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CFram  
PROGRAMME  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



## NORTH WESTERN - NEAGH BANN

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

AB06

UoM06

I gcomhpháirtíocht le  
In partnership with



comhairle chontae na mí  
meath county council



Ná tóg as an áit an t-imleabhar seo agus ná scríobh air – chun críche comhairliúcháin amháin  
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# NWNB CFRAM Study

## UoM06

### 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 NWNB CFRAM study area includes three Units of Management (UoM) / Hydrometric Areas (HAs) in Ireland. 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 NWNB CFRAM study includes UoM01 (Donegal) and UoM36 (Erne) in the NW IRBD, and UoM06 (Neagh Bann) in the NB IRBD. There is a high level of flood risk within the NWNB CFRAM Study area with significant coastal and fluvial flooding events having occurred in the past. UoM06 includes hydrometric areas 03 and 06. It covers an area of 1,779 km<sup>2</sup> and includes the majority of County Louth, much of County Monaghan and parts of Meath and Cavan.

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 UoM06 under the NWNB 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 UoM06 within the NWNB 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 UoM06.

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 NWNB 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 UoM06 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. Given the transboundary location of the NWNB CFRAM study with Northern Ireland, there is the potential for transboundary impacts from implementation of the FRMPs and therefore there is a requirement to undertake transboundary consultations as part of this SEA process. The statutory consultee established within the SEA legislation for Northern Ireland is the Northern Ireland Environment Agency (NIEA) (formerly Environment and Heritage Service).

## **DESCRIPTION OF THE PLAN**

The NWNB CFRAM Study informs the development of the four FRMPs for the north region. The NWNB CFRAM study area is the same as the boundary identified for the North Western IRBD and the Neagh Bann IRBD under the first cycle of the Water Framework Directive (WFD) implementation. The NWNB 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 UoM06 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 UoM06 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 UoM06 within the NWNB 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 UoM06 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 five SACs in the study area, of which two are classed as “water dependent” SACs. There are five SPAs in the study area, of which three are classed as “water dependent” SPAs. There is one Ramsar Site in the study area (Dundalk Bay). There is one NHA (Eshbrack Bog) and 48 proposed Natural Heritage Areas (pNHA) in the study area. There are three wildfowl sanctuaries in the UoM06 study area. There is one OSPAR MPA in the UoM06 study area.

## **Population / Human Health**

The 2011 census data held by the Central Statistics Office (CSO, 2011) shows a total population for the UoM06 study area of approximately 147,668. 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 UoM06, the average number of persons per household ranges from 2.78 to 2.97 (CSO, 2011). Within each of the AFAs in UoM06 there is also the potential risk of flooding to high vulnerability sites.

## **Geology, Soil and Landuse**

Calcareous red-mica greywacke forms a quarter of the bedrock in UoM06. A large proportion of this covers most of Louth with some smaller areas in northern Meath and south east Monaghan. A number of Irish Geological Heritage (IGH) sites are within or in the vicinity of an AFA in UoM06. Acid brown earths and brown podzolics cover most of UoM06. Surface water and groundwater gleys derived from non-calcareous parent materials are also distributed widely through the Neagh Bann. Agricultural lands comprise nearly 86% of the UoM06 with the majority used for pasture (67%) 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. Intertidal flats comprise the next most common land use, covering around 3% of the land area.

## **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 UoM06, 25% of rivers, 12% of lakes, and 8% of coastal and transitional water bodies were classified as being of satisfactory condition in the WFD first cycle NWNB River Basin Management Plans. Ten lakes and sections of three rivers in UoM06 are designated as Drinking Water Lakes/Rivers. There are four designated bathing waters in the study area. There are 14 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. All waterbodies within UoM06 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 UoM06 study area has 11.5 km of designated river waterways for the abstraction of drinking water and three drinking water lakes. There are also 17 water treatment plants and 24 waste water treatment facilities within the study area. The UoM06 study area is well serviced by transport infrastructure. There are 5,458 km of roads with 42 km of this being a motorway. There is one train station within the study area (Dundalk). There are three ports in UoM06 (Annagassan, Dundalk and Greenore).

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 UoM06 study area that could be impacted by flooding and flood risk management include 35 Eircom exchanges and six large renewable projects (most of which are 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 UoM06 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 are currently 2,889 recorded monuments within the study area under the Records of Monuments and Places (RMP). There are currently 1,196 records in the NIAH within the UoM06 study area. There are 44 sites subject to a Preservation Order (including six temporary sites) within the UoM06 study area. Of these, three are assessed as being at “High” vulnerability and 13 at “Moderate” vulnerability to flooding.

## **Landscape**

The landscape of UoM06 is a relatively low lying area. Carlingford Mountain with its peak - Slieve Foye - stands at 589 m and is the highest point in the river basin. The AFAs within UoM06 are within the landscapes of counties Louth and Monaghan. The Carlingford Lough and Mountains, including West Feede Uplands, are landscapes of international importance. Carlingford is a major tourist attraction

and visual amenity is important to the AFA. The Annagassan AFA area contains the Dundalk Bay SPA, the impressive coastal routes of high scenic quality and the Dunany Point area. The area most sensitive to change is that north of Termonfeckin where the topography of the land rises up at Castlecoo and falls back down to the coastal plain north of Clogherhead.

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

The most recent fish survey in transitional waters in the UoM06 study area was undertaken in 2009 in Inner Dundalk Bay and the Castletown Estuary (Central and Regional Fisheries Boards, 2010). A total of 11 fish species were recorded in the Castletown Estuary and 16 fish species were recorded in Inner Dundalk Bay. Both waterbodies were assigned a “moderate” Transitional Fish Classification Index (TFCI) status based on these results. The Dee River is known for its stocks of native wild brown trout, as well as Atlantic salmon and sea trout. Game angling is popular in the Ardee area. The River Glyde is also known for stocks of brown trout, sea trout and salmon. Dundalk Bay supports substantial shell fisheries, with several aquaculture sites in the area, mainly for oysters and cockles. Upstream of Dundalk, in Northern Ireland, the Creggan Lower, Cully Water, Forkill/Kilcurry River and the Kilnasaggart River are all designated salmonid rivers. The Fane River is a well-known river for salmon and sea trout fishing and also supports stocks of eel and lamprey among other species. The River Blackwater in Northern Ireland is a designated salmonid river over 6 km downstream of Monaghan. Carlingford Lough, located in Carlingford AFA, is a designated shellfish water with several licensed aquaculture/mariculture sites.

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

In the 2011 census, nearly 52,000 residential properties were identified in the UoM06 study area. Health care facilities in the UoM06 study area include seven hospitals and 19 health centres distributed throughout the region. The study area also includes 10 nursing homes and four residential care homes for the elderly, many of which are also associated with hospitals or health centres. There are 113 primary schools and 21 post-primary schools in the UoM06. There is one third-level education institution located within the study area. There are nine fire stations, 19 Garda stations and two civil defence sites in the UoM06 study area.

The UoM06 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 258 km of amenity walks within the study area and around 112 km of cycle trails. There are four designated bathing waters in UoM06. In 2015, three beaches in Louth achieved “Blue Flag” status. The UoM06 study area encompasses many popular tourist attractions, including the Carlingford Heritage Centre, the Patrick Kavanagh Rural and Literary Resource Centre, and the Market House Venue and Gallery in Monaghan. There are three galleries, two theatres and nine museums located within UoM06.

### **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 UoM06 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 the following **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. The below **Table 2** demonstrates the engineering options (alternatives) that were considered for UoM06. 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.

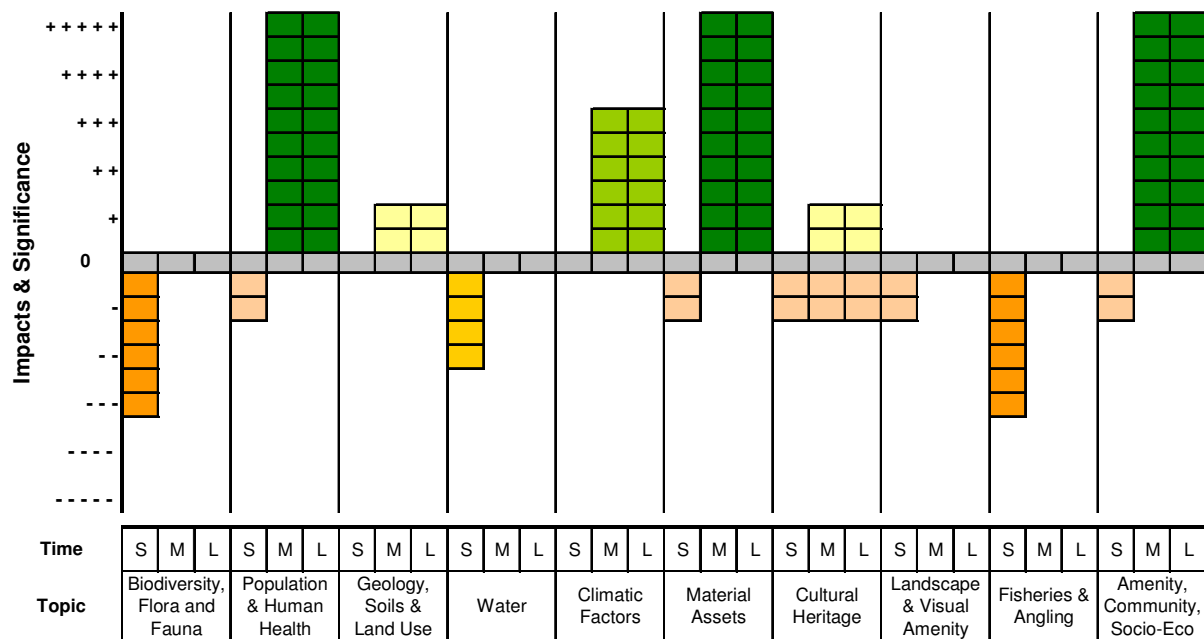
**Table 2 FRM Options for UoM06**

Spatial Scale	Name	Option Number	Description
Sub-Catchment	Glyde-Dee	0	No Options Technically and Economically feasible.
AFA	Annagassan	1	Hard Defences
AFA	Ardee	1	Hard Defences
AFA	Ardee	2	Storage
AFA	Ardee	3	Hard Defences and Storage
AFA	Carlingford & Greenore	1	Fluvial Hard Defences, Coastal Hard Defences, Improved Channel Conveyance and Two Pumping Stations
AFA	Carrickmacross	0	No Options Technically and Economically feasible.
AFA	Dundalk & Blackrock South	1	Hard Defences, Improvement of Channel Conveyance, Storage
AFA	Dundalk & Blackrock South	2	Hard Defences, Improvement of Channel Conveyance, Storage
AFA	Dundalk & Blackrock South	3	Hard Defences, Improvement of Channel Conveyance, Storage, Relocation of Properties
AFA	Dundalk & Blackrock South	4	Hard Defences, Improvement of Channel Conveyance, Storage, Relocation of Properties
AFA	Inniskeen	1	Hard Defences
AFA	Inniskeen	2	Hard Defence and Improved Channel Conveyance
AFA	Inniskeen	3	Hard Defence and Improved Channel Conveyance
AFA	Monaghan	1	Hard Defences Version 1 and Other Works
AFA	Monaghan	2	Hard Defences Version 2 and Other Works
AFA	Termonfeckin	1	Improvement of Channel Conveyance
AFA	Termonfeckin	2	Hard Defences and Improvement of Channel Conveyance

## ASSESSMENT

The methodologies for the many levels of environmental assessment that have been undertaken for the UoM06 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 UoM06 and provides a summary of the potential environmental impacts of the preferred options.

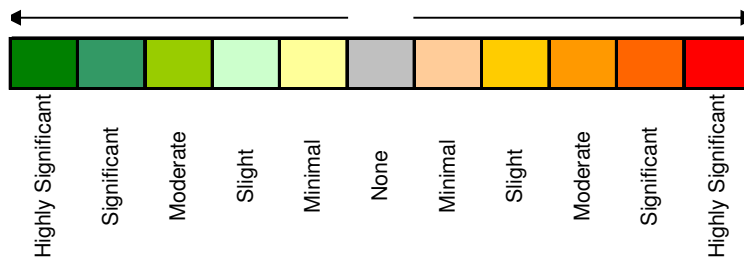
**Annagassan** - Option 1 Hard Defences. At risk properties in flood cell 1 would be protected from walls set back from the existing rock armour along the coastline, a series of walls and embankments adjacent to the mouth of the River Glyde and by improving the existing embankment. These hard defences would protect to the 0.5% AEP tidal event and the 0.5% AEP wave overtopping event with an average height of 1.13 m and a total length of 2422 m.



### Key

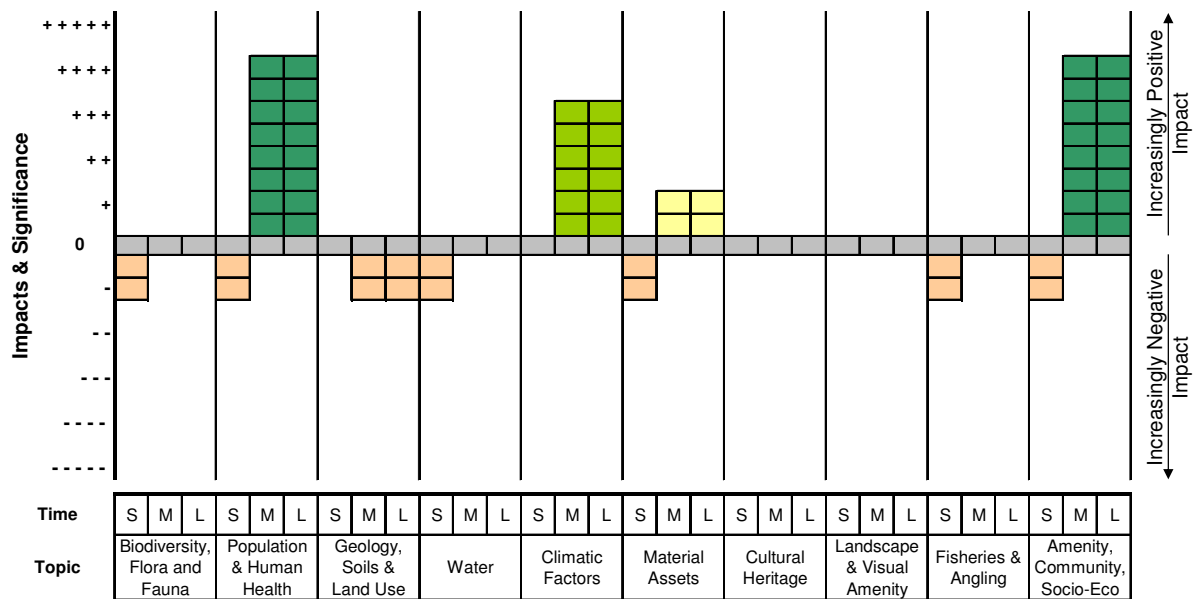
Increasing Positive Impacts

Increasing Negative Impacts



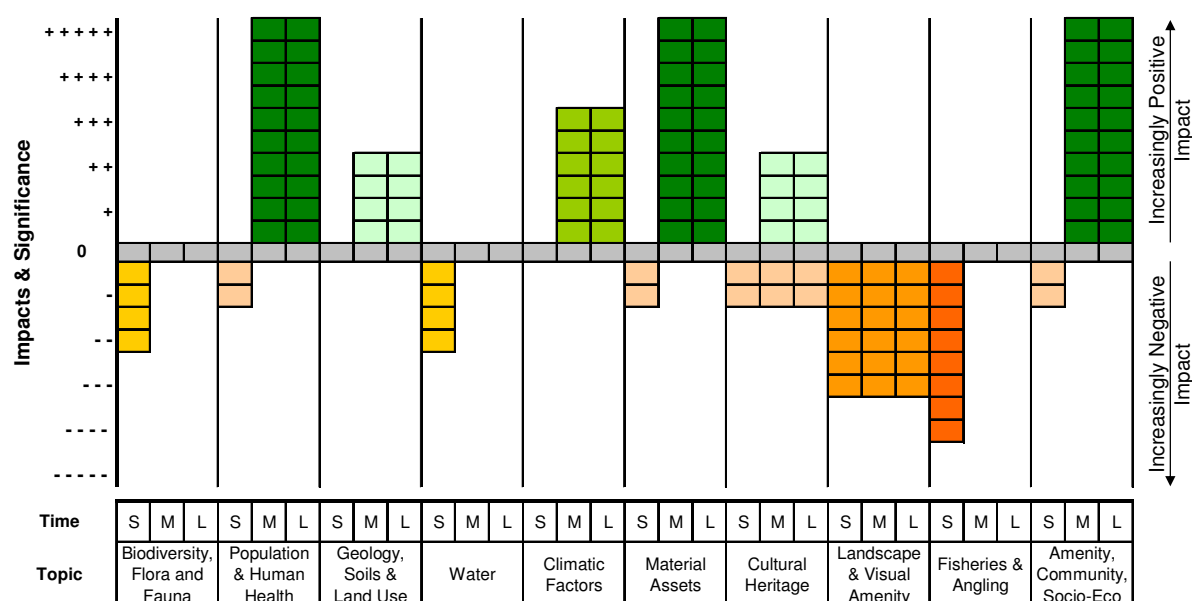
There is the potential for short term, moderate negative impacts on biodiversity, fisheries and angling, and slight negative impacts on water quality from the construction of hard defences adjacent to a number of protected areas including waterbodies known for sensitive species. These impacts are construction phase disturbances that could be mitigated for with good planning and management. The proposed construction of defences and improvement of embankments could provide medium and long term benefits to the soil resource, with a reduction in the area of agricultural land flooded, 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, positive, medium and long term 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 Annagassan AFA will not have a significant adverse impact on European sites.

**Ardee** - 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 flood event with an average height of 0.8m and a total length of 0.6km.



There is the potential for short term, minimal negative environmental impacts from the construction of hard defences. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed construction of hard defences could provide medium and long term benefits to the environment by providing 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 moderate to significant, positive, medium and long term impacts on these topic areas from a reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Ardee AFA will not have a significant adverse impact on European sites.

**Carlingford & Greenore** - Option 1 Fluvial Hard Defences, Coastal Hard Defences, Improved Channel Conveyance and Two Pumping Stations. At risk properties in Flood Cells 1, 2 and 3 would be protected from a series of flood embankments, walls and two pumping stations. The fluvial Hard Defences would contain the flow of 1% AEP fluvial event within the upper reaches of the Carlingford and Carlingford Commons watercourses to provide partial protection. When required during a fluvial event and at high tidal water levels the two Pumping Stations would extract any flood water that cannot be discharged to Carlingford Harbour as normal. The fluvial Hard Defences and the Pumping Station would both need to be in place to achieve full protection from a 1% AEP fluvial event. The coastal Hard Defences would provide design SoP for the 0.5% tidal event and the 0.5% wave overtopping event with an average height of 1 m and a total length of 2.5 km. At risk properties in flood cells 4 and 5 would be protected from a series of flood embankments, walls, and an upgrade to a culvert. The upgraded culvert would contain the flow of 1%AEP fluvial event within the Mullatee watercourse. The coastal Hard Defences would provide design SoP for the 0.5% tidal event with an average height of 0.7 m and a total length of 1 km.

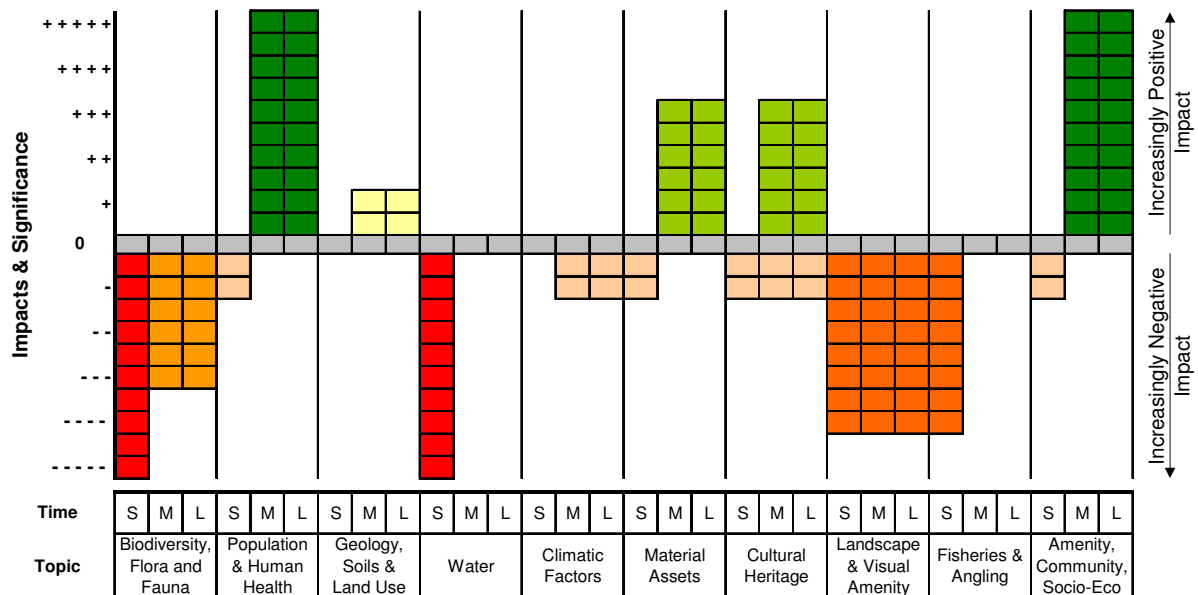


There is the potential for short term, slight negative impacts on biodiversity and water quality, and significant negative impacts on fisheries and angling from the construction of walls, embankments and pumping stations adjacent to a number of protected areas including a sensitive shellfish designated waterbody. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. There will likely be medium and long term benefits with this option in place with reduced flooding to agricultural land, a greater resilience to the potential impacts of climate change and increased protection from flooding for numerous NIAH buildings. However there is also the potential for significant negative visual impacts in the short, medium and long term on a medium sensitivity landscape. 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 Carlingford & Greenore AFA will not have a significant adverse impact on European sites.

**Carrickmacross** - It has been assessed that the level of risk in Carrickmacross 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 Carrickmacross AFA in this SEA Environmental Report.

**Dundalk and Blackrock South (Option 2)** - Option 2 - Hard Defences, Improvement of Channel Conveyance, Storage. At risk properties would be protected from a series of hard defences, including flood embankments and walls, rock armour coastal protection, demountable barriers, road raising, a sluice gate and tanking of property. These defences would be required along with improvement of channel conveyance on the Blackrock River and Dundalk Blackwater River, along with Storage on the Castletown River. This option would protect to the 0.5% mechanism 1 coastal event, the 0.5% mechanism 2 coastal event and the 1% AEP fluvial flood event. Hard defences required have an

average height of 1.4 m and a total length of 19.5km. The improvement of channel conveyance requires a 430 m length of the Blackrock River to be lowered, along with the replacement of two undersized culverts. On the Dundalk Blackwater, two undersized parallel culverts should be replaced. The storage area to be created is located upstream of the Castletown River, allowing a volume of 84,329m<sup>3</sup> to be stored during the 1% AEP fluvial flood event. This requires a short 15 m embankment, along with a culvert and weir in order to retain flow at the 10% AEP event.



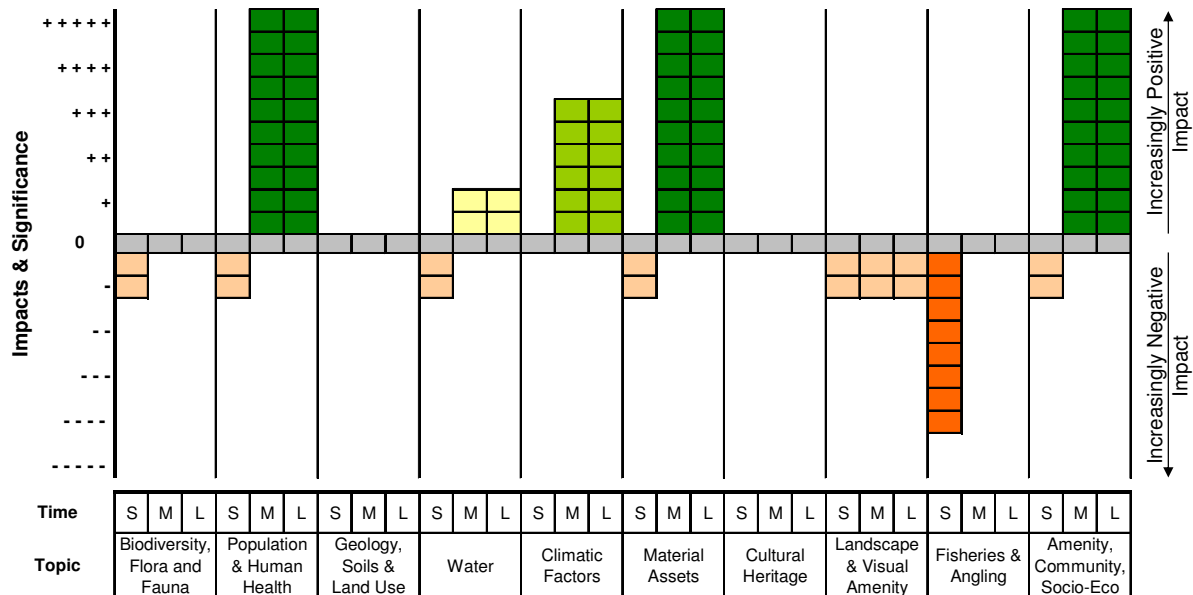
There is the potential for short term, highly significant negative impacts on biodiversity and water quality, and significant negative impacts on fisheries and angling from the construction and restoration of embankments in a number of protected areas, and from dredging activities. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. However negative impacts on biodiversity may continue to the medium and long term with the possible direct loss of habitats from recurring dredging events. There is anticipated to be medium and long term benefits with this option in place with a reduction in flooding to agricultural lands and an increase in protection to several NIAH buildings and recorded monuments from flooding. However there is anticipated to be construction phase and permanent significant negative visual impacts on the moderate value landscape. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be medium and long term, moderate to highly significant positive impacts on these topic areas from a reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Dundalk and Blackrock AFA still have the potential for residual impacts on European sites. This will need investigated further at the detailed design phase, with site specific ecological surveys required to undertake a detailed Stage 2 Appropriate Assessment.

An alternative, more environmentally sustainable option to this is Option 4, which would involve the retreat of defences at Marsh North / Ballymascanlan so they are not bisecting the designated areas, although there still may be works footprints within designated areas. This Option 4 may however be a viable alternative to Option 2 if the impacts on the European sites are deemed to be unacceptable.

**Inniskeen** - Option 1 - Hard Defences. At risk properties would be protected from a series of flood embankments and walls. Hard Defence would also include a 253 m long section of raised road (within

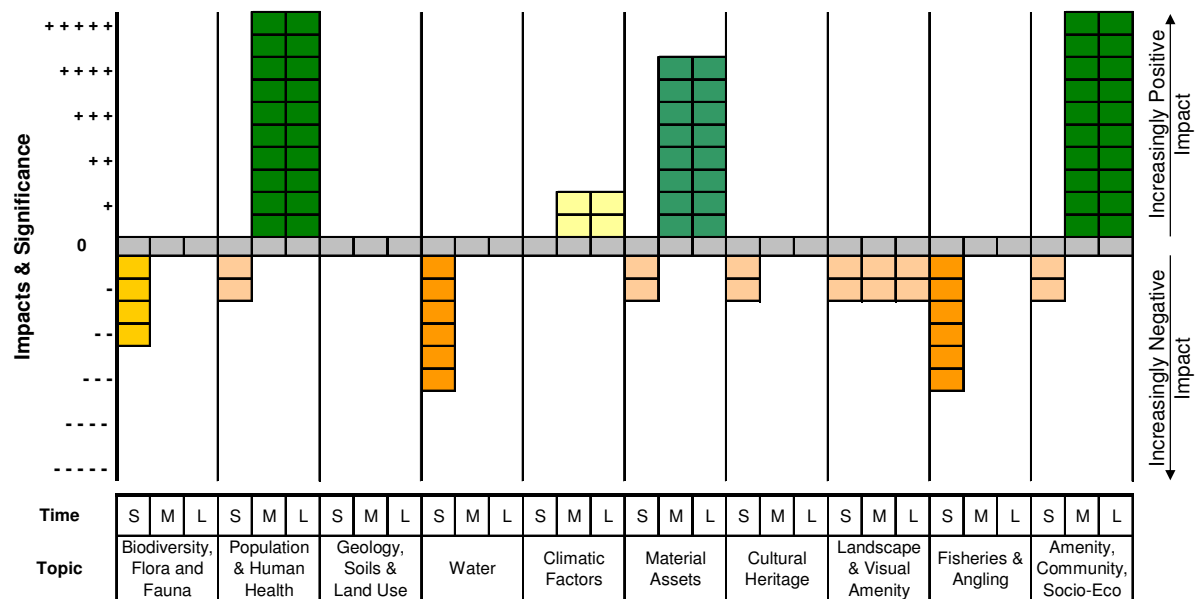


flood cell 2) as space does not allow for walls or embankments. The raising of this road would require that the soffit level of the current structure (0613M01851D) is also increased to accommodate the raised road. These hard defences would protect to the 1% AEP fluvial flood event with an average height of 1.36 m and a total length of 0.64 km.



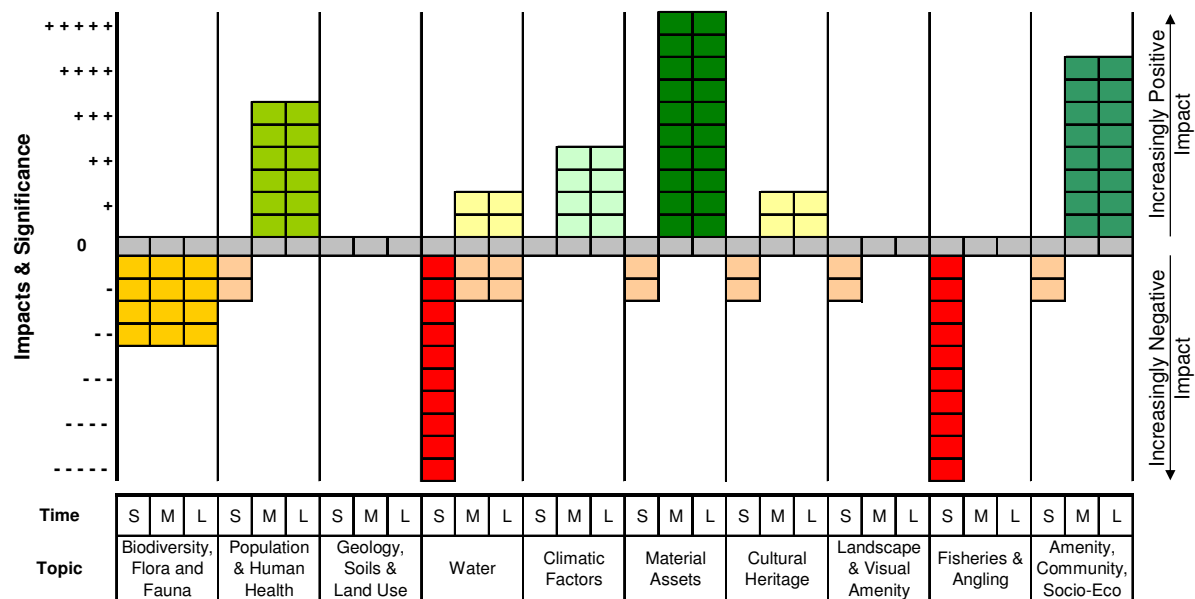
There is the potential for short term, minimal to significant negative environmental impacts from the construction of hard defences. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed construction of hard defences at Inniskeen could provide medium and long term benefits to the environment with a reduced flood risk to the Inniskeen WWTW 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 Inniskeen AFA will not have a significant adverse impact on European sites.

**Monaghan** - Option 2 - Hard Defences Version 2 and Other Works. At risk properties would be protected from a series of flood embankments and walls in flood cells 1-9 with additional measures in place to protect properties in flood cell 5. Additionally the road junction would be protected within flood cell 2. These FRM methods would protect properties only in flood cells 1-9 and the road junction in flood cell 2 to the 1% AEP flood event.



There is anticipated to be short term, slight to moderate negative impacts on biodiversity, water quality, fisheries and angling from the construction of hard defences set back from the waterbody. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed hard defences may provide medium and long term environmental benefits with a greater resilience to the potential impacts of climate change. However there is the potential for construction phase and permanent minimal negative visual impacts on local views. 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 Monaghan AFA will not have a significant adverse impact on European sites.

**Termonfeckin** - Option 1 - Improvement of Channel Conveyance. At risk properties would be protected from improvement of channel conveyance in two areas along the Termonfeckin watercourse. This FRM option would protect to the 1% AEP flood event.



There is the potential for short term, slight to highly significant, negative sedimentation and morphological impacts on biodiversity, water, fisheries and angling as a result of an improvement in channel conveyance. In addition, the recurring dredging events will likely result in medium and long term minimal to slight negative impacts to biodiversity and water quality. The proposed improved channel conveyance will likely provide environmental benefits with a reduction in flooding 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 moderate 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 Termonfeckin AFA, may have residual impacts on Boyne Coast and Estuary SAC and Boyne Estuary SPA. This relates to the potential for intermittent residual sedimentation impacts on wetland habitats during flood events or maintenance following dredging of the Termonfeckin River. This will need investigated further at the detailed design phase, with site specific ecological surveys required to undertake a detailed Stage 2 Appropriate Assessment. All options assessed for Termonfeckin require improvement of channel conveyance. The construction of the FRM measures and any ongoing maintenance dredging should employ effective preventative measures to contain suspended solids and other pollutants.

## APPROPRIATE ASSESSMENT

An AA Screening was undertaken for the NWNB CFRAM Study in late 2015 / early 2016, which demonstrated the potential European sites that may be negatively impacted upon by FRM activities in UoM06. 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 Appropriate Assessment it has been concluded that, provided the avoidance and mitigation measures suggested in the NIS are adopted at the project stage, the majority of the proposed draft FRM measures in the UoM06 FRMP will not have a significant adverse impact on the above European sites. The potential for residual impacts following mitigation were however identified from proposed FRM options at Dundalk & Blackrock South and Termonfeckin. These potential impacts would need investigated further at the detailed design phase, with site-specific hydrological, hydraulic, ecological and bird surveys required to undertake a detailed Stage 2 Appropriate Assessment.

## **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 NWNB 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 06 (UoM06) under the North Western – Neagh Bann (NWNB) Catchment-based Flood Risk Assessment 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 NWNB 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.

