Ireland**

A Practical Guide to the Strategic Environmental Assessment Directive. September 2005. Office of the Deputy Prime Minister. [http://www.ehsni.gov.uk/bm\\_sea\\_practicalguide.pdf](http://www.ehsni.gov.uk/bm_sea_practicalguide.pdf)

Strategic Environmental Assessment. Services and Standards for Responsible Authorities. Environment and Heritage Service. <http://www.ehsni.gov.uk/sea-servicesandstandards.pdf>

**Other**

Strategic Environmental Assessment DRAFT Practical Guidance for Practitioners on How to Take Account of Air. June 2008. Scotland & Northern Ireland Forum for Environmental Research.

Strategic Environmental Assessment DRAFT Practical Guidance for Practitioners on How to Take Account of Soil. June 2008. Scotland & Northern Ireland Forum for Environmental Research.

Strategic Environmental Assessment DRAFT Practical Guidance for Practitioners on How to Take Account of Water. June 2008. Scotland & Northern Ireland Forum for Environmental Research.

Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners. June 2004. Countryside Council for Wales, English Nature, the Environment Agency and the RSPB.  
<http://www.english-nature.org.uk/pubs/publication/PDF/SEAbiodiversityGuide.pdf>

Strategic Environmental Assessment Toolkit (Version 1). September 2006. Scottish Executive.  
<http://www.scotland.gov.uk/Publications/2006/09/13104943/0>

Strategic Environmental Assessment Website. Guidance on Air, Soil and Water. September 2009. SNIFFER. <http://www.seaguidance.org.uk/1/Homepage.aspx>



## **APPENDIX E**

### **Eastern CFRAM Study Stakeholder List**

Title	Name	Surname	Role	Organisation	Group/Sector
<b>Stakeholders/External Parties</b>					
<b>Environmental Authorities</b>					
Mr	Tadhg	O'Mahony		Environmental Protection Agency (EPA)	State agency or body
Mr	Cian	O'Mahony		Environmental Protection Agency (EPA)	State agency or body
Ms	Nicola	Foley		Environmental Protection Agency (EPA)	State agency or body
Ms	Marie	Archbold		Environmental Protection Agency (EPA)	State agency or body
Ms	Emer	Connolly		Department of Environment, Community and Local Government (DECLG)	Government department
Mr	Lorcán	Scott		National Parks and Wildlife Service (NPWS)	Government department
Ms	Linda	Patton		National Parks and Wildlife Service (NPWS)	Government department
Mr	Wesley	Atkinson		National Parks and Wildlife Service (NPWS)	Government department
Mr	Padraig	Comerford		National Parks and Wildlife Service (NPWS)	Government department
Mr	Jimi	Conroy	Kilkenny area	National Parks and Wildlife Service (NPWS)	Government department
Mr	Kieran	Buckley		National Parks and Wildlife Service (NPWS)	Government department
Mr	Sean	Hogan	National Director for Fire Emergency Management	Department of Environment, Community and Local Government (National Directorate)	Government department
Ms	Lorraine	O'Donoghue	Principal Officer Marine Planning and Foreshore	Department of Environment, Community and Local Government	Government department
Mr	PJ	Shaw	Water Advisor (Foreshore)	Department of Environment, Community and Local Government	Government department
<b>Primary Stakeholders</b>					
Mr	Gerry	O'Connell		Dublin City Council	City Council
Mr	Bernard	Egan		Dun Laoghaire-	County

Title	Name	Surname	Role	Organisation	Group/Sector
				Rathdown County Council	Council
Mr	Colum	Gallagher		Fingal County Council	County Council
Mr	Liam	Coughlan		Fingal County Council	County Council
Mr	Alan	Dunney		Kildare County Council	County Council
Mr	Paddy	Connolly		Louth County Council	County Council
Ms	Fiona	Fallon		Meath County Council	County Council
Mr	Tom	Shanahan		Offaly County Council	County Council
Mr	John	Connolly		Offaly County Council	County Council
Mr	John	Brophy		Offaly County Council	County Council
Mr	Andrew	O'Mullane		South Dublin County Council	County Council
Mr	Michael	McAdam		South Dublin County Council	County Council
Mr	Brian	Kehoe		Westmeath County Council	County Council
Mr	Marc	Devereux		Wicklow County Council	County Council
Mr	Eddie	Taffe		Wexford County Council	County Council
Mr	Peadar	Lafferty		Cavan County Council	County Council
Mr	Kevin	Sexton		Cavan County Council	County Council
Mr	Pat	Finn		Drogheda Borough Council	Borough Council
Mr	Ray	Earle		Eastern River Basin District (ERBD)	River Basin District
Ms	Marin	Dancin		DLRCC	County Council
Mr	Daragh	Sheedy		DLRCC	County Council
Mr	Dermot	Kinane		DCC	County Council
Mr	Liam	O'Dwyer		DLRCC	County Council
Mr	Cathal	Smith		ESB	Service Provider
Ms	Roisin	O'Callaghan		Fisheries Ireland	Service provider
Mr	Joe	Craig		DLRCC	County Council
Mr	Gerry	Concannon		DLRCC	County Council
Mr	Brian	Harkin		SDCC	County Council
Mr	Brian	O'Mahony		Electricity Supply Board (ESB)	Service provider (state)
Mr	John	Hayes		Electricity Supply Board (ESB)	Service provider (state)

Title	Name	Surname	Role	Organisation	Group/Sector
Mr	Mike	Fitzgerald		Electricity Supply Board (ESB)	Service provider (state)
Ms	Sharon	McMahon	Senior Exec Engineer	Dublin City Council / Dublin Flood Forum	City Council
<b>Secondary Stakeholders</b>					
Mr	Peter	Cafferkey		Department of Agriculture, Fisheries and Marine	Government department
Mr	Peter	Carvill	Sec of State	Department of Arts, Heritage and Gaeltacht Affairs	Government department
Mr	Freddie	O'Dwyer		Built Heritage and Architectural Policy (Department of Arts, Heritage and the Gaeltacht)	State agency or body
Ms	Catherine	Desmond		National Monuments Service (Department of Arts, Heritage and the Gaeltacht)	State agency or body
Mr	Breda	Farrell		Dept. of Transport, Tourism and Sport	State agency of body
Dr	Margaret	Fitzgerald	Director of Public Health	Health Service Executive (HSE)	State agency or body
Mr	Brian	Gilroy	National Director of Estate	Health Service Executive (HSE)	State agency or body
Mr	Pat	McCarthy	Assistant Director of Estates	Health Service Executive (HSE)	State agency or body
Mr	Tom	Ryan	Director	Association of Municipal Authorities of Ireland	Local government
Cllr	Hilary	Quinlan		Association of County and City Councils	Local government
Mr	Colm	McCoy		Dublin and Mid-East Regional Authorities	Regional Authority
Mr	Dominic	Walsh		Southern and Eastern Regional Assembly	Regional Authority
Ms	Beatrice	Kelly		The Heritage Council	State agency or body
Mr	William	Walsh		Inland Fisheries Ireland (IFI) - Eastern River Basin District	State agency or body
Mr	Donnachadh	Byrne	Senior Fisheries Environmental Officer	Inland Fisheries Ireland (IFI) (DCENR) - South Eastern River Basin District	State agency or body

Title	Name	Surname	Role	Organisation	Group/Sector
Mr	Brian	Beckett	Fisheries Environmental Officer	Inland Fisheries Ireland (IFI) (DCENR) - Blackrock	State agency or body
Ms	Tally	Hunter-Williams		Geological Survey of Ireland	State agency or body
Ms	Finola	O'Driscoll		Dublin Transport Office	State agency or body
Ms	Tara	Spain		Transport Infrastructure Ireland	State agency or body
Mr	Billy	O'Keefe		Transport Infrastructure Ireland	State agency or body
Ms	Maria	Fitzgerald		Transport Infrastructure Ireland	State agency or body
Mr	Stephen	Byrne	Environmental officer	Transport Infrastructure Ireland	State agency or body
Mr	Sampurna	Chundru	Senior roads engineer	Transport Infrastructure Ireland	State agency or body
Mr	Eric	Donald		Teagasc	State agency or body
Ms	Loretta	Lambkin		Dublin Docklands Development Authority	State agency or body
Mr	Anthony	Abbott-King		Dublin Docklands Development Authority	State agency or body
Ms	Siobhan	O'Mahoney		Dublin Docklands Development Authority	State agency or body
Mr	Conor	O'Donovan		National Transport Authority	State agency or body
Mr	David	Clements		National Transport Authority	State agency or body
Mr	Ian	Lawler		Bord Iascaigh Mhara (BIM)	State agency or body
Mr	John	Hickey		Bord Iascaigh Mhara (BIM)	State agency or body
Mr	Liam	Keegan		Met Eireann	State agency or body
Sir / Madam				SEAI	State agency or body
Sir / Madam				Health and Safety Authority	State agency or body
Mr	Frank	Conlon		Industrial Development Agency	State agency or body
Ms	Paula	Treacy		Waterways Ireland	State agency or body
Ms	Rosanna	Nolan		Waterways Ireland (Barrow Navigation)	State agency or body
Mr	Mervyn	Hamilton	Senior Engineer for urban areas	Waterways Ireland	State agency or body
Mr	Derek	Higgins		Waterways Ireland	State agency

Title	Name	Surname	Role	Organisation	Group/Sector
					or body
Mr	Freddie	O'Dwyer		Built Heritage and Architectural Policy (Department of Arts, Heritage and the Gaeltacht)	State agency or body
Ms	Grainne	Lynch		Coastal and Marine Resources Centre	Research body
Ms	Yvonne	Shields		Commissioner of Irish Lights	State agency or body
Mr	Tony	Maguire		Flood Resilient City	Research project
Ms	Jane	Cregan		Iarnród Éireann	Service provider (state)
Mr	Colin	Ward		Dublin Bus	Service provider (state)
Mr	Aidan	McGinty		Dublin Bus	Service provider (state)
Mr	Paul	Mallee	Chairperson of the Board	Bus Éireann	Service provider (state)
Mr	Paul	Lennon	Integrity	Bord Gáis Networks	Service provider (state)
Mr	Liam P	O'Riordan	Conceptual planning.	Bord Gáis Networks	Service provider (state)
Sir / Madam				Dublin Port Company	Service provider (state)
Mr	John	Barlow		Wicklow Port Company	Service provider (state)
Mr	Frank	Allen		Dun Laoghaire Harbour Company	Service provider (state)
Mr	Martin	Donnelly		Drogheda Port Company	Service provider (state)
Mr	Martin	Doherty		Dublin Airport Authority	Service provider (state)
Mr	Stephen	Walsh		Dublin Airport Authority	Service provider (state)
Mr	Michael	Lenihan		Bord na Mona	Service provider (semi-state)
Mr	Gerry	McNally	Land Manager	Bord na Mona	Service provider (semi-state)
Mr	Enda	McDonagh	Environmental Manager	Bord na Mona	Service provider (semi-state)
Mr	Gerry	Ryan		Bord na Mona	Service provider (semi-state)
Ms	Gael	Gibson		EirGrid	Service provider (semi-state)
Ms	Aoife	Blake		EirGrid	Service provider (Semi-state)
Mr	Francis	Walsh		Eircom	Service provider (commercial)
Ms	Aileen	O'Sullivan		Coillte	Commercial (state)

Title	Name	Surname	Role	Organisation	Group/Sector
Ms	Tina	Aughney		Environmental Pillar and Irish Environmental Network	NGO
Ms	Tina	Aughney		Bat Conservation Ireland	NGO
Ms	Camilla	Keane		An Taisce	NGO
Ms	Sinead	O'Brien		Sustainable Water Network (SWAN)	NGO
Ms	Nuala	Freeman		Sustainable Water Network (SWAN)	NGO
Mr	Eamon	Moore		SWAN / An Taisce	NGO
Ms	Karin	Dubsky		Coastwatch Ireland	NGO
Ms	Siobhan	Egan		BirdWatch Ireland	NGO
Ms	Helen	Boland		BirdWatch Ireland	NGO
Ms	Bernie	Barrett		Badgerwatch	NGO
Mr	Tadhg	O'Corcora		Irish Peatland Conservation Council	NGO
Sir / Madam				Irish Water and Fish Preservation Society	NGO
Sir / Madam				Royal Irish Academy	NGO
Ms	Mary	Keenan		Tree Council of Ireland	NGO
Ms	Eanna	Ni Lamhna	President	Tree Council of Ireland	NGO
Mr	James	Tallon		Mills and Millers of Ireland	NGO
				Royal National Lifeboats Association Ireland	NGO
Mr	Charles	Doherty		Royal Society of Antiquaries of Ireland	NGO
Mr	Gerry	Gunning		Irish Farmers Association (IFA)	Representative body
Mr	Padraig	McMahon		Irish Farmers Association (IFA)	Representative body
Mr	Sean	Murphy		Chambers Ireland	Representative body
Mr	David	O'Halloran		Dublin Chamber of Commerce	Representative body
				Dublin Chamber of Commerce	Representative body
Mr	Jose	Poveda		Dublin Chamber of Commerce	Representative body
Mr	Ciaran	Corcoran		Dublin Chamber of Commerce	Representative body
Sir / Madam				Dun Laoghaire Rathdown Chamber of Commerce	Representative body
Mr	Peter	Byrne		South Dublin Chamber of Commerce	Representative body
Sir /				Fingal Dublin	Representative

Title	Name	Surname	Role	Organisation	Group/Sector
Madam				Chamber of Commerce	body
Sir / Madam				Bray and District Chamber of Commerce	Representative body
Sir / Madam				Arklow Chamber of Commerce	Representative body
Sir / Madam				Greystones Chamber of Commerce	Representative body
Sir / Madam				Wicklow and District Chamber of Commerce	Representative body
Sir / Madam				Kells and District Chamber of Commerce	Representative body
Sir / Madam				Navan Chamber of Commerce	Representative body
Sir / Madam				Trim and District Chamber of Commerce	Representative body
Sir / Madam				Newbridge Chamber of Commerce	Representative body
Sir / Madam				North Kildare Chamber of Commerce	Representative body
Sir / Madam				Cavan Chamber of Commerce	Representative body
Ms	Carol	Kierans		Drogheda and District Chamber of Commerce	Representative body
Mr	Shane	O'Loughlin		Irish Creamery Milk Suppliers Association (ICMSA)	Representative body
Ms	Mary	Buckley		Irish Creamery Milk Suppliers Association (ICMSA)	Representative body
Mr	Terry	O'Regan		Landscape Alliance Ireland	Representative body
Mr	Conor	Gouldsbury		Irish Business and Employers Confederation (IBEC)	Representative body
Mr	Mark	Fielding		Irish Small and Medium Enterprises Association (ISME)	Representative body
Ms	Caroline	Spilling	Director General. Send stakeholder pack, no emails or phonecalls	Institute of Engineers of Ireland	Representative body
Mr	Robert	Butler		Construction Industry Federation	Representative body

Title	Name	Surname	Role	Organisation	Group/Sector
Mr	Gerry	Farrell		Irish Concrete Federation	Representative body
Mr	Ger	Loughlin		Irish Residential Boat Owners Association	Special interest amenity group
Mr	Paddy	Byrne		Recreational Angling Ireland	Special interest amenity group
Mr	John	Chambers		Irish Federation of Pike Angling Clubs	Representative body
Mr	Pat	Chambers	Environmental Officer	Irish Federation of Pike Angling Clubs	Representative body
Mr	Michael	Callaghan		National Anglers Representative Association	Representative body
Mr	Ronnie	Miley		Dublin Trout Anglers	Representative body
Mr	Benny	Cullen		Canoeing Ireland	Special interest amenity group
Mr	Noel	Carr		Federation of Irish Salmon and Sea Trout Anglers	Special interest amenity group
Mr	Brian	Cooke		Irish Federation of Sea Anglers	Special interest amenity group
Mr	Hugh	O'Rourke		Irish Federation of Sea Anglers	Special interest amenity group
Mr	Martin	Corcoran		Rowing Ireland	Special interest amenity group
Ms	Geraldine	Walsh	Chief Executive	Dublin Civic Trust	Special interest amenity group
Mr	Stuart	McGrane		Trout Angling Federation of Ireland	Special interest amenity group
Mr	Dermot	Casey		Coarse Angling Federation of Ireland	Special interest amenity group
Mr	Richard	Caplice		Irish Angling Development Alliance	Special interest amenity group
Mr	Peter	Walsh		Irish Angling Development Alliance	Special interest amenity group
Sir / Madam				National Organisation of Regional Game Councils	Special interest amenity group
Ms	Jean	Kennedy		Inland Waterways Association of Ireland	Special interest amenity group
Mr	Jerry	Gallagher		Irish Shellfish Association	Representative body
Sir / Madam				Sea Fisheries Protection Authority	Representative body
Sir /				Irish	Representative

Title	Name	Surname	Role	Organisation	Group/Sector
Madam				Countrywomen's Association	body
Ms	Gretta	Hannigan		Fisheries Ireland	Service provider

## **APPENDIX F**

### **Plans, Policies and Programmes**

## REVIEW OF PLANS, POLICIES AND PROGRAMMES

The tables below provide a summary of the relevant EU Directives, the transposing regulations and/or the regulatory framework for environmental protection and management arising from them. The information is not exhaustive and it is recommended to consult the Directive, Regulation, Plan or Programme to become familiar with the full details of each. These tables have been updated following the receipt of scoping responses.

### EUROPEAN

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
<i>Biodiversity, Flora and Fauna</i>				
The EU Birds Directive 2009/147/EC	Protects all wild birds, their nests, eggs and habitats within the European Community. It gives EU member states the power and responsibility to classify Special Protection Areas (SPAs) to protect birds which are rare or vulnerable in Europe, as well as all migratory birds which are regular visitors.	<ul style="list-style-type: none"> <li>• Preserve, maintain or re-establish a sufficient diversity and area of habitats for all the species of birds referred to in Annex I.</li> <li>• Preserve, maintain and establish biotopes and habitats to include the creation of protected areas (Special Protection Areas); ensure the upkeep and management in accordance with the ecological needs of habitats inside and outside the protected zones, re-establish destroyed biotopes and creation of biotopes</li> <li>• Measures for regularly occurring migratory species not listed in Annex I is required as regards their breeding, moulting and wintering areas and staging posts along their migration routes. The protection of wetlands and particularly wetlands of</li> </ul>	European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011)	<p>The FRMP should ensure that European Sites are suitably protected from loss or damage.</p> <p>The flood risk management strategies are expected to require a screening for Appropriate Assessment, following which there may be requirement for a Natura Impact Statement to ensure that any strategies proposed do not adversely affect SPAs and SACs.</p>

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
		international importance.		
The EU Habitats Directive (92/43/EEC)	Builds on the Birds Directive (see above) by protecting natural habitats and other species of wild plants and animals. Together with the Birds Directive, it underpins a European network of protected areas known as Natura 2000: Special Protection Areas (SPAs, classified under the Birds Directive) and Special Areas of Conservation (SACs, classified under the Habitats Directive).	<ul style="list-style-type: none"> <li>• Propose and protect sites of importance to habitats, plant and animal species.</li> <li>• Establish a network of Natura 2000 sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, to enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.</li> <li>• Carry out comprehensive assessment of habitat types and species present.</li> <li>• Establish a system of strict protection for the animal species and plant species listed in Annex IV.</li> </ul>	<p>European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011)</p> <p>The Wildlife Act 1976 (S.I. No. 39/1976) and The Wildlife (Amendment) Act 2000 (S.I. No. 38/2000)</p>	

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
<p>The EU Biodiversity Strategy to 2020 [COM(2011)244] “Our life insurance, our natural capital”</p>	<p>Aimed at reversing biodiversity loss and speeding up the EUs transition towards a resource efficient and green economy. Primary objectives of the strategy include:</p> <ul style="list-style-type: none"> <li>• conserving and restoring nature;</li> <li>• maintaining and enhancing ecosystems and their services;</li> <li>• ensuring the sustainability of agriculture, forestry and fisheries;</li> <li>• Ensuring the sustainable use of fisheries resources</li> <li>• combating invasive alien species; and</li> <li>• addressing the global biodiversity crisis.</li> </ul>	<ul style="list-style-type: none"> <li>• To mainstream biodiversity in the decision making process across all sectors.</li> <li>• To substantially strengthen the knowledge base for conservation, management and sustainable use of biodiversity.</li> <li>• To increase awareness and appreciation of biodiversity and ecosystems services.</li> <li>• To conserve and restore biodiversity and ecosystem services in the wider countryside.</li> <li>• To conserve and restore biodiversity and ecosystem.</li> <li>• services in the marine environment</li> <li>• To expand and improve on the management of protected areas and legally protected species.</li> <li>• To substantially strengthen the effectiveness of International governance for biodiversity and ecosystem services.</li> </ul>	<p>Actions for Biodiversity 2011-2016’, Ireland’s 2nd National Biodiversity Plan (DAHG, 2011)</p>	<p>The FRMP should have regard for this strategy and look for opportunities to conserve, and, where possible, restore or enhance biodiversity.</p>
<p>The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or “The Bonn Convention” [L210, 19/07/1982 (1983)])</p>	<p>The Bonn Convention focuses on preserving the habitats used by migratory species and aims to enhance the conservation of terrestrial, marine and avian species on a global scale throughout their range.</p>	<ul style="list-style-type: none"> <li>• Establishes a legal foundation for internationally coordinated conservation measures throughout a migratory range.</li> <li>• Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these</li> </ul>	<p>European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011)</p>	<p>The FRMP should have regard for the implications on migratory species of introducing new flood risk management strategies.</p>