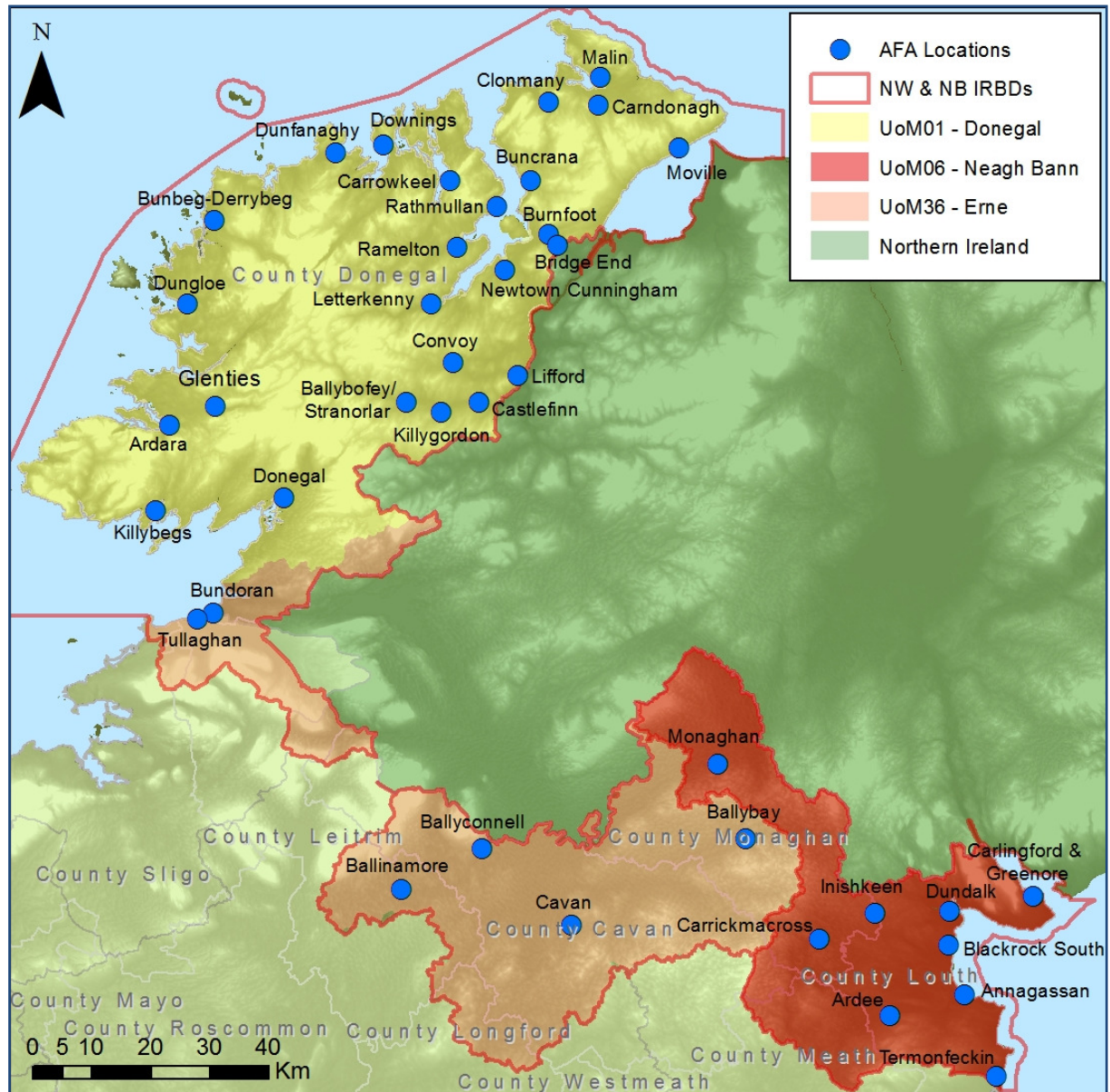
The NWNB CFRAM study commenced in the North Western and Neagh Bann River International Basin Districts (IRBDs) in April 2011 and will run until the end of 2016. The North Western District is a cross-border river basin district (RBD) with approximately 7,400 km<sup>2</sup> in Ireland and 4,900 km<sup>2</sup> in Northern Ireland. The district is home to less than half a million people and has a relatively low population density. Less than 2% of the land area is urbanised and many people live in small villages or single dwellings in rural areas. The fertile soils of the Foyle and Erne basins support beef, dairy, sheep and pig farming as well as crop cultivation. Further west the landscape is mountainous, with many coniferous forest plantations and some sheep and cattle grazing. The spectacular coastline, the surfing beaches and the remote beauty spots attract many tourists. The Neagh Bann District is also a cross-border river basin district with approximately 2,000 km<sup>2</sup> in Ireland and 6,000 km<sup>2</sup> in Northern Ireland. The district is home to over half a million people. Agriculture, mainly livestock grazing on pasture land, is the main activity in the district.

The Local Authorities within the NWNB CFRAM study area are:

- |                            |                            |
|----------------------------|----------------------------|
| • Cavan County Council;    | • Louth County Council;    |
| • Donegal Council;         | • Meath County Council;    |
| • Leitrim County Council;  | • Monaghan County Council; |
| • Longford County Council; | • Sligo County Council.    |

The NWNB CFRAM study area includes three Units of Management (UoM). The UoMs constitute major catchments / river basins (typically greater than 1,000 km<sup>2</sup>) and their associated coastal areas, or conglomerations of smaller river basins and their associated coastal areas. The North Western IRBD includes two UoMs in Ireland, UoM01 (Donegal) and UoM36 (Erne). The Neagh Bann IRBD covers represents one single UoM in Ireland, UoM06 (Neagh Bann). The UoMs and the AFAs in the NWNB CFRAM study area are shown in **Figure 2.1**.

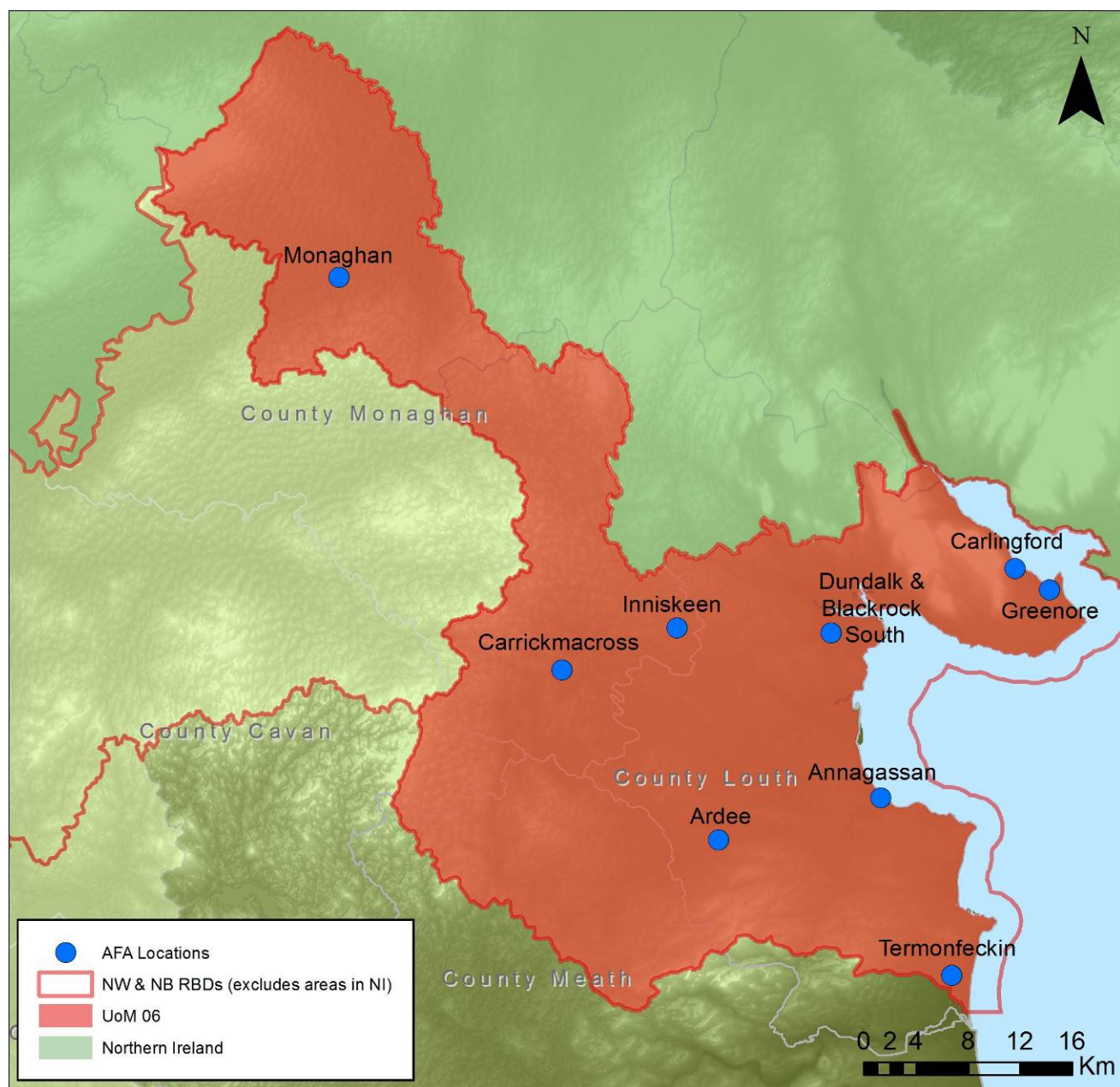




**Figure 2.1 NWNB CFRAM Study area, HAs / UoMs and AFAs**

## 2.4 UOM06

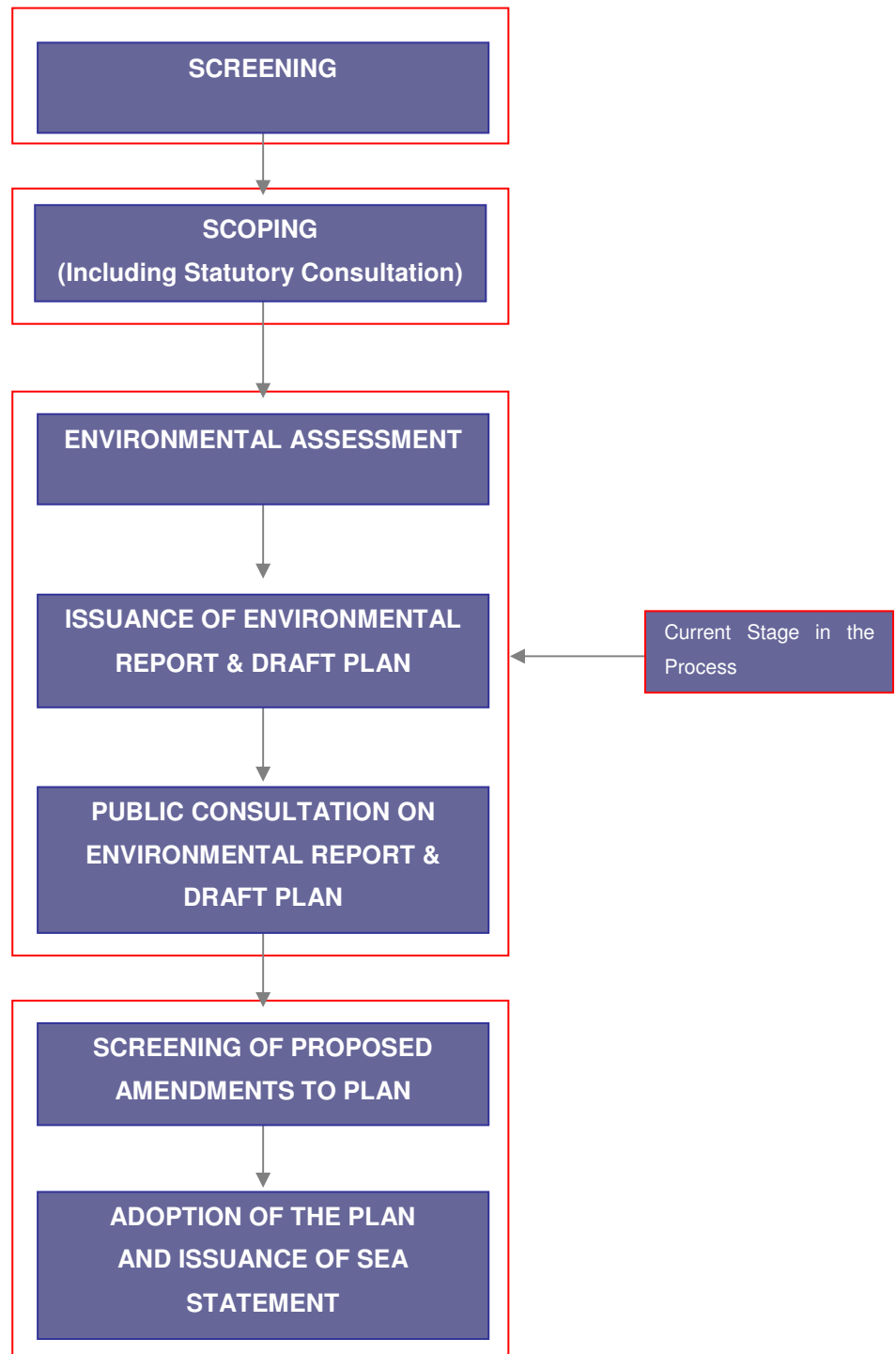
UoM06 includes hydrometric areas 03 and 06. It covers an area of 1,779 km<sup>2</sup> and includes the majority of County Louth, much of County Monaghan and parts of Meath and Cavan. The principal rivers in UoM06 are the Fane, Glyde and Dee rivers (which flow eastwards into the Irish Sea) and the Blackwater River (which flows over the border into Northern Ireland in the northern reaches of the UoM). There are nine AFAs located within UoM06. UoM06 and the AFAs in the UoM are shown in **Figure 2.2**.



**Figure 2.2 UoM06 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 1000 km<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:

<http://nwnb.cfram.com/>

### 3.4 SCOPING FOR SEA

The SEA Scoping for the NWNB 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 NWNB CFRAM Study. The purpose of the Scoping Report and associated documents was to provide sufficient information on the NWNB 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 NWNB CFRAM Study can be found at: <http://nwnb.cfram.com/>

#### 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).

Given the transboundary location of the NWNB CFRAM study with Northern Ireland, there is the potential for transboundary impacts from implementation of the FRMPs and therefore there is a requirement to undertake transboundary consultations as part of this SEA process. The statutory consultee established within the SEA legislation for Northern Ireland is the Northern Ireland Environment Agency (NIEA) (formerly Environment and Heritage Service).

### 3.5 APPROPRIATE ASSESSMENT

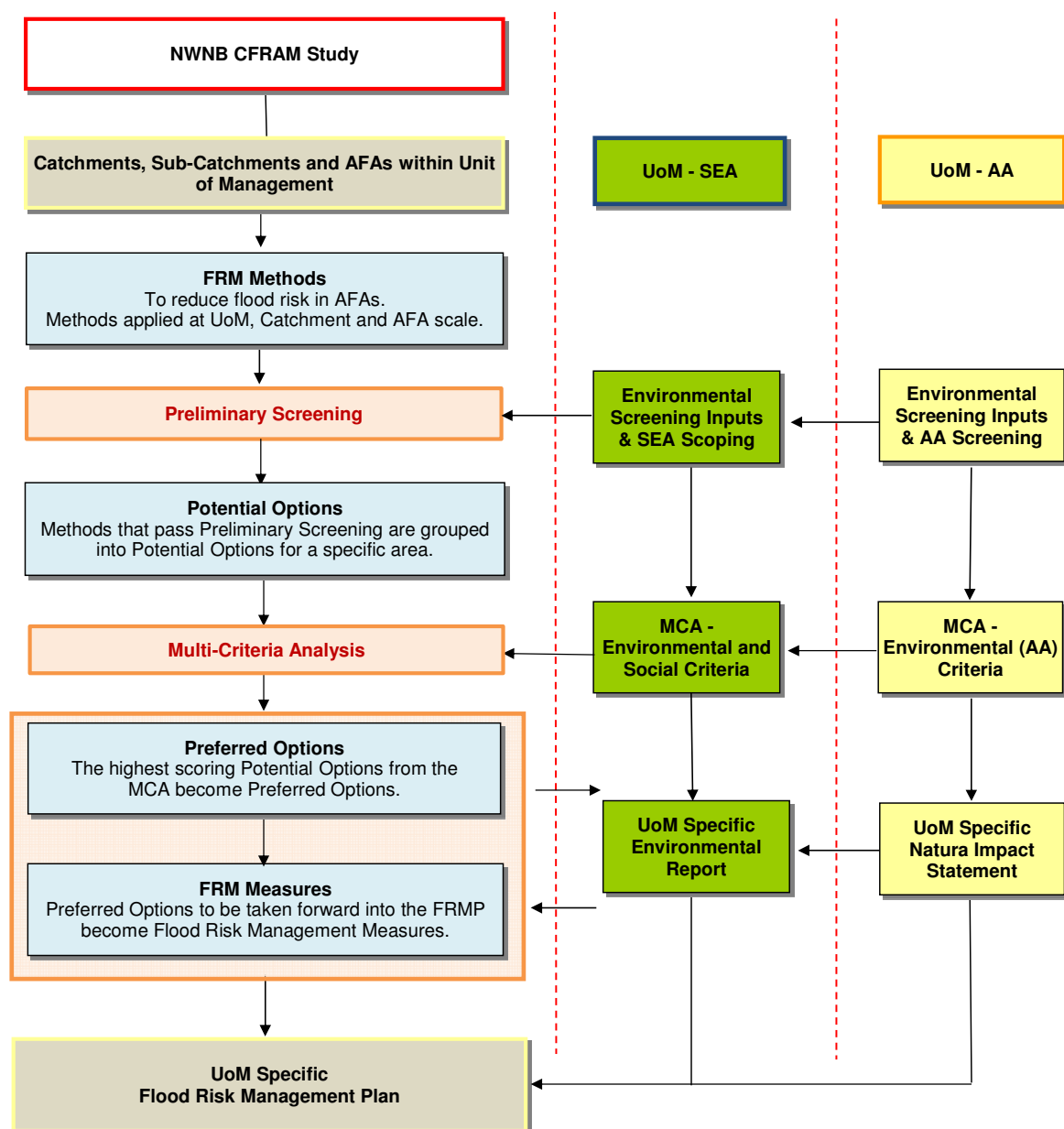
The Habitats Directive (Council Directive 92/43/EEC) on the conservation of natural habitats and of wild fauna and flora obliges member states to designate, protect and conserve habitats and species of

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 (AA). 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 NWNB 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 UoM06. 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 UoM06 within the NWNB 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 UoM06. 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 NWNB 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 UoM06 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
- Population & Human Health
- Geology, Soils and Landuse
- Water
- Climatic Factors
- Material Assets & Infrastructure
- Cultural, Architectural & Archaeological Heritage
- Landscape & Visual Amenity
- Fisheries & Angling

- Amenity, Community & Socio-Economics

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

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

## 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 UoM06 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 UoM06 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 NWNB CFRAM Study was circulated on the 15<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 this Scoping pack and all information was made publically available on the NWNB CFRAM website. The stakeholders contacted for this study are included in **Appendix E** of this Environmental Report. This SEA Scoping Pack consisted of a NWNB CFRAM Study SEA Scoping Report, a table of High Level Impacts of FRM Methods, a NWNB CFRAM Study SEA Scoping Summary and a NWNB 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**

Given the transboundary location of the NWNB CFRAM study with Northern Ireland, there is the potential for transboundary impacts from implementation of the FRMPs and therefore there is a requirement to undertake transboundary consultations as part of this SEA process. The statutory consultee established within the SEA legislation for Northern Ireland is the Northern Ireland Environment Agency (NIEA) (formerly Environment and Heritage Service).

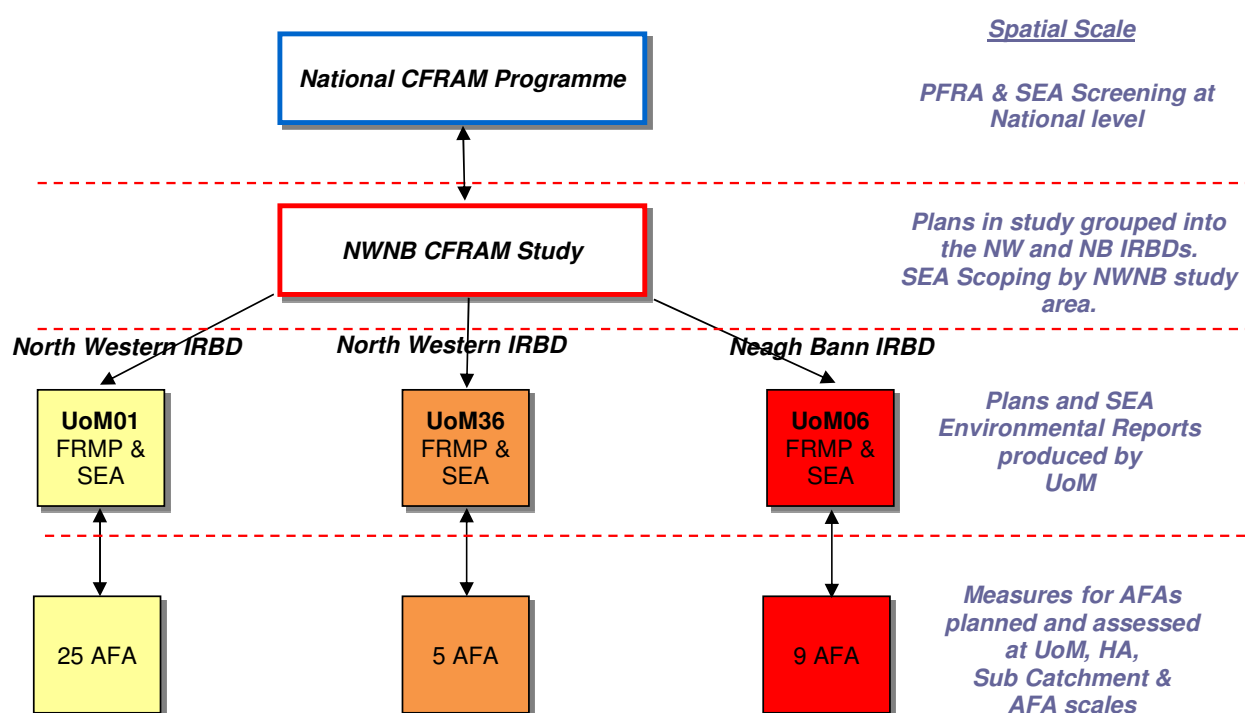
#### **4.7.3 Proposed Consultation on Draft Plan and Environmental Report**

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 NWNB CFRAM Study website: <http://nwnb.cfram.com/>

## 5 DESCRIPTION OF THE PLAN

### 5.1 INTRODUCTION

The NWNB CFRAM Study informs the development of the three FRMPs for the NWNB region. The NWNB CFRAM study area is the same as the boundary identified for the North Western IRBD and Neagh Bann IRBD under the first cycle of the Water Framework Directive (WFD) implementation. The NWNB 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 NWNB CFRAM Study, FRMPs and SEAs.



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

The purpose of the FRMP for UoM06 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 UOM06 FLOOD RISK MANAGEMENT PLAN

**Table 5.1** sets out the proposed elements of the UoM06 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 UoM06 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 UoM06 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 UoM06**

AFA/HPW	County	UoM / HA
Annagassan	Louth	6
Ardee	Louth	6
Carlingford & Greenore	Louth	6
Carrickmacross	Monaghan	6
Dundalk & Blackrock South	Louth	6
Inniskeen	Monaghan	6
Monaghan	Monaghan	6
Termonfeckin	Louth	6

## 5.4 TEMPORAL SCOPE

The UoM06 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 UoM06 within the NWNB 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 UoM06 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 five SACs in the UoM06 study area of which two are classed as “water dependent” SACs. Information relating to these SACs is found in **Table 6.1**. As there is the potential for transboundary impacts from implementation of the FRMPs, potential impacts on SACs within the Northern Ireland areas of the NBIRBD will also be reviewed as part of the SEA scoping. In Northern Ireland, there are 12 SACs in the NBIRBD. The SACs in the UoM06 study area, as well as those in the Northern Ireland areas of NBIRBD are shown in **Figure 6.1**.

**Table 6.1 SACs within UoM06 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').
Carlingford Mountain	Annex I habitats 4060 Alpine and Boreal heaths, 8110 Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> ), 8210 Calcareous rocky slopes with chasmophytic vegetation, and 8220 Siliceous rocky slopes with

	chasmophytic vegetation.
Carlingford Shore	Annex I habitats 1210 Annual vegetation of drift lines and 1220 Perennial vegetation of stony banks.
Clogher Head	Annex I habitats 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts and 4030 European dry heaths.
Dundalk Bay*	Annex I habitats 1130 Estuaries, 1140 Mudflats and sandflats not covered by seawater at low tide, 1220 Perennial vegetation of stony banks, 1310 Salicornia and other annuals colonizing mud and sand, 1330 Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> ) and 1410 Mediterranean salt meadows ( <i>Juncetalia maritimi</i> ).

\* 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 five SPAs in the UoM06 study area (of which, three are classed as “water dependent” SPAs). Information relating to these SPAs is found in **Table 6.2**. As there is the potential for transboundary impacts from implementation of the FRMPs, potential impacts on SPAs within the Northern Ireland areas of the NBIRBD will also be reviewed as part of the SEA. In Northern Ireland there are seven SPAs in the NBIRBD. The SPAs located in UoM06, as well as those in the Northern Ireland areas of the NBIRBD are shown in **Figure 6.1**.

**Table 6.2 SPAs within UoM06 and their Qualifying Interests**

SPA	Qualifying Interest(s)
Boyne 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> .
Carlingford Lough*	“Wetlands” habitat which hosts internationally important wintering populations of the Annex I species Brent Goose <i>Branta bernicla hrota</i> .
Dundalk Bay*	The qualifying interests are for “wetlands and waterbirds” including wintering populations of the Annex I bird species Great Crested Grebe <i>Podiceps cristatus</i> , Greylag Goose <i>Anser anser</i> , Light-bellied Brent Goose <i>Branta bernicla hrota</i> , Shelduck <i>Tadorna tadorna</i> , Teal <i>Anas crecca</i> , Mallard <i>Anas platyrhynchos</i> , Pintail <i>Anas acuta</i> , Common Scoter <i>Melanitta nigra</i> , Red-breasted Merganser <i>Mergus serrator</i> , Oystercatcher <i>Haematopus ostralegus</i> , Ringed Plover <i>Charadrius hiaticula</i> , Golden Plover <i>Pluvialis apricaria</i> , Grey Plover <i>Pluvialis squatarola</i> , Lapwing <i>Vanellus vanellus</i> , Knot <i>Calidris canutus</i> , Dunlin <i>Calidris alpina</i> , Black-tailed Godwit <i>Limosa limosa</i> , Bar-tailed Godwit <i>Limosa lapponica</i> , Curlew <i>Numenius arquata</i> , Redshank <i>Tringa totanus</i> , Black-headed Gull <i>Chroicocephalus ridibundus</i> , Common Gull <i>Larus canus</i> , and Herring Gull <i>Larus</i>



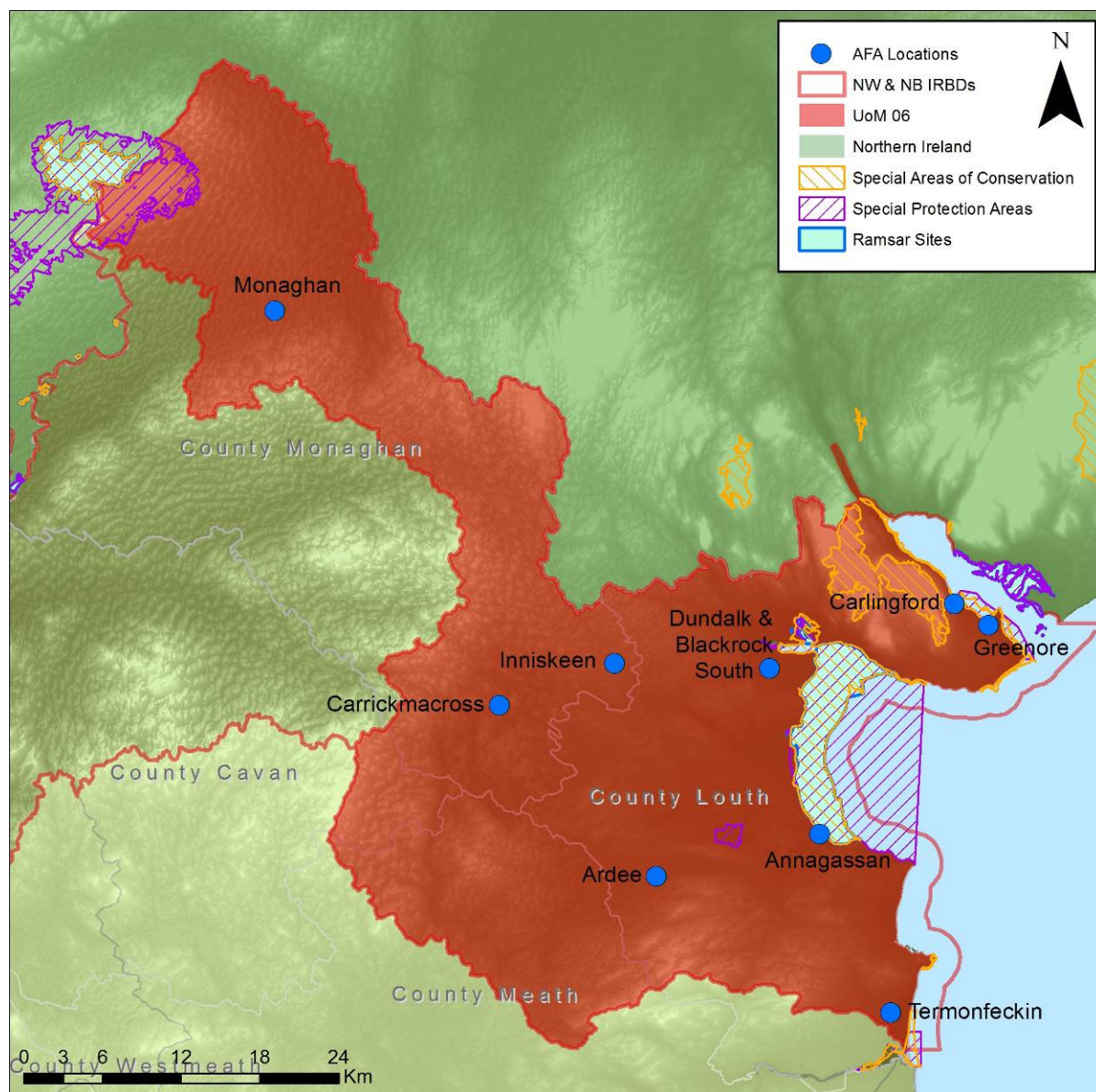
	<i>argentatus</i> .
Slieve Beagh	Annex I species Hen Harrier <i>Circus cyaneus</i> .
Stabannan-Braganstown	Annex I species Greylag Goose ( <i>Anser anser</i> ) for which the site supports an internationally important wintering population (35% of national total).

\* denotes those SPAs that are water dependent.

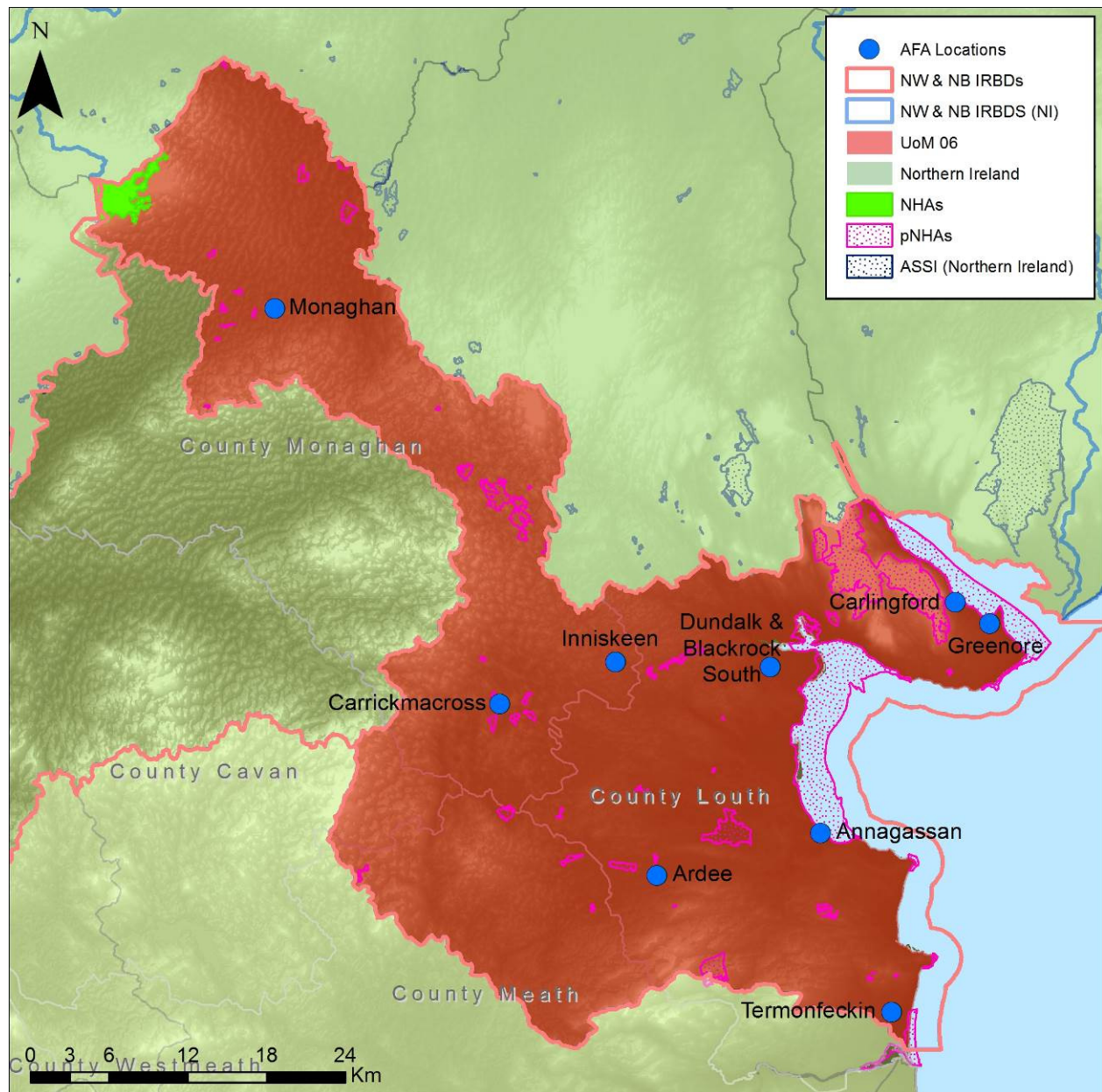
- Ramsar Sites are designated under the Convention on Wetlands of International Importance for the protection of wetland areas (which are important feeding habitats for birds). All Ramsar Sites are also recognised as SPAs and/or SACs and so are afforded protection by the European Communities (Birds and Natural Habitats) Regulations 2011. There is one Ramsar Site located in UoM06 (Dundalk Bay);
- As there is the potential for transboundary impacts from implementation of the FRMPs, potential impacts on Ramsar Sites within the Northern Ireland areas of the NBIRBD will also be reviewed as part of the SEA. In Northern Ireland there are three Ramsar Sites in the NBIRBD. The Ramsar Sites in the UoM06, as well as those in the Northern Ireland areas of the NBIRBDs are shown in **Figure 6.2**;
- 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 is one NHA in the UoM06 study area (Eshbrack Bog). There are a further 48 proposed Natural Heritage Areas (pNHA) in the study area. These 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. As there is the potential for transboundary impacts from implementation of the FRMPs, potential impacts on Areas of Special Scientific Interest (ASSI) within the Northern Ireland areas of the NBIRBDs will also be reviewed as part of the SEA. ASSIs are areas of land that have been identified by scientific survey as being of the highest degree of conservation value, either because of the flora or fauna that is found on it, or because of geological features. In Northern Ireland there are 107 ASSI sites in the NBIRBD. The NHA and pNHAs in UoM06 as well as the ASSIs in the Northern Ireland areas of the NBIRBD are shown in **Figure 6.2**;
- 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 are three wildfowl sanctuaries in the UoM06 study area (Ballymascanlan Estuary, Boyne Estuary and Lurgan Green);
- 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 within UoM06;
- Nature reserves are identified as being important habitats to support wildlife and are protected under Ministerial Order. There are no nature reserves in the UoM06 study area;
- 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 in UoM06. As there is the potential for transboundary impacts from the implementation of the FRMPs, potential impacts on FPM catchments in Northern Ireland will also be reviewed in the SEA. Northern Ireland has two FPM catchments in the NBIRBD.

- 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 is one OSPAR MPA in UoM06.



**Figure 6.1 Sites with International Environmental Designations**



**Figure 6.2 Sites with National Environmental Designations**

The biodiversity value of much of the UoM06 study area has been recognised, with a significant proportion of the catchment designated as of European or national importance. Some of the SACs and SPAs are on or adjacent to estuaries, such as Boyne Coast and Estuary, and Dundalk Bay. The shallow mudflats and sandflats in these estuaries provide important feeding habitats for wintering waterfowl. The Boyne Coast and Estuary SAC is located 1km downstream of Termonfeckin AFA. Dundalk Bay SAC, SPA and Ramsar Site is located directly within, directly downstream and adjacent to Annagassan Strabannan AFA and Dundalk & Blackrock South AFA.

Some of the inland environmental designations are for areas of bog or peatland, for example, Eshbrack Bog NHA and Ardee Cutaway Bog pNHA. 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.

Non-native, invasive species are a particular threat to the native flora and fauna of UoM06. Problematic areas are mainly river valleys, however coastal areas are also at risk from species such as hottentot fig (*Carpobrotus edulis*) which is an aggressive invader of coastal habitat. As these non-native species could be spread by flooding or flood risk management measures, particularly plants, they therefore require appropriate mitigation and control strategies.

It should be noted that an Appropriate Assessment Screening has been undertaken for the NWNB CFRAM Study. This Screening exercise established that nine European sites (four SACs and five SPAs) have the potential to experience an impact from FRM methods in six of the AFAs in UoM06 (**Table 6.3**). These sites would require further investigation at Stage 2 Appropriate Assessment:

**Table 6.3 SACs and SPAs Screened-In from UoM06 AA Screening**

AFA with Identifiable Impact Pathway to European Site	European Site	Site Code
<b>Annagassan</b>	Dundalk Bay SAC Dundalk Bay SPA Strabannan-Braganstown SPA	000455 004026 004091
<b>Ardee</b>	Dundalk Bay SAC Dundalk Bay SPA	000455 004026
<b>Blackrock South</b>	Dundalk Bay SAC Dundalk Bay SPA	000455 004026
<b>Carlingford &amp; Greenore</b>	Carlingford Lough SPA Carlingford Lough SPA (NI) Carlingford Mountain SAC Carlingford Shore SAC	004078 UK9020161 000453 002306
<b>Dundalk</b>	Dundalk Bay SAC Dundalk Bay SPA	000455 004026
<b>Inniskeen</b>	Dundalk Bay SAC Dundalk Bay SPA	000455 004026
<b>Termonfeckin</b>	Boyne Coast And Estuary SAC Boyne Estuary SPA	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 (**Section 9**) of the report.