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
		<p>animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.</p> <ul style="list-style-type: none"> <li>In Europe, legislation to ensure that the provisions of the Bonn convention are applied includes the Birds Directive and the Habitats Directive.</li> </ul>		
<i>Climatic Factors</i>				
EU Adaption Strategy 2013	The Strategy on Adaptation to Climate Change focuses on promoting Member State action, integrating adaptation into EU policies, and supporting better informed decision-making.	<p>The Commission encourages all Member States to adopt comprehensive adaptation strategies.</p> <p>Promoting better informed decision-making by addressing gaps in knowledge about adaptation and further developing the European Climate Adaptation Platform.</p> <p>Promoting adaptation in key vulnerable sectors through agriculture, fisheries and cohesion policy, ensuring that Europe's infrastructure is made more resilient, and encouraging the use of insurance against natural and man-made disasters.</p>	<p>National Climate Change Strategy (DELG, 2000) and National Climate Change Strategy 2007-2012 (DEHLG, 2007)</p> <p>The Climate Action and Low Carbon Development Bill 2015 [2/2015]</p>	The FRMP will have regard to this strategy and will (in combination with other users and bodies) cumulatively contribute towards the achievement of the objectives of the regulatory framework for environmental protection and management.
Second European Climate Change Programme (ECCP II)	Objectives seek to develop the necessary elements of a strategy to implement the Kyoto protocol.	Develop a framework for a low carbon economy which will be achieved through a National Mitigation Plan (to lower Ireland's level greenhouse	National Climate Change Strategy (DELG, 2000) and National Climate Change Strategy 2007-	The FRMP should aim to contribute towards climate change mitigation. The study could potentially have

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
2005.  Climate Change Agreement [UNFCCC, 2007]	<p>The climate and energy package is a set of binding legislation which aims to ensure the European Union meets its ambitious climate and energy targets for 2020. These targets, known as the "20-20-20" targets, set three key objectives for 2020:</p> <ul style="list-style-type: none"> <li>• A 20% reduction in EU greenhouse gas emissions from 1990 levels;</li> <li>• Raising the share of EU energy consumption produced from renewable resources to 20%;</li> <li>• A 20% improvement in the EU's energy efficiency.</li> </ul>	<p>emissions) and a National Adaptation Framework (to provide for responses to changes caused by climate change). This includes:</p> <ul style="list-style-type: none"> <li>• Reform of the EU Emissions Trading System (EU ETS) to include a cap on emission allowances in addition to existing system of national caps</li> <li>• Agreement of national targets for non-EU ETS emissions from countries outside the EU</li> <li>• Commitment to meet the national renewable energy targets of 16% for Ireland by 2020</li> <li>• Preparation of a legal framework for technologies in carbon capture and storage</li> </ul>	<p>2012 (DEHLG, 2007)</p> <p>The Climate Action and Low Carbon Development Bill 2015 [2/2015]</p>	<p>implications on achieving renewable energy targets as maintenance and construction of flood risk management infrastructure may contribute to energy use or may complement energy production.</p>
Renewable Energy Directive (2009/28/EC)	<ul style="list-style-type: none"> <li>• Provides a framework for the production and promotion of energy from renewable sources Identifies national targets for renewable sources consumed in transport, electricity and heating and cooling by 2020. States must:</li> <li>• Meet a target of 20% for renewable energy sources</li> <li>• Outline how the national target will be met under the Directive</li> <li>• Prepare and implement a national energy action plan</li> </ul>	<ul style="list-style-type: none"> <li>• Where possible, the electricity distribution network should give priority to generating units using energy from renewable sources</li> <li>• Requirement for public bodies to take steps in ensuring all new or recently renovated (&gt;2011) public buildings fulfil an exemplary role in the context of the Directive.</li> </ul>	<p>European Union (Renewable Energy) Regulations 2014. (S.I. No. 483/2014)</p>	<p>The FRMP could potentially have implications on achieving renewable energy targets as maintenance and construction of flood risk management infrastructure may contribute to energy use or may influence renewable energy production.</p>

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
<i>Cultural, Architectural and Archaeological Heritage</i>				
United Nations Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972) "The World Heritage Convention" [WHC-2005/WS/02]	<p>Objectives seek to ensure the identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage and ensure that effective and active measures are taken for these.</p> <p>The Convention recognises the way in which people interact with nature and encourages signatories to</p> <ul style="list-style-type: none"> <li>integrate the protection of cultural and natural heritage into regional planning programmes,</li> <li>set up staff and services at their sites,</li> <li>undertake scientific and technical conservation research and</li> <li>adopt measures which give this heritage a function in the day-to-day life of the community.</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of measures for the protection of monuments of national importance by virtue of the historical, architectural, traditional, artistic or archaeological interest attaching to them. Includes the site of the monument, the means of access to it and any land required to preserve the monument from injury or to preserve its amenities.</li> <li>World Heritage Sites in Ireland are specific locations that have been included in the UNESCO World Heritage Programme list of sites of outstanding cultural or natural importance to the common heritage of humankind. Two such sites in Ireland have been designated</li> </ul>	National Heritage Plan 2002 - 2007 (DAHG, 2002)	The FRMP should consider sites of cultural and natural heritage and ensure they are protected from loss or damage resulting from flood management measures.
<i>Geology, Soils and Landuse</i>				
EU Thematic Strategy for Soil Protection [COM(2006) 231] (including proposals for a Soil Framework Directive)	<p>Highlights a need for action to prevent the ongoing deterioration of Europe's soils.</p> <p>The Soil Thematic Strategy would seek to:</p>	<ul style="list-style-type: none"> <li>Objective of integrating soil protection into other EU policies, including agriculture and rural.</li> <li>Promotion of rehabilitation of industrial sites and contaminated land.</li> </ul>	No current legislation in Ireland specific to the protection of soil resources.	The provisions of the European Strategy should form a framework for soil protection and improvement that the FRMP should take into account.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
	<ul style="list-style-type: none"> <li>Establish common principles for the protection and sustainable use of soils;</li> <li>Prevent threats to soils, and mitigate the effects of those threats;</li> <li>Preserve soil functions within the context of sustainable use; and</li> <li>Restore degraded and contaminated soils to approved levels of functionality.</li> </ul>			
<i>Landscape and Visual Amenity</i>				
European Landscape Convention (ETS No. 176), Florence, 20 October 2000	<ul style="list-style-type: none"> <li>Promotion of the protection, management and planning of European landscapes and organising European co-operation on landscape issues.</li> <li>Applies to the entire territory of the Parties and covers natural, rural, urban and peri-urban areas.</li> <li>Inclusion of landscapes that might be considered outstanding as well as everyday or degraded landscapes.</li> <li>Aimed at the protection, management and planning of all landscapes and raising awareness of the value of a living landscape.</li> <li>Complements the Council of Europe's and UNESCO's heritage conventions.</li> </ul>	<ul style="list-style-type: none"> <li>Respond to the public's wish to enjoy high-quality landscapes and to play an active part in the development of landscapes.</li> <li>Each administrative level (national, regional and local) should draw up specific and/or sectoral landscape strategies within the limits of its competences. These are based on the resources and institutions which, when co-ordinated in terms of space and time, allow policy implementation to be programmed. The various strategies should be linked by landscape quality objectives.</li> </ul>	<p>The Planning and Development Acts 2000 - 2010 (S.I. No. 30/2000, S.I. No. 30/2010)</p> <p>National Spatial Strategy 2002-2020 "People, Places and Potential" (DELG, 2002)</p>	The FRMP could potentially have implications on landscapes and visual amenity.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
<i>Population and Human Health</i>				
Drinking Water Directive (98/83/EC)	<ul style="list-style-type: none"> <li>Aimed at the improvement and maintenance of the quality of water intended for human consumption.</li> <li>Aims to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.</li> </ul>	<ul style="list-style-type: none"> <li>Sets values applicable to water intended for human consumption for a defined range of parameters.</li> <li>Requires implementation of all measures necessary to ensure that regular monitoring of the quality of water intended for human consumption is carried out, in order to check that the water available to consumers meets the requirements set out in the legislation.</li> <li>Any failure to meet the required standards is immediately investigated in order to identify the cause.</li> <li>Any necessary remedial action is taken as soon as possible to restore its quality and gives priority to their enforcement action.</li> <li>Undertake remedial action to restore the quality of the water where necessary to protect human health.</li> <li>Notification of consumers when remedial action is being undertaken, except where the competent authorities consider the non-compliance with the required standards value to be trivial.</li> </ul>	<p>European Union (Drinking Water) Regulations 2014 (S.I. No. 106/2007) (as amended)</p> <p>European Communities (Water Policy) Regulations 2003 (S.I. No. 722/2003)</p>	The FRMP study may have implications for waters used as a drinking water supply.
Bathing Water Directive (revised) 2006	The overall objective of the revised Bathing Water Directive remains the protection of public health whilst	<ul style="list-style-type: none"> <li>Updates the way in which water quality is measured, focusing on fewer microbiological indicators, and</li> </ul>	Bathing Water Quality (Amendment) Regulations 2008 (S.I.	The FRMP should consider the contribution that measures could make towards the attainment of