### **Future Trends**

In the future, it is likely that there will be benefits to 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.

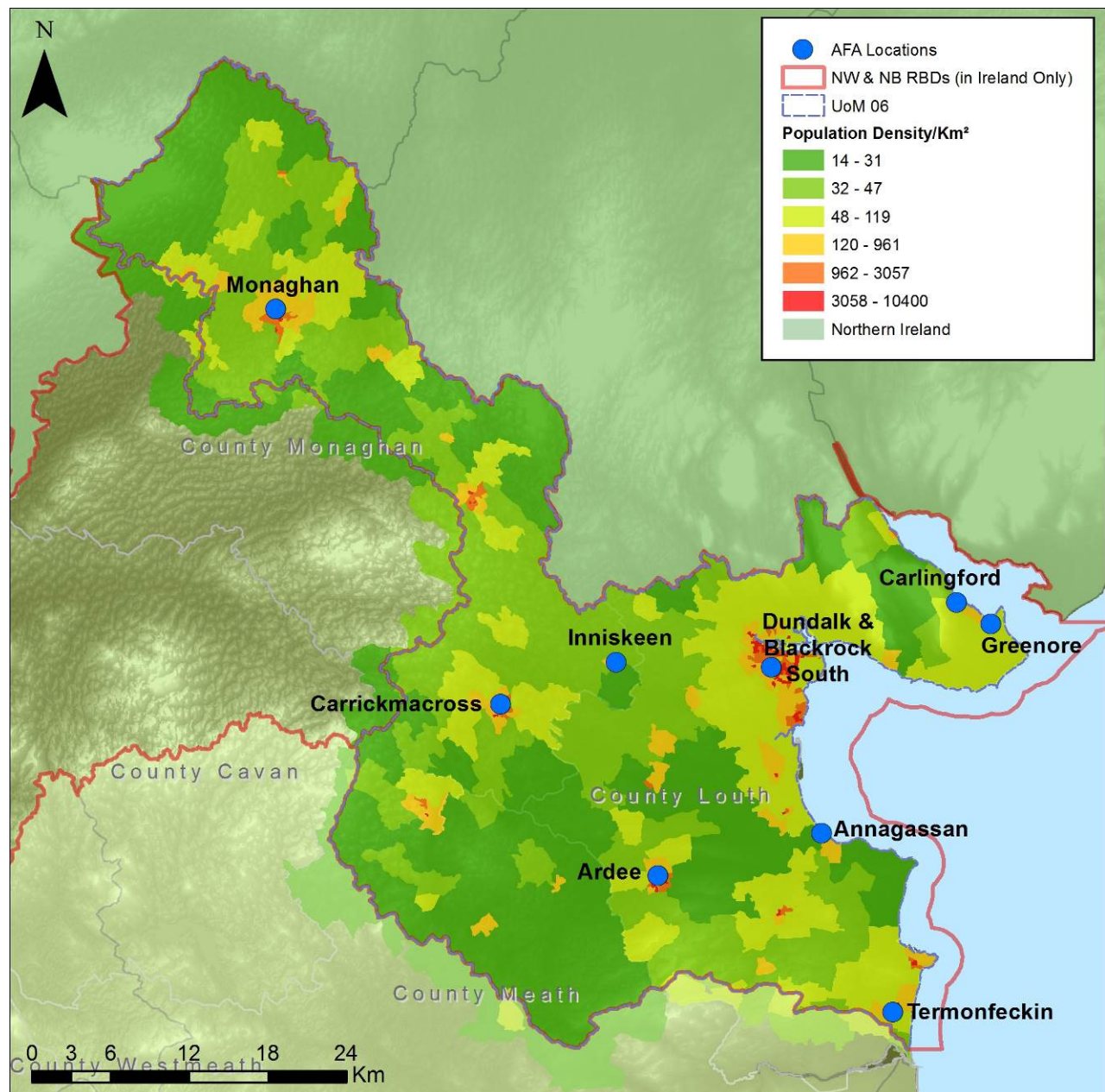
Changes in land use, such as increasing urbanisation, afforestation or changing agricultural practices, will continue to threaten biodiversity within the UoM06 study area, both within and outside of the designated sites.

### **Key Issues**

- Consideration of the 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 UoM06 study area, in addition to those outside the study area, including in Northern Ireland, that may be impacted by proposals within the FRMP;
- 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 catchments designated for FPM in UoM06, there is the potential for 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 UoM06 study area of approximately 147,668. UoM06 is very rural in nature. The primary settlements include the towns of Dundalk, Monaghan, Carrickmacross, Castleblaney and Ardee. The population has increased in County Monaghan by 8%, in County Cavan by 14.3%, in County Meath by 13.1% and in County Louth by 10.5% since the last census in 2011. The population density by electoral division for the UoM06 study area is shown in **Figure 6.3** (CSO, 2011).



**Figure 6.3 Population Density (population/km<sup>2</sup>) 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

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

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 showed 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 of the risk to the population and human health. Within UoM06, the average number of persons per household ranges from 2.78 to 2.97 (CSO, 2011). Within each of the AFAs in UoM06 there is also the potential risk of flooding to highly vulnerability sites such as hospitals and schools. **Table 6.4** provides a summary of the number of residential properties and the number of high vulnerability social receptors within each of the AFAs in UoM06 at risk of flooding in a 1% AEP fluvial and/or 0.5% AEP coastal event.

**Table 6.4 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
Annagassan	22	0
Ardee	6	0
Calingford Greenore	255	0
Carrickmacross	7	0
Dundalk & Blackrock South	1,169	1 Ambulance Station
Iniskeen	9	0
Monaghan	13	0
Termonfeckin	5	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.

### **Future Trends**

The population trend within the UoM06 study area is generally one of increasing growth, broadly matching the national average growth through the last census period of around 8.1%. 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 UoM06 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;
- 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 UoM06 study.

## **6.4 GEOLOGY, SOILS & LAND USE**

Calcareous red-mica greywacke forms a quarter of the bedrock in UoM06. A large proportion of this covers most of Louth with some smaller areas in northern Meath and south east Monaghan. Formations of calcareous greywacke and banded mudstone run in a north-east direction in the southern part of the UoM, spanning across northern Meath and into Louth before reaching the coast. In the northern part of the river basin district, argillaceous limestone and siltstone is present in a large area in northern Monaghan along the Northern Irish border. Micrite, crinoidal grainstone/packstone has a large formation in southern Monaghan, but also extends into northern Meath. Other significant formations of bedrock include massive sandstone and microconglomerate in eastern Monaghan, along the Northern Irish border, and dark quartz greywacke and conglomerate extending northwards from northern Meath, through eastern Cavan to Monaghan.

The GSI and the DAHG are currently identifying sites of geological interest across the country 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 UoM06. For example, Ardee-Newton Bedform field (a field with a huge variety and range of features) is located within Ardee AFA. Castlebellingham Morainic Complex (a large accumulation of sands and gravels deposited at the edge of the retreating ice margin) and Dundalk Bay (extensive flats and associated beach, dune and slack features) are located downstream of this same AFA. In addition, Dundalk Bay, a wide coastal embankment incorporating wide expanses of coastal flats, and Carlingford Area, which provides excellent examples of palaeogene volcanic and intrusive igneous rocks, minerals and metamorphosed country rocks, are located within the Dundalk & Blackrock South AFA.

**Table 6.5** details the quarries and pits found within UoM06. There are no mines located within UoM06. The locations of these sites are illustrated in **Figure 6.4**, along with the areas of unproductive aquifers in the UoM06 study area. These poorly productive aquifer areas can indicate areas of reduced infiltration and rejected groundwater recharge which could contribute to flood risk. Most of Louth, as well as large parts of Monaghan, have bedrock that is generally unproductive. Other areas of unproductive bedrock are located in northern Meath, and eastern Cavan.

**Table 6.5 Quarries and Pits located within UoM06**

Operation	Name	Location
Quarries	Donagh Quarry	Glaslough, Co. Monaghan
	Dunleer Quarry	Dunleer, Co. Louth
	Gallstown Quarry	Drogheda, Co. Lough
	Irish Stoneware & Fireclays Ltd.	Carrickmacross, Co. Monaghan
	McQuaid Quarries Ltd.	Clontibret, Co. Monaghan
	Mokeeran Quarry	Carrickmacross, Co. Monaghan
	Roadstone Barley Hill Quarry	Kingscourt, Co. Cavan
	Roadstone Castleblayney Quarry	Castleblayney, Co. Monaghan
	Watterson Quarry	Carrickroe, Co. Monaghan
Pits	Duffy's Pit	Mountbagnall, Co. Louth
	Dundalk Quarry Products (Loughran's Pit)	Mountbagnall, Co. Louth
	Dundalk Quarry Products (Riverstown)	Dundalk, Co. Louth
	Kingscourt Brick Ltd.	Kingscourt, Co. Cavan
	Paddy Lynch (Dundalk) Ltd.	Mountbagnall, Co. Louth
	Rampark Pit	Rathmore, Co. Louth
	Roadstone Silica Sand Ltd. (Ardagh)	Kingscourt, Co. Cavan
	Roadstone Silica Sand Ltd.(Carrickaleck)	Kingscourt, Co. Cavan

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 through the implementation of flood risk

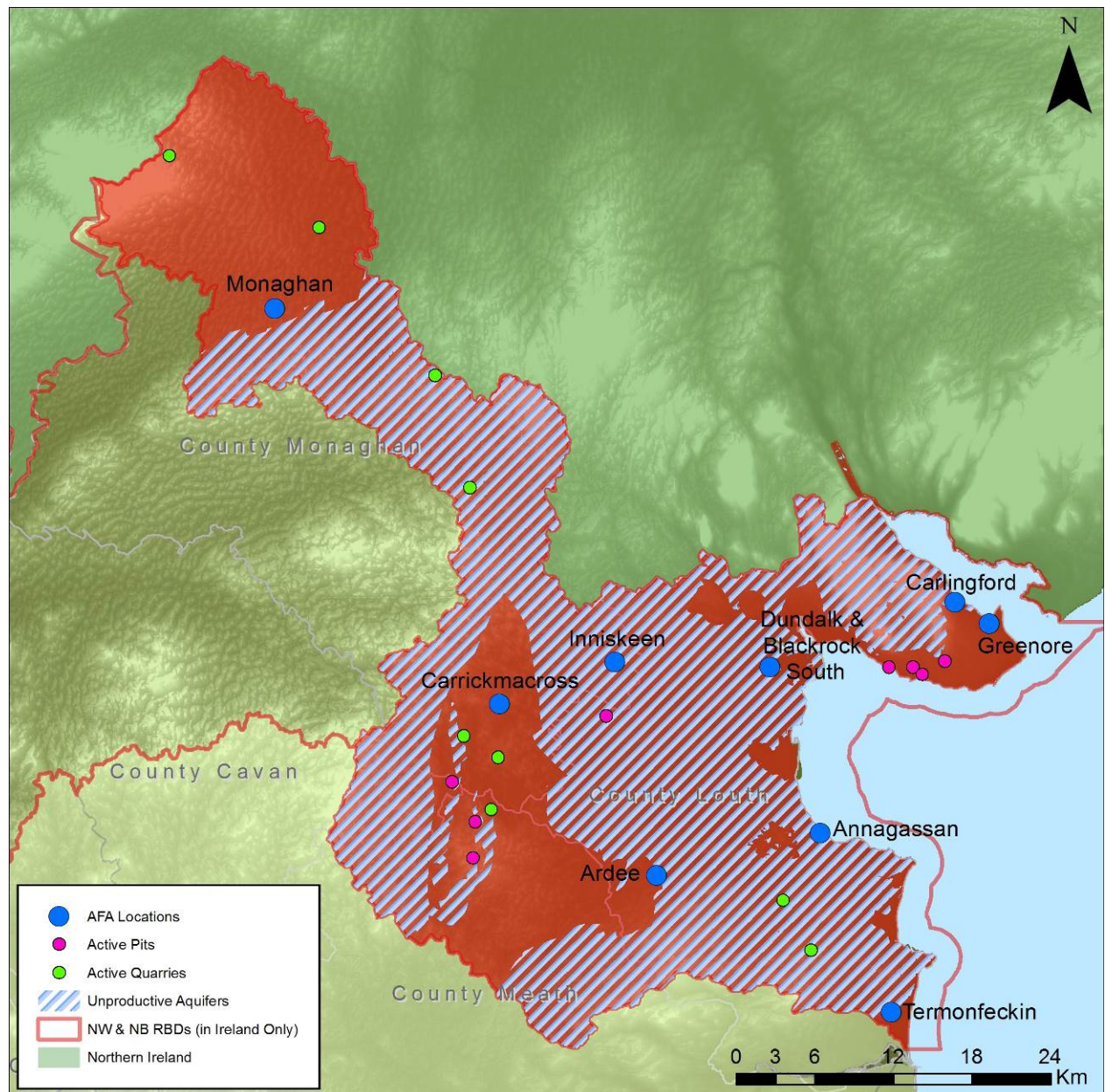
management measures both directly, through direct footprints of construction works, and indirectly through alterations to flood plains. These alterations of the existing available soil resource to agricultural production from FRM measures will be assessed as a key indicator.

Acid brown earths and brown podzolics cover most of UoM06. Surface water and groundwater gleys derived from non-calcareous parent materials are also distributed widely through the Neagh Bann, particularly in the western and northern parts of the river basin, as well as in some areas of the south east near the coastline. Shallow acid brown earths/ brown podzolics, lithosols, regosols, and some outcropping rocks are distributed throughout the river basin district also, while cutaway/cutover basin and blanket peats are located in western parts of the UoM away from the coastline.

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 UoM06 is shown in **Table 6.6**.

**Table 6.6 Land Use Types by Area and Percentage Cover in UoM06**

Description	Area (Km <sup>2</sup> )	% of UoM06
Pastures	1,241	67
Non-irrigated arable land	232	13
Land principally occupied by agriculture	104	6
Intertidal flats	51	3
Discontinuous urban fabric	43	2
Peat bogs	36	2
Transitional woodland scrub	23	1
Complex cultivation patterns	20	1
Coniferous forest	17	1
Mixed forest	15	1
Moors and heathland	11	1



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

Agricultural lands comprise over 86% of UoM06 with the majority used for pasture (67%) to graze dairy cows, cattle, and sheep; however there are also large areas of arable land, used for the production of grains, fruit and vegetables.

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 UoM06 study watercourses. Depending on agricultural practices, the farming of arable land can lead to increased soil loss to receiving watercourses through ploughing and the presence of exposed soils. This will be exacerbated if environmental measures, such as buffer strips along river banks, are not employed. The 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 FRM 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 UoM06 are Carlingford Greenore, Carrickmacross, Dundalk & Blackrock South, Monaghan and Termonfeckin.

There are 106 areas of native woodland covering over 6 km<sup>2</sup> identified by the NPWS within this UoM. There are also a further 29 km<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 area 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

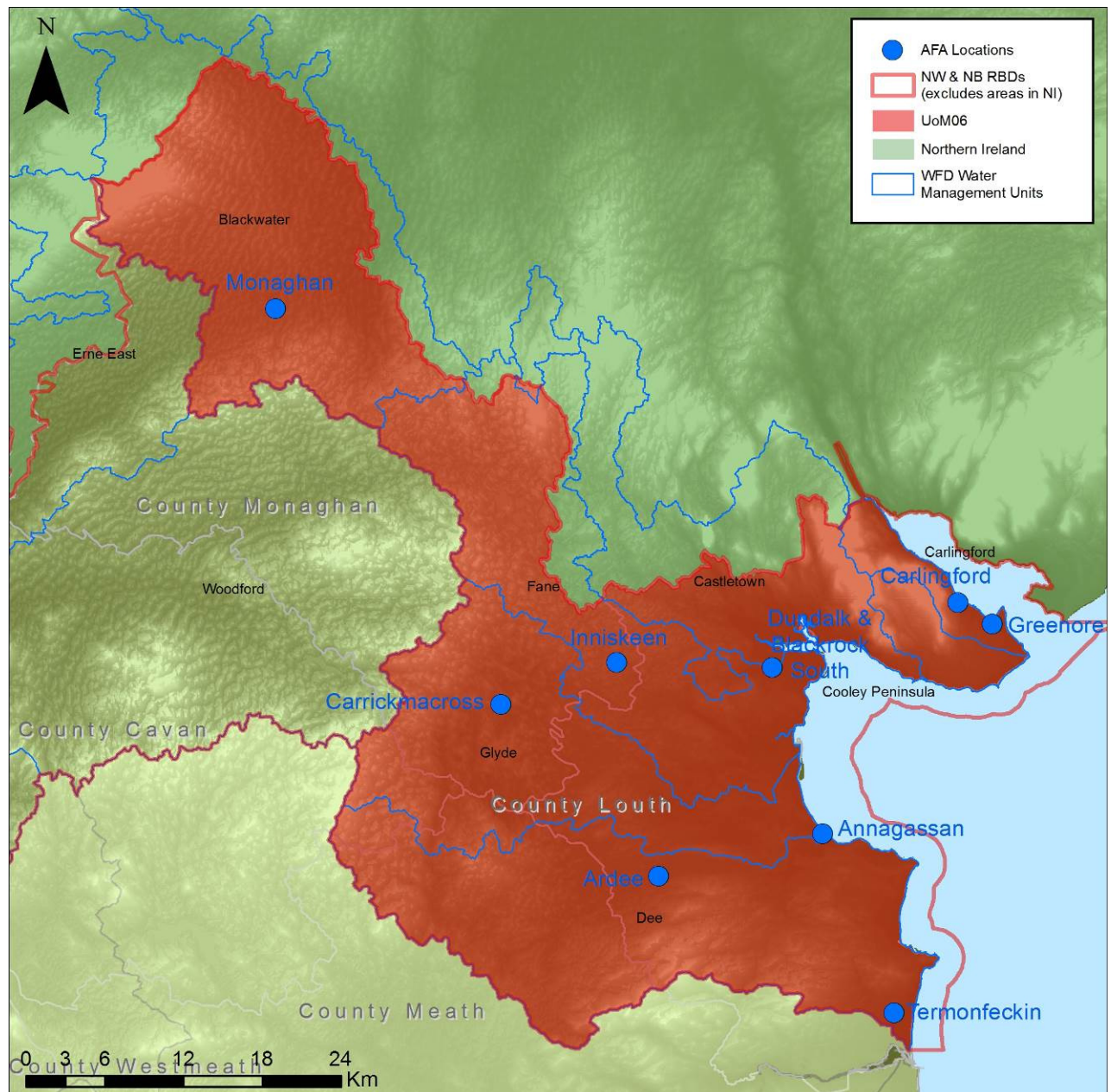
The UoM06 study area is located within the boundaries of the Neagh Bann RBD, one of the districts delineated in Ireland under the WFD to enable the management of water resources to be undertaken on a catchment wide basis in accordance with the Directive. **Figure 6.5** illustrates both the location of the WFD Management Units within the UoM, and the location of UoM06 within the NBIRBD.

The Neagh Bann 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 UoM06, 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, due to the new RBMP in process of being developed.





**Figure 6.5 NBIRBD, UoM06 and Water Management Units**

- Rivers:** Under the WFD, 95 river bodies have been identified in the UoM06 study area in the first cycle RBMPs, though they are being updated for the second cycle. The principal river here is the Erne (draining parts of Cavan and Monaghan). Out of these 95 river bodies, 24 are at Good Ecological Status. This leaves 71 river bodies whose statuses are required to improve under the WFD.

River Water Bodies	
<b>93</b>	Total No of RWB
<b>0</b>	High Eco Status
<b>24</b>	Good Eco Status
<b>25</b>	Moderate Eco Status
<b>46</b>	Poor Eco Status
<b>0</b>	Bad Eco Status

- **Lakes:** Under the WFD, 17 lake bodies have been identified in the UoM06 study area. Of these 17 lake bodies, two are at Good Ecological Status. A further 15 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.

Lake Water Bodies	
17	Total No of LWB
0	High Eco Status
2	Good Eco Status
10	Moderate Eco Status
4	Poor Eco Status
1	Bad Eco Status

**Transitional and Coastal Waters:** In UoM06, marine waters include nine estuaries, of which all are at Moderate Ecological Status, and four coastal waters (one at Good Ecological Status, two at Moderate Ecological Status and one unassigned) and account for just over 200 km<sup>2</sup>. The Newry River Estuary flows into the Irish Sea at Carlingford Lough and the Ballymascanlan and Castletown estuaries meet the Irish Sea at Dundalk Bay.

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

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

- **Groundwaters:** As with all UoMs, the water system below ground in the UoM06 is complex because of the wide range of rock types and soils. The underground aquifers can cross surface water catchment and boundaries. There are 28 groundwater bodies identified under the WFD in UoM06. Although 26 of these are at Good Overall Quality, two are at Poor Overall Quality and require an improvement in their quality under the WFD.
- **Artificial Waters:** These are two artificial reservoirs within UoM06 (Balynafagh and Turlough Hill reservoirs).

Groundwater Water Bodies	
28	Total No of GWB
26	Good Overall Quality
2	Poor Overall Quality

It can be seen in **Figure 6.6** that the status of waterbodies in UoM06 varies, with Poor 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, 25% of rivers and 12% 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.

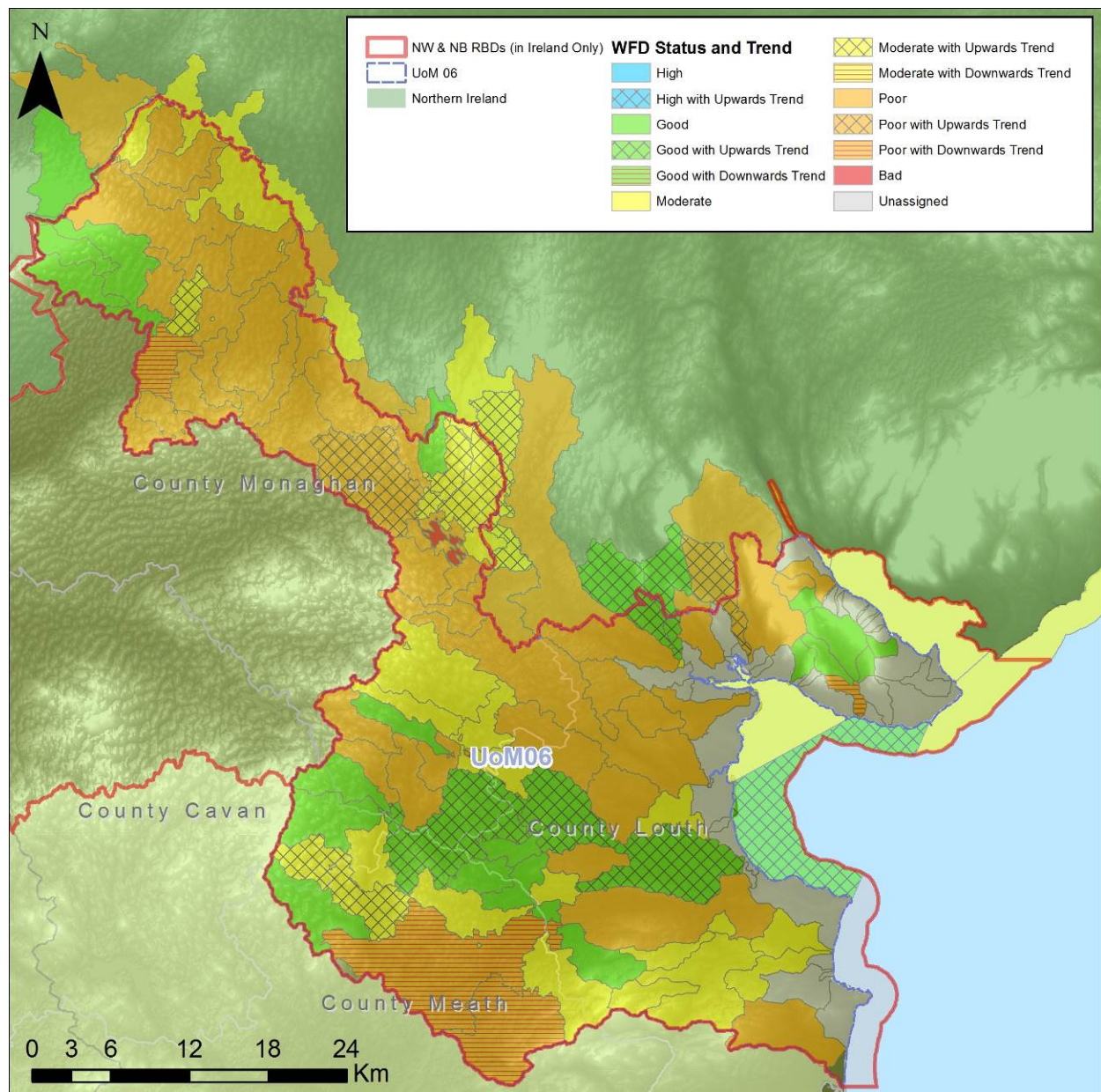
**Figure 6.6** also shows that 11 waterbodies in UoM06 were observed to be on an upwards trend, improving water quality, however five were failing to meet WFD objectives of maintaining or improving status and were identified as trending downwards during the mid-cycle surveys.

Within the UoM06 study area there are 17 water treatment plants, 24 waste water treatment plants, two registered landfill sites and 14 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 the 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”) implements 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 UoM06 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 UoM06 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.

UoM06 is a relatively low slope, low energy system with a predominance of inland low slope lowland meandering channels, flanked by steeper pool riffle channels to the west and north east where lands of higher altitude progress towards low lying flatter lands both to the north in County Armagh and at the Louth coast.

Within UoM06, Monaghan, Carrickmacross, Annagassan and Ardee are AFAs within catchments that have been extensively arterially drained in the past. The Glyde and Dee Arterial Drainage Scheme took place between 1950 and 1957 and was a pilot drainage scheme implemented shortly after the 1945 Arterial Drainage Act. It benefited 10,643 hectares of land in terms of drainage for agricultural use. The Monaghan Blackwater Scheme was a smaller more recent scheme that took place between 1984 and 1992 benefitting 2,367 hectares of land. Historical drainage has also been undertaken within Dundalk. In terms of sedimentation of rivers, the initial schemes have had the long term effect of making river courses more susceptible to bed and bank erosion in high flow conditions and resulting siltation. This was due to the removal of natural gravels and bank vegetation. However this impact is more of a consideration in the Glyde and Dee Scheme since it was one of the first to be carried out. Environmental practices evolved over time such that the Monaghan Blackwater Scheme is likely to have had less impact in this regard. Whilst the initial works took place historically, maintenance activities have since been required to maintain channel capacity by removing silt and debris build up, typically every six years. Maintenance works in itself can be a source of sediment loss if bank vegetation and river buffer zones are not protected. However the OPW now employ comprehensive environmental drainage maintenance practices which minimise the risk of sediment loss in light of the WFD and other related legislation whilst still fulfilling their statutory duties under the Arterial Drainage Act to maintain channel conveyance capacity from a flood risk perspective.

The channel types in UoM06 are typical of Irish catchments. Sediment transport, erosion and deposition are natural morphological processes. In larger catchments it is expected that the upper reaches are 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, such that there is risk of these impacts. 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 has been scoped out of the SEA process and will not be assessed within the environmental report.

## **6.7 CLIMATE**

Within the UoM region, annual average air temperatures (measured at Clones, Co. Cavan) 1981-2010<sup>5</sup> were around 9.4°C, with an average of 3.3 hours of sunshine per day. Mean annual rainfall over this period was approx. 960mm, with an average of 64 days per year when rainfall amounts exceed 5mm. Rainfall patterns are typical of what might be expected in terms of wind patterns and topography. According to the United Nations Intergovernmental Panel on Climate Change (2007) there is “unequivocal” evidence of climate change and furthermore:

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<sup>5</sup> Met Eireann (2015) Malin Head Averages <http://www.met.ie/climate-ireland/1981-2010/malin.html> accessed 14.09.2015

*"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 40 m 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 wetter winters being anticipated 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. This 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 UoM06 study area has 11.5 km of designated river waterways for the abstraction of drinking water and ten drinking water lakes. There are also 17 water treatment plants and 24 waste water treatment facilities within the study area.

The UoM06 study area is well serviced by transport infrastructure. There are 5,458 km of roads with 42 km of this being a motorway. There is one train station within the study area (Dundalk). There are three ports in UoM06 (Annagassan, Dundalk and Greenore).

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 UoM06 study area that could be impacted by flooding and flood risk management; include 35 Eircom exchanges and six large renewable projects (most of which are 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 UoM06 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 6.7** provides a summary of each of the AFAs within UoM06 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 6.7 Transport and Utility Receptors at Risk within AFAs**

AFA	Material Assets	
	Transport Receptors	Utility Receptors
Annagassan	1 Regional Road 3 Local Roads	0
Ardee	2 Main Roads 4 Local Urban Roads	0
Calingford Greenore	3 Regional Roads	0
Carrickmacross	Shercock Road	0
Dundalk & Blackrock South	7 National Roads 23 Regional Roads 226 Local Roads	1 Electricity Station
Iniskeen	2 Local Roads	Electricity Hereditament
Monaghan	1 National Primary Road 4 National Secondary Roads 3 Regional Roads 9 Local Roads	0
Termonfeckin	2 Regional Roads 2 Local Roads	0

### **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 provide 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 the 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 UoM06 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. However, there are no World Heritage Sites within the study area.
- 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 2,889 recorded monuments within the UoM06 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 1,196 records in the NIAH within the UoM06 study area.
- 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 44 sites subject to a Preservation Order (including six temporary sites) within the UoM06 study area. Of these, three are assessed as being at “High” vulnerability, 13 at “Moderate” vulnerability, and 28 at “Low” 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 the 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 UoM06 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;
- 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 landscape of UoM06 is a relatively low lying area. Carlingford Mountain with its peak - Slieve Foye - stands at 589 m and is the highest point in the river basin. Other smaller peaks include Mount Oriel in Louth and Monercrom in eastern Cavan.

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 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 22 Sensitive Landscape Areas/Landscape Character Assessment Areas in the study area, the majority of which surround lakes, rivers and coastal areas.

The AFAs within UoM06 are within the landscapes of counties Louth and Monaghan. The Louth Landscape Character Assessment 2002 and Louth County Development Plan (2009-2015) cite the Carlingford Lough and Mountains, including West Feede Uplands, as landscapes of international importance. Carlingford is a major tourist attraction and visual amenity is important to the AFA. Louth Landscape Character Assessment of 2002 cites that the landscapes within Annagassan, Ardee and Termonfeckin AFAs are regionally important. Termonfeckin is described as a very attractive sylvan

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

village. The area most sensitive to change is that north of Termonfeckin where the topography of the land rises up at Castlecoo and falls back down to the coastal plain north of Clogherhead. The Assessment is looking to conserve and restore the extensive sandy beaches with vulnerable dune systems and the village of Termonfeckin, with its sylvan setting and archaeological importance. The Ardee AFA area is classified by the Louth Landscape Character Assessment 2002 as the Muirhevna Plain and is looking to conserve the agricultural land and hedgerows, the small broadleaf woodlands throughout the area and within the town of Ardee, and the four pNHAs in the area. The Annagassan AFA area contains the Dundalk Bay SPA, the impressive coastal routes of high scenic quality and the Dunany Point area.

Within the Louth Landscape Character Assessment, the Dundalk & Blackrock South AFA is between the landscape area of Dundalk Bay and Lower Faughart, Castletown and Flurry River Basins. Dundalk Bay is named as a sensitive landscape of regional and local importance for conservation and enhancement. This is mainly due to the Dundalk Bay SPA saltmarsh and mudflats, with its full range of plant communities, and impressive coastal routes of high scenic quality.

The Monaghan Landscape Character Assessment notes the Inniskeen AFA as being of mixed landscape, comprising of low drumlin hills and undulating farmland. It is cited as a moderately scenic landscape and would not be considered to be highly sensitive to change. However, the environs of the River Fane, owing to its relatively flat topography, is highly visually exposed and could be unsuited to large scale development. Smaller scale development would have to be accompanied by appropriate planning. Monaghan AFA is located within the Monaghan Drumlin Uplands Landscape Character Area. Most of this landscape is in good condition. The summit or highest point along the ridgeline is likely to be highly sensitive to development because it is visually exposed for many kilometres. In general, this landscape would not be regarded as highly scenic and hence, the capacity to accommodate development without undue compromise to the farmed landscape pattern is good. The Ulster Canal and environs would be considered an area of Secondary Amenity Value.

### ***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 development 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;
- 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). In UoM06, fish surveys were undertaken at the Big River and the White river in 2012 and in the Fane River and the White River in 2013 (IFI, 2013a and IFI, 2014). A total of seven fish species were recorded during the 2012 WFD Surveillance Monitoring Programme for fish in rivers (Brown Trout, Eel, Lamprey sp., Minnow, Stone Loach and Three-Spined Stickleback). Of the two sites surveyed, the White River was the more diverse, with seven species recorded compared to just two in the Big River. Brown trout and eels were recorded in both sites, while all other species were present only in the White River.

The most recent fish survey in transitional waters in the UoM06 study area was undertaken in 2009 in Inner Dundalk Bay and the Castletown Estuary (Central and Regional Fisheries Boards, 2010). A total of 11 fish species were recorded in the Castletown Estuary and 16 fish species were recorded in Inner Dundalk Bay. Both waterbodies were assigned a “moderate” TFCI status based on these results.

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.

Flooding and flood risk management will need to consider the impact of flooding upon fish habitat. Flood-related threats include siltation due to changes in flow affecting erosion and deposition patterns, pollution from flooding episodes and the 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 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.

The Dee River flows through Annagassan and Ardee AFAs. This river is known for its stocks of native wild brown trout, as well as Atlantic salmon and sea trout. The Dee fishery is located at the lower end of the River Dee, below Cappogue Bridge, 7 km upstream of Annagassan AFA and 8 km downstream of Ardee AFA. In the Ardee area this river contains an adult salmonid nursery and adult habitat, and supports stocks of salmon, sea trout and brown trout. The river also supports lamprey and European

eel among other species. Game angling is popular in the Ardee area. The River Glyde also flows through the Annagassan AFA. This river is also known for stocks of brown trout, sea trout and salmon. Migratory fish species including salmon, sea trout, lamprey and eels use the river at Annagassan on their journeys upstream or out to sea. In the transitional water habitat at Annagassan the river supports fish species such as mullet and flounder.

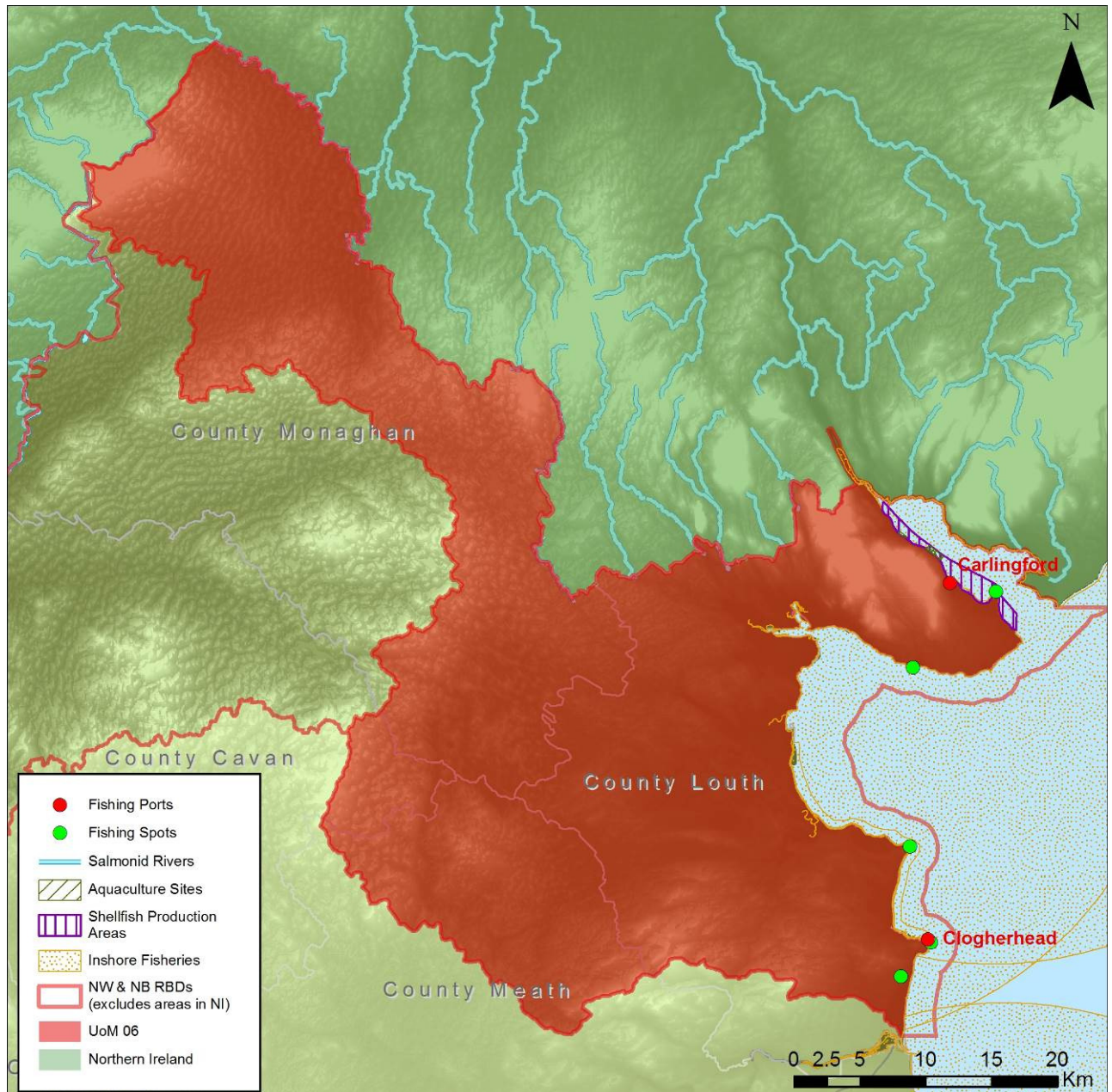
Within Dundalk & Blackrock South AFA is Dundalk Bay, which supports substantial shell fisheries, with several aquaculture sites in the area, mainly for oysters and cockles. The Castletown River is known for stocks of wild brown trout and runs of salmon and sea trout. Upstream of Dundalk, in Northern Ireland, the Creggan Lower, Cully Water, Forkill/Kilcurry River and the Kilnasaggart River are all designated salmonid rivers. In the Castletown River Estuary at Dundalk there is some fishing for mullet and flounder, with occasional seatrout and bass. The main sea angling in the bay is from Gyles Quay. Charter angling also takes place in the bay. The Ramparts River flows through Dundalk and contains modest stocks of brown trout.