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
[2006/7/EC]	<p>bathing. It:</p> <ul style="list-style-type: none"> <li>imposes stricter standards for water quality and the implementation of new method of assessment.</li> <li>establishes a more pro-active approach to the assessment of possible pollution risks, and to the management of bathing waters; and</li> <li>places considerable emphasis on promoting increased public involvement, and for improved dissemination of information on bathing water quality to the general public.</li> </ul>	<p>setting different standards for inland and coastal bathing sites.</p> <ul style="list-style-type: none"> <li>Reduces the health risks linked to bathing by setting scientifically based minimum water quality standards.</li> <li>Makes changes to monitoring and sampling frequency.</li> <li>Allows a limited number of water samples to be disregarded during short term pollution incidents, if the event is predicted and the public warned beforehand.</li> <li>Provides better information to the public, allowing more informed choices to be made about the risk of bathing.</li> <li>Improves the overall management of bathing water quality by requiring an assessment of potential sources of pollution.</li> <li>Is compatible with other EU water related legislation, in particular the Water Framework Directive.</li> </ul>	No. 79/2008) (as amended)	bathing water quality standards. Coastal outfalls and flooding events can be linked with bathing water pollution.
<i>Water</i>				
The 'Floods' Directive, 2007 (2007/60/EC)	This Directive provides a framework for the assessment and management of flood risks, aiming to reduce the adverse consequences associated with flooding for human health, the environment, cultural heritage and	<p>Member States must:</p> <ul style="list-style-type: none"> <li>assess the risk of flooding of all water courses and coast lines,</li> <li>map the flood extent and assets and humans at risk in these areas at</li> </ul>	<p>European Communities (Assessment and Management of Flood Risks) Regulations 2010</p> <p>European Union</p>	The National Preliminary Flood Risk Assessment describes the areas that have potential for significant flood risk. Consequently, Flood Risk and Flood Hazard maps in addition

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
	economic activity.	<p>River Basin level and in areas covered by Article 5(1) and 13(1); and</p> <ul style="list-style-type: none"> <li>implement flood risk management plans and take adequate and coordinated measures to reduce this flood risk.</li> </ul> <p>Member States are required to first carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding. For such zones they would then need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by the end of 2015. The public must be informed and allowed to participate in the planning process.</p>	(Environmental Impact Assessment) (Flood Risk) Regulations 2012 (S.I. No. 470/2012)	to Flood Risk Management Plans are being produced. These regional scale plans will be the key outputs of the CFRAM studies.
The EU Water Framework Directive (2000/60/EC), (as amended by Decision 2455/2001/EC and Directives 2008/32/EC, 2008/105/EC and 2009/31/EC.	<p>Aims to improve water quality and quantity within rivers, estuaries, coasts and aquifers.</p> <p>Aims to prevent the deterioration of aquatic ecosystems and associated wetland by setting out a timetable until 2027 to achieve good ecological status or potential.</p> <p>Member States are required to manage the effects on the ecological quality of water which result from changes to the physical characteristics of water bodies.</p> <p>Action is required in those cases where</p>	<ul style="list-style-type: none"> <li>Identification and establishment of individual river basin districts.</li> <li>Preparation of individual river basin management plans for each of the catchments. These contain the main issues for the water environment and the actions needed to deal with them.</li> <li>Establishment of a programme of monitoring water quality in each RBD.</li> <li>Establishment of a Register of Protected Areas (includes areas previously designated under the Freshwater Fish and Shellfish</li> </ul>	<p>European Communities (Water Policy) Regulations, 2003 (S.I. No. 722/ 2003)</p> <p>European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272/2009)</p>	<p>The FRMP will need to consider the requirements of the WFD and ensure that it does not compromise its objectives, and that it contributes to achieving its aims. The WFD uses the same study areas (river basin districts) as the Floods Directive (see above) and is based on the same 6 year cycle of planning.</p> <p>Water quality and quantity is linked to the FRMP as flooding events can lead to water pollution and changes in water levels. The FRMP should promote sustainable</p>

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
	<p>these “hydro-morphological” pressures are having an ecological impact which will interfere with the ability to achieve WFD objectives.</p> <p>The following Directives have been subsumed into the Water Framework Directive :</p> <ul style="list-style-type: none"> <li>• The Drinking Water Abstraction Directive</li> <li>• Sampling Drinking Water Directive</li> <li>• Exchange of Information on Quality of Surface Freshwater Directive</li> <li>• Shellfish Directive</li> <li>• Freshwater Fish Directive</li> <li>• Groundwater (Dangerous Substances) Directive</li> <li>• Dangerous Substances Directive</li> </ul>	<p>Directives which have become sites designated for the protection of economically significant aquatic species under WFD and placed on the Protected Areas register).</p> <ul style="list-style-type: none"> <li>• Promotion of sustainable management of the water environment by carefully considering current land use and future climate scenarios, minimising the effects of flooding and drought events and facilitating long term improvements in water quality, including the protection of groundwater near landfill sites, as well as minimising agricultural runoff.</li> </ul>		<p>management of the water environment by carefully considering current land use and future climate scenarios, minimise the effects of flooding and drought events and to facilitate long term improvements in water quality, including the protection of groundwater.</p>
<p>The Groundwater Directive (80/68/EEC) and,</p> <p>Groundwater Daughter Directive (2006/118/EC)</p>	<ul style="list-style-type: none"> <li>• Aims to protect groundwater from pollution by controlling discharges and disposals of certain dangerous substances to groundwater.</li> <li>• Made under the Water Framework Directive, the Daughter Directive aims to prevent and limit inputs of pollutants to groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of criteria for assessing good groundwater status and for the identification of significant and sustained upwards trends and the starting points for trend reversal.</li> <li>• Threshold values adopted for the pollutants, groups of pollutants and indicators of pollution which have been identified as contributing to the characterisation of bodies or groups of bodies of groundwater as being at risk.</li> </ul>	<p>European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9/2010)</p>	<p>The FRMP should, where possible, contribute to the protection of groundwater from point source and diffuse pollution that could be caused or exacerbated by flooding.</p>

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
The Nitrates Directive (91/676/EC)	<ul style="list-style-type: none"> <li>Objectives of reducing water pollution caused or induced by nitrates from agricultural sources and preventing further pollution.</li> <li>Key requirements are the designation of Nitrate Vulnerable Zones and the establishment of action programmes in relation to these zones.</li> </ul>	<ul style="list-style-type: none"> <li>Aims to create good farming practices by establishing a voluntary code of good agricultural practice.</li> <li>Identify and designate zones at risk of surface water and groundwater pollution from nitrates.</li> <li>Implement compulsory action programmes for nitrates vulnerable zones.</li> <li>Enforce the implementation of a national Nitrates Action Programme.</li> <li>Monitoring of water quality to assess nitrogen compounds.</li> <li>Introduction of 2-metre wide uncultivated and unsown buffer zones adjacent to streams/drains, where tillage crops are grown.</li> </ul>	European Union (Good Agricultural Practice for Protection of Waters) Regulations 2014. S.I. No. 31/2014 ("the Nitrates Regulations")	Impacts on water quality are of relevance to the FRMP as flooding can be linked with water pollution.
Urban Wastewater Treatment Directive 91/271/EEC. Amended under Directive 98/15/EEC	<ul style="list-style-type: none"> <li>The primary objective is to protect the environment from the adverse effects of discharges of urban wastewater, by the provision of urban wastewater collecting systems (sewerage) and treatment plants for urban centres.</li> <li>The Directive also provides general rules for the sustainable disposal of sludge arising from wastewater treatment.</li> </ul>	<ul style="list-style-type: none"> <li>Establishes minimum requirements for urban waste water collection and treatment systems in specified agglomerations to include special requirements for sensitive areas and certain industrial sectors.</li> <li>Urban waste water entering collecting systems shall before discharge, be subject to secondary treatment.</li> <li>Annex II requires the designation of areas sensitive to eutrophication which receive water discharges.</li> </ul>	European Communities (Urban Waste Water Treatment) Regulations 2001 (S.I. No. 254/2001)	Impacts on water quality are of relevance to the FRMP as flooding can be linked with water pollution.
Environmental Quality	<ul style="list-style-type: none"> <li>Establishes environmental quality</li> </ul>	<ul style="list-style-type: none"> <li>Apply the EQS laid down in Part A of</li> </ul>	European Communities	Impacts on water quality are of

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
Standards Directive (Directive 2008/105/EC) (also known as the Priority Substances Directive), as amended by Directive 2013/39/EU.	standards (EQS) for priority substances and certain other pollutants as provided for in Article 16 of the Water Framework Directive and aims to achieve good surface water chemical status in accordance with the provisions and objectives of Article 4 of the Water Framework Directive.	<p>Annex I to this Directive for bodies of surface water.</p> <ul style="list-style-type: none"> <li>• Determine the frequency of monitoring in biota and/or sediment of substances.</li> <li>• Monitoring shall take place at least once every year, unless technical knowledge and expert judgment justify another interval.</li> <li>• Notify the European Commission if the substances for which EQS have been established if a deviation of the monitoring is planned along with the rationale and approach.</li> <li>• Establish an inventory, including maps, if available, of emissions, discharges and losses of all priority substances and pollutants listed in Part A of Annex I to this Directive for each river basin district.</li> </ul>	<p>Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009)</p> <p>European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003)</p>	relevance to the FRMP as flooding can be linked with water pollution.
A Blueprint to Safeguard Europe's Water Resources (2012)	To ensure sufficient availability of good quality water for sustainable and equitable water use	<ul style="list-style-type: none"> <li>• Aims to ensure the availability of a sufficient quantity of good quality water.</li> <li>• Aims to improve the implementation of current EU water policy.</li> <li>• Promotes the integration of water and other policies.</li> <li>• Outlines actions required for the implementation of current water legislation, integration of water policy objectives into other policies, and filling the gaps in particular as regards water quantity and</li> </ul>	European Communities (Water Policy) Regulations, 2003 (S.I. No. 722/2003)	The FRMP will have regard to this Blueprint and will (in combination with other users and bodies) cumulatively contribute towards the achievement of the objectives of the regulatory framework for environmental protection and management.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
		efficiency.		
Marine Strategy Framework Directive (2008/56/EC).	<ul style="list-style-type: none"> <li>Establishes a framework whereby the necessary measures are undertaken to achieve or maintain good environmental status in the marine environment by the year 2020.</li> <li>Requires the development and implementation of marine strategies in order to protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected.</li> <li>It aims to prevent and reduce inputs in the marine environment, with a view to phasing out pollution as defined in Article 3(8), so as to ensure that there are no significant impacts on or risks to marine biodiversity, marine ecosystems, human health or legitimate uses of the sea.</li> </ul>	<ul style="list-style-type: none"> <li>Preparation of an assessment of the current environmental status of the waters concerned and the environmental impact of human activities.</li> <li>Establishment of a series of environmental targets and associated indicators.</li> <li>Development of a programme of measures designed to achieve or maintain good environmental status, by 2020.</li> <li>Establishment of a monitoring programme for ongoing assessment and regular updating of targets.</li> <li>Cooperation with transboundary Member States to implement these measures.</li> </ul>	European Communities (Marine Strategy Framework) Regulations 2011 (S.I. No. 249/2011)	The FRMP may have implications on the environmental status of coastal waters, as it extends to coastal flooding.
<i>Environment and Sustainable Development</i>				
EIA Directive (2011/92/EU as amended by 2014/52/EU)	<ul style="list-style-type: none"> <li>Requires the assessment of the environmental effects of public and private projects which are likely to have significant effects on the environment.</li> <li>Aims to assess and implement avoidance or mitigation measures to</li> </ul>	<ul style="list-style-type: none"> <li>All projects listed in Annex I are considered as having significant effects on the environment and compulsorily require an EIA.</li> <li>For projects listed in Annex II, a "screening procedure" is required to determine the effects of projects on</li> </ul>	European Communities (Environmental Impact Assessment) Regulations 1989 (S.I. No. 349/1989) (as amended)  European Union	The FRMP will have regard to the EIA regulations in the development of any future flood risk management schemes.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
	<p>eliminate environmental effects, before consent is given of projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment with regard to their effects.</p>	<p>the basis of thresholds/criteria or a case by case examination. The competent authority may give a decision on whether a project requires EIA.</p> <ul style="list-style-type: none"> <li>• Requirement for identification, description and assessment in an appropriate manner, in the light of each individual case, on the direct and indirect effects of a project on the following factors: human beings, fauna and flora, soil, water, air, climate and the landscape, material assets and the cultural heritage, the interaction between each factor.</li> <li>• Requirement for consultation with relevant authorities, stakeholders and public allowing sufficient time to make a submission before a decision is made.</li> <li>• Establishment of a recognised structure and content for the Environmental Impact Statement, which is the document submitted as a written account of the EIA.</li> <li>• Inclusion of proposed flood risk management schemes in EIA screening process</li> </ul>	<p>(Environmental Impact Assessment) (Flood Risk) Regulations 2012 (S.I. No 470/2012)</p>	
Environmental Liability Directive (2004/35/EC)	<ul style="list-style-type: none"> <li>• Establishes a framework for environmental liability based on the 'polluter-pays' principle, to prevent and remedy environmental damage.</li> <li>• Relates to environmental damage caused by occupational activities</li> </ul>	<ul style="list-style-type: none"> <li>• Describes procedures for circumstances where environmental damage has occurred. Requires the polluter to take all practicable steps to immediately control, contain, remove or otherwise manage the relevant contaminants and/or any</li> </ul>	<p>European Communities (Environmental Liability) Regulations 2008 [S.I. No. 547/2008]</p>	<p>Flooding events can lead to water pollution. The FRMP will be obliged to comply with the requirements of the regulations.</p>

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Relevant Legislation in Ireland	Relevance to FRMP
	<p>(listed in Annex III), and to any imminent threat of such damage occurring by reason of any of those activities; damage to protected species and natural habitats caused by any occupational activities other than those listed in Annex III, and to any imminent threat of such damage occurring by reason of any of those activities, whenever the operator has been at fault or negligent.</p>	<p>other damage factors in order to limit or to prevent further environmental damage and adverse effects on human health or further impairment of services and the necessary remedial measures.</p> <ul style="list-style-type: none"> <li>• Establishes measures for cases where environmental damage has not yet occurred, but there is an imminent threat of such damage occurring.</li> <li>• The regulations make the polluter financially liable and allow the competent authority to initiate cost recovery proceedings where appropriate.</li> </ul>		

**NATIONAL**

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<i>Biodiversity, Flora and Fauna</i>				
'Actions for Biodiversity 2011-2016', Ireland's 2 <sup>nd</sup> National Biodiversity Plan (DAHG, 2011)	<ul style="list-style-type: none"> <li>National strategy for the maintenance and enhancement of biological diversity, which should be integrated across other policy sectors.</li> </ul>	<ul style="list-style-type: none"> <li>Identification and protection of key biological resources and the monitoring of potentially damaging processes and activities.</li> <li>Preparation of Local Biodiversity Action Plans by Local Authorities to protect, enhance and promote local biodiversity</li> </ul>	UN Convention on Biological Diversity (1992) Strategic Plan 2011 to 2020 "Living in Harmony with Nature".	The FRMP should look for opportunities to conserve, and where possible restore, biodiversity.
Flora (Protection) Order 1999 (S.I. No. 94/1999)	<ul style="list-style-type: none"> <li>Enforces the protection of rare and endangered plants.</li> </ul>	<ul style="list-style-type: none"> <li>Derived from Section 21 of the Wildlife Act, objectives include it being illegal to alter, damage or interfere in any way with named flora species or their habitats. This protection applies wherever the plants are found and is not confined to sites designated for nature conservation.</li> </ul>	The Wildlife Act 1976 (S.I. No. 39/1976) and The Wildlife (Amendment) Act 2000 (S.I. No. 38/2000)	The FRMP should have regard to the protection of flora in accordance with the Order.
The Fisheries Acts, 1959 to 2007 (S.I. No. 14 of 1959 and No. 17 of 2007) and the Inland Fisheries Act 2010 (No. 10 of 2010)	<ul style="list-style-type: none"> <li>These acts provide for the efficient and effective management, conservation, protection, development and improvement of fisheries, hatcheries and fish farms. The species protected include all freshwater fish, sea bass and certain molluscs.</li> </ul>	<ul style="list-style-type: none"> <li>Inland Fisheries Ireland which replaced the Fisheries Boards following the Inland Fisheries Act (2010) must ensure the suitability of fish habitats, including taking consideration of the conservation of biodiversity in water ecosystems.</li> <li>The Act also requires those involved in aquaculture to obtain a licence.</li> <li>As well as enforcing provisions of</li> </ul>	Local Government Water Pollution Acts 1977 (S.I. No. 1/1977) & 1990 (S.I. No. 21/1990)	The FRMP should take into account the legislation which does not allow barriers to migration or the obstruction of the passage of fish or the impairment of the usefulness of the bed and soil of any waters as spawning grounds or their capacity to produce the food of fish

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		the Fisheries Acts, IFI is empowered to enforce the Water Pollution Acts 1977 & 1990, and at fisheries sensitive locations where industrial, local authority and agricultural discharges have resulted in a serious deterioration in water quality, including fish kills, successful prosecutions have been taken.		
<i>Climatic Factors</i>				
National Renewable Energy Action Plan (DCENR, 2010)	<ul style="list-style-type: none"> <li>Sets out the national strategic approach and measures to deliver on the Renewable Energy Directive 2009/28/EC</li> <li>Aims to achieve target of 16% renewable energy usage by 2020</li> </ul>	<p>Sets national targets to be met by 2020 as follows:</p> <ul style="list-style-type: none"> <li>40% electricity consumption from renewable sources</li> <li>10% electric vehicles by 2020</li> <li>12% renewable heat by 2020</li> </ul>	<p>European Communities (Renewable Energy) Regulations 2011 (S.I. No. 147/2011)</p> <p>Requirement of the Renewable Energy Directive (2009/28/EC)</p>	The FRMP should have regard for achieving renewable energy targets as maintenance and construction of flood risk management infrastructure may contribute to energy use or may influence energy production
National Climate Change Strategy 2007-2012 (DEHLG, 2007)	<ul style="list-style-type: none"> <li>Establishes a framework for action to reduce Ireland's greenhouse gas emissions</li> </ul>	<p>Sets out principles and actions for the reduction of CO<sub>2</sub> emissions in Ireland in the following areas:</p> <ul style="list-style-type: none"> <li>energy supply</li> <li>transport</li> <li>waste management</li> <li>industry, commercial and services sector</li> <li>agriculture</li> </ul>	European Communities (Renewable Energy) Regulations 2011 (S.I. No. 147/2011) "The Framework for Climate Change Bill"	The FRMP will have regard to this strategy and will (in combination with other users and bodies) cumulatively contribute towards the achievement of the objectives of the regulatory framework for environmental protection and management.

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		<ul style="list-style-type: none"> <li>• residential</li> <li>• public sector</li> </ul>		
National Climate Change Adaptation Framework – Building Resilience to Climate Change (DECLG, 2012)	Aims to provide the policy context for a strategic national adaptation response to climate change, promote dialogue and understanding of adaptation issues identify and promote adaptation solutions and committing to actions to support the adaptation process		European Communities (Renewable Energy) Regulations 2011 (S.I. No. 147/2011) “The Framework for Climate Change Bill”	The FRMP should have regard for achieving renewable energy targets as maintenance and construction of flood risk management infrastructure may contribute to energy use or may influence energy production
National (Climate) Mitigation Plan (DECLG, 2012)	The focus of the plan is to identify sector based mitigation measures to be adopted by the various government departments to mitigate greenhouse gas. The plan will also track the implementation of measures already underway and identify additional measures in the longer term to reduce GHG and progress the overall national low carbon transition agenda to 2050.	<p>It focuses on identifying further mitigation measures in four sectors:</p> <ul style="list-style-type: none"> <li>• agriculture and forest sector</li> <li>• electricity</li> <li>• transport</li> <li>• built environment</li> </ul>	European Communities (Renewable Energy) Regulations 2011 (S.I. No. 147/2011) “The Framework for Climate Change Bill”	The FRMP should have regard for achieving renewable energy targets as maintenance and construction of flood risk management infrastructure may contribute to energy use or may influence energy production
Offshore Renewable Energy Development Plan (DCENR, 2014)	The OREDP is a plan that identifies the opportunity for the sustainable development of Ireland’s abundant offshore renewable energy resources	<ul style="list-style-type: none"> <li>• Ireland is obliged to reach a target of 16% of all energy consumed in the State coming from renewable sources by 2020.</li> <li>• This obligation is to be met by 10% in transport, 12% from heat and</li> </ul>	European Communities (Renewable Energy) Regulations 2011 (S.I. No. 147/2011) “The Framework for Climate	The FRMP should have regard for achieving renewable energy targets as maintenance and construction of flood risk management infrastructure may contribute to energy use or may