The Fane River, a well-known river for salmon and sea trout fishing, flows through Inniskeen AFA. Upstream of Inniskeen in Northern Ireland the River Fane is designated as a Salmonid River. In Inniskeen itself the River Fane contains a valuable salmonid nursery and adult habitat. As well as supporting good numbers of salmon and trout, it also supports stocks of eel and lamprey among other species.

Monaghan Town and its satellite villages of Emyvale, Glaslough, Scotstown, Ballinode and Tydavet are surrounded by a host of angling lakes for pike. Among the most popular venues in the area are Glaslough, Quig Lough, Drumreask and Killyboley. The River Blackwater in Northern Ireland is a designated salmonid river over 6 km downstream of Monaghan. The Monaghan Blackwater and the Shambles River flow through Monaghan Town. The Monaghan Blackwater supports stocks of salmonids and lamprey among other species. Coarse angling is popular in the many lakes in the area and game fishing is popular on the river.

Inshore line fishing is popular in the Irish Sea offshore from Termonfeckin AFA. Clogher Head and Baltray Strand are popular sea fishing locations, which are to the north and south of Termonfeckin along the coast. The Termonfeckin River flows through Termonfeckin and supports modest sea trout populations, which may increase if water quality improves. Some local angling takes place. Carlingford Lough, located in Carlingford AFA, is a designated shellfish water with several licensed aquaculture/mariculture sites.

**Figure 6.7** shows the designated salmonids rivers, main fishing ports, main sea angling areas and main inshore fisheries in the UoM06 study area.



**Figure 6.7 Fisheries and Ports in UoM06**

### ***Future Trends***

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

Improvements are to be introduced as part of the Programme of Measures to allow for the achievement of WFD objectives which 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, nearly 52,000 residential properties were identified in the UoM06 study area. Health care facilities in the UoM06 study area include seven hospitals and 19 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 10 nursing homes and four residential care homes for the elderly, many of which are also associated with hospitals or health centres. There are 113 primary schools and 21 post-primary schools in the UoM06. There is one third-level education institution located within the study area (Dundalk IT).

There are nine fire stations, 19 Garda stations and two civil defence sites in UoM06 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 North Western regional tourism area (comprising counties Cavan, Donegal, Leitrim, Monaghan and Sligo) attracted 506,000 international visitors in 2013, generating over €176 million of revenue<sup>7</sup>. Cavan and Leitrim together received 192,000 domestic visitors (estimated spend €35 million) and Louth and Monaghan are the least frequently visited counties with 129,000 combined visitors. The UoM06 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.

There are four designated bathing waters in UoM06. In 2015, three beaches in Louth achieved “Blue Flag” status. There is one marina in UoM06 at Carlingford. The sheltered beaches of the east coast of UoM06 are popular due to their accessibility from Dublin and other heavily populated areas. The lakeland areas of Cavan and surrounds are also popular for fishing and watersports. There are around 258 km of amenity walks and 112 km of cycle routes in UoM06.

The UoM06 study area encompasses many popular tourist attractions. There are three galleries, two theatres and nine museums located within UoM06. These include the Carlingford Heritage Centre, the

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<sup>7</sup> Fáilte Ireland (2014) [Regional tourism performance in 2013](#) (accessed 10/08/2015)

Patrick Kavanagh Rural and Literary Resource Centre, and the Market House Venue and Gallery in Monaghan.

In addition to hotels, guesthouses and bed and breakfasts which are largely concentrated within the larger towns and villages, camping and caravanning sites are a major feature of the accommodation available to visitors to the UoM06 study area. These are most often associated with popular beaches, but also exist near loughs and rivers.

From the County Development Plans and Local Area Plans that make up UoM06 there are 106 sites designated as open space / park, 77 sites designated as conservation / amenity or buffer space / corridor/belt / landscape, there are 207 sites designated as mixed / general 'green' / recreation & conservation, there are seven sites designated as community facilities and there are 139 sites designated as mixed / general community services / facilities.

Within each of the AFAs in UoM06 there is the potential risk of flooding to social infrastructure receptors and social amenity sites (e.g. parks). **Table 6.8** provides a summary of each of the AFAs within UoM06 and the social infrastructure and amenity receptors at risk of flooding in a 1% AEP fluvial event and/or a 0.5% AEP coastal event.

**Table 6.8 Social Infrastructure and Amenity Sites at Risk within AFAs**

AFA	Social Infrastructure Assets	Social Amenity Sites
Annagassan	0	2 Open Space, Amenity & Recreation Areas
Ardee	0	3 Open Space Areas
Calingsford Greenore	2 Surgery/Health Centres 1 Community Centre	7 Open Space, Amenity & Recreation Areas 2 Community Facilities
Carrickmacross	0	1 Landscape Protection Area 1 Community Services/Facility Area
Dundalk & Blackrock South	5 Community Centres 1 Hotel 1 Health Centre 1 School 1 Church 1 Sports Centre	2 Nature Conservation Areas 1 Community, Education & Recreation Area 17 Recreation, Amenity & Open Space Areas 1 Strategic Recreation Area
Iniskeen	0	0
Monaghan	0	4 Community Services/Facilities Areas 1 Recreational Amenity Area 6 Landscape Protection/Conservation Areas
Termonfeckin	0	0



Within each of the AFAs in UoM06 there is the potential risk of flooding to economic receptors, such as commercial properties. **Table 6.9** provides a summary of each of the AFAs within UoM06 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 from flooding within the AFA over a 50 year time period.

**Table 6.9 Non-Residential Properties at Risk and PVD within AFAs**

AFA	Non-Residential Properties	PVD
Annagassan	8	€ 6,598,463
Ardee	4	€ 12,957,910
Carlingford & Greenore	97	€ 227,439,686
Carrickmacross	3	€ 497,138
Dundalk & Blackrock South	140	€ 149,746,523
Inniskeen	5	€ 7,428,411
Monaghan	34	€ 26,948,607
Termonfeckin	2	€ 682,863

### **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. In the UoM06 study area, a new initiative has been set up called "Ireland's Ancient East". It is intended to attract visitors to the east coast of Ireland whilst also complementing the west coast's "Wild Atlantic Way" initiative. This focuses attention on prehistoric and medieval heritage sites such as those found in the Boyne valley and at Carlingford Lough.

The population structure described in **Section 6.3**, 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 it 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 UoM06 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 biodiversity and their habitats will remain and may adversely impact biodiversity.

The population trend within UoM06 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. In addition, without the FRMP the resultant increase in flooding may result in an increase in erosion to 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 FRM management. Current FRM management 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 addition, sensitive landscapes will be under a greater threat from flooding without the necessary flood management in the FRMP.

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 UoM06 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 UoM06 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>UoM06 Flood Risk Management Plan</b></li> <li>• Neagh Bann River Basin Management Plan 2009-2015 (DEHLG, 2010)</li> <li>• Midlands BAU (Business Area Unit) 2016-2020 (Coillte, 2016)</li> <li>• Northwest BAU (Business Area Unit) 2016-2020 (Coillte, 2016)</li> <li>• Regional Planning Guidelines for the Northern and Western 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>• Monaghan County Development Plan 2013-2019 (Monaghan County Council, 2013)</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>• Dundalk &amp; Environs Development Plan 2009-2015 (Louth County Council, 2009)</li> <li>• Ardee Local Area Plan 2010-2016 (Louth County Council, 2010)</li> </ul>

	<ul style="list-style-type: none"> <li>• The Geological Heritage of Cavan (GSI, 2013)</li> <li>• Landscape Character Assessment Monaghan (Monaghan County Council, 2008)</li> <li>• Louth County Council Landscape Character Assessment (Louth County Council, 2002)</li> <li>• Cavan Economic Plan 2009-2012 (Cavan County Council, 2009)</li> <li>• Meath Economic Development Strategy 2014-2022 (Meath County Council, 2014)</li> <li>• Economic Strategy &amp; Implementation Plan for County Monaghan 2010–2014 (Monaghan County Council, 2010)</li> <li>• County Cavan Groundwater Protection Scheme (GSI, 2008)</li> <li>• Monaghan Groundwater Protection Scheme (GSI, 2002)</li> <li>• County Meath Groundwater Protection Scheme (GSI and Meath County Council, 1996)</li> <li>• Cavan Draft Heritage Plan 2016-2021 (Cavan County Council, 2015)</li> <li>• Draft County Meath Heritage Plan 2016-2021 (Meath County Council, 2015)</li> <li>• Louth Heritage Plan 2015-2020 (Louth County Council, 2014)</li> <li>• Monaghan Heritage Plan 2012-2017 (Monaghan County Council, 2012)</li> <li>• Housing Strategy for County Cavan 2008-2014 (Appendix 26) (Cavan County Council, 2007)</li> <li>• Monaghan's Housing Strategy 2013-2019 (Monaghan County Council, 2013)</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>• Carlingford Lough Shellfish Pollution Reduction Programme (DEHLG, 2009)</li> <li>• Dundalk Bay Shellfish Pollution Reduction Programme (DEHLG, 2009)</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 **8.2.2.1** to **8.2.2.13**. 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 are two Arterial Drainage Scheme within the UoM06, namely the Glyde and Dee, and the Monaghan Blackwater Arterial Drainage Schemes. 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 three Drainage Districts (DD) within the Glyde-Dee Catchment, namely the Blackwater DD, Fane DD and Wottanstown 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 UoM06. 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 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 UoM06. 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 UoM06**

Spatial Scale	Name	Option Number	Description
Sub-Catchment	Glyde-Dee	0	No Options Technically and Economically feasible.
AFA	Annagassan	1	Hard Defences
AFA	Ardee	1	Hard Defences
AFA	Ardee	2	Hard Defences and Storage
AFA	Carlingford & Greenore	1	Fluvial Hard Defences, Coastal Hard Defences, Improved Channel Conveyance and Two Pumping Stations
AFA	Carrickmacross	0	No Options Technically and Economically feasible.
AFA	Dundalk & Blackrock South	1	Hard Defences, Improvement of Channel Conveyance, Storage
AFA	Dundalk & Blackrock South	2	Hard Defences, Improvement of Channel Conveyance, Storage
AFA	Dundalk & Blackrock South	3	Hard Defences, Improvement of Channel Conveyance, Storage, Relocation of Properties
AFA	Dundalk & Blackrock South	4	Hard Defences, Improvement of Channel Conveyance, Storage, Relocation of Properties
AFA	Inniskeen	1	Hard Defences
AFA	Inniskeen	2	Hard Defence and Improved Channel Conveyance
AFA	Inniskeen	3	Hard Defence and Improved Channel Conveyance
AFA	Monaghan	1	Hard Defences Version 1 and Other Works
AFA	Monaghan	2	Hard Defences Version 2 and Other Works
AFA	Termonfeckin	1	Improvement of Channel Conveyance
AFA	Termonfeckin	2	Hard Defences and Improvement of Channel Conveyance

## 9 ASSESSMENT

### 9.1 METHODOLOGY

The methodologies for the many levels of environmental assessment that have been undertaken for the UoM06 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 UoM06 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 Sustainable Planning and Development Management

This method is applicable throughout UoM06. 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.

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

This method is applicable throughout UoM06. 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.

#### 9.2.3 Voluntary Home Relocation

This method is applicable throughout UoM06. This option is considered environmentally neutral as it is a potential assessment of policy options. No further environmental assessment was considered for this option.

#### 9.2.4 Local Adaptation Planning

This method is applicable throughout UoM06. 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.

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

This method is applicable throughout UoM06. 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.

### **9.2.6 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.

### **9.2.7 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.

### **9.2.8 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.

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

This method is applicable throughout UoM06. 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.

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

This method is applicable throughout UoM06. 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.

### **9.2.11 Individual Property Protection**

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

### 9.2.12 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.

### 9.2.13 Minor Works Scheme

This method is applicable throughout UoM06. 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 Glyde-Dee Sub-catchment screening. Storage and Improvement of Channel Conveyance methods were screened and found to be technically unfeasible. 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 ANNAGASSAN

UoM	UoM06
Area / Location	Annagassan AFA
Option	Option 1 Hard Defences
Code	GBNIIENB-060013-0106-M33
Description	At risk properties in flood cell 1 would be protected from walls set back from the existing rock armour along the coastline, a series of walls and embankments adjacent to the mouth of the River Glyde and by improving the existing embankment. These hard defences would protect to the 0.5% AEP tidal event and the 0.5% AEP wave overtopping event with an average height of 1.13 m and a total length of 2422 m.

0 0.2 0.4 0.8 Km

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Total MCA-Benefit Score	Option Cost (€millions)	MCA-Benefit Score / Cost Ratio
919	3.70	248.34

Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
6.6	3.70	3.13	0.85

### Key Environmental Issues

- Agriculture is important to the Annagassan area, with pasture and arable land to the west and south of the AFA. Production of this land is interlinked with the local hydrology and hydrogeology.
- The Dundalk Bay SAC, SPA and Ramsar Site are within, directly downstream and adjacent to Annagassan. Strabannan - Braganstown SPA is over 8 km upstream of the AFA on the River Glyde.
- The Dundalk Bay Marine Protected Area and pNHA are directly downstream and adjacent to Annagassan. Dunany Point pNHA is over 6 km south-east along the coast from Annagassan. Strabannan - Braganstown pNHA is over 8 km upstream of the AFA on the River Glyde.
- The Dee River is known for stocks of native wild brown trout, as well as Atlantic salmon and the sea trout. The Dee fishery is located at the lower end of the River Dee, below Cappogue Bridge, around 7 km upstream of Annagassan. The River Glyde is also known for stocks of brown trout, sea trout and Atlantic salmon. Migratory fish species including salmon, sea trout, lamprey and eels use the river at Annagassan on their journeys upstream or out to sea. In the transitional water habitat at Annagassan the river supports fish species such as mullet and flounder.
- Louth Landscape Character Assessment of 2002 classifies the general area as the Dundalk Bay Coast and in the Annagassan area is looking to conserve and restore the Dundalk Bay SPA, the impressive coastal routes of high scenic quality and the Dunany Point area. The landscape is classified as being of regional importance.
- There is one NIAH recorded building of regional importance within the AFA, which is the Annagassan Bridge, which spans the River Glyde.
- The Annagassan area is rich in archaeological heritage. There are three monuments in state care within the AFA, being associated with Lisnaran Fort. There are no heritage sites with preservation orders in the area. There is also an enclosure and an ecclesiastical site in the area; however these are of less vulnerability to flooding.

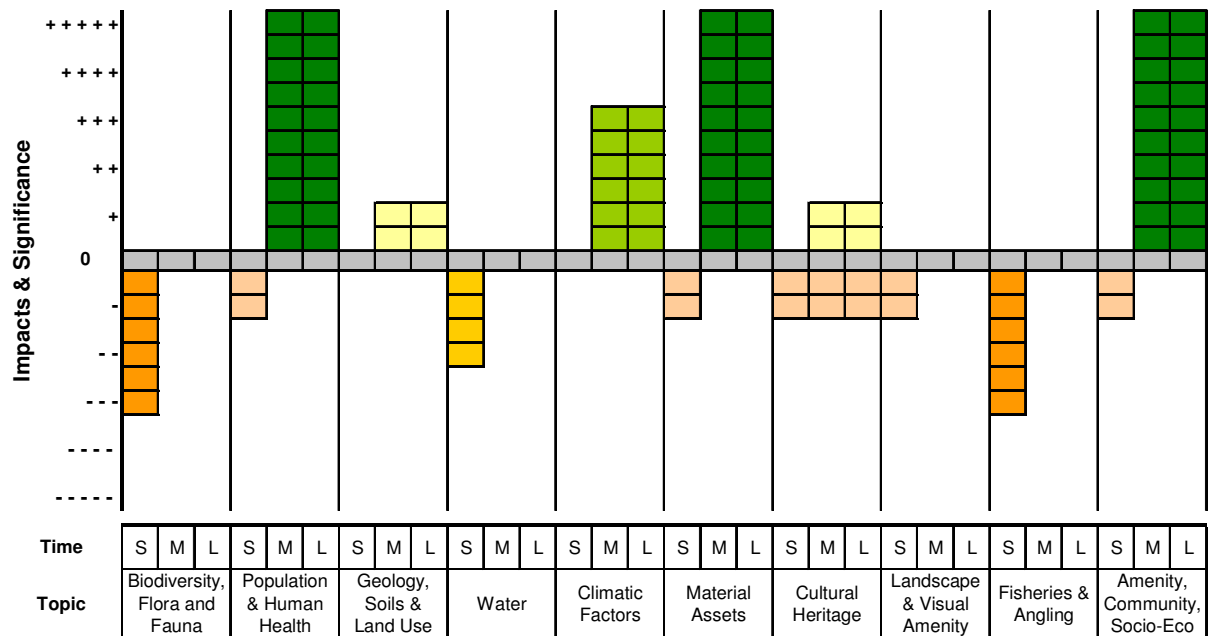
### Environmental Assessment

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

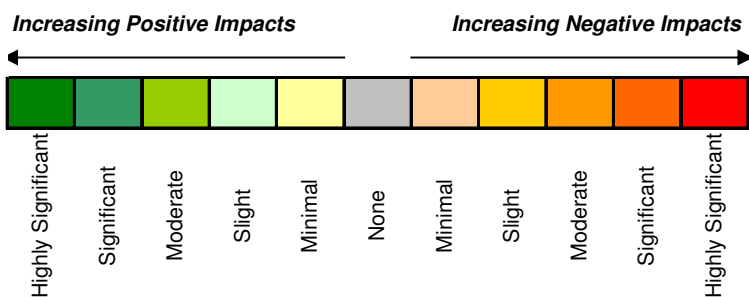


Amenity, Community & Socio-Economics (ACS)	-1	5	5
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### Summary Chart of Impacts



### Key



## Discussion of Impacts

### Biodiversity, Flora & Fauna

There is the potential for moderate, direct, construction phase impacts on the periphery of and adjacent to the Donegal Bay SAC, SPA, pNHA, MPA and Ramsar site from the construction of walls and embankments, set back from the waterbody where possible. There is also the potential for direct temporary loss of habitat and displacement of species from the works area and for short term, indirect, downstream impacts from sedimentation during works. However the impacts could be mostly mitigated for with good site practice, effective planning and timing of works. There is unlikely to be any impacts on biodiversity 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 Annagassan AFA on the following European sites:

- Dundalk Bay SAC (000455)
- Dundalk Bay SPA (004026)
- Strabannan-Braganstown SPA (004091)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European site, alone and in-combination with other plans and projects, taking into account the site's 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 Annagassan 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 the local population during the construction phase. In the medium and long term there are 26 ground floor properties benefiting with this option in place from a reduced flood risk for the 0.5% AEP coastal flooding events. There are no additional upper floor properties or highly vulnerable properties benefiting with this option in place.

### Geology, Soils & Landuse

There is unlikely to be any short term impacts from this option on the soil resource. In the medium and long term there is the potential for a reduction in rural land flooded, resulting in a minimal positive impact. The majority of the hard defences proposed in this option are located along the coast of Dundalk Bay IGH site, a wide coastal embayment incorporating wide expanses of coastal flats. Care is needed to avoid any potential negative impacts of this option on this site.

### Water

Slight negative construction phase impacts are likely with this option, with the excavation and restoration of banks adjacent to and set back from sensitive and non-sensitive waterbodies. There is the potential for in-stream and on-bank construction impacts in areas which are already impacted by infrastructure and FRM methods. However these impacts should not be permanent or recurring, hence there is unlikely to be any impacts in the medium and long term from this option.

### Climatic Factors

There is unlikely to be any impacts on climatic factors in the short term construction phase. This option is adaptable at a moderate cost, resulting in a moderately positive impact on climatic factors in the medium and long term.

### Material Assets & Infrastructure

Although there is likely to be a minimal negative disturbance impact on material assets and infrastructure during the construction phase, there are four transport links and one utility benefiting with

this option in place, as a result of a reduced flood risk for the 0.5% AEP coastal flooding events.

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

There is a slight potential for short, medium and long term minimal negative physical impacts to and on the setting of Annagassan Bridge NIAH structure from the construction phase of this option and tie in of defences. In the medium and long term there is the potential for increased protection from severe flooding to one monument.

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

In the short term there is the potential for construction phase impacts on a local sensitivity landscape. Construction and rehabilitation of walls and embankments will take place in areas already impacted by infrastructure and FRM methods. These impacts will mainly be on those visual amenities being protected by the FRM methods. There is unlikely to be any impacts continuing to the medium and long term.

#### **Fisheries & Angling**

There is the potential for direct construction phase impacts from construction and augmentation of walls and embankments adjacent to waterbodies known for sensitive species. There is also the potential for short term, indirect, downstream impacts to fisheries from sedimentation during works. However these impacts could be mostly mitigated for with good site practice, effective planning and timing of works. There is unlikely to be any permanent or recurring 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 the construction phase, with the potential for minimal negative impacts on access to amenity areas and access for commercial activity. In the medium and long term there are three social infrastructure/amenity sites and eight commercial properties benefiting with this option in place, with a reduced flood risk for the 0.5% AEP coastal flooding events.

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

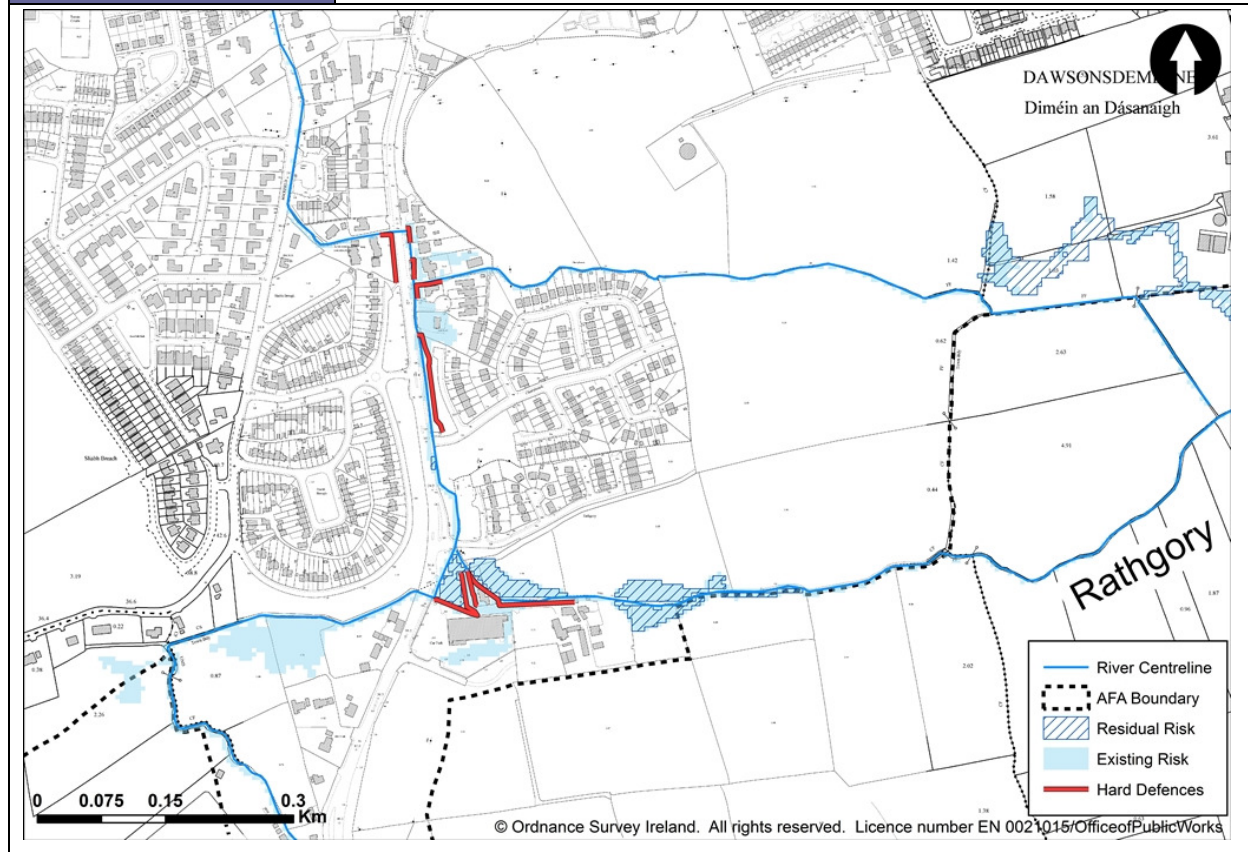
- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- The Louth County Development Plan 2015-2021 provides a framework for the development of County Louth over the plan period. The plan has undergone Appropriate Assessment; therefore no in-combination effects are expected.
- Louth County Council carry out ad-hoc maintenance to catchment watercourses where resources allow, however these maintenance activities are likely to be local in nature and are not expected to have significant in-combination impacts with FRM measures.
- The Glyde and Dee Arterial Drainage Scheme is located in County Louth. The drainage catchment includes the Rivers Glyde and Dee and adjoining stream and drainage channel tributaries. The scheme has a benefitting area of 10,643 ha. Channel maintenance involves removing features that are interfering or may interfere with the design conveyance of a channel e.g. siltation, in-stream growth of a range of vegetation types, growth of trees within the channel cross-section. Maintenance activities have taken place on the Glyde and Dee Arterial Drainage Scheme since 1957 when the scheme was completed. The Arterial Drainage maintenance activities for the period 2012 – 2016 have been subjected to appropriate assessment, which concluded that the conservation objectives, including the Special Conservation Interests, the Qualifying Interests or the integrity of the designated sties would not be affected by proposed maintenance activities on the Glyde and Dee Arterial Drainage Scheme. Therefore no in-combination effects from drainage maintenance activities are anticipated.

**Key Conclusions:**

There is the potential for short term, moderate negative impacts on biodiversity, fisheries and angling, and slight negative impacts on water quality from the construction of hard defences adjacent to a number of protected areas including waterbodies known for sensitive species. These impacts are construction phase disturbances that could be mitigated for with good planning and management. The proposed construction of defences and improvement of embankments could provide medium and long term benefits to the soil resource, with a reduction in the area of agricultural land flooded, 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, positive, medium and long term 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 Annagassan AFA will not have a significant adverse impact on European sites.

**9.5 ARDEE**

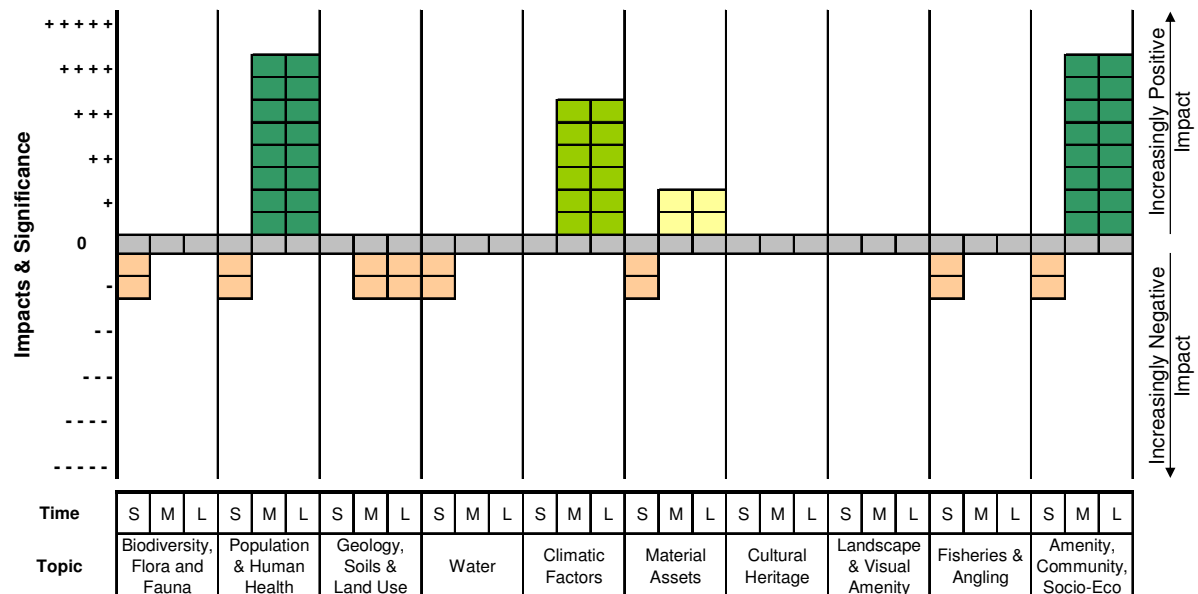
<b>UoM</b>	UoM06
<b>Area / Location</b>	Ardee AFA
<b>Option</b>	Option 1 Hard Defences
<b>Code</b>	GBNIIENB-060014-0206-M33
<b>Description</b>	At risk properties would be protected from a series of flood embankments and walls. These hard defences would protect to the 1% AEP flood event with an average height of 0.8m and a total length of 0.6km.



Total MCA-Benefit Score		Option Cost (€millions)	MCA-Benefit Score / Cost Ratio
738		0.84	875.19
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
12.96	0.84	2.66	3.16
Key Environmental Issues			
<ul style="list-style-type: none"> <li>• Agriculture is very important to the Ardee area, with the AFA surrounded by pasture and arable land. Production of this land is heavily interlinked with the local hydrology and hydrogeology.</li> <li>• There are no SACs or SPAs in the vicinity of the AFA and any AFA specific FRM methods to be employed. The River Dee discharges to the River Glyde at Dundalk Bay SAC, SPA, OSPAR MPA, Ramsar Site and pNHA, around 15 km downstream of Ardee.</li> <li>• Louth Hall &amp; Ardee Woods pNHA and Ardee Cutaway Bog pNHA are within and hydraulically linked to the AFA via the Rivers Dee and Cappocksgreen. Corstown Loughs pNHA and Mentrím Lough pNHA are upstream of the AFA and may have interactions with up-catchment FRM measures.</li> <li>• Fishing activity in the area is of local importance. The Dee River is known for stocks of native wild brown trout, as well as Atlantic salmon and the sea trout. The Dee fishery is located at the lower end of the River Dee, below Cappogue Bridge, around 8 km downstream of Ardee. In the Ardee area, the River Dee contains an adult salmonid nursery and adult habitat and supports stocks of salmon, sea trout and brown trout. The river also supports lamprey and European eel among other species. Game angling is a popular activity in the Ardee area.</li> <li>• Louth Landscape Character Assessment of 2002 classifies the general area as the Muirhevna Plain and looks to conserve the agricultural land and hedgerows, the small broadleaf woodlands throughout the area and within the town of Ardee, and the four pNHAs in the area. The landscape is classified as being of regional importance.</li> <li>• There are over 70 NIAH recorded buildings of local and regional importance within the AFA, as well as one monument (a medieval building) with a preservation order that is classified as being more vulnerable to flooding.</li> <li>• There are several recorded archaeological monuments / features within Ardee. However there are no recorded archaeological heritage features with preservation orders or in state care within the AFA, or in the vicinity of the AFA. The archaeological heritage features in the area are mainly burial features and raths with low vulnerability to flooding.</li> </ul>			

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

### Summary Chart of Impacts



### Discussion of Impacts

#### Biodiversity, Flora & Fauna

In the short term, there is the potential for temporary minimal negative construction impacts in the vicinity of the proposed walls but these will be offset by the already modified nature of the banks and should not affect any protected areas. There is also the potential for indirect sedimentation impacts to downstream habitats during construction. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. The River Dee discharges to the River Glyde at Dundalk Bay SAC, SPA, OSPAR MPA and Ramsar Site around 15 km downstream of Ardee. There should be no impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures. There is unlikely to be any medium or long term negative impacts on biodiversity, flora and fauna with this

option.

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 Ardee AFA on the following European sites:

- Dundalk Bay SAC (000455)
- Dundalk Bay SPA (004026)

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 site's 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 Ardee AFA will not have a significant adverse impact on the above European sites.

#### **Population & Human Health**

There is the potential for short term, minimal disturbance impacts during the construction phase on the local population. However in the medium and long term there is the potential for significantly positive impacts as six ground floor properties and one upper floor property will benefit due to the increased protection for the 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 impact during the construction phase of this option to geology, the soil resource and landuse. In the medium and long term however there is the potential for minimal negative impacts to the soil resource as flood extents become slightly larger on agricultural land. The hard defences proposed in this plan are likely to be constructed in Ardee-Newtown Bedform Field IGH site, a field of subglacial bedforms which includes drumlins, crag-and-tails and ribbed moraines. Care is needed to avoid any potential negative impacts of this option on this site.

#### **Water**

There is the potential for short term negative impacts on water from the construction of hard defences set back from non-sensitive watercourse, and indirect sedimentation impacts to downstream sensitive waterbodies during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works. Potential for on bank and in stream works. There is unlikely to be any negative impacts of this option in the medium and long term.

#### **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 at a moderate cost, resulting in it having a moderately positive impact on climatic factors.

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

There is the potential for short term disturbance impacts to local infrastructure during the construction phase. In the medium and long term there will be one road benefitting with this option in place from up to 1% AEP fluvial flooding events. There are no additional utilities benefitting with this option in place.

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

There are over 70 NIAH recorded buildings of local and regional importance within the AFA, as well as one monument (medieval building) with a preservation order that is classified as being more vulnerable to flooding. However this proposed measure will not have any impact nor will it result in increased flood risk at any of these sites. This is a result of there being no known architectural or archaeological features or sites located in the vicinity of the FRM option.



### **Landscape & Visual Amenity**

Louth Landscape Character Assessment of 2002 classifies the general area as the Muirhevna Plain and is looking to conserve the agricultural land and hedgerows, the small broadleaf woodlands throughout the area and within the town of Ardee, and the four pNHAs in the area. The walls that are proposed will be located in an existing built up /suburban area and will have no impact on these objectives. Therefore there will be no impact of this option on the landscape and visual amenity in the surrounding area.

### **Fisheries & Angling**

There is the potential for short term negative impacts from construction of hard defences set back from non-sensitive watercourse and indirect sedimentation impacts to the downstream sensitive River Dee. Potential for on-bank and in-stream works. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works. In the medium and long term, there are unlikely to be any impacts on fisheries and angling.

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

There is the potential for minimal negative, short term, disturbance impacts to the local community during the construction phase with potential minimal negative impacts on access for commercial activity. However in the medium and long term, there is the potential for significant positive impacts as one commercial property may benefit through a reduced flood risk for the 1% AEP fluvial flooding events. There are three additional social infrastructure/amenity sites benefiting with this option in place.