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
	for increasing indigenous production of renewable electricity, thereby contributing to reductions in our greenhouse gas emissions,	40% from electricity	Change Bill"	influence energy production
<i>Cultural, Architectural and Archaeological Heritage</i>				
The National Monuments Acts (1930 to 2004) (S.I. No. 2/1930 & No. 22/2004)	<ul style="list-style-type: none"> <li>Objectives seek to ensure the identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage and ensure that effective and active measures are taken for these.</li> <li>Establishment of measures for the protection of monuments of national importance by virtue of the historical, architectural, traditional, artistic or archaeological interest attaching to them. Includes the site of the monument, the means of access to it and any land required to preserve the monument from injury or to preserve its amenities.</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of a National Inventory of Architectural Heritage (NIAH). The objective of the NIAH is to aid in the protection and conservation of the built heritage, especially by advising planning authorities on the inclusion of particular structures in the Record of Protected Structures (RPS).</li> <li>Sites included in the RPS are awarded automatic protection and may not be demolished or materially altered without grant of permission under the Planning Acts.</li> <li>Policy created on licensing of excavations and guidelines for licensees on strategies and method statements, reports and publications.</li> </ul>	<p>The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 (S.I. No. 119/1999)</p> <p>The Planning and Development Act 2000 (S.I. No. 30/2000)</p> <p>Framework and Principles for the Protection of the Archaeological Heritage (DAHG, 1999)</p> <p>Policy and Guidelines on Archaeological Excavation (DAHG, 1999)</p> <p>Architectural Heritage Protection - Guidelines for Planning Authorities</p>	The FRMP should consider sites of archaeological, architectural, cultural and natural heritage and ensure they are protected from loss or damage resulting from flood management measures.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
			(DAHG, 2011)	
<i>Geology, Soils and Landuse</i>				
Food Harvest 2020 “A vision for Irish agri-food and fisheries” (DAFF, 2010)	<ul style="list-style-type: none"> <li>A strategy to chart the direction of agri-food, forestry and fisheries for the ten year period to 2020.</li> <li>Aims to innovate and expand the Irish food industry in response to increased global demand for quality foods</li> </ul>	<ul style="list-style-type: none"> <li>Sets out a vision for the potential growth in agricultural output after the removal of milk quotas in 2015</li> <li>Aims to increase the value of primary output of the agriculture, fisheries and forestry sector by 33% over compared to the 2007-2009 average.</li> </ul>	<p>European Communities (Food and Feed Hygiene) Regulations 2009 (S.I. No. 432/2009) (as amended)</p> <p>European Communities (Hygiene of Foodstuffs) (S.I. No. 369/2006)</p>	The FRMP should consider landuse factors, such as agriculture, in its strategies.
Agri-vision 2015 Action Plan (DAFF, 2006)	<ul style="list-style-type: none"> <li>Outlines the vision for agricultural industry to improve competitiveness and response to market demand while respecting and enhancing the environment.</li> </ul>	<ul style="list-style-type: none"> <li>Emphasises the link between agricultural production and public goods such as the landscape, heritage, and biodiversity.</li> </ul>		The FRMP should consider landuse factors, such as agriculture, in its strategies.
<p>Rural Environmental Protection Scheme (REPS)</p> <p>Agri-Environmental Options Scheme(AEOS)</p> <p>Green, Low-Carbon, Agri-environment Scheme (GLAS)</p>	<ul style="list-style-type: none"> <li>Agri-environmental funding schemes administered by the Department of Agriculture, Food and the Marine aimed at rural development for environmental enhancement and protection</li> </ul>			The FRMP should consider landuse factors, such as agriculture, in its strategies.
Raised Bog SAC	Aims to meet nature conservation	<ul style="list-style-type: none"> <li>Ensure that the implications of</li> </ul>	The Wildlife	The FRMP should take into

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<p>Management Plan (Draft) (DAHG, 2014),</p> <p>National Peatland Strategy (Draft) (NPWS, 2014)</p> <p>Review of Raised Bog Natural Heritage Area Network (NPWS, 2014)</p>	<p>obligations in regards to the loss of natural bog habitats, while having regard to national and local economic, social and cultural needs.</p>	<p>management choices for water levels, quantity and quality are fully explored, understood and factored into policy making and land use planning.</p> <ul style="list-style-type: none"> <li>Review the current raised bog NHA network in terms of its contribution to the national conservation objective for raised bog habitats and determine the most suitable sites to replace the losses of active raised bog habitat and high bog areas within the SAC network and to enhance the national network of NHAs</li> </ul>	<p>(Amendment) Act 2000 (S.I. No. 38/2000)</p> <p>European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011)</p>	<p>consideration areas of bog habitat or peatland.</p>
<p>Irish Geological Heritage (IGH) Programme (GSI 1998-)</p>	<p>Programme to raise awareness about geological heritage and to recognise and protect geological heritage (or geoheritage).</p>	<p>Establishment of county geological sites and integration of these into the planning system.</p> <p>Preparation of guidelines to aid the extractive industry in addressing geological heritage, particularly in the end usage of quarries.</p> <p>Targeted mapping to provide more detail in priority areas and areas of low data coverage</p> <p>Designation of three UNESCO-supported Global Geoparks – Copper Coast (Waterford), Marble Arch Caves (Fermanagh-Cavan) and Burren &amp; Cliffs of Moher (Clare),</p>	<p>National Heritage Plan 2002 - 2007 (DAHG, 2002)</p> <p>The Wildlife (Amendment) Act 2000 (S.I. No. 38/2000)</p>	<p>The FRMP should take into consideration areas of geological heritage.</p>

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
National Development Plan 2007-2013 (DECLG, 2007)	This plan proposes an investment of some €184 billion in our economic and social infrastructure, the enterprise, science and agriculture sectors, the education, training and skills base of the people and environmental services.			The FRMP should take into consideration landuse factors changes to infrastructure and agriculture, in its strategies.
National Forestry Programme 2014-2020 (DAFM, 2015)	Outlines a new state funded Forestry Programme for the period 2014 – 2020	<p>The following four needs have been identified in relation to Ireland's forest sector:</p> <ul style="list-style-type: none"> <li>• Increase on a permanent basis, Ireland's forest cover to capture carbon, produce wood and help mitigation;</li> <li>• Increase and sustain the production of forest-based biomass to meet renewable energy targets;</li> <li>• Support forest holders to actively manage their plantations;</li> <li>• Optimise the environmental and social benefits of new and existing forests.</li> </ul>	<p>European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020 addressing in particular the Common Assessment Principles;</p> <p>Regulation (EU) no 1305/2013 of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) no 1698/2005.</p>	The FRMP should consider landuse factors, such as forestry, in its strategies.
National Forest Policy Review (DAFM, 2014)	This policy sets out an updated national forest policy strategy which is fit for purpose, reflects and takes account of the substantial changes that have occurred in Irish forestry since the publication of its	To develop an internationally competitive and sustainable forest sector that provides a full range of economic, environmental and social benefits to society and which accords with the Forest Europe definition of sustainable forest	European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020 addressing in particular the Common Assessment Principles;	The FRMP should consider landuse factors, such as forestry, in its strategies.

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	forerunner in 1996.	management	Regulation (EU) no 1305/2013 of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) no 1698/2005.	
National Sludge Wastewater Sludge Management Plan (Draft) (Irish Water, 2015)	Outlines how all types of non-hazardous sludge arising from waste water and water treatment, agriculture and industry will be dealt with.		Waste Management Act 1996 (as amended) Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 (as amended) Urban Waste Water Treatment Directive (91/271/EEC) European Communities (Urban Waste Water Treatment) Regulations 2001 (S.I. No. 254/2001)	The FRMP will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Rural Development Programme 2014-2020 (DAFM,2015)	A central priority of the Irish RDP is restoring, preserving and enhancing ecosystems related to agriculture and forestry. Three quarters of the funds is allocated to this priority, targeting over 1 million hectares of agricultural area.	Ireland's RDP will fund action under six Rural Development priorities: <ul style="list-style-type: none"> <li>• Knowledge transfer and innovation in agriculture, forestry and rural areas</li> <li>• Competitiveness of agri sector and sustainable forestry</li> </ul>		The FRMP will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		<ul style="list-style-type: none"> <li>Food chain organisation, including processing and marketing of agricultural products, animal welfare and risk management in agriculture</li> <li>Restoring, preserving and enhancing ecosystems related to agriculture and forestry</li> <li>Resource efficiency and climate</li> </ul>		
<i>Landscape and Visual Amenity</i>				
National Landscape Strategy for Ireland (Draft) 2014 – 2024 (DAHG, 2014)	<ul style="list-style-type: none"> <li>Strategy for the provision of a framework for the protection of the many cultural, social, economic and environmental values embedded in the landscape.</li> </ul>	<ul style="list-style-type: none"> <li>To be implemented by the State, working in co - operation with public authorities, stakeholders, communities and individuals.</li> <li>Objectives include to establish and to implement, through a series of actions, policies aimed at understanding, managing, protecting and planning the landscape.</li> <li>Sets out specific measures to integrate and embed landscape considerations in all sectors which influence the landscape and improve and enhance the quality of decision - making by those who have an impact on it.</li> </ul>		The FRMP will have regard to this strategy and will (in combination with other users and bodies) cumulatively contribute towards the achievement of the objectives of the regulatory framework for environmental protection and management.
<i>Material Assets and Infrastructure</i>				

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
National Infrastructure and Capital Investment Plan 2012-2016 (Department of Public Expenditure and Reform, 2011)	<ul style="list-style-type: none"> <li>Replaces the National Development Plan. Assesses the existing capacity of Ireland's infrastructure and identifies remaining gaps which must be addressed to aid economic recovery, social cohesion and environmental sustainability.</li> </ul>	<p>The approach identifies four main components of the investment strategy, namely:</p> <ul style="list-style-type: none"> <li>Economic infrastructure – encompassing transport networks, energy provision and telecommunications capacity.</li> <li>Investment in the productive sector and human capital – such as direct supports for enterprise development; science, technology and innovation advancement; supports for tourism, agriculture, fisheries and forestry; and capital investment in education infrastructure.</li> <li>Environmental infrastructure – including our waste and water systems and investment for environmental sustainability.</li> <li>Critical social investment – such as the health service and social housing programmes.</li> </ul>		The FRMP will have regard to this plan and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
National Secondary Road Needs Study 2011 (NRA, 2011)	<ul style="list-style-type: none"> <li>The National Secondary Road Needs Study (NSRNS) is to identify an optimal future NSR network, develop and prepare an NSR Network Programme and provide an outline delivery programme which offers value for money.</li> </ul>			The FRMP will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives
Grid 25 Implementation Plan 2011-2016	Grid25 is a high-level strategy outlining how EirGrid intends to	The core strategy must, among other		The FRMP will have regard to these plans and will (in

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(EIRGIRD, 2010)	undertake the development of the electricity transmission grid in the short, medium and longer-terms, to support a long-term sustainable and reliable electricity supply.	<p>aspects: -</p> <p>Detail and take account of existing and proposed transmission infrastructure in a county;</p> <p>Provide the framework for deciding on the scale, phasing and location of new development, having regard to existing serviced and planned investment over the coming years.</p>		combination with other users and bodies) cumulatively contribute towards the achievement of its objectives
<i>Water</i>				
Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland (The Inter-Departmental Marine Coordination Group (MCG), 2012)	<ul style="list-style-type: none"> <li>Aims to build on Ireland's rich maritime heritage and increase engagement with the sea.</li> <li>Strengthen maritime identity increase awareness of the value (market and nonmarket), opportunities and social benefits of engaging with the sea</li> </ul>	<ul style="list-style-type: none"> <li>Establishes two targets: <ul style="list-style-type: none"> <li>Double the value of our ocean wealth to 2.4% of GDP by 2030</li> <li>Increase the turnover from Ireland's ocean economy to exceed €6.4bn by 2020</li> </ul> </li> <li>Focuses on creating a thriving maritime economy, whereby Ireland harnesses the market opportunities to achieve economic recovery and socially inclusive, sustainable growth.</li> <li>Sets out to achieve healthy ecosystems that provide monetary and non-monetary goods and services</li> </ul>		The FRMP will have regard to this plan and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Arterial Drainage	<ul style="list-style-type: none"> <li>Sets out the roles and</li> </ul>	<ul style="list-style-type: none"> <li>Part 1 of the Programme comprises</li> </ul>	Arterial Drainage Act,	In future planning cycles it is

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Maintenance and High Risk Designation Programme 2011-2015 (Office of Public Works, 2011)	responsibilities of the OPW in maintaining all rivers, embankments and urban flood defences on which it has executed works since the 1945 Act in “proper repair and effective condition”.	Arterial Drainage Maintenance (including Scheme Channel Maintenance Works, Maintenance of Scheme Structures, Scheme Embankment Maintenance and Flood Relief Scheme Maintenance. <ul style="list-style-type: none"><li>• Part 2 of the Programme comprises High Risk Channel Designation.</li></ul>	1945 (S.I No 3/1945) as amended and extended 1995 (S.I. No. 14/1995)	likely that the arterial drainage plans will be brought together with flood risk management planning under the CFRAM studies.
National Strategic Plan for Sustainable Aquaculture Development (DAFM, 2015)	<ul style="list-style-type: none"><li>• The vision of this plan for 2020 is to develop a sustainable and competitive aquaculture sector, where production will grow according to market and consumer demands and in balance with nature and society</li></ul>	The following actions are proposed to be undertaken <ul style="list-style-type: none"><li>• Build capacity and scale in the industry</li><li>• Dedicated supports to new entrants to the sector</li><li>• Support organic certification of aquaculture production</li><li>• Aid shellfish producers significantly affected by biotoxin closures</li></ul>	Article 34 of the Common Fisheries Policy Regulation	The FRMP should consider factors, such as aquaculture, in its strategies.
Capital Investment Programme 2014-2016 (Irish Water, 2014)	<ul style="list-style-type: none"><li>• Irish Water proposed in the programme to invest €1.77 billion to deliver urgently required improvements to water services throughout Ireland.</li></ul>	The Capital Investment Plan include; <ol style="list-style-type: none"><li>1. Eliminating Boil Water Notices in Roscommon</li><li>2. Providing more water and in particular reducing disruption to supply in the Dublin area</li><li>3. Improving Water Quality</li><li>4. Investing for economic development</li></ol>		The FRMP will have regard to this programme and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		5. Tackling leakage 6. Increasing wastewater treatment capacity and improving environmental compliance 7. Better Control and Monitoring 8. Improving existing plants		
Water Services Strategic Plan (Irish Water, 2014)	<ul style="list-style-type: none"> <li>This Water Services Strategic Plan sets out strategic objectives for the delivery of water services over the next 25 years up to 2040.</li> </ul>	<ul style="list-style-type: none"> <li>The requirement for the plan to address the delivery of six strategic objectives as follows :</li> <li>Meet Customer Expectations;</li> <li>Ensure a Safe and Reliable Water Supply;</li> <li>Provide Effective Management of Wastewater;</li> <li>Protect and Enhance the Environment;</li> <li>Support Social and Economic Growth; and</li> <li>Invest in Our Future</li> </ul>	Water Services (No. 2) Act 2013 (the Water Services Act)	The FRMP will have regard to this strategic plan and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives
<i>Environment and Sustainable Development</i>				

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
National Spatial Strategy for Ireland 2002-2020 People, Places and Potential (DELG, 2002)	<ul style="list-style-type: none"> <li>• Planning framework for Ireland</li> <li>• Aims to achieve a better balance of social, economic and physical development across Ireland, supported by effective planning</li> </ul>	<ul style="list-style-type: none"> <li>• Proposes that areas of sufficient scale and critical mass will be built up through a network of gateways, hubs and key town</li> </ul>	Local Government (Planning and Development) Act, 1963 (as amended) (S.I. No. 28/1963) Requirement of the Planning and Development (Amendment) Act 2010 (S.I. No. 30/2010)	The FRMP will have regard to this strategy and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.