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

- 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.
- Louth County Council carry out ad-hoc maintenance to the watercourses where resources allow, however these maintenance activities are likely to be local in nature and are not expected to have significant in-combination impacts with FRM measures.
- The Louth County Development Plan 2015-2021 provides a framework for the development of County Louth over the plan period. The plan has undergone Appropriate Assessment; therefore no in-combination effects are expected.
- The Glyde and Dee Arterial Drainage Scheme is located in County Louth. The drainage catchment includes the Rivers Glyde and Dee and adjoining stream and drainage channel tributaries. The scheme has a benefitting area of 10,643 ha. Channel maintenance involves removing features that are interfering or may interfere with the design conveyance of a channel e.g. siltation, in-stream growth of a range of vegetation types, growth of trees within the channel cross-section. Maintenance activities have taken place on the Glyde and Dee Arterial Drainage Scheme since 1957 when the scheme was completed. The Arterial Drainage maintenance activities for the period 2012 – 2016 have been subjected to appropriate assessment, which concluded that the conservation objectives, including the Special Conservation Interests, the Qualifying Interests or the integrity of the designated sties would not be affected by proposed maintenance activities on the Glyde and Dee Arterial Drainage Scheme. Therefore no in-combination effects from drainage maintenance activities are anticipated.

### **Key Conclusions:**

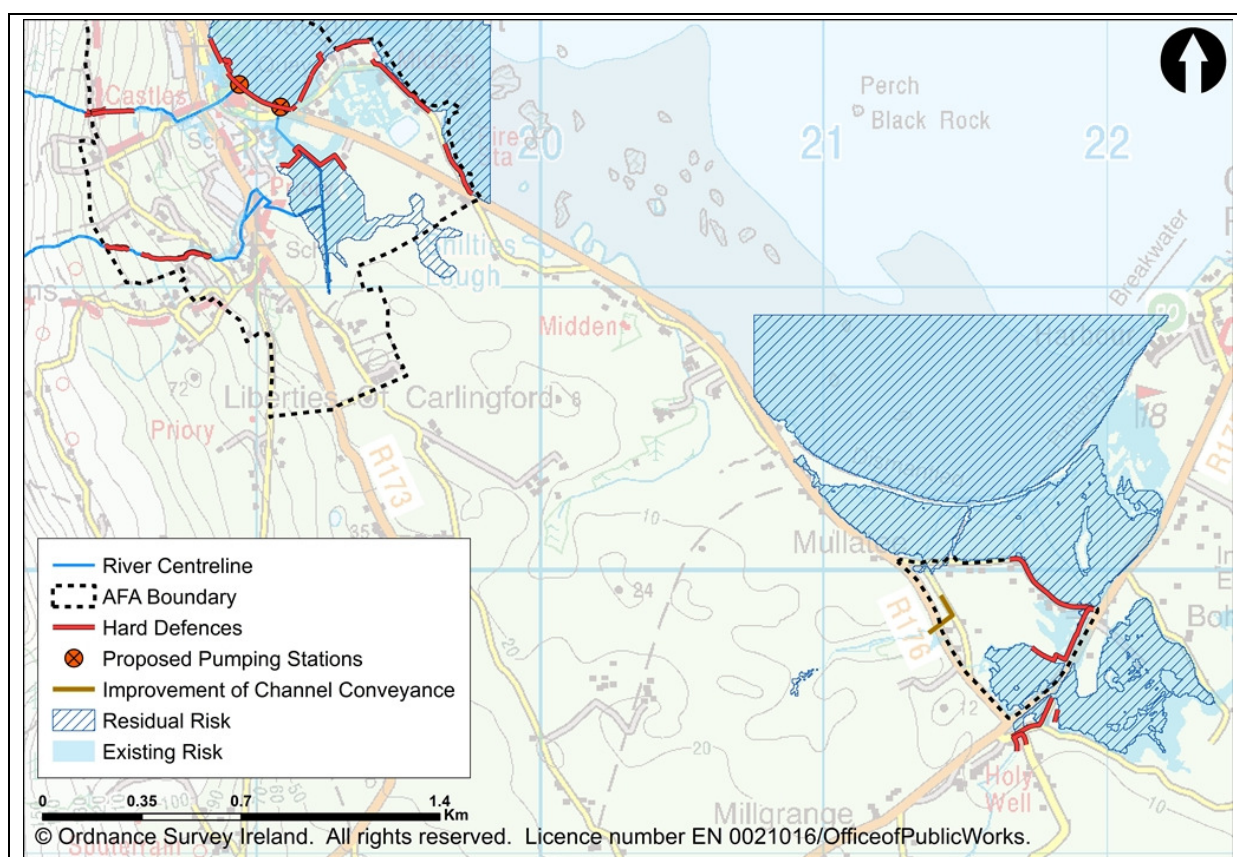
There is the potential for short term, minimal negative environmental impacts from the construction of hard defences. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed construction of hard defences could provide medium and long term benefits to the environment by providing 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 moderate to significant, positive, medium and long term impacts on these topic areas from a reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Ardee AFA will not have a significant adverse impact on European sites.

## 9.6 CARLINGFORD & GREENORE

<b>UoM</b>	UoM06
<b>Area / Location</b>	Carlingford and Greenore AFA
<b>Option</b>	Option 1 Fluvial Hard Defences, Coastal Hard Defences, Improved Channel Conveyance and Two Pumping Stations
<b>Code</b>	GBNIIENB-060016-0306-M33
<b>Description</b>	<p>At risk properties in Flood Cells 1, 2 and 3 would be protected from a series of flood embankments, walls and two pumping stations. The fluvial Hard Defences would contain the flow of 1% AEP fluvial event within the upper reaches of the Carlingford and Carlingford Commons watercourses to provide partial protection. When required during a fluvial event and at high tidal water levels the two Pumping Stations would extract any flood water that cannot be discharged to Carlingford Harbour as normal. The fluvial Hard Defences and the Pumping Station would both need to be in place to achieve full protection from a 1% AEP fluvial event. The coastal Hard Defences would provide design SoP for the 0.5% tidal event and the 0.5% wave overtopping event with an average height of 1 m and a total length of 2.2 km.</p> <p>At risk properties in flood cells 4 and 5 would be protected from a series of flood embankments, walls, and an upgrade to a culvert. The upgraded culvert would contain the flow of 1%AEP fluvial event within the Mullatee watercourse. The coastal Hard Defences would provide design SoP for the 0.5% tidal event with an average height of 0.7 m and a total length of 1.1 km.</p>



Total MCA-Benefit Score	Option Cost (€millions)	MCA-Benefit Score / Cost Ratio
1329	23.41	58.80

#### Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions

Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
227.45	23.41	63.12	2.70

#### Key Environmental Issues

- Agricultural production occurs outside Carlingford & Greenore AFA and is of local importance to the area, but not to the AFA. Mainly pasture land and non-irrigated arable land.
- Carlingford Shore SAC and Carlingford Lough SPA are located directly downstream of Carlingford & Greenore. Carlingford Mountain SAC is located upstream / up-catchment of Carlingford & Greenore and may have the potential to be impacted by up-catchment FRM methods.
- Carlingford Mountain pNHA is located upstream / up-catchment of Carlingford & Greenore. Carlingford Shore pNHA is located downstream of Carlingford & Greenore. Dundalk Bay IWeBS keysite in the vicinity.
- Carlingford Lough is a designated shellfish water with several licensed aquaculture / mariculture sites.
- Louth Landscape Character Assessment (2002) and Louth County Development Plan (2009-

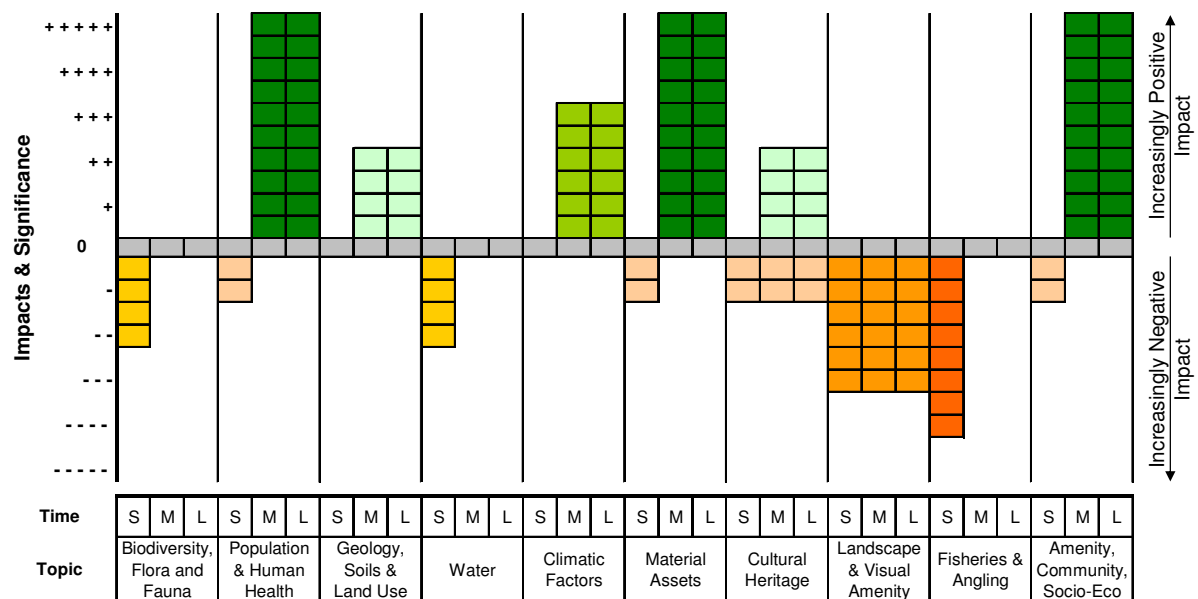
2015) cite the Carlingford Lough and Mountains, including West Feede Uplands, as a landscape of international importance. Carlingford town is a major tourist attraction and visual amenity is important to the AFA. The Assessment also looks to conserve the landscape / seascape in the area of the Carlingford Lough SPA and SAC, and to enhance / restore the railway village of Greenore, however general landscape of Cooley Lowlands and Coastal Areas is not overly sensitive and is of local importance.

- There are several NIAH recorded buildings of local and regional importance within Carlingford & Greenore. There are several recorded archaeological monuments / features within Carlingford Town, which is itself a historic town. There are three monuments (houses / tower houses) in state care within the AFA, however all three are of low vulnerability to flooding. Within the AFA there is one monument (Medieval House) with a preservation order that is potentially highly vulnerable to flooding. The archaeological heritage features in the area are mainly churches, raths and defences, with low vulnerability to flooding.

#### Environmental Assessment

Environmental Topic	Short Term Impacts	Medium Term Impacts	Long Term Impacts
Biodiversity, Flora & Fauna (BFF)	-2	0	0
Population & Human Health (PHH)	-1	5	5
Geology, Soils and Landuse (S)	0	2	2
Water (W)	-2	0	0
Climatic Factors (C)	0	3	3
Material Assets & Infrastructure (MA)	-1	5	5
Cultural, Architectural & Archaeological Heritage (H)	-1	-1/2	-1/2
Landscape & Visual Amenity (L)	-3	-3	-3
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 the potential for direct construction phase disturbance impacts to the adjacent Carlingford Shore SAC, and Carlingford Lough SPA and pNHA from the construction of walls, embankments and pumping stations on existing modified areas, set back from the waterbodies and designated sites. There is also the potential for short term, indirect, downstream impacts to Carlingford Shore SAC, and Carlingford Lough SPA and pNHA from sedimentation during works in Carlingford and Greenore. There is the potential for temporary, direct loss of habitat and displacement of species from works area, with impacts limited by already modified channel / shoreline. These impacts could be mostly mitigated for with good site practice, effective planning and timing of works. There is unlikely to be any permanent or recurring impacts as a result of this option.

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 Carlingford/Greenore AFA on the following European sites:

- Carlingford Lough SPA (004078),
- Carlingford Lough SPA (NI) (UK9020161)
- Carlingford Shore SAC (002306)
- Carlingford Mountain SAC (000453)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European site, alone and in-combination with other plans and projects, taking into account the site's 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 Carlingford/Greenore will not have a significant adverse impact on the above European sites.

**Population & Human Health**

In the short term, there is likely to be disturbance impacts during the construction of this option on the local population. However there are 383 ground floor properties and 52 upper floor properties benefiting from up to 1% AEP fluvial and 0.5% AEP coastal flooding events, resulting in a medium and long term highly significant positive impact. There are no additional highly vulnerable properties benefiting from this option.

**Geology, Soils & Landuse**

There is unlikely to be any negative impacts of this option on the soil resource in the short term. However in the medium and long term flood extents on agricultural land will be reduced, resulting in slight positive impacts. A section of the proposed hard defences are likely to be located in the Carlingford Area IGH site, a site that contains palaeogene volcanic and intrusive igneous rocks, minerals and metamorphosed country rocks. Care is needed to avoid any potential negative impacts of this option on this site.

**Water**

This option involves the construction of flood walls, embankments, pumping stations and a culvert replacement adjacent to and upstream of a sensitive waterbody on mainly already modified areas. There is the potential for in-stream and on-bank works in non-sensitive waterbodies. There is also the potential for short term, indirect, downstream impacts from sedimentation during works.

In the medium and long term, there are unlikely to be impacts of this option although there will be a reduced flood risk from the 1% AEP fluvial event and the 0.5% AEP tidal and overtopping events.

**Climatic Factors**

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

**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 a highly significant positive impact, as there are 64 transport links benefiting through protection from up to 1% AEP fluvial and 0.5% AEP coastal flooding events. There are no additional utilities benefiting from this option.

**Cultural, Architectural & Archaeological Heritage**

There is the potential for temporary, minimal, negative impacts on and on the setting of the boathouse and Carlingford pier NIAH structures, and on a midden in the area of Carlingford Sailing Club from construction / augmentation of coastal defences and pumping stations. However archaeological material may be discovered in excavation work in this area. Potential for medium and long term impacts on the setting of and increased flood risk to the site of Muchgrange church and St James Holy Well. In the medium and long term, there is also the potential for an increased protection to nine NIAH buildings from severe flooding including Taaffe's Castle and Paid na Farrell's Castle.

**Landscape & Visual Amenity**

Carlingford Town is a major tourist attraction and visual amenity is important to the AFA. Northernmost fluvial flood walls would be partially in "green belt" area in LAP, southernmost fluvial flood walls are in land zoned for residential development. Both appear to require the removal of some natural trees or hedgerows. As a result, there is the potential for moderate negative impacts during the construction phase of this option on the landscape as well as moderate negative impacts in the medium and long term. Measures may have a permanent negative impact on medium sensitivity landscape character (sensitivity termed as medium, as walls will be well outside the town centre/heritage area).

**Fisheries & Angling**

There is the potential for direct construction phase impacts from construction and augmentation of walls, embankments and pumping stations adjacent to sensitive shellfish designated waterbody. There is also the potential for short term, indirect, downstream impacts to shell fisheries from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. There is unlikely to be permanent or recurring impacts following the construction phase.

**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. However there are 38 social infrastructure/amenity sites and 61 commercial properties benefiting through protection from up to 1% AEP fluvial and 0.5% coastal 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:

- 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.
- The Louth County Development Plan 2015-2021 provides a framework for the development of County Louth over the plan period. The plan has undergone Appropriate Assessment; therefore no in-combination effects are expected.
- The Carlingford and Greenore coastline and watercourses are maintained by Louth County Council. Inspections and maintenance works in these areas are carried out as and when necessitated, however these maintenance activities are likely to be local in nature and are not expected to have significant in-combination impacts with FRM measures.
- There are no other plans/projects ongoing or proposed (at the time of this study) which may give rise to any form of cumulative impact on the European sites.

**Key Conclusions:**

There is the potential for short term, slight negative impacts on biodiversity and water quality, and significant negative impacts on fisheries and angling from the construction of walls, embankments and pumping stations adjacent to a number of protected areas including a sensitive shellfish designated waterbody. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. There will likely be medium and long term benefits with this option in place with reduced flooding to agricultural land, a greater resilience to the potential impacts of climate change and increased protection from flooding for numerous NIAH buildings. However there is also the potential for significant negative visual impacts in the short, medium and long term on a medium sensitivity landscape. 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 Carlingford & Greenore AFA will not have a significant adverse impact on European sites.

**9.7 CARRICKMACROSS**

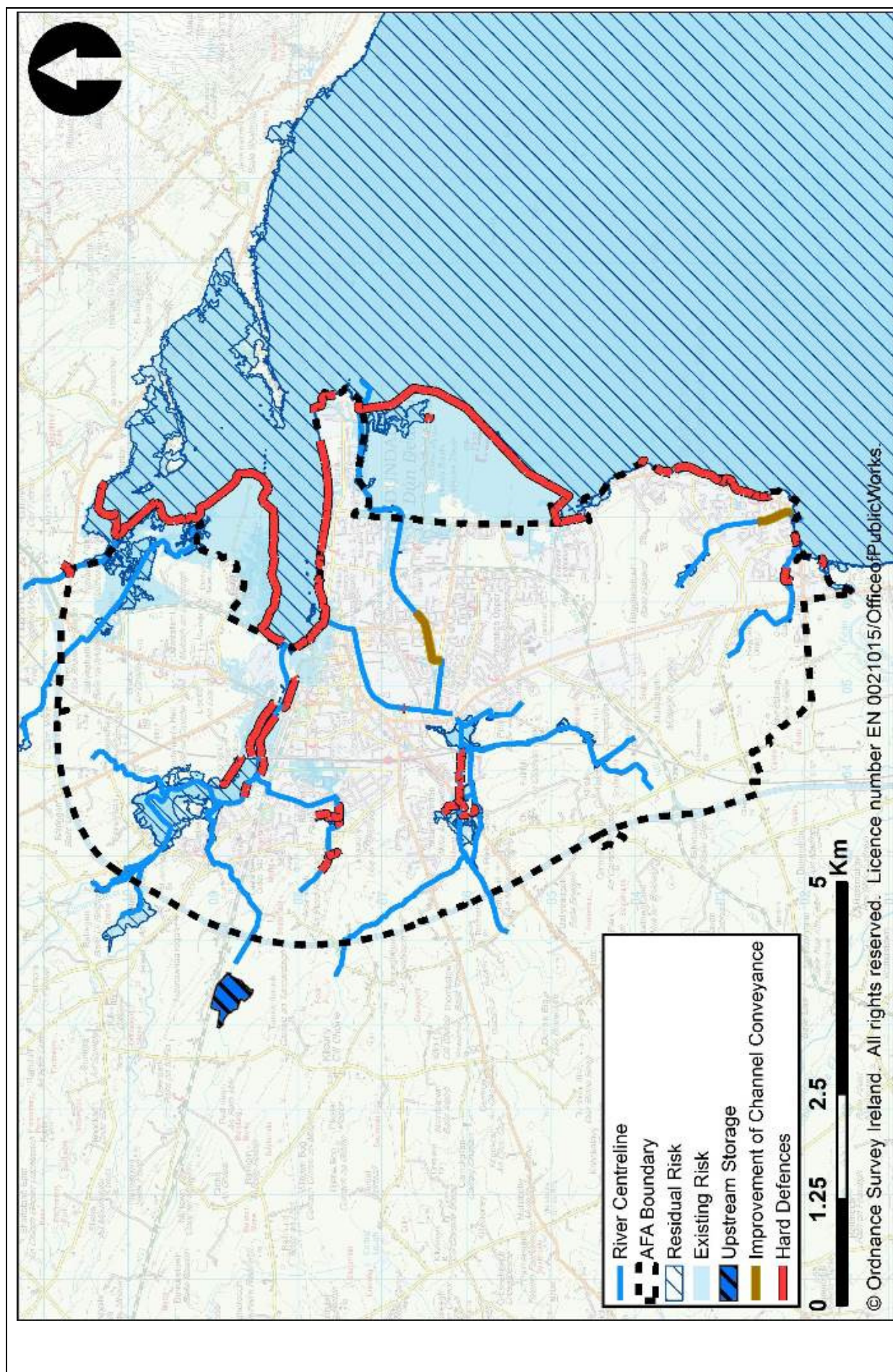
It has been assessed that the level of risk in Carrickmacross is currently zero or very low. The flood risk in this AFA will be reviewed, along with other areas, as part of the review of the Preliminary Flood Risk Assessment. The next steps in the assessment process, such as identification of options or MCA

appraisal have not been implemented and therefore there is no assessment for the Carrickmacross AFA in this SEA Environmental Report.

## 9.8 DUNDALK AND BLACKROCK SOUTH

<b>UoM</b>	UoM06
<b>Area / Location</b>	Dundalk and Blackrock South AFA
<b>Option</b>	Option 2 - Hard Defences, Improvement of Channel Conveyance, Storage
<b>Code</b>	GBNIIENB-060019-0406-M61
<b>Description</b>	<p>At risk properties would be protected from a series of hard defences, including flood embankments and walls, rock armour coastal protection, demountable barriers, road raising, a sluice gate and tanking of property. These defences would be required along with improvement of channel conveyance on the Blackrock River and Dundalk Blackwater River, along with Storage on the Castletown River.</p> <p>This option would protect to the 0.5% mechanism 1 coastal event, the 0.5% mechanism 2 coastal event and the 1% AEP fluvial flood event. Hard defences required have an average height of 1.4 m and a total length of 19.5km. The improvement of channel conveyance requires a 430 m length of the Blackrock River to be lowered, along with the replacement of two undersized culverts. On the Dundalk Blackwater, two undersized parallel culverts should be replaced. The storage area to be created is located upstream of the Castletown River, allowing a volume of 84,329m<sup>3</sup> to be stored during the 1% AEP fluvial flood event. This requires a short 15 m embankment, along with a culvert and weir in order to retain flow at the 10% AEP event.</p>







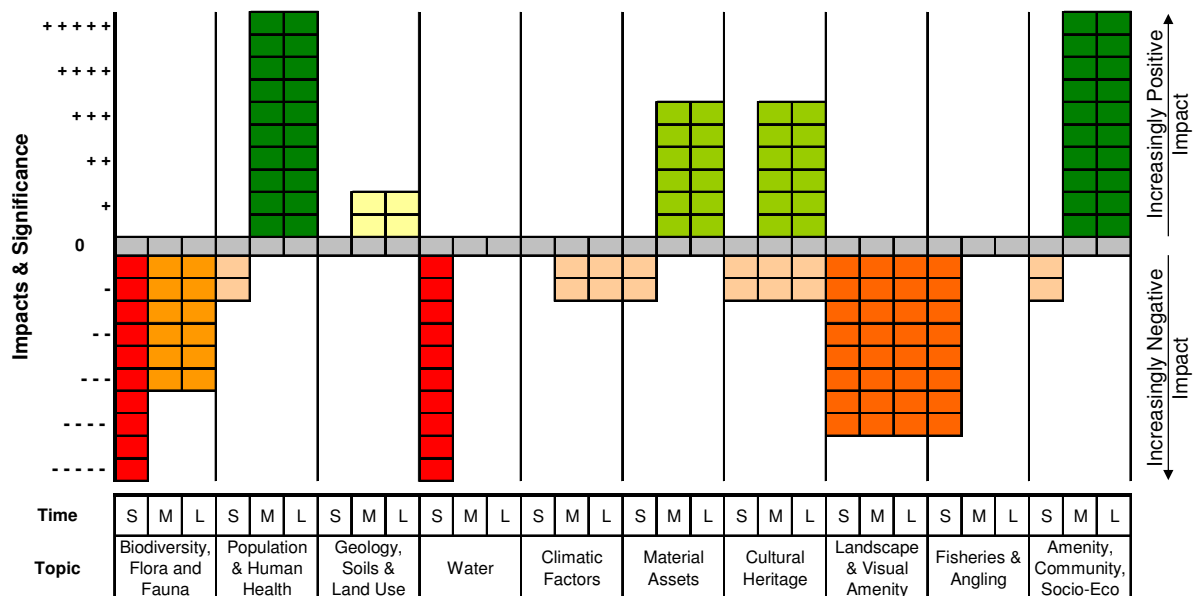
Total MCA-Benefit Score		Option Cost (€millions)	MCA-Benefit Score / Cost Ratio
1134		40.54	27.98
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
258.77	40.54	134.94	3.33
Key Environmental Issues			
<ul style="list-style-type: none"> <li>The majority of the AFA is urbanised however the periphery of the AFA and the surrounding area to the west, north and south is dominated by fertile pasture and arable lands. Agricultural production would be important to the area.</li> <li>Dundalk Bay SAC, SPA and Ramsar Site are within, adjacent to and downstream of the AFA. The Carlingford Mountain SAC is over 3.5 km north-east of Dundalk, however is not hydraulically linked to the AFA. The Slieve Gullion SAC is over 8 km north of the AFA in Northern Ireland. The Carlingford Shore SAC and the Carlingford Lough SPA are over 9 km north-east from Dundalk, but are not hydraulically linked to the AFA. The Stabannan-Braginstown SPA is 7 km south-west of, and not hydraulically linked to, the AFA.</li> <li>Dundalk Bay Marine Protected Area and pNHA are within, adjacent to and downstream of the AFA. The Drumcah, Toprass and Cortial Loughs pNHAs are over 2 km upcatchment of the AFA. The Ravensdale Plantation pNHA is over 4 km north of, but not hydraulically linked to the AFA. The Carlingford Lough pNHA is over 9 km north-east from Dundalk, but is not hydraulically linked to the AFA. The Trumpet Hill pNHA is over 2 km north-east of Dundalk, but is not hydraulically linked to the AFA. The Stabannan-Braginstown pNHA is 7 km south-west of, and not hydraulically linked to, the AFA. The Slieve Gullion ASSI and the Cloghinny ASSI are around 8 km north of the AFA in Northern Ireland. The Cashel Loughs ASSI, Loughaveely ASSI, Lurgan Lough ASSI, Glendesha ASSI and Mullaghbane ASSI are all over 8 km up-catchment of the AFA within Northern Ireland.</li> <li>Dundalk Bay supports substantial shellfisheries, with several aquaculture sites in the area, mainly for oysters and cockles. The Castletown River is known for stocks of wild brown trout and runs of salmon and sea trout. Upstream of Dundalk, in Northern Ireland, the Creggan Lower, Cully Water, Forkill/Kilcurry River and the Kilnasaggart River are all designated salmonid rivers. In the Castletown River Estuary at Dundalk there is some fishing for mullet and flounder, with occasional seatrout and bass. The main sea angling in the bay is from Gyles Quay. Charter angling also takes place in the bay. The Ramparts River flows through Dundalk and contains modest stocks of Brown Trout.</li> <li>Within the Louth Landscape Character Assessment the Dundalk Bay is cited as a sensitive landscape of regional and local importance for conservation and enhancement, mainly due to the Dundalk Bay SPA Saltmarsh and mudflats, with full range of plant communities, and the impressive coastal routes of high scenic quality.</li> </ul>			

- There are 417 NIAH buildings within the AFA of national, regional and local importance. There are two monuments (souterrains) with preservation orders within the AFA, which are vulnerable to flooding. There is one monument in state care within the AFA, which is of low vulnerability to flooding. There are 146 other monuments recorded within the AFA, which are of low vulnerability to flooding.

### Environmental Assessment

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

### Summary Chart of Impacts



## Discussion of Impacts

### Biodiversity, Flora & Fauna

In the short term, there is the potential for highly significant negative impacts. There is the potential for direct impacts to Dundalk Bay SAC, SPA, pNHA, Ramsar site, and OSPAR Marine Protected Area from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. There is also the potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Direct loss of natural and semi natural habitats in the footprint of works. However it is possible for defences to be set further back from designated sites. As a result of a possible direct loss of habitats and potential recurring dredging impacts, there may be moderately negative impacts of this option 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 Dundalk and Blackrock South AFA on the following European sites:

- Dundalk Bay SAC (000455)
- Dundalk Bay SPA (004026)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European site, alone and in-combination with other plans and projects, taking into account the site's 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 Dundalk and Blackrock South may have residual impacts on Dundalk Bay SAC and SPA. For option 2, this relates to the extent and location of coastal hard defences, and the impact of these on wetland habitats, either directly in the footprint of the FRM work or indirectly through sedimentation. There is also potential for intermittent residual sedimentation impacts during flood events or maintenance following dredging of the Blackrock River.

Option 4 also has potential for intermittent residual impacts following improvement of channel conveyance in the Blackrock River and potential for medium- to long-term damage to wetland habitats, with works footprints still in the designated areas, however this option includes potential positive impacts, as repositioning of coastal hard defences at Marsh North / Ballymascanlan will allow inundation of the land currently behind hard defences and potentially lead to an increase in the extent of wetland coastal habitats.

### Population & Human Health

There is the potential for short term disturbance impacts to the local population during the construction phase. However there are 1,285 ground floor properties, 21 upper floor properties and one highly vulnerable property benefiting with this option in place from up to 1% AEP fluvial and 0.5% AEP coastal flooding events. 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 impact of this option on the soil resource in the short term. In the medium and long term the proposed option has the potential to reduce flooding to agricultural lands. Sections of the proposed hard defences are likely to be located in Dundalk Bay IGH site, a wide coastal embayment incorporating wide expanses of coastal flats. Care is needed to avoid any potential negative impacts of this option on this site.

**Water**

This option will involve the excavation and restoration of banks adjacent to and set back from sensitive waterbodies. In the short term, there is the potential for highly significant negative impacts as a result of in-stream and on-bank construction impacts. Online storage on an undesignated tributary of the Castletown River will be created, which would be operational during flood events; however this requires a culvert and weir. Improvement of channel conveyance in Blackrock and Blackwater Rivers will be undertaken which will also result in negative construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies are listed in WFD Register of Protected Areas. There is unlikely to be any negative impacts in the medium and long term.

**Climatic Factors**

There is unlikely to be any impacts on climatic factors in the short term construction phase. This option is not adaptable to climate change; therefore there is the potential in the medium or long term for minimal negative impacts.

**Material Assets & Infrastructure**

There is the potential for short term disturbance impacts to local infrastructure during the construction phase. There are 107 transport links and one utility benefiting with this option in place in the medium and long term as a result of 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 as a result of embankments. However in the medium and long term, there is the potential for an increase in the level of protection for several NIAH buildings in Dundalk and for a few recorded monuments in the AFA.

**Landscape & Visual Amenity**

There is the potential for short term significant negative impacts on the landscape during the disturbance construction phase. These negative impacts are likely to extend to the medium and long term due to permanent impacts on the moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay. There is also the potential for some localised negative impacts on views in Dundalk.

**Fisheries & Angling**

In the short term there is the potential for significant negative impacts generally due to direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. There is the potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. However there is the potential for mitigation measures to minimise impacts on fisheries. There is unlikely to be negative impacts in the medium and long term to fisheries.

**Amenity, Community and Socio-Economics**

There is the potential for short term minimal negative disturbance impacts to the local community during the construction phase and minimal negative impacts on access to amenity areas and access for commercial activity. There are 127 social infrastructure/amenity sites and 155 commercial properties benefiting with this option in place in the medium and long term, as a result of an increased protection 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:

- 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.
- The Dundalk, Marshes Lower and Dundalk Blackwater watercourses are located within a Drainage District and are maintained by Louth City Council, who carries out routine inspections and maintenance as and when resources are available. Louth County Council carries out ad-hoc maintenance to the other watercourses in the Dundalk AFA where resources allow.
- The Louth County Development Plan 2015-2021 provides a framework for the development of County Louth over the plan period. The plan has undergone Appropriate Assessment; therefore no in-combination effects are expected.

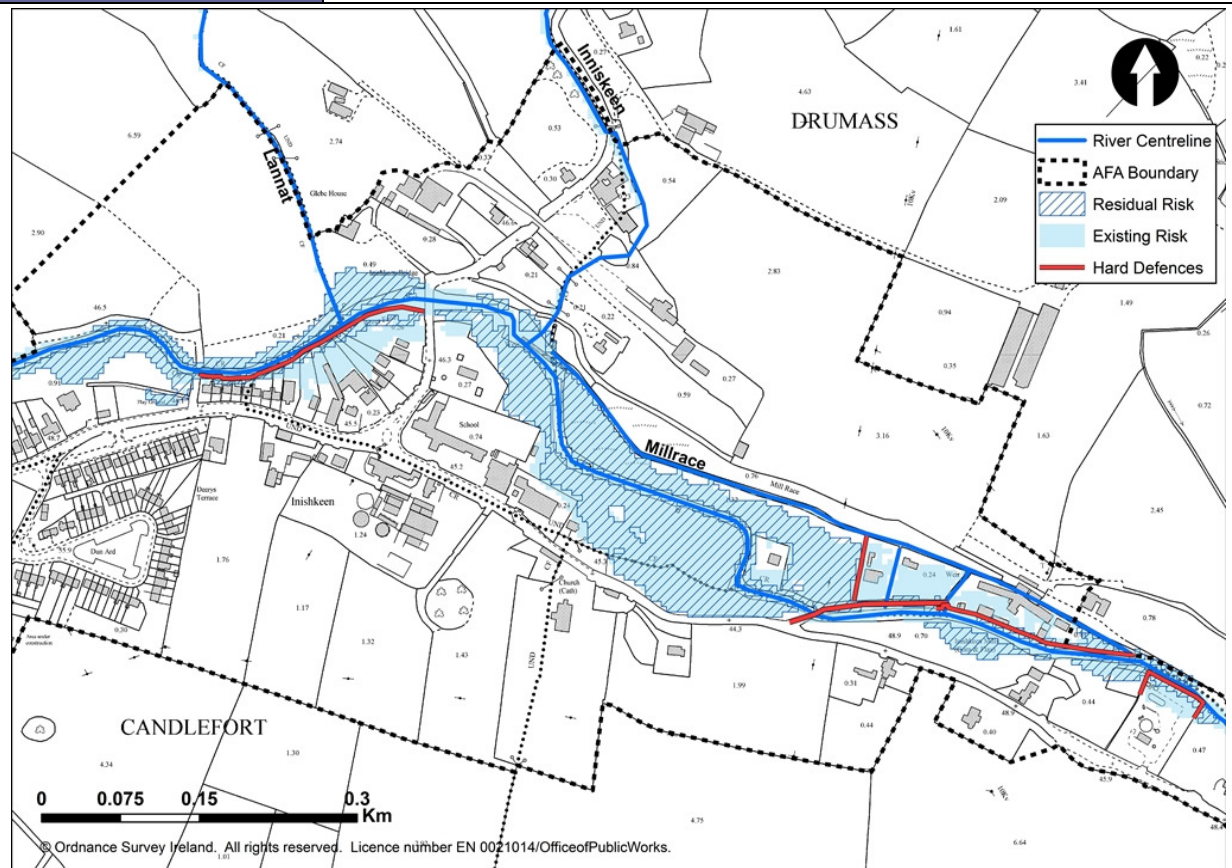
#### Key Conclusions:

There is the potential for short term, highly significant negative impacts on biodiversity and water quality, and significant negative impacts on fisheries and angling from the construction and restoration of embankments in a number of protected areas, and from dredging activities. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. However negative impacts on biodiversity may continue to the medium and long term with the possible direct loss of habitats from recurring dredging events. There is anticipated to be medium and long term benefits with this option in place with a reduction in flooding to agricultural lands and an increase in protection to several NIAH buildings and recorded monuments from flooding. However there is anticipated to be construction phase and permanent significant negative visual impacts on the moderate value landscape. Aside from short term disturbance impacts to population, human health, material assets, amenity, community and socio-economics, there is likely to be medium and long term, moderate to highly significant positive impacts on these topic areas from a reduced flood risk. The NIS has concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Dundalk and Blackrock AFA still have the potential for residual impacts on European sites. This will need investigated further at the detailed design phase, with site specific ecological surveys required to undertake a detailed Stage 2 Appropriate Assessment.

An alternative, more environmentally sustainable option to this is Option 4, which would involve the retreat of defences at Marsh North / Ballymascanlan so they are not bisecting the designated areas, although there still may be works footprints within designated areas. This Option 4 may however be a viable alternative to Option 2 if the impacts on the European sites are deemed to be unacceptable.

## 9.9 INNISKEEN

<b>UoM</b>	UoM06
<b>Area / Location</b>	Inniskeen AFA
<b>Option</b>	Option 1 - Hard Defences
<b>Code</b>	GBNIIENB-060020-0606-M33
<b>Description</b>	<p>At risk properties would be protected from a series of flood embankments and walls. Hard Defence would also include a 253 m long section of raised road (within flood cell 2) as space does not allow for walls or embankments. The raising of this road would require that the soffit level of the current structure (0613M01851D) is also increased to accommodate the raised road.</p> <p>These hard defences would protect to the 1% AEP fluvial flood event with an average height of 1.36 m and a total length of 0.64 km.</p>



Total MCA-Benefit Score	Option Cost (€millions)	MCA-Benefit Score / Cost Ratio	
1049	2.10	499.9	
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
5.92	2.10	2.67	1.27

### Key Environmental Issues

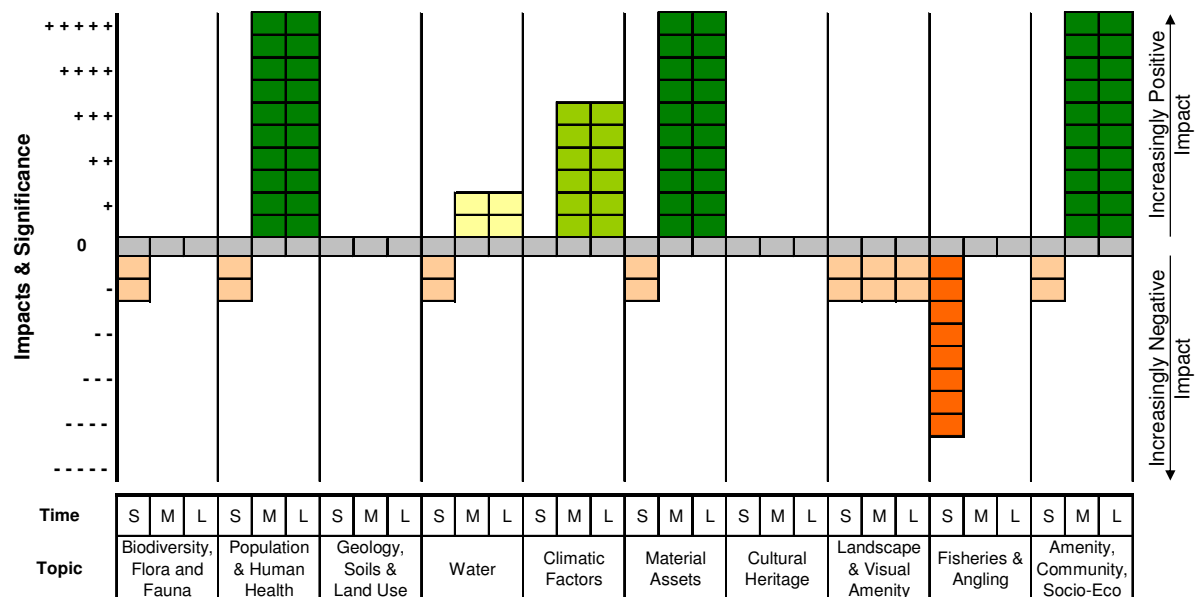
- Agriculture is very important to the Inniskeen area, with the AFA surrounded by pasture and grazing land. Production of this pasture land is interlinked with the local hydrology and hydrogeology, given the drumlin hill landscape. Downstream of Inniskeen towards Knockbridge and Blackrock land use is mainly arable in the flat floodplain of the Fane River.
- There are no SACs or SPAs in the vicinity of, or directly downstream of the AFA, and any AFA specific FRM methods to be employed.
- There are no national or local level nature designations in the vicinity of, or directly downstream of the AFA, and any AFA specific FRM methods to be employed.
- The Fane River is well known for Salmon and Sea Trout fishing. Upstream of Inniskeen in Northern Ireland the River Fane is designated as a Salmonid River. In Inniskeen itself the River Fane contains valuable salmonid nursery and adult habitat. As well as supporting good numbers of salmon and trout it also supports stocks of eel and lamprey among other species.
- The Monaghan Landscape Character Assessment notes the area as being mixed of landscape type topographically comprising low drumlin hills and undulating farmland. It is cited as a moderately scenic landscape and would not be considered to be highly sensitive to change. However the environs of the River Fane, owing to its relatively flat topography, is highly visually exposed and could be unsuited to large scale development. Smaller scale development would have to be accompanied by appropriate planting in order to accommodate same in a discreet manner in this landscape.
- There is one recorded architectural heritage feature (a round tower) in state care within the AFA, however this would be of low vulnerability to flooding.
- No recorded archaeological heritage features with preservation orders or in state care within the AFA, or in the vicinity of the AFA. Archaeological heritage features in the area are mainly raths, souterrains, burial sites and religious sites with a low vulnerability to flooding.

### Environmental Assessment

Environmental Topic	Short Term Impacts	Medium Term Impacts	Long Term Impacts
Biodiversity, Flora & Fauna (BFF)	-1	0	0
Population & Human Health (PHH)	-1	5	5
Geology, Soils and Landuse (S)	0	0	0
Water (W)	-1	1	1
Climatic Factors (C)	0	3	3
Material Assets & Infrastructure (MA)	-1	5	5
Cultural, Architectural & Archaeological Heritage (H)	0	0	0
Landscape & Visual Amenity (L)	-1	-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 unlikely to be any negative impact from this option on existing national, regional and local sites as a result of FRM measures. There is the potential for localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction, prior to re-establishment. There is the potential for increased protection to flooding from up to 1% AEP fluvial events at the Inniskeen waste water treatment plant.

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 Inniskeen AFA on the following European sites:

- Dundalk Bay SAC (000455)
- Dundalk Bay SPA (004026)

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 site's 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 Inniskeen AFA will not have a significant adverse impact on the above European sites.

#### Population & Human Health

During the construction phase of this option there is the potential for short term disturbance impacts to the local population. However in the medium and long term, there are 10 ground floor properties benefitting with this option in place due to protection from up to 1% AEP fluvial flood events. There are no upper floor properties or highly vulnerable properties benefitting with this option in place.



**Geology, Soils & Landuse**

There is unlikely to be any impact on the soil resource and agricultural land from this proposed option in the short, medium and long term.

**Water**

There is the potential for short term, minimal negative impacts in the construction phase to the non-sensitive waterbody from the excavation and restoration of banks and walls, set back from the waterbody. In the medium and long term, there is the potential for minimally positive impacts as a result of reduced flooding risk from the 1% AEP fluvial flooding event to the Inniskeen WWTW.

**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 at moderate cost and hence has the potential to have a moderate positive impact in the medium and long term.

**Material Assets & Infrastructure**

There is the potential for short term disturbance impacts to local infrastructure during the construction phase. In the medium and long term there is the potential for highly significant positive impacts as one utility may benefit due to an increased protection for the 1% AEP fluvial flooding events. There are no additional transport links benefiting with this option in place.

**Cultural, Architectural & Archaeological Heritage**

There is unlikely to be any impacts from this option on architectural or archaeological features in the short, medium or long term. There are few heritage features in the AFA or in the vicinity of the AFA and those that are located within the area are at low vulnerability to flooding.

**Landscape & Visual Amenity**

In the short term construction phase, this option has the potential to cause minimal negative impacts on the local landscape prior to the establishment of screening. There is the potential for minimal negative impacts to local views in the medium and long term from new and augmented embankments.

**Fisheries & Angling**

There is the potential for short term significant negative impacts from construction in the vicinity of local fishing areas on the River Fane from disturbance and sedimentation. After the construction phase, there is unlikely to be any permanent or recurring impact of this option on fish, fisheries or angling.

**Amenity, Community and Socio-Economics**

There is the potential for minimal negative, short term, disturbance impacts to the local community during the construction phase with potential minimal negative impacts on access for commercial activity. In the medium and long term there are highly significant positive impacts with 10 commercial properties benefiting with this option in place, with a reduced flood risk for the 1% AEP fluvial flooding events. There are no additional social infrastructure/amenity sites benefiting with this option in place.

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

- 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.
- The Monaghan County Development Plan 2013-2019 provides a framework for the development of County Monaghan over the plan period. The plan has undergone Appropriate Assessment; therefore no in-combination effects are expected.
- The Local Authorities (Monaghan County Council) carry out ad-hoc maintenance to the rivers Fane, Lannat and Glebe (modelled as the Inniskeen River) where resources allow. These maintenance activities are likely to be local in nature and are not expected to have significant in-combination impacts with FRM measures.

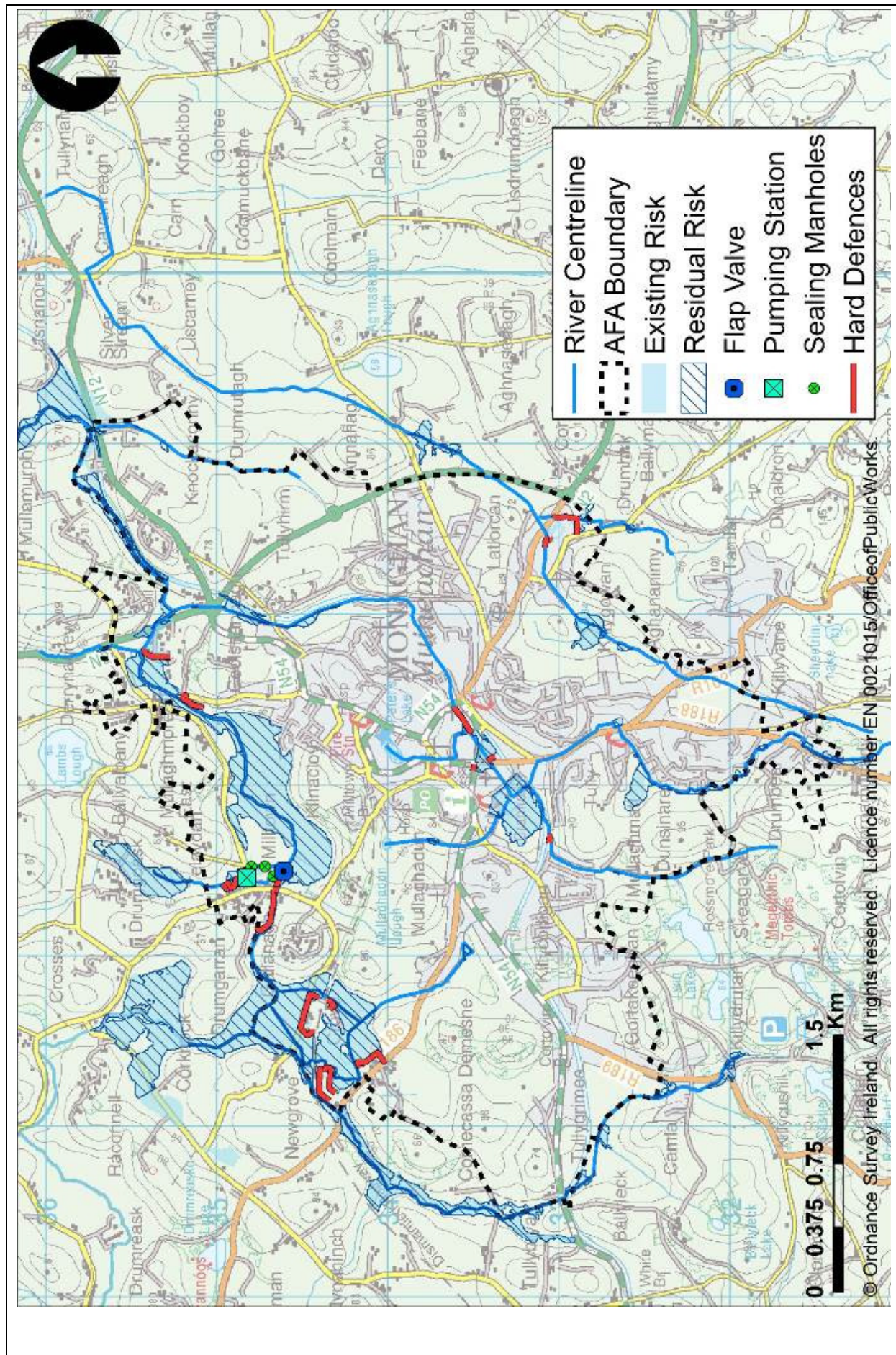
**Key Conclusions:**

There is the potential for short term, minimal to significant negative environmental impacts from the construction of hard defences. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed construction of hard defences at Inniskeen could provide medium and long term benefits to the environment with a reduced flood risk to the Inniskeen WWTW 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 Inniskeen AFA will not have a significant adverse impact on European sites.

**9.10 MONAGHAN**

<b>UoM</b>	UoM06
<b>Area / Location</b>	Monaghan AFA
<b>Option</b>	Option 2 - Hard Defences Version 2 and Other Works
<b>Code</b>	GBNIIENB-030011-0706-M33
<b>Description</b>	At risk properties would be protected from a series of flood embankments and walls in flood cells 1-9 with additional measures in place to protect properties in flood cell 5. Additionally the road junction would be protected within flood cell 2. These FRM methods would protect properties only in flood cells 1-9 and the road junction in flood cell 2 to the 1% AEP flood event.



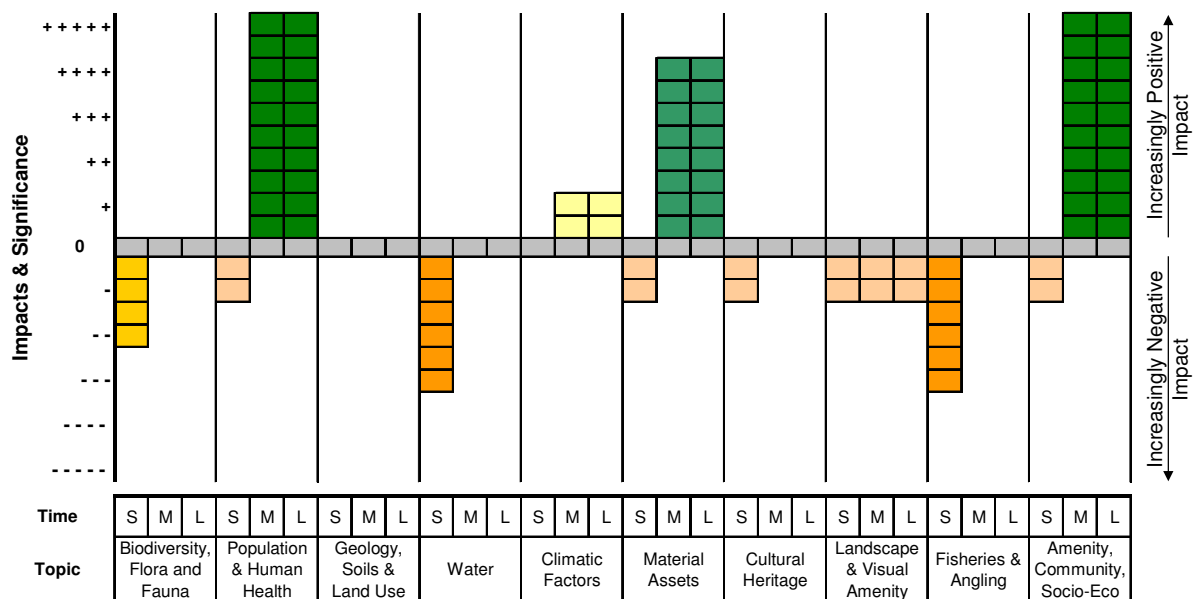




Total MCA-Benefit Score		Option Cost (€millions)	MCA-Benefit Score / Cost Ratio
1098.61		13.56	81.03
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
26.95	13.56	12.61	0.93
Key Environmental Issues			
<ul style="list-style-type: none"> <li>• Agriculture is important to the Monaghan area, with the AFA surrounded by pasture land. Production of this pasture land is heavily interlinked with the local hydrology and hydrogeology. The majority of the AFA itself is however urbanised.</li> <li>• Slieve Beagh SAC and SPA are over 10 km upstream of Monaghan in the headwaters of the River Blackwater.</li> <li>• Tullybrick Lough ASSI and the Caledon and Tynan ASSI are 8 km downstream of the AFA in NI. Wrights Wood pNHA is within Monaghan Town. The Ulster Canal pNHA (Aghalisk), the Rosefield Lake and Woodland pNHA, the Drumreask Lough pNHA and the Corcreeghy Lake and Woodland pNHA are all just upstream of Monaghan</li> <li>• Monaghan Town and its satellite villages of Emyvale, Glaslough, Scotstown, Ballinode and Tydavet are surrounded by a host of angling lakes for pike. Among the most popular venues in the area are Glaslough, Quig Lough, Drumreask and Killyboley. The River Blackwater in Northern Ireland is a designated salmonid river, over 6 km downstream of Monaghan. The Monaghan Blackwater and the Shambles River flow through Monaghan Town. The Monaghan Blackwater supports stocks of salmonids and lamprey among other species. Coarse angling is popular in the many lakes in the area and game fishing is popular on the river.</li> <li>• The AFA is within the Monaghan Drumlin Uplands Landscape Character Area. Most of this landscape is in good condition. The summit or highest point along the ridgeline is likely to be highly sensitive to development because it is visually exposed for many kilometres. In general, this landscape would not be regarded as highly scenic and hence, the capacity to accommodate development without undue compromise to the farmed landscape pattern is good. The Ulster Canal and Environs would be considered an area of Secondary Amenity Value.</li> <li>• There are many NIAH buildings of national and regional importance within the AFA and in the vicinity of the AFA.</li> <li>• No recorded archaeological heritage features with preservation orders or in state care within the AFA, or in the vicinity of the AFA. There are several monuments within the AFA; however all are of low vulnerability to flooding.</li> </ul>			

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

### Summary Chart of Impacts



### Discussion of Impacts

#### Biodiversity, Flora & Fauna

There is unlikely to be any impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures. There is also unlikely to be any impact on existing national, regional and local sites as a result of FRM measures. However there is the potential for temporary localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction prior to re-establishment. There is unlikely to be any permanent or recurring impacts of this option in the medium and long term.

Although a hydraulic linkage is present between the AFA catchment and Lough Neagh and Lough Beg

SPA, due to the distance between the sites there is not considered to be any potential impact pathway and it is therefore determined that the preferred option put forward in the FRMP for Monaghan AFA can be screened out of requiring appropriate assessment.

#### **Population & Human Health**

There is the potential for short term disturbance impacts to the local population during the construction phase. There are 13 ground floor properties and 18 upper floor properties benefiting with this option in place in the medium and long term from a reduced risk from the 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 impact on the soil resource or agricultural production as a result of this option in the short, medium and long term. There will be no increase in flooding on agricultural land due to this option.

#### **Water**

There is the potential for short term, moderate negative construction impacts in the non-sensitive waterbody in the vicinity of the new structures. Excavation and restoration of banks and walls will take place, set back from the waterbody. There is unlikely to be any further negative impacts in the medium and long term as a result of this option.

#### **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 although only at a significant cost. Therefore there is the potential for minimal positive impacts in the medium and long term.

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

Although there will be a minimal negative impact on material assets and infrastructure during the construction phase, there are eight transport links benefiting with this option in place in the medium and long term. This is a result of a reduced flood risk from the 1% AEP fluvial flooding events. There are no additional utilities benefiting with this option in place.

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

During the construction phase there is the potential for a slight negative impact on the setting of Ballyalbany Bridge NIAH structure from hard defences / embankments. However there is unlikely to be any impacts of this option in the medium and long term on heritage features.

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

There is likely to be short term construction phase impacts of local flood embankments prior to establishment of screening. Localised impacts on those to be defended. It is unlikely that there will be impacts on the wider landscape. There may be negative visual impacts on local views in the medium and long term.

#### **Fisheries & Angling**

There is the potential for short term minor negative impacts during the construction phase in the non-sensitive waterbody. Excavation and restoration of banks and walls will take place set back from the waterbody. It is unlikely that there will be any negative impacts as a result of this option in the medium and long term.

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

There is the potential for minimal negative, short term, disturbance impacts to the local community during the construction phase, with potential temporary impacts on access for commercial activity. However there is the potential for highly significant positive impacts in the medium and long term as 36 commercial properties may benefit with this option in place as a result of an increase in protection from the 1% AEP fluvial flooding events. There are no additional social infrastructure/amenity sites benefiting with this option in place.

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

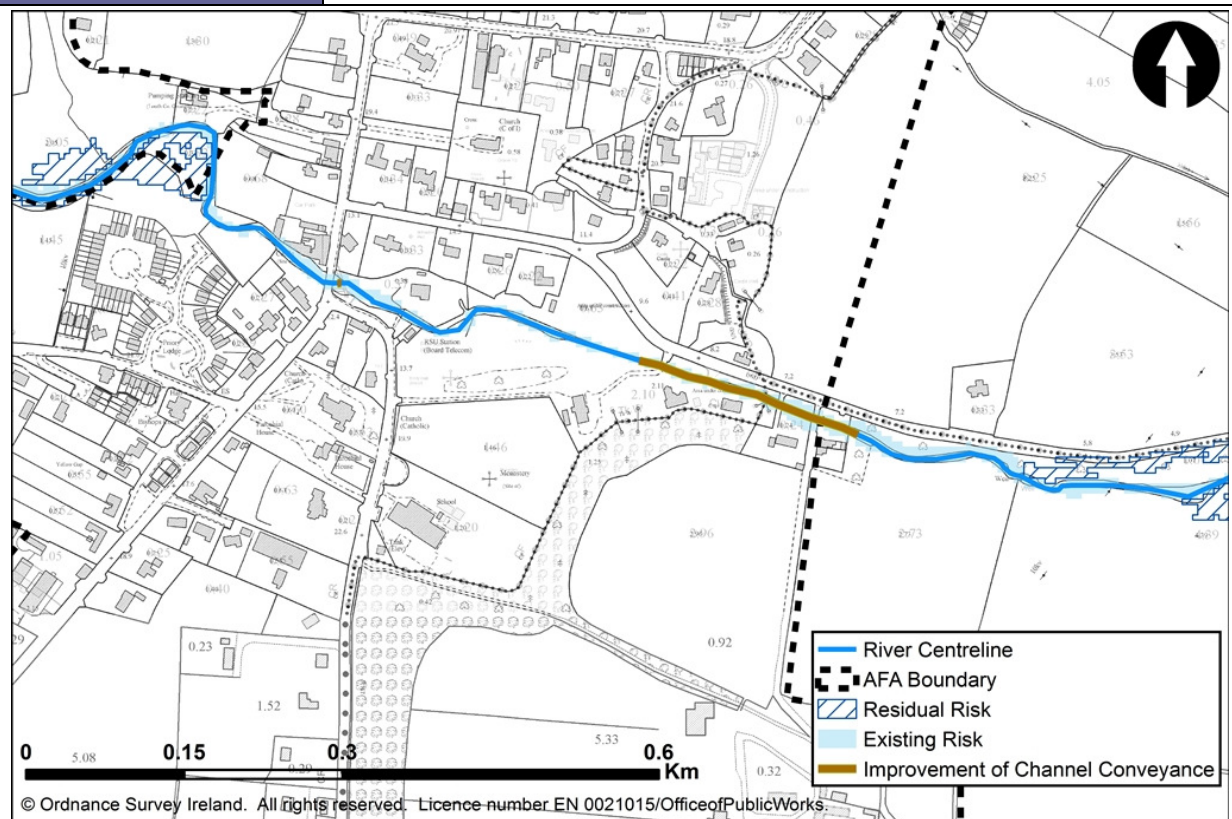
- The Monaghan Blackwater Arterial Drainage Scheme is located in Co. Monaghan. It includes over 287km of watercourse. The Arterial Drainage maintenance activities have been subjected to appropriate assessment which concluded that no significant impacts, via any of the three pathways, were been identified as part of the assessment. Therefore no in-combination effects from the proposed FRM measure with drainage maintenance activities are anticipated.
- The Monaghan County Development Plan 2013-2019 provides a framework for the development of County Monaghan over the plan period. The plan has undergone Appropriate Assessment; therefore no in-combination effects are expected.

**Key Conclusions:**

There is anticipated to be short term, slight to moderate negative impacts on biodiversity, water quality, fisheries and angling from the construction of hard defences set back from the waterbody. These impacts are mainly construction phase disturbances that could be mitigated for with good planning and management. The proposed hard defences may provide medium and long term environmental benefits with a greater resilience to the potential impacts of climate change. However there is the potential for construction phase and permanent minimal negative visual impacts on local views. 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 Monaghan AFA will not have a significant adverse impact on European sites.

## 9.11 TERMONFECKIN

<b>UoM</b>	UoM06
<b>Area / Location</b>	Termonfeckin AFA
<b>Option</b>	Option 1 - Improvement of Channel Conveyance
<b>Code</b>	GBNIIENB-060024-0806-M33
<b>Description</b>	At risk properties would be protected from improvement of channel conveyance in two areas along the Termonfeckin watercourse. The removal of the weir downstream of Drogheda Bridge and by dredging approximately 1135m <sup>3</sup> of material and underpinning four bridges along Strand Road. This FRM option would protect to the 1% AEP flood event.



Total MCA-Benefit Score	Option Cost (€millions)	MCA-Benefit Score / Cost Ratio	
-289	0.35	-815.32	
Economic Appraisal (Cost-Benefit Analysis) Outcomes - All figures €millions			
Area NPVd (uncapped)	Option Cost	Option NPVb (capped)	Benefit - Cost Ratio
0.68	0.35	0.32	0.9
Key Environmental Issues			
<ul style="list-style-type: none"><li>Agriculture is important to the Termonfeckin area, with pasture, arable and cultivated land</li></ul>			



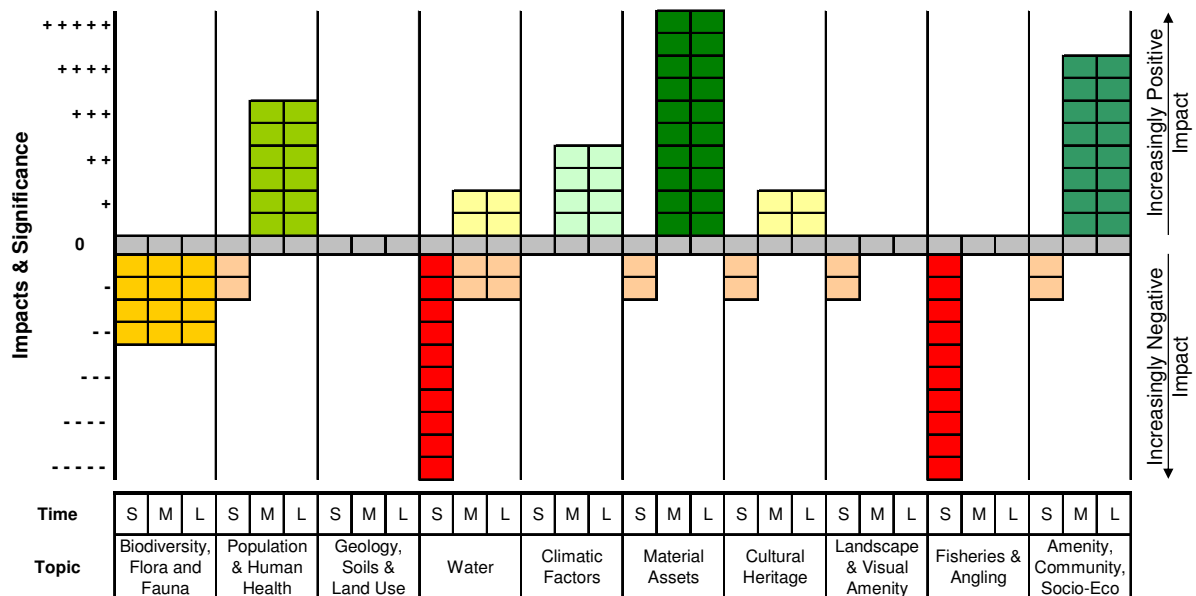
surrounding the AFA. Production of this land is interlinked with the local hydrology and hydrogeology.

- The Boyne Coast and Estuary SAC is 1 km directly downstream of Termonfeckin on the coast. The Boyne Estuary SPA is 1.5 km south along the coast from the mouth of the Termonfeckin River. The Clogher Head SAC is over 3 km north along the coast from the mouth of the Termonfeckin River.
- The Boyne Coast and Estuary pNHA is 1 km directly downstream of Termonfeckin on the coast. Blackhall Woods and Castlecoo Hill are over 2 km north of the AFA.
- In shore line fishing is common in the Irish Sea offshore from Termonfeckin. Clogher Head and Baltray Strand are popular sea fishing locations, which are to the north and south of Termonfeckin along the coast. The Termonfeckin River flows through Termonfeckin and supports modest sea trout populations, which may increase if water quality improves. Some local angling takes place here.
- Louth Landscape Character Assessment of 2002 classifies the general area as the Dunany-Boyne Estuary and Termonfeckin is described as a very attractive sylvan village. The area most sensitive to change is that north of Termonfeckin where the topography of the land rises up at Castlecoo and falls back down to the coastal plain north of Clogherhead. The Assessment is looking to conserve and restore the extensive sandy beaches with vulnerable dune systems and the village of Termonfeckin, with its sylvan setting and archaeological importance. The general landscape is classified as being of regional importance. Seapoint is a designated bathing water.
- There are several NIAH buildings of regional value within the AFA. There is one monument in state care within the AFA, which is a castle - tower house. There are several other monuments within the AFA, however these are of low vulnerability to flooding and are not within state care and do not have preservation orders.

### Environmental Assessment

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

## Summary Chart of Impacts



## Discussion of Impacts

### Biodiversity, Flora & Fauna

Although there will be no direct impacts to any SAC, SPA or Ramsar sites, there is the potential for increased sedimentation to downstream Boyne Coast and Estuary SAC and pNHA during conveyance works as well as the direct loss of local, undesigned, flora and fauna from the works. There is also the potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following the works that may have increased sedimentation impacts on Boyne Coast and Estuary SAC and pNHA. As a result, this option has the potential to result in slight negative impacts in the short, 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 Termonfeckin AFA on the following European sites:

- Boyne Coast and Estuary SAC (001957)
- Boyne Estuary SPA (004080)

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 site's 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 Termonfeckin AFA, may have residual impacts on Boyne Coast and Estuary SAC and Boyne Estuary SPA. This relates to the potential for intermittent residual sedimentation impacts on wetland habitats during flood events or maintenance following dredging of the Termonfeckin River. The detailed design of the scheme should recognise this potential and incorporate measures to avoid scouring. The construction of the FRM measures and any ongoing maintenance dredging should employ effective preventative measures to contain suspended solids and other pollutants. With these preventative measures in place, it has been concluded that the residual impacts will be insignificant.

<b>Population &amp; Human Health</b>
<p>There is the potential for short term disturbance impacts to the local population during the construction phase. In the medium and long term there are five ground floor properties and one upper floor property that would benefit with this option in place as they are protected from up to 1% AEP fluvial flooding events. There are no additional highly vulnerable properties benefiting with this option in place.</p>
<b>Geology, Soils &amp; Landuse</b>
<p>There is unlikely to be any temporary or permanent impacts from this option on the soil resource or land use within the area of Termonfeckin AFA.</p>
<b>Water</b>
<p>In the short term there is the potential for highly significant negative impacts as a result of the potential for direct morphological impacts and sedimentation impacts downstream during conveyance works. There is the potential for recurring impacts from dredging in the medium and long term. Improvement in channel conveyance in a non-sensitive waterbody, upstream of the Louth Coast sensitive coastal waterbody. Reduced risk of flooding will result in a minimal positive impact in the medium and long term.</p>
<b>Climatic Factors</b>
<p>There is unlikely to be any impacts on climatic factors in the short term construction phase. This option is adaptable at moderate to significant cost, resulting in the potential for slight positive impacts in the medium and long term.</p>
<b>Material Assets &amp; Infrastructure</b>
<p>There is the potential for short term minimal disturbance impacts to local infrastructure during the construction phase of this option. In the medium and long term there are three transport links benefiting with this option in place as a result of the protection from the 1% AEP fluvial flooding events. There are no additional utilities benefiting with this option in place.</p>
<b>Cultural, Architectural &amp; Archaeological Heritage</b>
<p>In the short term there is the potential for construction phase impacts on the setting of the Termonfeckin Bridge NIAH structure. However this minimal impact is likely to be only temporary. In the medium and long term there will be positive impacts with this option through increased protection from flooding to one monument (a burial ground) from the 1% AEP fluvial flooding events.</p>
<b>Landscape &amp; Visual Amenity</b>
<p>There is the potential for short term construction phase impacts on views from those to be protected. However there is unlikely to be any impacts on the wider landscape in the medium and long term.</p>
<b>Fisheries &amp; Angling</b>
<p>This option includes an improvement of channel conveyance in a non-sensitive waterbody. This has the potential to result in direct impacts to potential fish habitats and indirect temporary impacts on downstream fishing activity during the construction phase of this option. There is the potential for recurring impacts from dredging and increased sedimentation in the medium and long term.</p>
<b>Amenity, Community and Socio-Economics</b>
<p>There is the potential for short term, minimal negative, disturbance impacts to the local community during the construction phase with potential minimal negative impacts on access for commercial activity. In the medium and long term there are two commercial properties benefitting with this option in place, with a reduced risk from the 1% AEP fluvial flooding events. There are no additional social infrastructure/amenity sites benefiting with this option in place.</p>
<p>Potential sources of in-combination effects identified as part of this assessment include:</p> <ul style="list-style-type: none"> <li>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</li> </ul>

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

- Louth County Council carry out ad-hoc maintenance to the watercourses where resources allow, however these maintenance activities are likely to be local in nature and are not expected to have significant in-combination impacts with FRM measures.
- The Louth County Development Plan 2015-2021 provides a framework for the development of County Louth over the plan period. The plan has undergone Appropriate Assessment; therefore no in-combination effects are expected.

#### Key Conclusions:

There is the potential for short term, slight to highly significant, negative sedimentation and morphological impacts on biodiversity, water, fisheries and angling as a result of an improvement in channel conveyance. In addition, the recurring dredging events will likely result in medium and long term minimal to slight negative impacts to biodiversity and water quality. The proposed improved channel conveyance will likely provide environmental benefits with a reduction in flooding 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 moderate 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 Termonfeckin AFA, may have residual impacts on Boyne Coast and Estuary SAC and Boyne Estuary SPA. This relates to the potential for intermittent residual sedimentation impacts on wetland habitats during flood events or maintenance following dredging of the Termonfeckin River. This will need investigated further at the detailed design phase, with site specific ecological surveys required to undertake a detailed Stage 2 Appropriate Assessment. All options assessed for Termonfeckin require improvement of channel conveyance. The construction of the FRM measures and any ongoing maintenance dredging should employ effective preventative measures to contain suspended solids and other pollutants.

## 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	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	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	Minimise risk to human health and life of residents	Residential property flooding in the UoM	OPW, Local Authority and Emergency Services Reporting.
		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	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

SEA Topic	Objective	Sub-Objective	Indicator	Possible Data and Responsible Authority
<b>Water</b>	Support the objectives of the WFD	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	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	Minimise risk to transport infrastructure	Number and type of transport routes that have flooded in the UoM.	OPW, Local Authority and NRA reporting.
		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	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.
		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.

SEA Topic	Objective	Sub-Objective	Indicator	Possible Data and Responsible Authority
<b>Landscape and Visual</b>	Protect, and where possible enhance, landscape character and visual amenity within the river corridor	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	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	Minimise risk to social infrastructure and amenity	Social infrastructure and amenity assets impacted by flooding in the UoM.	OPW and Local Authority reporting.
		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 UoM06 under the NWNB 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 UoM06, 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 UoM06 as the preferred option.

Following the various levels of assessment of FRM options to manage flood risk in UoM06, 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:

- Annagassan - Hard Defences
- Ardee - Hard Defences
- Carlingford & Greenore - Fluvial Hard Defences, Coastal Hard Defences, Improved Channel Conveyance and Two Pumping Stations
- Dundalk & Blackrock South - Hard Defences, Improvement of Channel Conveyance, Storage
- Inniskeen - Hard Defences
- Monaghan - Hard Defences Version 2 and Other Works
- Termonfeckin - Improvement of Channel Conveyance

**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 UoM06 incorporating the FRM measures proposed at the AFAs of Annagassan, Ardee, Carlingford / Greenore, Dundalk & Blackrock, Inniskeen, Monaghan and Termonfeckin on the following European sites:

- Dundalk Bay SAC (000455)
- Dundalk Bay SPA (004026)
- Strabannan-Braganstown SPA (004091)
- Carlingford Lough SPA (004078)
- Carlingford Lough SPA (NI) (UK9020161)

- Carlingford Mountain SAC (000453)
- Carlingford Shore SAC (002306)
- Boyne Coast and Estuary SAC (001957)
- Boyne Estuary SPA (004080)
- Lough Neagh and Lough Beg SPA (NI) (UK9020091)

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 majority of the proposed draft FRM measures in the UoM06 FRMP will not have a significant adverse impact on the above European sites. The potential for residual impacts following mitigation were however identified from proposed FRM options at Dundalk & Blackrock South and Termonfeckin. These potential impacts would need investigated further at the detailed design phase, with site-specific hydrological, hydraulic, ecological and bird surveys required to undertake a detailed Stage 2 Appropriate Assessment.

**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 NWNB CFRAM Study website: <http://nwnb.cfram.com/>.

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 UoM06	July 2016 – October 2016	Statutory, Non Statutory and Public Consultation on SEA Environmental Report and Natura Impact Statement
Release of Final FRMP for UoM06	Early 2017	SEA Environmental Statement

The contact for any information regarding the SEA of the FRMP for UoM06 is as follows:

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



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## 14 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.