**REGIONAL/SUB-REGIONAL**

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<p>County and Town Development Plans</p> <ul style="list-style-type: none"> <li>• Louth County Development Plan 2015-2021 (Louth County Council, 2015)</li> <li>• Cavan County Development Plan 2014-2020</li> <li>• Meath County Development Plan 2013-2019 (Meath County Council, 2013)</li> <li>• Westmeath County Development Plan 2014-2020</li> <li>• Offaly County Development Plan 2014-2020</li> <li>• Kildare County Development Plan 2011-2017 (Kildare County Council, 2011)</li> <li>• Drogheda Borough Council Development Plan 2011-2017 (Louth County Council, 2011)</li> <li>• Navan</li> </ul>	<ul style="list-style-type: none"> <li>• Outlines planning objectives for County/Town development over six year lifespan</li> <li>• Strategic framework for planning and sustainable development including those set out in National Spatial Strategy and Regional Planning Guidelines</li> </ul>	<ul style="list-style-type: none"> <li>• Identifies future infrastructure, development and zoning required</li> <li>• Protects and enhances amenities and environment.</li> <li>• Guides planning authority in assessing proposals.</li> </ul>	Requirement of the Planning and Development Act 2000 (S.I. No. 30/2000) as amended	The FRMP will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
Development Plan 2009-2015 (Meath County Council, 2009) <ul style="list-style-type: none"> <li>Trim Development Plan 2008-2014 (Meath County Council, 2008)</li> </ul>				
Local Area Plans <ul style="list-style-type: none"> <li>Edenderry Local Area Plan 2011-2017 (Offaly County Council, 2011)</li> <li>Athboy Local Area Plan 2009-2015 (Meath County Council, 2009)</li> <li>Longwood Local Area Plan 2009-2015 (Meath County Council, 2009)</li> <li>East Meath Local Area Plan 2014-2020 (Meath County Council, 2014)</li> </ul>	<ul style="list-style-type: none"> <li>Statutory document which provides detailed planning policies to ensure proper planning and sustainable development of area.</li> <li>Sets out objectives for future planning and development.</li> </ul>	<ul style="list-style-type: none"> <li>Identifies issues of relevance to the area and outlines principles for future development of area.</li> <li>Is consistent with relevant County/Town Development Plans, National Spatial Strategy and Regional Planning Guidelines</li> </ul>	Local Government (Planning and Development) Act, 1963 (S.I. No. 28/1963) (as amended)  Requirement of the Planning and Development (Amendment) Act (2010) (S.I. No. 30/2010)	The FRMP study will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
Planning Schemes for Strategic Development Zones (SDZ)- None Relevant	<ul style="list-style-type: none"> <li>An area of land designated by the Government to contain specified developments of economic or social importance to the State.</li> <li>Aims to create sustainable communities under a master plan to facilitate the requirements by which it was acquired by the State.</li> </ul>	<ul style="list-style-type: none"> <li>Development includes necessary infrastructural and community facilities and services.</li> </ul>	Local Government (Planning and Development) Act, 1963 (S.I. No. 28/1963) (as amended)	The FRMP study will have regard to these Zones and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Housing Strategies  Offaly Housing Strategy 2008-2015	<ul style="list-style-type: none"> <li>Ensures proper planning and sustainable development of the area of the development plan.</li> <li>Provides housing policy for existing and future population of the area.</li> </ul>	<ul style="list-style-type: none"> <li>Identifies the existing needs or likely future need for housing.</li> <li>Ensures the availability of housing for persons of different levels of income.</li> <li>Ensures a mixture of housing types to suit demographics.</li> <li>Each Local Authority is required to prepare a housing strategy and review it every two years.</li> </ul>	<p>Local Government (Planning and Development) Act, 1963 (S.I. No. 28/1963) (as amended)</p> <p>Requirement of the Planning and Development Act 2000 (S.I. No. 30/2000) as amended</p>	The FRMP study will have regard to these Strategies plan and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Biodiversity Action Plans <ul style="list-style-type: none"> <li>Local Biodiversity Action Plan Louth</li> <li>(Draft) County Meath Biodiversity Action Plan 2015-2021</li> <li>Westmeath Biodiversity Action Plan 2014-2020</li> <li>Kildare Biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>Aims to protect, conserve, enhance and restore biodiversity and ecosystem services across all spectrums.</li> </ul>	<ul style="list-style-type: none"> <li>Outlines the status of biodiversity and identifies species of importance.</li> <li>Outlines objectives and targets to be met to maintain and improve biodiversity.</li> <li>Aims increase awareness.</li> </ul>		The FRMP study will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
Plan 2009-2014				
Heritage Plans <ul style="list-style-type: none"> <li>• Louth Heritage Plan 2015-2020</li> <li>• Cavan Draft Heritage Plan 2016-2021</li> <li>• Draft County Meath Heritage Plan 2016-2021</li> <li>• Westmeath Heritage Plan 2010-2015</li> <li>• Offaly Heritage Plan 2012-2016</li> <li>• Kildare Heritage Plan 2014-2018</li> </ul>	<ul style="list-style-type: none"> <li>• Aims to highlight the importance of heritage at a strategic level.</li> </ul>	<ul style="list-style-type: none"> <li>• Manage and promote heritage as well as increase awareness.</li> <li>• Aim to conserve and protect heritage.</li> </ul>		The FRMP study will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
County Landscape Character Assessments <ul style="list-style-type: none"> <li>• Louth County Council Landscape Character Assessment (Louth County Council, 2002)</li> <li>• Landscape, Recreation and Amenities Chapter 14 (Kildare County Council, 2011)</li> </ul>	<ul style="list-style-type: none"> <li>• Characterises the geographical dimension of the landscape.</li> </ul>	<ul style="list-style-type: none"> <li>• Identifies the quality, value, sensitivity and capacity of the landscape area.</li> <li>• Guides strategies and guidelines for the future development of the landscape.</li> </ul>	Requirement of the Planning and Development Act 2000 (S.I. No. 30/2000) as amended  Landscape and Landscape Assessment Guidelines (DoEHLG, 2000)	The FRMP study will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<ul style="list-style-type: none"> <li>The Geological Heritage of Cavan (GSI, 2013)</li> <li>Offaly Historic Landscape Characterisation (Offaly County Council, 2006)</li> </ul>				
Special Amenity Area Orders- None Relevant	<ul style="list-style-type: none"> <li>Aims to protect special areas of landscape, environmental or amenity value</li> </ul>		Local Government (Planning and Development) Act, 1963 (S.I. No. 28/1963) (as amended)	The FRMP study will have regard to these orders and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Shellfish Pollution Reduction Programmes- None Relevant	<ul style="list-style-type: none"> <li>Aims to improve water quality and ensure the protection or improvement of designated shellfish waters in order to support shellfish life and growth and contribute to the high quality of shellfish products directly edible by man.</li> </ul>	<ul style="list-style-type: none"> <li>Identifies key and secondary pressures on water quality in designated shellfish areas.</li> <li>Outlines specific measures to address identified key and secondary pressures on water quality.</li> <li>Addresses the specific pressures acting on water quality in each area.</li> </ul>	European Communities (Quality of Shellfish Waters) Regulations 2006 (SI 268/2006) (as amended) and requirement of Shellfish Waters Directive (2006/113/EC) for designated shellfish waters	Impacts on water quality are of relevance to the FRMP as flooding can be linked with water pollution.
Freshwater Pearl Mussel Sub-Basin Management Plans- None Relevant	<ul style="list-style-type: none"> <li>Identifies the current status of the species and the reason for loss or decline.</li> <li>Identifies measure required to improve or restore current status.</li> </ul>	<ul style="list-style-type: none"> <li>Identifies pressures on Freshwater Pearl Mussels for each of the designated populations in Ireland.</li> <li>Outlines restoration measures required to ensure favourable conservation status.</li> </ul>	Requirement of Water Framework Directive (2000/60/EC) and Habitats Directive (92/43/EEC) European Communities (Water Policy) Regulations 2003	Impacts on water quality are of relevance to the FRMP as flooding can be linked with water pollution.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
			(S.I. No. 722 of 2003) European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) The Wildlife Act 1976 (S.I. No. 39/1976) and The Wildlife (Amendment) Act 2000 (S.I. No. 38/2000)	
<p>Groundwater Protection Schemes</p> <ul style="list-style-type: none"> <li>County Cavan Groundwater Protection Scheme (GSI, 2008)</li> <li>Couth Offaly Groundwater Protection Scheme (GSI and Offaly County Council, 1998)</li> <li>County Kildare Groundwater Protection Scheme (GSI and Kildare County Council, 2002)</li> <li>County Meath Groundwater Protection Scheme (GSI and Meath County Council, 1996)</li> <li>Ballmakenny Group</li> </ul>	<ul style="list-style-type: none"> <li>Preserve and prevent deterioration in quality and identify the status of groundwater.</li> <li>Protect groundwater quality for drinking water purposes.</li> <li>Provides a framework for and informs planning authorities.</li> </ul>	<ul style="list-style-type: none"> <li>Assess and identify the vulnerability, aquifer potential and source protection of groundwater.</li> <li>Map Groundwater Protections Zones.</li> <li>Identify groundwater protection responses for existing and potential environmental risks.</li> <li>Integrate Groundwater Protection Schemes into County Development Plans.</li> </ul>		Impacts on water quality are of relevance to the FRMP as flooding can be linked with water pollution.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
Water Scheme (GSI and Louth County Council, 2011)				
County Renewable Energy Strategies  • County Offaly Wind Strategy (Offaly County Council, 2009)	• Aims to ensure competitive, secure and sustainable energy	<ul style="list-style-type: none"> <li>• Progress renewable energy forms at county level.</li> <li>• Develop sustainable energy forms including renewable electricity, bioenergy, wind energy etc.</li> </ul>	Renewable Energy Directive (2009/28/EC) European Communities (Renewable Energy) Regulations 2011 (S.I. No. 147/2011) The Framework for Climate Change Bill	The FRMP will have regard to these Strategies and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Economic development plans for rural and urban areas  • Cavan Economic Plan 2009-2012 (Cavan County Council, 2009) • Meath Economic Development Strategy 2014-2022 (Meath County Council, 2014) • Offaly Local and Economic & Community Plan 2016-2021 (Offaly County Council, 2015) • Kildare Local and Economic & Community Plan	Plans to enable areas to achieve sustained and sustainable economic growth and development.	<ul style="list-style-type: none"> <li>• Identifies opportunities for development of the economy in an areas</li> <li>• Identifies challenges that may be preventing economic development</li> <li>• Identifies what is required to ensure that the opportunities are realised and jobs created</li> </ul>		The FRMP will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
2016-2021 (Kildare County Council, 2015)				
<p>River Basin Management Plans and associated Programmes of Measures - including International (Northern Ireland) Plans and Programmes</p> <ul style="list-style-type: none"> <li>• Eastern River Basin District Management Plan 2009-2015 (DEHLG, 2010)</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a framework for the protection of water bodies at River Basin District (RBD) level</li> <li>• Preserve, prevent the deterioration of water status and where necessary improve and maintain "good status" of water bodies in that RBD</li> <li>• Promote sustainable water usage</li> </ul>	<ul style="list-style-type: none"> <li>• Aims to improve water quality and quantity within inland surface waters (rivers and lakes), transitional waters coastal waters and groundwater and meet the environmental objectives outlined in Article 4 of the Water Framework Directive</li> <li>• Identifies and manages water bodies in the RBD</li> <li>• Establishes a programme of measures for monitoring and improving water quality in the RBD</li> <li>• Involves the public through consultations</li> <li>• RBMPs are prepared and reviewed every six years. The first RBMPs covered the period 2010 to 2015. The second cycle of developing plans for the period 2015-2021 are currently being prepared.</li> </ul>	<p>Requirement of the Water Framework Directive (2000/60/EC) European Communities (Water Policy) Regulations, 2003 (SI No. 722) (as amended) Guidelines for the Establishment of River Basin District Advisory Councils (RBDAC) (WFD Ireland)</p>	<p>Water quality and quantity is linked to the FRMP as flooding events can lead to water pollution and changes in water levels. The Eastern CFRAM study should promote sustainable management of the water environment by carefully considering current land use and future climate scenarios, minimise the effects of flooding and drought events and to facilitate long term improvements in water quality, including the protection of groundwater.</p>
Water Quality Management Plans- None	<ul style="list-style-type: none"> <li>• Aims to manage and protect water at catchment based level</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure quality of water covered by the plan is maintained and protected</li> <li>• Manages the status of water at catchment level</li> <li>• Aims to prevent and abate pollution</li> </ul>	<p>Requirement of the local Government (Water Pollution) Act 1977 (S.I. No. 1/1977)</p>	<p>Water quality and quantity is linked to the FRMP as flooding events can lead to water pollution and changes in water levels. The FRMP should promote sustainable management of the water</p>

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		of waters		environment by carefully considering current land use and future climate scenarios, minimise the effects of flooding and drought events and to facilitate long term improvements in water quality, including the protection of groundwater.
Business Area Unit <ul style="list-style-type: none"> <li>Midlands BAU (Business Area Unit) 2016-2020 (Coillte, 2016)</li> </ul>	<ul style="list-style-type: none"> <li>Each BAU is a strategic plan which is the core document in the planning framework for the management of Coillte Forests.</li> </ul>	The key principle on which the plan is based which requires meeting four closely related objectives: <ul style="list-style-type: none"> <li>Wise use of natural and cultural resources</li> <li>Effective protection of the environment</li> <li>Sustainable supply of forest products (wood and non-wood)</li> <li>Working with communities</li> </ul>	Forestry Act 2014	The FRMP will have regard to these plans and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Regional Planning Guidelines <ul style="list-style-type: none"> <li>Regional Planning Guidelines for the Border Region 2010-2022, Regional Planning Guidelines Office, 2010)</li> <li>Regional Planning</li> </ul>	<ul style="list-style-type: none"> <li>Gives regional effect to National Spatial Strategy</li> </ul>	<ul style="list-style-type: none"> <li>Guides development for each county in the region</li> <li>Inform County Development Plans in situ with National Spatial Strategy recommendations</li> </ul>	Planning and Development (Amendment) Act 2010 (S.I. No. 30/2010)	The FRMP will have regard to these planning guidelines and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<p>Guidelines for the Greater Dublin Area 2010-2022, (Regional Planning Guidelines Office, 2010)</p> <ul style="list-style-type: none"> <li>Regional Planning Guidelines for the Midland 2010-2022, (Regional Planning Guidelines Office, 2010)</li> </ul>				
<p>Greater Dublin Strategic Drainage Strategy (DCC, 2005)</p>	<ul style="list-style-type: none"> <li>The GDSDS was commissioned in June 2001 to carry out a strategic analysis of the existing foul and surface water systems in the local authority areas of Dublin City, Fingal, South Dublin, Dun LaoghaireRathdown and the adjacent catchments in Counties Meath, Kildare and Wicklow.</li> </ul>	<p>The recommended strategy for the long term drainage requirements for the Greater Dublin Region are;</p> <ul style="list-style-type: none"> <li>New Regional Wastewater Treatment Plant at Portrane</li> <li>Orbital sewer to Blanchardstown</li> <li>Pumped connection from South Dublin to orbital sewer</li> <li>Pumped connection from Leixlip to orbital sewer</li> <li>Pumped connection from Meath to orbital sewer</li> <li>Redirecting excess flows from Swords and Malahide</li> <li>Maintain Ringsend Wastewater Treatment Plant for existing</li> </ul>		<p>The FRMP will have regard to this strategy and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives</p>

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		catchments <ul style="list-style-type: none"> <li>• Upgrade existing treatment works to their ultimate design capacity</li> <li>• Upgrade local sewerage networks</li> </ul>		
Transport Strategy:  Draft Transport Strategy for the Greater Dublin Area 2016-2035 (NTA, 2015)	The Draft Transport Strategy for the Greater Dublin Area 2016-2035, sets out a cohesive and integrated transport framework to support and sustain the region's development.	The Strategy proposes: <ul style="list-style-type: none"> <li>• New Core Bus Network</li> <li>• Luas to Poolbeg / Finglas / Lucan</li> <li>• Metro South – from St Stephens Green to Brides Glen</li> <li>• Rail-based Park and Ride facilities</li> <li>• expand cycling network to 1,485 km</li> </ul>	Dublin Transport Authority Act (2008)	The FRMP will have regard to this strategy and will (in combination with other users and bodies) cumulatively contribute towards the achievement of its objectives.