<b>OBJECTIVE 3 (ii) Population and Human Health</b>													
<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												
<b>Guidance on Assignment of Local Weightings</b>													
<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><b>Rate of Onset of Flooding</b></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><b>Flood Depths and Velocities (Risk to Life)</b></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				
<p>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).</p> <p><b>Route and Airport Scoring</b></p> <p>Each type of transport route and airport is assigned a score. The types of transport routes and airports are categorised and scored as follows:</p>				
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
<p><i>Local Urban Roads (Streets)</i></p> <p>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.</p> <p>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.</p>				

### **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:

Factor = 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:*

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

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																		
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																		

***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 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**

## Annagassan AFA – Option 1

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.75	<i>There are 26 ground floor properties and there are no additional upper floor properties benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	4.97	<i>There are 3 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.83	<i>There are 8 commercial properties benefiting with this option in place.</i>
2.a	4.70	<i>With this option in place the total economic damages have been reduced from €149803.27 to €8847.</i>
2.b	4.98	<i>There are 4 transport links benefiting with this option in place.</i>
2.c	4.98	<i>There is 1 utility benefiting with this option in place.</i>
2.d	1.00	<i>Reduction in rural land flooded</i>
3.a	-2.00	<i>Construction phase impacts with potential for excavation and restoration of banks adjacent to and set back from sensitive and non-sensitive waterbodies. Potential for in-stream and on-bank construction impacts in areas which are already impacted by infrastructure and FRM methods.</i>
3.b	-3.00	<i>Potential for direct construction phase impacts on the periphery of and adjacent to the Donegal Bay SAC, SPA and Ramsar site from the construction of walls and embankments, set back from the waterbody where possible. Potential for direct temporary loss of habitat and displacement of species from works area. Potential for short term, indirect, downstream impacts from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>
3.c	-3.00	<i>Potential for direct construction phase impacts on the periphery of and adjacent to the Donegal pNHA and MPA from the construction of walls and embankments, set back from the waterbody where possible. Potential for direct temporary loss of habitat and displacement of species from works area. Potential for short term, indirect, downstream impacts from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>

3.d	-3.00	<i>Potential for direct construction phase impacts from construction and augmentation of walls and embankments adjacent to waterbodies known for sensitive species. Potential for short term, indirect, downstream impacts to fisheries from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>
3.e	-1.00	<i>Short term construction phase impacts on local sensitivity landscape. Construction and rehabilitation of walls and embankments in areas already impacted by infrastructure and FRM methods. Impacts mainly on those to be protected.</i>
3.f.i	-1.00	<i>Slight potential for physical impacts to and on the setting of Annagassan Bridge NIAH structure from the construction and tie in of defences.</i>
3.f.ii	1.00	<i>Increased protection from severe flooding to one monument.</i>
4.a	2.00	<i>Low risk</i>
4.b	3.00	<i>The following hazards have been identified: working near water, heavy plant machinery</i>
4.c	3.00	<i>Option is adaptable at moderate cost</i>

## Ardee AFA – Option 1

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	3.66	<i>There are 6 ground floor properties and there is 1 upper floor property benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	4.95	<i>There are 3 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	3.99	<i>There is 1 commercial property benefiting with this option in place.</i>
2.a	4.71	<i>With this option in place the total economic damages have been reduced from €505785.37 to €29818.48.</i>
2.b	0.47	<i>There is 1 road benefiting with this option in place.</i>
2.c	0.00	<i>There are no additional utilities benefiting with this option in place.</i>
2.d	-1.00	<i>Flood extents slightly larger</i>
3.a	-1.00	<i>Short term negative impacts from construction of hard defences set back from non-sensitive watercourse. Potential for on bank and in stream works. Reduced flood risk for the 1% AEP fluvial event. Potential for indirect sedimentation impacts to downstream sensitive waterbodies during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>
3.b	0.00	<i>The River Dee discharges to the River Glyde at Dundalk Bay SAC, SPA, OSPAR MPA, Ramsar Site c.15km downstream of Ardee. No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.</i>
3.c	-1.00	<i>Localised construction impacts are anticipated in the vicinity of the proposed walls but these will be mitigated by the already modified nature of the banks and should not affect any protected areas. Potential for indirect sedimentation impacts to downstream habitats during construction. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>

3.d	-1.00	<i>Short term negative impacts from construction of hard defences set back from non-sensitive watercourse. Potential for on bank and in stream works. Potential for indirect sedimentation impacts to downstream sensitive River Dee during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works. waterbody treated as sensitive.</i>
3.e	0.00	<i>Louth Landscape Character Assessment of 2002 classifies the general area as the Muirhevna Plain and is looking to conserve the agricultural land and hedgerows, the small broadleaf woodlands throughout the area and within the town of Ardee, and the four pNHAs in the area. The walls are proposed in an existing built up /suburban area and will have no impact on these objectives.</i>
3.f.i	0.00	<i>There are over 70 NIAH recorded buildings of local and regional importance within the AFA, as well as one monument (Medieval Building) with a preservation order that is classified as being more vulnerable to flooding. Proposed measures will not have any impact nor will result in increased flood risk on any of these sites.</i>
3.f.ii	0.00	<i>No effects on archaeological features - no protected features in AFA or influenced area.</i>
4.a	4.00	<i>Negligible operational risk</i>
4.b	2.00	<i>The following hazards have been identified: Working near Water, Working near Water, Heavy Plant Machinery</i>
4.c	3.00	<i>Option is adaptable at moderate cost</i>

## Ardee AFA – Option 2

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	3.66	<i>There are 6 ground floor properties and there is 1 upper floor property benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	4.95	<i>There are 3 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	3.99	<i>There is 1 commercial property benefiting with this option in place.</i>
2.a	4.88	<i>With this option in place the total economic damages have been reduced from €505785.37 to €12630.29.</i>
2.b	3.26	<i>There are 2 transport links benefiting with this option in place.</i>
2.c	0.00	<i>There are no additional utilities benefiting with this option in place.</i>
2.d	-3.00	<i>Agricultural areas used for storage</i>
3.a	-3.00	<i>Short term negative impacts from construction of hard defences set back from, and storage area on, non-sensitive watercourses. Potential for on bank and in stream works. Permanent impacts of online storage upstream of Ardee on non-sensitive undesignated watercourse. Reduced flood risk for the 1% AEP fluvial event. Potential for indirect sedimentation impacts to downstream sensitive waterbodies during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>
3.b	0.00	<i>The River Dee discharges to the River Glyde at Dundalk Bay SAC, SPA, OSPAR MPA, Ramsar Site c.15km downstream of Ardee. No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.</i>

3.c	-2.00	<i>Localised construction impacts are anticipated in the vicinity of the proposed walls and storage areas but these will be mitigated by the already modified nature of the banks and agricultural area. Direct local loss of flora and fauna prior to re-establishment. No impact on national, regional or local designated areas. Potential for indirect sedimentation impacts to downstream habitats during construction. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>
3.d	-3.00	<i>Short term negative impacts from construction of hard defences set back from, and storage area on, non-sensitive watercourses. Potential for on bank and in stream works. Permanent impacts of introduction of barriers to fish passage with online storage upstream of Ardee. Potential for indirect sedimentation impacts to downstream sensitive River Dee during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works.</i>
3.e	-1.00	<i>Louth Landscape Character Assessment of 2002 classifies the general area as the Muirhevna Plain and is looking to conserve the agricultural land and hedgerows, the small broadleaf woodlands throughout the area and within the town of Ardee, and the four pNHAs in the area. Storage is proposed in agricultural land and may have short term impact (construction) on moderate sensitivity landscape character/feature in the zone of visibility of the selected measure, prior to establishment of screening. Hard defences are proposed in an existing built up /suburban area and will have no impact on these objectives.</i>
3.f.i	0.00	<i>There are over 70 NIAH recorded buildings of local and regional importance within the AFA, as well as one monument (Medieval Building) with a preservation order that is classified as being more vulnerable to flooding. Proposed measures will not have any impact nor will result in increased flood risk on any of these sites.</i>
3.f.ii	0.00	<i>No effects on archaeological features - no protected features in AFA or influenced area.</i>
4.a	4.00	<i>Negligible operational risk</i>
4.b	2.00	<i>The following hazards have been identified: Working Near Water , Working Near Water, Heavy Plant Machinery</i>
4.c	2.00	<i>Option is adaptable at moderate to significant cost</i>

## Carlingford/Greenore AFA – Option 1

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.86	<i>There is a combined number of 383 ground floor properties and there are 52 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	4.91	<i>There is a combined number of 38 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.</i>
1.b.ii	4.98	<i>There is a combined number of 61 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.</i>
2.a	4.84	<i>With this option in place the total economic damages have been reduced from €5688882 to €184153.13.</i>
2.b	4.91	<i>There is a combined number of 64 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	2.00	<i>All flood water is kept in channel with option in place therefore flood extents impacts on agricultural land are minimised</i>
3.a	-2.00	<i>Construction of flood walls, embankments, pumping stations and a culvert replacement adjacent to and upstream of a sensitive waterbody on mainly already modified areas. Potential for in-stream and on-bank works in non-sensitive waterbodies. Potential for short term, indirect, downstream impacts from sedimentation during works. Reduced flood risk for the 1% AEP fluvial event and the 0.5% AEP tidal and overtopping events.</i>



3.b	-2.00	<p><i>Potential for direct construction phase disturbance impacts to the adjacent Carlingford Shore SAC and Carlingford Lough SPA from the construction of walls, embankments and pumping stations on existing modified areas, set back from the waterbodies and designated sites.</i></p> <p><i>Potential for short term, indirect, downstream impacts to Carlingford Shore SAC and Carlingford Lough SPA from sedimentation during works in Greenore. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. Unlikely to be any permanent or recurring impacts.</i></p>
3.c	-2.00	<p><i>Potential for direct construction phase disturbance impacts to the adjacent Carlingford Lough pNHA from the construction of walls, embankments and pumping stations on existing modified areas, set back from the waterbodies and designated site.</i></p> <p><i>Potential for short term, indirect, downstream impacts to Carlingford Lough pNHA from sedimentation during works in Greenore. Potential for direct temporary loss of habitat and displacement of species from works area, with impacts limited by already modified channel / shoreline. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. Unlikely to be any permanent or recurring impacts.</i></p>
3.d	-4.00	<p><i>Potential for direct construction phase impacts from construction and augmentation of walls, embankments and pumping stations adjacent to sensitive shellfish designated waterbody. Potential for short term, indirect, downstream impacts to shellfisheries from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. Unlikely to be any permanent or recurring impacts on fisheries following construction.</i></p>
3.e	-3.00	<p><i>Carlingford town is rated of high is a major tourist attraction and visual amenity is important to the AFA. Northernmost fluvial flood walls would be partially in "green belt" area in LAP, southernmost fluvial flood walls are in land zoned for residential development. Both appear to require the removal of some natural trees or hedgerows. Measures may have permanent impact on medium sensitivity landscape character (sensitivity termed as medium, as walls will be well outside the town centre/heritage area.</i></p>

3.f.i	2.00	<i>Potential for physical impacts on and on the setting of the boathouse and Carlingford pier NIAH structures from construction / augmentation of coastal defences and pumping stations. Increased protection to 9 NIAH buildings from severe flooding.</i>
3.f.ii	1.00	<i>Potential for physical impacts on a midden in the area of Carlingford Sailing Club from construction of coastal defences, however archaeological material may be discovered in excavation work in this area. Potential for impacts on the setting of and increased flood risk to the site of Muchgrange church and St James holy well. Increased protection to Taaffe's Castle and Paid na Farrell's Castle from severe flooding.</i>
4.a	3.00	<i>Very low operational risk</i>
4.b	1.00	<i>The following hazards have been identified: working near water (construction), working near water (O&amp;M), heavy plant and machinery (construction), work on wells</i>
4.c	3.00	<i>Option is readily adaptable at limited cost</i>

## Dundalk and Blackrock South AFA – Option 1

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.93	<i>There are 1285 ground floor properties and there are 21 upper floor properties benefiting with this option in place.</i>
1.a.ii	4.62	<i>There is 1 highly vulnerable property benefiting with this option in place.</i>
1.b.i	4.96	<i>There are 127 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.92	<i>There are 155 commercial properties benefiting with this option in place.</i>
2.a	4.55	<i>With this option in place the total economic damages have been reduced from €7011212 to €636221.</i>
2.b	3.25	<i>There are 107 transport links benefiting with this option in place.</i>
2.c	2.11	<i>There is 1 utility benefiting with this option in place.</i>
2.d	1.00	<i>The proposed option has an overall slight improvement on the impact on agricultural land.</i>
3.a	-4.00	<i>Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in small undesignated Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas.</i>
3.b	-5.00	<i>Potential for direct impacts to Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Direct loss of natural and semi natural habitats in the footprint of works. Potential for defences to be set further back from designated sites.</i>

3.c	-5.00	<i>Potential for direct impacts to Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Potential for defences to be set further back from designated sites.</i>
3.d	-4.00	<i>Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.</i>
3.e	-4.00	<i>Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay. Potential for some localised negative impacts on views in Dundalk.</i>
3.f.i	3.00	<i>Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.</i>
3.f.ii	1.00	<i>Increase in the level of protection for a few recorded monuments.</i>
4.a	3.00	<i>Moderate, but manageable risk</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	1.00	<i>Option is adaptable only at significant cost</i>

## Dundalk and Blackrock South AFA – Option 2

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.93	<i>There are 1285 ground floor properties and there are 21 upper floor properties benefiting with this option in place.</i>
1.a.ii	4.62	<i>There is 1 highly vulnerable property benefiting with this option in place.</i>
1.b.i	4.96	<i>There are 127 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.92	<i>There are 155 commercial properties benefiting with this option in place.</i>
2.a	4.55	<i>With this option in place the total economic damages have been reduced from €7011212 to €636221.</i>
2.b	3.25	<i>There are 107 transport links benefiting with this option in place.</i>
2.c	2.11	<i>There is 1 utility benefiting with this option in place.</i>
2.d	1.00	<i>The proposed option has an overall slight improvement on the impact on agricultural land.</i>
3.a	-5.00	<i>Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in Blackwater River and Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas.</i>
3.b	-5.00	<i>Potential for direct impacts to Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Direct loss of natural and semi natural habitats in the footprint of works. Potential for defences to be set further back from designated sites.</i>

3.c	-5.00	<i>Potential for direct impacts to Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Potential for defences to be set further back from designated sites.</i>
3.d	-4.00	<i>Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.</i>
3.e	-4.00	<i>Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay. Potential for some localised negative impacts on views in Dundalk.</i>
3.f.i	3.00	<i>Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.</i>
3.f.ii	1.00	<i>Increase in the level of protection for a few recorded monuments.</i>
4.a	0.00	<i>Moderate, but manageable risk</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	1.00	<i>Option is adaptable only at significant cost</i>

## Dundalk and Blackrock South AFA – Option 3

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.93	<i>There are 1285 ground floor properties and there are 21 upper floor properties benefiting with this option in place.</i>
1.a.ii	4.62	<i>There is 1 highly vulnerable property benefiting with this option in place.</i>
1.b.i	4.96	<i>There are 127 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.92	<i>There are 155 commercial properties benefiting with this option in place.</i>
2.a	4.55	<i>With this option in place the total economic damages have been reduced from €7011212 to €636221.</i>
2.b	3.25	<i>There are 107 transport links benefiting with this option in place.</i>
2.c	2.11	<i>There is 1 utility benefiting with this option in place.</i>
2.d	-4.00	<i>The proposed option has an overall loss of agricultural land, when considering the relocation of the embankment at Marsh North. A significant area of land would become frequently inundated.</i>
3.a	-3.00	<i>Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in small undesignated Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas. Defences set back further from Dundalk Bay with this Option.</i>
3.b	1.00	<i>Potential for indirect impacts to adjacent and downstream Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay SAC, SPA and Ramsar site. Potential for creation of new habitat at Marsh North.</i>

3.c	1.00	<i>Potential for indirect impacts to adjacent and downstream Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay pNHA and OSPAR Marine Protected Area. Potential for creation of new habitat at Marsh North.</i>
3.d	-3.00	<i>Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.</i>
3.e	-2.00	<i>Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay, however are more set back from the water in this Option. Potential for some localised negative impacts on views in Dundalk.</i>
3.f.i	3.00	<i>Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.</i>
3.f.ii	1.00	<i>Increase in the level of protection for a few recorded monuments.</i>
4.a	3.00	<i>Moderate, but manageable risk</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	1.00	<i>Option is adaptable only at significant cost</i>



## Dundalk and Blackrock South AFA – Option 4

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.93	<i>There are 1285 ground floor properties and there are 21 upper floor properties benefiting with this option in place.</i>
1.a.ii	4.62	<i>There is 1 highly vulnerable property benefiting with this option in place.</i>
1.b.i	4.96	<i>There are 127 social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.92	<i>There are 155 commercial properties benefiting with this option in place.</i>
2.a	4.55	<i>With this option in place the total economic damages have been reduced from €7011212 to €636221.</i>
2.b	3.25	<i>There are 107 transport links benefiting with this option in place.</i>
2.c	2.11	<i>There is 1 utility benefiting with this option in place.</i>
2.d	-4.00	<i>The proposed option has an overall loss of agricultural land, when considering the relocation of the embankment at Marsh North. A significant area of land would become frequently inundated.</i>
3.a	-4.00	<i>Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in Blackwater River and Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas. Defences set back further from Dundalk Bay with this Option.</i>
3.b	1.00	<i>Potential for indirect impacts to adjacent and downstream Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay SAC, SPA and Ramsar site. Potential for creation of new habitat at Marsh North.</i>

3.c	1.00	<i>Potential for indirect impacts to adjacent and downstream Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay pNHA and OSPAR Marine Protected Area. Potential for creation of new habitat at Marsh North.</i>
3.d	-3.00	<i>Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.</i>
3.e	-2.00	<i>Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay, however are more set back from the water in this Option. Potential for some localised negative impacts on views in Dundalk.</i>
3.f.i	3.00	<i>Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.</i>
3.f.ii	1.00	<i>Increase in the level of protection for a few recorded monuments.</i>
4.a	3.00	<i>Moderate, but manageable risk</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	1.00	<i>Option is adaptable only at significant cost</i>

## Inniskeen AFA – Option 1

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.88	<i>There are 10 ground floor properties and there are no additional upper floor properties benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	0.00	<i>There are no additional social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.64	<i>There are 10 commercial properties benefiting with this option in place.</i>
2.a	1.04	<i>With this option in place the total economic damages have been reduced from €397818.05 to €314749.94.</i>
2.b	0.00	<i>There are no additional transport links benefiting with this option in place.</i>
2.c	4.67	<i>There is 1 utility benefiting with this option in place.</i>
2.d	0.00	<i>Agriculture very important to the Inniskeen area, with the AFA surrounded by pasture and grazing land. Production of this pasture land is interlinked with the local hydrology and hydrogeology, given the drumlin hill landscape. Further downstream of Inniskeen towards Knockbridge and Blackrock the land use is mainly arable in the flat floodplain of the Fane River</i>
3.a	0.00	<i>Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Reduced flooding in 1% AEP extent to Inniskeen waste water treatment plant.</i>
3.b	0.00	<i>No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.</i>
3.c	0.00	<i>No impact on existing national, regional and local sites as a result of FRM measures. Potential for localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction, prior to re-establishment.</i>
3.d	-4.00	<i>Construction phase impacts in sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.</i>

3.e	-1.00	<i>Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.</i>
3.f.i	0.00	<i>No effects on architectural features.</i>
3.f.ii	0.00	<i>No effects on architectural features.</i>
4.a	4.00	<i>Negligible operational risk</i>
4.b	1.00	<i>The following hazards have been identified: Risk of burial from earthfall, working near water (construction), work with heavy plant and components, working near water (O&amp;M)</i>
4.c	3.00	<i>Option is adaptable at moderate cost</i>

## Inniskeen AFA – Option 2

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.88	<i>There are 10 ground floor properties and there are no additional upper floor properties benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	0.00	<i>There are no additional social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.64	<i>There are 10 commercial properties benefiting with this option in place.</i>
2.a	1.04	<i>With this option in place the total economic damages have been reduced from €397818.05 to €314749.94.</i>
2.b	0.00	<i>There are no additional transport links benefiting with this option in place.</i>
2.c	4.67	<i>There is 1 utility benefiting with this option in place.</i>
2.d	0.00	<i>Agriculture very important to the Inniskeen area, with the AFA surrounded by pasture and grazing land. Production of this pasture land is interlinked with the local hydrology and hydrogeology, given the drumlin hill landscape. Further downstream of Inniskeen towards Knockbridge and Blackrock the land use is mainly arable in the flat floodplain of the Fane River</i>
3.a	-4.00	<i>Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Reduced flooding in 1% AEP extent to Inniskeen waste water treatment plant.</i>
3.b	0.00	<i>No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.</i>
3.c	-2.00	<i>No impact on existing national, regional and local sites as a result of FRM measures. Potential for direct localised loss of or disturbance to undesignated flora/fauna within the channel and in semi-natural and urban habitat during construction, prior to re-establishment. Potential for indirect downstream sedimentation impacts from conveyance works.</i>

3.d	-5.00	<i>Construction phase impacts from increasing of channel conveyance in sensitive waterbody and excavation and restoration of banks and walls set back from waterbody. Potential for indirect downstream sedimentation impacts from conveyance works.</i>
3.e	-1.00	<i>Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.</i>
3.f.i	0.00	<i>No effects on architectural features.</i>
3.f.ii	0.00	<i>No effects on architectural features.</i>
4.a	4.00	<i>Negligible operational risk</i>
4.b	1.00	<i>The following hazards have been identified: Risk of burial from earthfall, working near water (construction), work with heavy plant and components, working near water (O&amp;M)</i>
4.c	3.00	<i>Option is adaptable at moderate cost</i>

## Inniskeen AFA – Option 3

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.88	<i>There are 10 ground floor properties and there are no additional upper floor properties benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	0.00	<i>There are no additional social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.64	<i>There are 10 commercial properties benefiting with this option in place.</i>
2.a	1.04	<i>With this option in place the total economic damages have been reduced from €397818.05 to €314749.94.</i>
2.b	0.00	<i>There are no additional transport links benefiting with this option in place.</i>
2.c	4.67	<i>There is 1 utility benefiting with this option in place.</i>
2.d	0.00	<i>Agriculture very important to the Inniskeen area, with the AFA surrounded by pasture and grazing land. Production of this pasture land is interlinked with the local hydrology and hydrogeology, given the drumlin hill landscape. Further downstream of Inniskeen towards Knockbridge and Blackrock the land use is mainly arable in the flat floodplain of the Fane River</i>
3.a	0.00	<i>Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Reduced flooding in 1% AEP extent to Inniskeen waste water treatment plant.</i>
3.b	0.00	<i>No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.</i>
3.c	0.00	<i>Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.</i>
3.d	-4.00	<i>Construction phase impacts in sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Increasing channel conveyance in mill race, artificial channel.</i>

3.e	-1.00	<i>Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.</i>
3.f.i	0.00	<i>No effects on architectural features.</i>
3.f.ii	0.00	<i>No effects on architectural features.</i>
4.a	4.00	<i>Negligible operational risk</i>
4.b	1.00	<i>The following hazards have been identified: Risk of burial from earthfall, working near water (construction), work with heavy plant and components, working near water (O&amp;M)</i>
4.c	1.00	<i>Option is adaptable only at significant cost</i>



## Monaghan AFA – Option 1

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.82	<i>There are 13 ground floor properties and there are 18 upper floor properties benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	0.00	<i>There are no additional social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.76	<i>There are 36 commercial properties benefiting with this option in place.</i>
2.a	4.12	<i>With this option in place the total economic damages have been reduced from €872454.07 to €152794.05.</i>
2.b	0.61	<i>There are 5 transport links benefiting with this option in place.</i>
2.c	0.00	<i>There are no additional utilities benefiting with this option in place.</i>
2.d	0.00	<i>Agricultural production. No increase in the negative impact of flooding on agricultural production</i>
3.a	-3.00	<i>Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.</i>
3.b	0.00	<i>No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.</i>
3.c	0.00	<i>No impact on existing national, regional and local sites as a result of FRM measures. Potential for localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction prior to re-establishment.</i>
3.d	-3.00	<i>Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.</i>
3.e	-1.00	<i>Short term construction phase impacts of local flood embankments prior to establishment of screening. Localised impacts on those to be defended. Unlikely to be impacts on the wider landscape.</i>

3.f.i	-1.00	<i>Potential for slight negative impacts on the setting of Ballyalbany Bridge NIAH structure from hard defences / embankments.</i>
3.f.ii	0.00	<i>No effects on archaeological features.</i>
4.a	3.00	<i>Very low operational risk - Pumping station in flood cell 5 would require intervention, monitoring and maintenance</i>
4.b	1.00	<i>The following hazards have been identified: working near water (construction), working near water (O&amp;M), heavy plant and machinery (construction), work on wells</i>
4.c	1.00	<i>Option is adaptable only at significant cost</i>

## Monaghan AFA – Option 2

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	4.82	<i>There are 13 ground floor properties and there are 18 upper floor properties benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	0.00	<i>There are no additional social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.76	<i>There are 36 commercial properties benefiting with this option in place.</i>
2.a	4.12	<i>With this option in place the total economic damages have been reduced from €872454.07 to €152794.05.</i>
2.b	3.50	<i>There are 8 transport links benefiting with this option in place.</i>
2.c	0.00	<i>There are no additional utilities benefiting with this option in place.</i>
2.d	0.00	<i>Agricultural production. No increase in the negative impact of flooding on agricultural production</i>
3.a	-3.00	<i>Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.</i>
3.b	0.00	<i>No impact on existing SAC, SPA or Ramsar sites as a result of flood risk management measures.</i>
3.c	0.00	<i>No impact on existing national, regional and local sites as a result of FRM measures. Potential for localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction prior to re-establishment.</i>
3.d	-3.00	<i>Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.</i>
3.e	-1.00	<i>Short term construction phase impacts of local flood embankments prior to establishment of screening. Localised impacts on those to be defended. Unlikely to be impacts on the wider landscape.</i>

3.f.i	-1.00	<i>Potential for slight negative impacts on the setting of Ballyalbany Bridge NIAH structure from hard defences / embankments.</i>
3.f.ii	0.00	<i>No effects on archaeological features.</i>
4.a	3.00	<i>Very low operational risk - Pumping station in flood cell 5 would require intervention, monitoring and maintenance</i>
4.b	1.00	<i>The following hazards have been identified: working near water (construction), working near water (O&amp;M), heavy plant and machinery (construction), work on wells</i>
4.c	1.00	<i>Option is adaptable only at significant cost</i>

## Termonfeckin AFA – Option 1

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	3.64	<i>There are 5 ground floor properties and there is 1 upper floor property benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	0.00	<i>There are no additional social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.23	<i>There are 2 commercial properties benefiting with this option in place.</i>
2.a	2.33	<i>With this option in place the total economic damages have been reduced from €15125.89 to €8086.67.</i>
2.b	4.89	<i>There are 3 transport links benefiting with this option in place.</i>
2.c	0.00	<i>There are no additional utilities benefiting with this option in place.</i>
2.d	0.00	<i>No Change.</i>
3.a	-5.00	<i>Improvement of channel conveyance in a non-sensitive waterbody, upstream of the Louth Coast sensitive coastal waterbody. Reduced risk of flooding. Potential for sedimentation impacts downstream during conveyance works.</i>
3.b	-2.00	<i>No direct impacts to any SAC, SPA or Ramsar sites, however potential for increased sedimentation to downstream Boyne Coast and Estuary SAC during conveyance works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary SAC.</i>
3.c	-2.00	<i>Direct loss of local, undesignated, flora and fauna from conveyance works. May re-establish following works. Potential for increased sedimentation to downstream Boyne Coast and Estuary pNHA during conveyance works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary pNHA.</i>
3.d	-5.00	<i>Improvement of channel conveyance in a non-sensitive waterbody. Potential for indirect impacts on downstream fishing activity.</i>

3.e	-1.00	<i>Short term construction phase impacts on views from those to be protected. Unlikely to be any impacts on the wider landscape.</i>
3.f.i	-1.00	<i>Potential for short term construction phase impacts on the setting of the Termonfeckin Bridge NIAH structure.</i>
3.f.ii	1.00	<i>Increased protection from flooding to one monument - burial ground.</i>
4.a	4.00	<i>No reliance on systems of 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 (construction), Working near water (O&amp;M), Heavy plant and machinery (construction)</i>
4.c	0.00	<i>Option is not adaptable</i>

## Termonfeckin AFA – Option 2

MCA Appraisal Outcomes		
Objective	Score	Comment
1.a.i	3.64	<i>There are 5 ground floor properties and there is 1 upper floor property benefiting with this option in place.</i>
1.a.ii	0.0	<i>There are no additional highly vulnerable properties benefiting with this option in place.</i>
1.b.i	0.00	<i>There are no additional social infrastructure/amenity sites benefiting with this option in place.</i>
1.b.ii	4.23	<i>There are 2 commercial properties benefiting with this option in place.</i>
2.a	2.33	<i>With this option in place the total economic damages have been reduced from €15125.89 to €8086.67.</i>
2.b	4.89	<i>There are 3 transport links benefiting with this option in place.</i>
2.c	0.00	<i>There are no additional utilities benefiting with this option in place.</i>
2.d	4.00	<i>Agriculture is important to the Termonfeckin area, with pasture, arable and cultivated land to the surrounding the AFA. Production of this land is interlinked with the local hydrology and hydrogeology.</i>
3.a	-5.00	<i>Improvement of channel conveyance in a non-sensitive waterbody, upstream of the Louth Coast sensitive coastal waterbody. Reduced risk of flooding. Potential for sedimentation impacts downstream during conveyance and construction works. In stream works.</i>
3.b	-2.00	<i>No direct impacts to any SAC, SPA or Ramsar sites, however potential for increased sedimentation to downstream Boyne Coast and Estuary SAC during conveyance and construction works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary SAC.</i>

3.c	-2.00	<i>Direct loss of local, undesignated, flora and fauna from conveyance works. May re-establish following works. Potential for increased sedimentation to downstream Boyne Coast and Estuary pNHA during conveyance and construction works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary pNHA.</i>
3.d	-5.00	<i>Improvement of channel conveyance and construction of flood walls in a non-sensitive waterbody. Potential for indirect impacts on downstream fishing activity.</i>
3.e	-2.00	<i>Short term construction phase impacts on views from those to be protected. Walls may have increased permanent, localised impacts. Unlikely to be any impacts on the wider landscape.</i>
3.f.i	-2.00	<i>Potential for short term construction phase impacts on the setting of the Termonfeckin Bridge NIAH structure. Permanent impacts on the setting of the bridge from flood walls.</i>
3.f.ii	1.00	<i>Increased protection from flooding to one monument - burial ground.</i>
4.a	4.00	<i>No reliance on systems of 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 (construction), Working near water (O&amp;M), Heavy plant and machinery (construction)</i>
4.c	0.00	<i>Option is not adaptable</i>



SEA - Annagassan Option 1

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-3.00	Potential for direct construction phase impacts on the periphery of and adjacent to the Donegal Bay SAC, SPA and Ramsar site from the construction of walls and embankments, set back from the waterbody where possible. Potential for direct temporary loss of habitat and displacement of species from works area. Potential for short term, indirect, downstream impacts from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-3.00	Potential for direct construction phase impacts on the periphery of and adjacent to the Donegal pNHA and MPA from the construction of walls and embankments, set back from the waterbody where possible. Potential for direct temporary loss of habitat and displacement of species from works area. Potential for short term, indirect, downstream impacts from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.
Population and Human Health	Minimise risk to human health and life - Residents.	4.78	There are 34 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.	1.00	Reduction in rural land flooded
Water	Support the objectives of the WFD.	-2.00	Construction phase impacts with potential for excavation and restoration of banks adjacent to and set back from sensitive and non-sensitive waterbodies. Potential for in-stream and on-bank construction impacts in areas which are already impacted by infrastructure and FRM methods.
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.	4.98	There are 4 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	4.98	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.	-1.00	Slight potential for physical impacts to and on the setting of Annagassan Bridge NIAH structure from the construction and tie in of defences.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Increased protection from severe flooding to one monument.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term construction phase impacts on local sensitivity landscape. Construction and rehabilitation of walls and embankments in areas already impacted by infrastructure and FRM methods. Impacts mainly on those to be protected.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-3.00	Potential for direct construction phase impacts from construction and augmentation of walls and embankments adjacent to waterbodies known for sensitive species. Potential for short term, indirect, downstream impacts to fisheries from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.97	There are 3 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	4.83	There are 8 commercial properties benefiting with this option in place.

SEA - Ardee Option 1

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	0.00	The River Dee discharges to the River Glyde at Dundalk Bay SAC, SPA, OSPAR MPA, Ramsar Site c.15km downstream of Ardee. 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	-1.00	Localised construction impacts are anticipated in the vicinity of the proposed walls but these will be mitigated by the already modified nature of the banks and should not affect any protected areas. Potential for indirect sedimentation impacts to downstream habitats during construction. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.
Population and Human Health	Minimise risk to human health and life - Residents.	3.66	There are 6 ground floor properties and there is 1 upper floor property 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.	-1.00	Flood extents slightly larger
Water	Support the objectives of the WFD.	-1.00	Short term negative impacts from construction of hard defences set back from non-sensitive watercourse. Potential for on bank and in stream works. Reduced flood risk for the 1% AEP fluvial event. Potential for indirect sedimentation impacts to downstream sensitive waterbodies during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works.
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.	0.47	There is 1 road 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	There are over 70 NIAH recorded buildings of local and regional importance within the AFA, as well as one monument (Medieval Building) with a preservation order that is classified as being more vulnerable to flooding. Proposed measures will not have any impact nor will result in increased flood risk on any of these sites.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on archaeological features - no protected features in AFA or influenced area.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	0.00	Louth Landscape Character Assessment of 2002 classifies the general area as the Muirhevna Plain and is looking to conserve the agricultural land and hedgerows, the small broadleaf woodlands throughout the area and within the town of Ardee, and the four pNHAs in the area. The walls are proposed in an existing built up /suburban area and will have no impact on these objectives.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-1.00	Short term negative impacts from construction of hard defences set back from non-sensitive watercourse. Potential for on bank and in stream works. Potential for indirect sedimentation impacts to downstream sensitive River Dee during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works. waterbody treated as sensitive.
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.	3.99	There is 1 commercial property benefiting with this option in place.

SEA - Ardee Option 2

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	0.00	The River Dee discharges to the River Glyde at Dundalk Bay SAC, SPA, OSPAR MPA, Ramsar Site c.15km downstream of Ardee. 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	-2.00	Localised construction impacts are anticipated in the vicinity of the proposed storage areas but these will be mitigated by the already slightly modified nature of the agricultural area. Direct local loss of flora and fauna prior to re-establishment. No impact on national, regional or local designated areas. Potential for indirect sedimentation impacts to downstream habitats during construction. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works.
Population and Human Health	Minimise risk to human health and life - Residents.	3.66	There are 6 ground floor properties and there is 1 upper floor property 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.	-3.00	Agricultural areas used for storage
Water	Support the objectives of the WFD.	-3.00	Online storage by damming attracts an automatic -5 score. negative score reduced by +2 by applying factor for benefits due to reduction in extent of flooding (in area with no pollution sources) at 1% AEP.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	2.00	Option is adaptable at moderate to significant cost
Material Assets	Minimise risk to transport infrastructure.	3.26	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	There are over 70 NIAH recorded buildings of local and regional importance within the AFA, as well as one monument (Medieval Building) with a preservation order that is classified as being more vulnerable to flooding. Proposed measures will not have any impact nor will result in increased flood risk on any of these sites.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on archaeological features - no protected features in AFA or influenced area.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-2.00	Louth Landscape Character Assessment of 2002 classifies the general area as the Muirhevna Plain and is looking to conserve the agricultural land and hedgerows, the small broadleaf woodlands throughout the area and within the town of Ardee, and the four pNHAs in the area. Storage is proposed in agricultural land and may have short term impact (construction) on moderate sensitivity landscape character/feature in the zone of visibility of the selected measure, prior to establishment of screening.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-3.00	Short term negative impacts from construction of 2 online storage areas on non-sensitive waterbodies. Potential for on bank and in stream works. Permanent impacts of introduction of barriers to fish passage with online storage upstream of Ardee. Potential for indirect sedimentation impacts to downstream sensitive River Dee during construction. Construction impacts could be mostly mitigated for with good site practice, effective planning and timing of works.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.95	There are 3 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	3.99	There is 1 commercial property benefiting with this option in place.

## SEA – Carlingford/Greenore SPA Option 1

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-2.00	Potential for direct construction phase disturbance impacts to the adjacent Carlingford Shore SAC and Carlingford Lough SPA from the construction of walls, embankments and pumping stations on existing modified areas, set back from the waterbodies and designated sites. Potential for short term, indirect, downstream impacts to Carlingford Shore SAC and Carlingford Lough SPA from sedimentation during works in Greenore. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. Unlikely to be any permanent or recurring impacts.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-2.00	Potential for direct construction phase disturbance impacts to the adjacent Carlingford Lough pNHA from the construction of walls, embankments and pumping stations on existing modified areas, set back from the waterbodies and designated site. Potential for short term, indirect, downstream impacts to Carlingford Lough pNHA from sedimentation during works in Greenore. Potential for direct temporary loss of habitat and displacement of species from works area, with impacts limited by already modified channel / shoreline. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. Unlikely to be any permanent or recurring impacts.
Population and Human Health	Minimise risk to human health and life - Residents.	4.94	There is a combined number of 525 ground floor properties and there are 58 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.	2.00	All flood water is kept in channel with option in place therefore flood extents on agricultural land are minimized
Water	Support the objectives of the WFD.	-2.00	Construction of flood walls, embankments, pumping stations and a culvert replacement adjacent to and upstream of a sensitive waterbody on mainly already modified areas. Potential for in-stream and on-bank works in non-sensitive waterbodies. Potential for short term, indirect, downstream impacts from sedimentation during works. Reduced flood risk for the 1% AEP fluvial event and the 0.5% AEP tidal and overtopping events.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	3.00	Option is readily adaptable at limited cost
Material Assets	Minimise risk to transport infrastructure.	4.91	There is a combined number of 64 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.
Cultural Heritage - Architectural & Archaeological	Avoid damage to or loss of features, institutions and collections of architectural value and their setting.	2.00	Potential for physical impacts on and on the setting of the boathouse and Carlingford pier NIAH structures from construction / augmentation of coastal defences and pumping stations. Increased protection to 9 NIAH buildings from severe flooding.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Potential for physical impacts on a midden in the area of Carlingford Sailing Club from construction of coastal defences, however archaeological material may be discovered in excavation work in this area. Potential for impacts on the setting of and increased flood risk to the site of Muchgrange church and St James holy well. Increased protection to Taffe's Castle and Paid na Farrell's Castle from severe flooding.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-3.00	Carlingford town is rated of high is a major tourist attraction and visual amenity is important to the AFA. Northernmost fluvial flood walls would be partially in "green belt" area in LAP, southernmost fluvial flood walls are in land zoned for residential development. Both appear to require the removal of some natural trees or hedgerows. Measures may have permanent impact on medium sensitivity landscape character (sensitivity termed as medium, as walls will be well outside the town centre/heritage area.
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 construction and augmentation of walls, embankments and pumping stations adjacent to sensitive shellfish designated waterbody. Potential for short term, indirect, downstream impacts to shellfisheries from sedimentation during works. Impacts could be mostly mitigated for with good site practice, effective planning and timing of works. Unlikely to be any permanent or recurring impacts on fisheries following construction.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.91	There is a combined number of 38 social infrastructure/amenity sites benefiting from the option's SoP from fluvial and coastal flood sources.
	Minimise risk to community - Local Employment.	4.98	There is a combined number of 61 commercial properties benefiting from the option's SoP from fluvial and coastal flood sources.

SEA - Dundalk & Blackrock South Option 1

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-5.00	Potential for direct impacts to Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Direct loss of natural and semi natural habitats in the footprint of works. Potential for defences to be set further back from designated sites.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-5.00	Potential for direct impacts to Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Potential for defences to be set further back from designated sites.
Population and Human Health	Minimise risk to human health and life - Residents.	4.84	There are 1744 ground floor properties and there are 47 upper floor properties benefiting with this option in place.
	Minimise risk to human health and life - High vulnerability properties.	4.62	There is 1 highly vulnerable property benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	1.00	The proposed option has an overall slight improvement on the impact on agricultural land.
Water	Support the objectives of the WFD.	-4.00	Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in small undesignated Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas.
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.	3.25	There are 107 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	2.11	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.	3.00	Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Increase in the level of protection for a few recorded monuments.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-4.00	Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay. Potential for some localised negative impacts on views in Dundalk.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	0.29	There are 56 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	4.92	There are 155 commercial properties benefiting with this option in place.



**SEA - Dundalk & Blackrock South Option 2**

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-5.00	Potential for direct impacts to Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Direct loss of natural and semi natural habitats in the footprint of works. Potential for defences to be set further back from designated sites.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-5.00	Potential for direct impacts to Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments, in particular in Ballymascanlan / Racecourse area where defences may bisect designated areas. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Potential for defences to be set further back from designated sites.
Population and Human Health	Minimise risk to human health and life - Residents.	4.84	There are 1744 ground floor properties and there are 47 upper floor properties benefiting with this option in place.
	Minimise risk to human health and life - High vulnerability properties.	4.62	There is 1 highly vulnerable property benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	1.00	The proposed option has an overall slight improvement on the impact on agricultural land.
Water	Support the objectives of the WFD.	-5.00	Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in Blackwater River and Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas.
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.	3.25	There are 107 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	2.11	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.	3.00	Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Increase in the level of protection for a few recorded monuments.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-4.00	Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay. Potential for some localised negative impacts on views in Dundalk.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.96	There are 127 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	4.92	There are 155 commercial properties benefiting with this option in place.

SEA - Dundalk & Blackrock South Option 3

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	1.00	Potential for indirect impacts to adjacent and downstream Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay SAC, SPA and Ramsar site. Potential for creation of new habitat at Marsh North.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	1.00	Potential for indirect impacts to adjacent and downstream Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackrock River. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay pNHA and OSPAR Marine Protected Area. Potential for creation of new habitat at Marsh North.
Population and Human Health	Minimise risk to human health and life - Residents.	4.84	There are 1744 ground floor properties and there are 47 upper floor properties benefiting with this option in place.
	Minimise risk to human health and life - High vulnerability properties.	4.62	There is 1 highly vulnerable property benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	-4.00	The proposed option has an overall loss of agricultural land, when considering the relocation of the embankment at Marsh North. A significant area of land would become frequently inundated.
Water	Support the objectives of the WFD.	-3.00	Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in small undesignated Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas. Defences set back further from Dundalk Bay with this Option.
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.	3.25	There are 107 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	2.11	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.	3.00	Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Increase in the level of protection for a few recorded monuments.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-2.00	Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay, however are more set back from the water in this Option. Potential for some localised negative impacts on views in Dundalk.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-3.00	Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.96	There are 127 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	4.92	There are 155 commercial properties benefiting with this option in place.

SEA - Dundalk & Blackrock South Option 4

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	1.00	Potential for indirect impacts to adjacent and downstream Dundalk Bay SAC, SPA and Ramsar site from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay SAC, SPA and Ramsar site. Potential for creation of new habitat at Marsh North.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	1.00	Potential for indirect impacts to adjacent and downstream Dundalk Bay pNHA and OSPAR Marine Protected Area from construction and restoration of embankments. Potential for indirect downstream impacts during construction of all walls and embankments and from dredging / culvert works at Blackwater and Blackrock Rivers. Potential for positive impacts on improvement of wetland habitat in Ballymascanlan / Racecourse area of Dundalk Bay pNHA and OSPAR Marine Protected Area. Potential for creation of new habitat at Marsh North.
Population and Human Health	Minimise risk to human health and life - Residents.	4.84	There are 1744 ground floor properties and there are 47 upper floor properties benefiting with this option in place.
	Minimise risk to human health and life - High vulnerability properties.	4.62	There is 1 highly vulnerable property benefiting with this option in place.
Geology, Soils and Landuse	Manage risk to agriculture.	-4.00	The proposed option has an overall loss of agricultural land, when considering the relocation of the embankment at Marsh North. A significant area of land would become frequently inundated.
Water	Support the objectives of the WFD.	-4.00	Excavation and restoration of banks adjacent to and set back from sensitive waterbodies. Potential for in-stream and on-bank construction impacts. Creation of online storage on undesignated tributary of the Castletown River, which would be operational during floods, however required culvert and weir. Improvement of channel conveyance in Blackwater River and Blackrock River with construction phase impacts of culvert replacements and construction phase dredging / lowering. Receiving waterbodies listed in WFD Register of Protected Areas. Defences set back further from Dundalk Bay with this Option.
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.	3.25	There are 107 transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	2.11	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.	3.00	Increase in the level of protection for several NIAH buildings in Dundalk. Embankments may however have slight negative impacts on the setting of some NIAH buildings.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Increase in the level of protection for a few recorded monuments.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-2.00	Permanent impacts on moderate value landscape. Embankments may have negative impacts on setting of Dundalk Bay and on local views of the Bay, however are more set back from the water in this Option. Potential for some localised negative impacts on views in Dundalk.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-3.00	Generally direct construction phase impacts from excavation and restoration of banks, and rehabilitation of existing in-stream and on-bank defences, in and adjacent to sensitive waterbodies. Potential for indirect downstream impacts to sensitive waterbodies (salmon and shellfish) during construction of defences and dredging works. Potential for mitigation measures to minimise impacts on fisheries.
Amenity, Community and Soci-economics	Minimise risk to community - Social Infrastructure and Amenity.	4.96	There are 127 social infrastructure/amenity sites benefiting with this option in place.
	Minimise risk to community - Local Employment.	4.92	There are 155 commercial properties benefiting with this option in place.



SEA - Inishkeen 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 FRM measures. Potential for localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction, prior to re-establishment.
Population and Human Health	Minimise risk to human health and life - Residents.	4.81	There are 31 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	Agriculture very important to the Inishkeen area, with the AFA surrounded by pasture and grazing land. Production of this pasture land is interlinked with the local hydrology and hydrogeology, given the drumlin hill landscape. Further downstream of Inishkeen towards Knockbridge and Blackrock the land use is mainly arable in the flat floodplain of the Fane River
Water	Support the objectives of the WFD.	0.00	Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Reduced flooding in 1% AEP extent to Inishkeen waste water treatment plant.
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.	4.67	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 features.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on architectural features.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Construction phase impacts in sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.
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.	4.64	There are 10 commercial properties benefiting with this option in place.

SEA - Inishkeen Option 2

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	-2.00	No impact on existing national, regional and local sites as a result of FRM measures. Potential for direct localised loss of or disturbance to undesignated flora/fauna within the channel and in semi-natural and urban habitat during construction, prior to re-establishment. Potential for indirect downstream sedimentation impacts from conveyance works.
Population and Human Health	Minimise risk to human health and life - Residents.	4.81	There are 31 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	Agriculture very important to the Inniskeen area, with the AFA surrounded by pasture and grazing land. Production of this pasture land is interlinked with the local hydrology and hydrogeology, given the drumlin hill landscape. Further downstream of Inniskeen towards Knockbridge and Blackrock the land use is mainly arable in the flat floodplain of the Fane River
Water	Support the objectives of the WFD.	-4.00	Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Reduced flooding in 1% AEP extent to Inniskeen waste water treatment plant.
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.	4.67	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 features.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on architectural features.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-5.00	Construction phase impacts from increasing of channel conveyance in sensitive waterbody and excavation and restoration of banks and walls set back from waterbody. Potential for indirect downstream sedimentation impacts from conveyance works.
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.	4.64	There are 10 commercial properties benefiting with this option in place.

SEA - Inishkeen Option 3

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	Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.
Population and Human Health	Minimise risk to human health and life - Residents.	4.81	There are 31 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	Agriculture very important to the Inniskeen area, with the AFA surrounded by pasture and grazing land. Production of this pasture land is interlinked with the local hydrology and hydrogeology, given the drumlin hill landscape. Further downstream of Inniskeen towards Knockbridge and Blackrock the land use is mainly arable in the flat floodplain of the Fane River
Water	Support the objectives of the WFD.	0.00	Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Reduced flooding in 1% AEP extent to Inniskeen waste water treatment plant.
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.	0.00	There are no additional transport links benefiting with this option in place.
	Minimise risk to utility infrastructure.	4.67	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 features.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	0.00	No effects on architectural features.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term construction phase impacts on local views to properties being defended. Construction of embankments prior to the establishment of screening.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-4.00	Construction phase impacts in sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody. Increasing channel conveyance in mill race, artificial channel.
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.	4.64	There are 10 commercial properties benefiting with this option in place.

SEA - Monaghan 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 FRM measures. Potential for localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction prior to re-establishment.
Population and Human Health	Minimise risk to human health and life - Residents.	4.82	There are 13 ground floor properties and there are 18 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	Agricultural production. No increase in the negative impact of flooding on agricultural production
Water	Support the objectives of the WFD.	-3.00	Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from 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.	0.61	There are 5 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 slight negative impacts on the setting of Ballyalbany Bridge NIAH structure from hard defences / embankments.
	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.	-1.00	Short term construction phase impacts of local flood embankments prior to establishment of screening. Localised impacts on those to be defended. Unlikely to be impacts on the wider landscape.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-3.00	Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.
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.	4.76	There are 36 commercial properties benefiting with this option in place.

SEA - Monaghan Option 2

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 FRM measures. Potential for localised loss of or disturbance to undesignated flora/fauna in semi-natural and urban habitat during construction prior to re-establishment.
Population and Human Health	Minimise risk to human health and life - Residents.	4.82	There are 13 ground floor properties and there are 18 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	Agricultural production. No increase in the negative impact of flooding on agricultural production
Water	Support the objectives of the WFD.	-3.00	Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from 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.	3.50	There are 8 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 slight negative impacts on the setting of Ballyalbany Bridge NIAH structure from hard defences / embankments.
	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.	-1.00	Short term construction phase impacts of local flood embankments prior to establishment of screening. Localised impacts on those to be defended. Unlikely to be impacts on the wider landscape.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-3.00	Construction phase impacts in non-sensitive waterbody. Excavation and restoration of banks and walls, set back from waterbody.
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.	4.76	There are 36 commercial properties benefiting with this option in place.



SEA - Termonfeckin Option 1

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-2.00	No direct impacts to any SAC, SPA or Ramsar sites, however potential for increased sedimentation to downstream Boyne Coast and Estuary SAC during conveyance works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary SAC.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-2.00	Direct loss of local, undesignated, flora and fauna from conveyance works. May re-establish following works. Potential for increased sedimentation to downstream Boyne Coast and Estuary pNHA during conveyance works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary pNHA.
Population and Human Health	Minimise risk to human health and life - Residents.	3.02	There are 9 ground floor properties and there is 1 upper floor property 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 Change.
Water	Support the objectives of the WFD.	-5.00	Improvement of channel conveyance in a non-sensitive waterbody, upstream of the Louth Coast sensitive coastal waterbody. Reduced risk of flooding. Potential for sedimentation impacts downstream during conveyance works.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	2.00	Option is adaptable at moderate to significant cost
Material Assets	Minimise risk to transport infrastructure.	4.89	There are 3 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 short term construction phase impacts on the setting of the Termonfeckin Bridge NIAH structure.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Increased protection from flooding to one monument - burial ground.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-1.00	Short term construction phase impacts on views from those to be protected. Unlikely to be any impacts on the wider landscape.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-5.00	Improvement of channel conveyance in a non-sensitive waterbody. Potential for indirect impacts on downstream fishing activity.
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.	4.23	There are 2 commercial properties benefiting with this option in place.

SEA - Termonfeckin Option 2

Topic	Objective	Score	Justification
Biodiversity, Flora and Fauna	Support the objectives of the Habitats and Birds Directives	-2.00	No direct impacts to any SAC, SPA or Ramsar sites, however potential for increased sedimentation to downstream Boyne Coast and Estuary SAC during conveyance and construction works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary SAC.
	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	-2.00	Direct loss of local, undesignated, flora and fauna from conveyance works. May re-establish following works. Potential for increased sedimentation to downstream Boyne Coast and Estuary pNHA during conveyance and construction works. Potential for increased flows and increased erosion and sedimentation downstream of Termonfeckin following works that may have increased sedimentation impacts on Boyne Coast and Estuary pNHA.
Population and Human Health	Minimise risk to human health and life - Residents.	3.02	There are 9 ground floor properties and there is 1 upper floor property 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.	4.00	Agriculture is important to the Termonfeckin area, with pasture, arable and cultivated land to the surrounding the AFA. Production of this land is interlinked with the local hydrology and hydrogeology.
Water	Support the objectives of the WFD.	-5.00	Improvement of channel conveyance in a non-sensitive waterbody, upstream of the Louth Coast sensitive coastal waterbody. Reduced risk of flooding. Potential for sedimentation impacts downstream during conveyance and construction works. In stream works.
Climate	Ensure flood risk can be managed effectively and sustainably into the future, and the potential impacts of climate change.	2.00	Option is adaptable at moderate to significant cost
Material Assets	Minimise risk to transport infrastructure.	4.89	There are 3 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.	-2.00	Potential for short term construction phase impacts on the setting of the Termonfeckin Bridge NIAH structure. Permanent impacts on the setting of the bridge from flood walls.
	Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.	1.00	Increased protection from flooding to one monument - burial ground.
Landscape and Visual	Protect, and where possible enhance, landscape character and visual amenity within the river corridor.	-2.00	Short term construction phase impacts on views from those to be protected. Walls may have increased permanent, localised impacts. Unlikely to be any impacts on the wider landscape.
Fisheries, Aquaculture and Angling	Protect and where possible enhance fisheries resource within the catchment (Inland Fisheries Only).	-5.00	Improvement of channel conveyance and construction of flood walls in a non-sensitive waterbody. Potential for indirect impacts on downstream fishing activity.
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.	4.23	There are 2 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**

### **NWNB CFRAM Study Stakeholder List**

Title	Name	Surname	Role	Organisation	Group/Sector
<b>Stakeholders/External Parties</b>					
<b>Primary Stakeholders</b>					
Mr	Toirleach	Gourley	Progress group	Monaghan County Council	County Council
Mr	Paddy	Connolly	Progress group	Louth County Council	County Council
Mr	Paul	Mulligan	Progress group	Cavan County Council	County Council
Ms	Eadaoin	Healy	Progress group	Donegal County Council	County Council
Mr	Donal	Murphy	Progress group	Donegal County Council	County Council
Mr	Brendan	McKenna	Progress group	Leitrim County Council	County Council
Ms	Fiona	Fallon	Progress group	Meath County Council	County Council
Mr	Tom	Murtagh	Progress group	Longford County Council	County Council
Mr	Tom	Kilfeather	Progress group	Sligo County Council	County Council
Mr	Jimmy	Murphy	Progress group	Rivers Agency, NI	State agency or body
Mr		Lawlor		Loughs Agency	State agency or body
Ms	Bernie	O'Flaherty	Progress Group	IAWCO	WFD Co-ordinator
Ms	Margaret	Gowley		NIEA	State agency or body
<b>Relevant State Bodies</b>					
Ms	Bernie	Kiely		Department of Environment, Community and Local Government (DECLG)	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
Mr	Sean	Hogan	National Director for Fire Emergency Management	Department of Environment, Community and Local Government	Government department
Mr	William	Cormacan	Divisional ecologist	National Parks and Wildlife Service	Government department

Title	Name	Surname	Role	Organisation	Group/Sector
Ms	Judit	Kelemen	Regional Manager	National Parks and Wildlife Service	Government department
Mr	Peter	Cafferkey	Nitrates, Biodiversity and Engineering Division	Department of Agriculture, Food and the Marine	Government department
Mr	Peter	Carvill	Secretary of State	Department of Arts, Heritage and Gaeltacht Affairs	Government department
Mr	Freddie	O'Dwyer		Department of Arts, Heritage and Gaeltacht Affairs (Built Heritage and Architectural Policy)	Government department
Mr	Catherine	Desmond		Department of Arts, Heritage and the Gaeltacht (National Monuments Service)	State agency or body
Dr	Margaret	Fitzgerald	Director of Public Health	Health Service Executive (HSE)	State agency or body
Mr	Peter	Smyth	North East region - Estates	Health Service Executive (HSE)	State agency or body
Mr	Owen	Doyle		Bord Iascaigh Mhara (BIM)	State agency or body
Mr	Liam	Keegan		Met Eireann	State agency or body
MS	Monica	Lee		Geological Survey of Ireland	State agency or body
Ms	Ailish	Keane		Inland Fisheries Ireland	State agency or body
Ms	Michaela	Kirrane		Inland Fisheries Ireland	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
Sir/Madam				Sustainable Energy Authority of Ireland	State agency or body
Mr	Eric	Donald		Teagasc	State agency or body
Ms	Beatrice	Kelly		The Heritage Council	State agency or body
Ms	Paula	Treacy		Waterways Ireland	State agency or body
Mr	John	Dooley	Research and Development policy	Forfás	State agency or body

Title	Name	Surname	Role	Organisation	Group/Sector
Mr	Michael G.	Tutty		Commission for Energy Regulation	State agency or body
Mr	Frank	Conlon		Industrial Development Agency	State agency or body
Ms	Yvonne	Shields		Commissioner of Irish Lights	State agency or body
<b>Secondary Stakeholders</b>					
Mr	Tom	Moylan	Director	Association of Municipal Authorities of Ireland	Local government
Mr	Michael	O'Brien		Association of County and City Councils	Local government
Mr	Sean	Murphy		Chambers Ireland	Representative body
Sir/Madam				Cavan County Development Board	Development Board
Sir/Madam				Donegal County Development Board	Development Board
Sir/Madam				Meath County Development Board	Development Board
Sir/Madam				Leitrim County Development Board	Development Board
Sir/Madam				Louth County Development Board	Development Board
Sir/Madam				Longford County Development Board	Development Board
Sir/Madam				Sligo County Development Board	Development Board
Ms	Edel	Crummey		Coillte	Commercial (state)
Ms	Sinead	O'Brien		Sustainable Water Network (SWAN)	NGO
Mr	Eamon	Moore		SWAN / An Taisce	NGO
Mr	Michael	Eweing		Environmental Pillar & Irish Environment Network	NGO
Ms	Tina	Aughney		Bat Conservation Ireland	NGO
Ms	Siobhan	Egan		BirdWatch Ireland	NGO
Ms	Helen	Boland		BirdWatch Ireland	NGO
Mr	Joe	Shannon		BirdWatch	NGO

Title	Name	Surname	Role	Organisation	Group/Sector
				Ireland	
Ms	Karin	Dubksy		Coastwatch	NGO
Ms	Caroline	Lewis		Irish Natural Forestry Foundation	NGO
Mr	Tadhg	O'Corcora		Irish Peatland Conservation Council	NGO
Ms	Fiona	Lynch		Irish Seal Sanctuary	NGO
Mr	Padraic	Fogarty		Irish Wildlife Trust	NGO
Mr	Barry	Kavanagh		Irish Wildlife Trust	NGO
Ms	Linda	Lawlor		Native Woodland Trust	NGO
Ms	Bernie	Barrett		Badgerwatch	NGO
Sir/Madam				Irish Water and Fish Preservation Society	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
Mr	Charles	Doherty		Royal Society of Antiquaries of Ireland	NGO
Ms	Jean	Kennedy		Inland Waterways Association of Ireland	NGO
Mr	Gerry	Gunning		Irish Farmers Association	Representative body
Mr	Bert	Stewart	Monaghan County Chairman	Irish Farmers Association	Representative body
Ms	Mary	Buckley		Irish Creamery Milk Suppliers Association (ICMSA)	Representative body
Mr	Cecil	Fairman		Irish Creamery Milk Suppliers Association (ICMSA)	Representative body
Mr	Terry	O'Regan		Landscape Alliance Ireland	Representative body
Mr	Mark	Fielding		Irish Small and Medium Enterprises Association (ISME)	Representative body
Mr	Caroline	Spillane	Director General	Engineers Ireland	Representative body
Mr	Robert	Butler		Construction Industry Federation	Representative body
Mr	Gerry	Farrell		Irish Concrete	Representative

Title	Name	Surname	Role	Organisation	Group/Sector
				Federation	body
Mr	Ger	Loughlin		Irish Residential Boat Owners Association	Representative body
Mr	Michael	Callaghan		National Anglers Representative Association	Representative body
Mr	Paddy	Byrne		Recreational Angling Ireland	Special interest amenity group
Mr	John	Carroll		Federation of Irish Salmon and Sea Trout Anglers	Special interest amenity group
Mr	Noel	Carr	Secretary	Federation of Irish Salmon and Sea Trout Anglers	Special interest amenity group
Mr	Hugh L	O'Rourke	National Secretary	Irish Federation of Sea Anglers	Special interest amenity group
Mr	Brian	Cooke		Irish Federation of Sea Anglers	Special interest amenity group
Mr	Hugh	O'Rourke		Irish Federation Sea Anglers	Special interest amenity group
Mr	Martin	Corcoran		Rowing Ireland	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
Mr	Francis	Walsh		Eircom	
Mr	Paul	Lennon	Integrity	Bord Gáis Networks	Service provider (state)
Mr	Liam P	O'Riordan	Conceptual planning. Note that the compant secretary is also called Liam O'Riordan.	Bord Gáis Networks	Service provider (state)
Mr	Paul	Mallee	Chairperson of the Board	Bus Eireann	Service provider (state)
Mr	Jane	Cregan		Iarnród Eireann	Service provider (state)
Sir/Madam				Ballybay Angling Association	Interest Group



Title	Name	Surname	Role	Organisation	Group/Sector
Mr	Colin	McKenna		Irish Central Border Area Network	
Cllr	Pat	Treanor		Irish Central Border Area Network	
Ms	Chris	McCarney		Blackwater Regional Partnership	
Ms	Dan	Curley		Blackwater Regional Partnership	
Mr.	John	Bourke		National Organisation of Regional Game Councils	Representative body
Mr	Flor	Harrington		Irish Shellfish Association	Representative body
Mr	Joe	Lee		Irish Salmon Growers' Association Ltd.	Representative body
Sir/Madam				Sea Fisheries Protection Authority	Representative body
Sir/Madam				Dundalk Port	
Sir/Madam				Greenore Port	
Sir/Madam				Killybegs Harbour	
Mr	Martin	Connell		Killybegs Harbour	
Mr	Tony	McNally		FWPM Project	
Sir/Madam				Irish Countrywomen's Association	
Mr	Bill	McCann	Harbour Master	Londonderry Port and Harbour (NI agency)	

## **APPENDIX F**

### **Plans, Policies and Programmes**



## REVIEW OF LEGISLATIONS, 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
<p>2005.</p> <p>Climate Change Agreement [UNFCCC, 2007]</p>	<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>
<p>Renewable Energy Directive (2009/28/EC)</p>	<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</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> </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

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
	molluscs.	<ul style="list-style-type: none"> <li>The Act also requires those involved in aquaculture to obtain a licence.</li> <li>As well as enforcing provisions of the Fisheries Acts, IFI is empowered to enforce the Water Pollution Acts 1977 &amp; 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.</li> </ul>		capacity to produce the food of fish
<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> </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

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		<ul style="list-style-type: none"> <li>• waste management</li> <li>• industry, commercial and services sector</li> <li>• agriculture</li> <li>• residential</li> <li>• public sector</li> </ul>		management.
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

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
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 for increasing indigenous production of renewable electricity, thereby contributing to reductions in our greenhouse gas emissions,	<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 40% from electricity</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
<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</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</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
		statements, reports and publications.	Excavation (DAHG, 1999)  Architectural Heritage Protection - Guidelines for Planning Authorities (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.
Rural Environmental Protection Scheme (REPS)  Agri-Environmental	<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</li> </ul>			The FRMP should consider landuse factors, such as agriculture, in its strategies.



Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
Options Scheme(AEOS)  Green, Low-Carbon, Agri-environment Scheme (GLAS)	protection			
Raised Bog SAC Management Plan (Draft) (DAHG, 2014),  National Peatland Strategy (Draft) (NPWS, 2014)  Review of Raised Bog Natural Heritage Area Network (NPWS, 2014)	Aims to meet nature conservation obligations in regards to the loss of natural bog habitats, while having regard to national and local economic, social and cultural needs.	<ul style="list-style-type: none"> <li>• Ensure that the implications of management choices for water levels, quantity and quality are fully explored, understood and factored into policy making and land use planning.</li> <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>The Wildlife (Amendment) Act 2000 (S.I. No. 38/2000)</p> <p>European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011)</p>	The FRMP should take into consideration areas of bog habitat or peatland.
Irish Geological Heritage (IGH) Programme (GSI 1998-)	Programme to raise awareness about geological heritage and to recognise and protect geological heritage (or geoheritage).	<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</p>	<p>National Heritage Plan 2002 - 2007 (DAHG, 2002)</p> <p>The Wildlife (Amendment) Act 2000 (S.I. No. 38/2000)</p>	The FRMP should take into consideration areas of geological heritage.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		<p>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>		
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</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</p>	The FRMP should consider landuse factors, such as forestry, in its strategies.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		forests.	1698/2005.	
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 forerunner in 1996.	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 management	European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020 addressing in particular the Common Assessment Principles;  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.	The FRMP should consider landuse factors, such as forestry, in its strategies.
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.	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
			No. 254/2001)	
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.	<p>Ireland's RDP will fund action under six Rural Development priorities:</p> <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> <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>		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
<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</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

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		<p>understanding, managing, protecting and planning the landscape.</p> <ul style="list-style-type: none"> <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>		management.
<i>Material Assets and Infrastructure</i>				
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</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.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
		<p>systems and investment for environmental sustainability.</p> <ul style="list-style-type: none"> <li>Critical social investment – such as the health service and social housing programmes.</li> </ul>		
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 (EIRGIRD, 2010)	Grid25 is a high-level strategy outlining how EirGrid intends to 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>The core strategy must, among other 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>		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
<i>Water</i>				
Harnessing Our Ocean Wealth: An Integrated	<ul style="list-style-type: none"> <li>Aims to build on Ireland's rich maritime heritage and increase</li> </ul>	<ul style="list-style-type: none"> <li>Establishes two targets:</li> </ul>		The FRMP will have regard to this plan and will (in combination

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
Marine Plan for Ireland (The Inter-Departmental Marine Coordination Group (MCG), 2012)	engagement with the sea. <ul style="list-style-type: none"> <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>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> <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>		with other users and bodies) cumulatively contribute towards the achievement of its objectives.
Arterial Drainage Maintenance and High Risk Designation Programme 2011-2015 (Office of Public Works, 2011)	<ul style="list-style-type: none"> <li>Sets out the roles and 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".</li> </ul>	<ul style="list-style-type: none"> <li>Part 1 of the Programme comprises Arterial Drainage Maintenance (including Scheme Channel Maintenance Works, Maintenance of Scheme Structures, Scheme Embankment Maintenance and Flood Relief Scheme Maintenance.</li> <li>Part 2 of the Programme comprises High Risk Channel Designation.</li> </ul>	Arterial Drainage Act, 1945 (S.I No 3/1945) as amended and extended 1995 (S.I. No. 14/1995)	In future planning cycles it is 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,	<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</li> </ul>	<p>The following actions are proposed to be undertaken</p> <ul style="list-style-type: none"> <li>Build capacity and scale in the</li> </ul>	Article 34 of the Common Fisheries Policy Regulation	The FRMP should consider factors, such as aquaculture, in its strategies.

Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
2015)	to market and consumer demands and in balance with nature and society	industry <ul style="list-style-type: none"> <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>		
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> <li>5. Tackling leakage</li> <li>6. Increasing wastewater treatment capacity and improving environmental compliance</li> <li>7. Better Control and Monitoring</li> <li>8. Improving existing plants</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
Water Services Strategic	<ul style="list-style-type: none"> <li>• This Water Services Strategic Plan</li> </ul>	<ul style="list-style-type: none"> <li>• The requirement for the plan to</li> </ul>	Water Services (No. 2) Act 2013 (the Water	The FRMP will have regard to this strategic plan and will (in



Directive/ Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
Plan (Irish Water, 2014)	sets out strategic objectives for the delivery of water services over the next 25 years up to 2040.	<p>address the delivery of six strategic objectives as follows:</p> <ul style="list-style-type: none"> <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>	Services Act)	combination with other users and bodies) cumulatively contribute towards the achievement of its objectives
<i>Environment and Sustainable Development</i>				
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>• Cavan County Development Plan 2014-2020 (Cavan County Council, 2014)</li> <li>• Dundalk &amp; Environs Development Plan 2009-2015 (Louth County Council, 2009)</li> <li>• Monaghan County Development Plan 2013-2019 (Monaghan County Council, 2013)</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>• Monaghan County Development Plan 2013-2019 (Monaghan County Council, 2013)</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
<p>Local Area Plans</p> <ul style="list-style-type: none"> <li>Ardee Local Area Plan 2010-2016 (Louth County Council, 2010)</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>	<p>Local Government (Planning and Development) Act, 1963 (S.I. No. 28/1963) (as amended)</p> <p>Requirement of the Planning and Development (Amendment) Act (2010) (S.I. No. 30/2010)</p>	<p>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.</p>
<p>Planning Schemes for Strategic Development Zones (SDZ)-none relevant</p>	<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>	<p>Local Government (Planning and Development) Act, 1963 (S.I. No. 28/1963) (as amended)</p>	<p>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.</p>
<p>Housing Strategies</p> <ul style="list-style-type: none"> <li>Housing Strategy for County Cavan 2008-2014 (Appendix 26) (Cavan County Council, 2007)</li> <li>Monaghan's Housing Strategy 2013-2019 (Monaghan County Council, 2013)</li> </ul>	<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</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>	<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.</p>

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Council, 2013)		review it every two years.		
Biodiversity Action Plans <ul style="list-style-type: none"> <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> </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.
Heritage Plans <ul style="list-style-type: none"> <li>Cavan Draft Heritage Plan 2016-2021 (Cavan County Council, 2015)</li> <li>Draft County Meath Heritage Plan 2016-2021 (Meath County Council, 2015)</li> <li>Louth Heritage Plan 2015-2020 (Louth County Council, 2014)</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.

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<ul style="list-style-type: none"> <li>Monaghan Heritage Plan 2012-2017 (Monaghan County Council, 2012)</li> </ul>				
<p>County Landscape Character Assessments</p> <ul style="list-style-type: none"> <li>The Geological Heritage of Cavan (GSI, 2013)</li> <li>Landscape Character Assessment Monaghan (Monaghan County Council, 2008)</li> <li>Louth County Council Landscape Character Assessment (Louth County Council, 2002)</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>	<p>Requirement of the Planning and Development Act 2000 (S.I. No. 30/2000) as amended</p> <p>Landscape and Landscape Assessment Guidelines (DoEHLG, 2000)</p>	<p>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.</p>
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)	<p>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.</p>
Shellfish Pollution Reduction Programmes	<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</li> </ul>	<ul style="list-style-type: none"> <li>Identifies key and secondary pressures on water quality in designated shellfish areas.</li> </ul>	European Communities (Quality of Shellfish Waters) Regulations 2006 (SI 268/2006) (as amended) and	<p>Impacts on water quality are of relevance to the FRMP as flooding can be linked with water</p>

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<ul style="list-style-type: none"> <li>• Carlingford Lough Shellfish Pollution Reduction Programme (DEHLG, 2009)</li> <li>• Dundalk Bay Shellfish Pollution Reduction Programme (DEHLG, 2009)</li> </ul>	life and growth and contribute to the high quality of shellfish products directly edible by man.	<ul style="list-style-type: none"> <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>	requirement of Shellfish Waters Directive (2006/113/EC) for designated shellfish waters	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 (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)	Impacts on water quality are of relevance to the FRMP as flooding can be linked with water pollution.
Groundwater Protection Schemes	<ul style="list-style-type: none"> <li>• Preserve and prevent deterioration in quality and identify the status of groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess and identify the vulnerability, aquifer potential and source protection of groundwater.</li> </ul>		Impacts on water quality are of relevance to the FRMP as flooding can be linked with water

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
<ul style="list-style-type: none"> <li>County Cavan Groundwater Protection Scheme (GSI, 2008)</li> <li>Monaghan Groundwater Protection Scheme (GSI, 2002)</li> <li>County Meath Groundwater Protection Scheme (GSI and Meath County Council, 1996)</li> </ul>	<ul style="list-style-type: none"> <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>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>		pollution.
County Renewable Energy Strategies- none relevant	<ul style="list-style-type: none"> <li>Aims to ensure competitive, secure and sustainable energy</li> </ul>	<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.
<p>Economic development plans for rural and urban areas</p> <ul style="list-style-type: none"> <li>Cavan Economic Plan</li> </ul>	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> </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
<p>2009-2012 (Cavan County Council, 2009)</p> <ul style="list-style-type: none"> <li>Meath Economic Development Strategy 2014-2022 (Meath County Council, 2014)</li> <li>Economic Strategy &amp; Implementation Plan for County Monaghan 2010-2014 (Monaghan County Council, 2010)</li> </ul>		<ul style="list-style-type: none"> <li>Identifies what is required to ensure that the opportunities are realised and jobs created</li> </ul>		
<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>Neagh Bann River Basin District Management Plan</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</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 NWNB 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,</p>



Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
2009-2015 (DEHLG, 2010)		<p>improving water quality in the RBD</p> <ul style="list-style-type: none"> <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> <li>•</li> </ul>		including the protection of groundwater.
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 of waters</li> </ul>	Requirement of the local Government (Water Pollution) Act 1977 (S.I. No. 1/1977)	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 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)</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</li> </ul>	The key principle on which the plan is based which requires meeting four closely related objectives:	Forestry Act 2014	The FRMP will have regard to these plans and will (in combination with other users and bodies) cumulatively

Plan/Programme	High Level Description	Key Objectives, Actions etc.	Related Legislation or Plans	Relevance to FRMP
2016-2020 (Coillte, 2016)  • Northwest BAU (Business Area Unit) 2016-2020 (Coillte, 2016)	Coillte Forests.	<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>		contribute towards the achievement of its objectives.
Regional Planning Guidelines  • Regional Planning Guidelines for the Northern and Western 2010-2022, (Regional Planning Guidelines Office, 2010)  • Regional Planning Guidelines for the Midland 2010-2022, (Regional Planning Guidelines Office, 2010)	<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.