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Legislative and policy response to the risk of coastal erosion and flooding in the UK and Ireland

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This paper examines the policy response of the UK and Irish administrations to the threat of flooding and coastal erosion, and compares these to the approach being taken in Northern Ireland. This is presented in the context of current climate projections which indicate that climate change and natural land movements will cause rising sea levels and higher storm surges for UK coasts, increasing the risk of coastal erosion and flooding.

Executive summary

Incidences of coastal flooding, caused by both erosion and increasingly stormy weather are generally anticipated to increase as a result of climate change. This paper:

- Defines the problem of coastal erosion and the level of threat faced by Northern Ireland;
- Discusses the current approaches to managing flood risk and coastal erosion in NI; and
- Examines flood and coastal erosion risk management policy, legislation and investment in GB and the Republic of Ireland.

Towards a strategic approach to flood and coastal erosion risk management

Coastal erosion and flooding are natural processes. However, they become major problems when they threaten our ways of life by damaging homes, business and infrastructure.

The traditional means of protecting society from these threats has been to erect sea defences. However, there is now widespread acceptance that the traditional *'hold the line and build our way out of trouble'* response to flood and coastal erosion risk is no longer sustainable.

Based on improvements in our understanding of these processes governments are increasingly taking a more strategic view of managing flood risk and coastal erosion.

The EU Floods Directive, provides Member States with a framework for managing flood risk, prescribing a three step approach:

1. Preliminary Flood Risk Assessment that considers impacts on human health and life, the environment, cultural heritage and economic activity. (by 2011)
2. Risk Assessment: By 2013 produce flood hazard and risk maps; and
3. Flood Risk Management Plans: Flood Risk Management Plans to be completed by December 2015 are intended to show policy makers, developers, and the public the nature of the risk and the measures proposed to manage these risks.

The Floods Directive was transposed into Northern Ireland legislation via the Water Environment (Floods Directive) Regulations (Northern Ireland) 2009.

Coastal Erosion in the UK

Rates of coastal erosion vary greatly around the UK. England is most affected, with 29.8% of its coastline suffering from erosion; 19.5% of the Northern Ireland coastline is suffering from erosion.

This variation of erosion patterns across the UK means that the impacts of climate change – sea level rise (SLR) and increased storminess – will have different implications depending on the nature of the coast and the current regime of erosion.

Climate change projections do, however, indicate that an increase in relative sea levels around the NI coastline coupled with an increase in the storminess of the weather will lead to more extensive and frequent coastal flooding here. This poses a significant risk to people, properties and infrastructure.

Rivers Agency's preliminary flood risk assessment estimates that:

- 46,000 or 5% of the 830,000 properties in Northern Ireland are at risk of flooding from rivers (fluvial) or the sea (coastal);
- Approximately 15,500 of these properties are protected to some extent by flood defence systems and the culvert network.

The report noted that while the threat of coastal flooding is not as widespread as fluvial flooding – the PFRA estimates approximately 1,800 people or 720 households are at risk of coastal flooding – coastal flooding has the potential to have a greater impact on public safety, economic activity and the environment.

Responsibility for coastal erosion in NI

The Department for Infrastructure (DfI) has overall responsibility for flood risk management and policy in Northern Ireland. However, no single Executive Department has the responsibility for coastal erosion risk management. In England and Wales, the approach taken has been to assign strategic oversight of flood and coastal erosion management to one body (the Environment Agency). Whilst in Scotland and Ireland the organisational roles and responsibilities with regards flood risk management are also well defined and although there is no statutory provision for the management of coastal erosion there are binding strategies in place requiring due attention to be given to this issue.

The Flood and Water Management Act (England and Wales) 2010 is the only legislation that recognises the inseparable processes of coastal erosion and coastal flooding. Rivers Agency has acknowledged that *“work needs to commence on a Floods Bill to enable the effective delivery of all components of Flood Risk Management”* and it is reasonable to anticipate a similar approach to that taken in England and Wales may be adopted.

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1 Introduction

Coastal erosion can be defined as the removal of material from the coast by wave action, tidal currents and/or the activities of humans, typically causing a landward retreat of the coastline.¹ Its effects can be observed on cliffs, tidal flats and saltmarshes, and beaches. Whilst coastal erosion is a natural process it does have the potential to cause issues where land retreats to a point where it impacts on our way of life by causing flooding, rock falls, loss of land and damage to infrastructure.²

Incidences of coastal flooding, caused by both erosion and increasingly stormy weather are generally anticipated to increase as a result of climate change. Recent extreme weather events have highlighted the severe impacts coastal flooding can have on people's lives – damaging homes, businesses and key infrastructures – This has led to calls for a more strategic approach to flood and coastal erosion risk management.

This purpose of this paper is to assess potential gaps in policy which may exist in Northern Ireland with regards to coastal erosion and flood risk management, it does this by:

- Defining the problem of coastal erosion and the level threat faced by Northern Ireland;
- Discussing the current approaches to managing flood risk and coastal erosion in NI; and
- Examining flood and coastal erosion risk management policy, legislation and investment in GB and EU Ireland.

2 Towards a strategic approach to flood and coastal erosion risk management

There has been a growing awareness of the risk of flooding in Northern Ireland following a number of extreme weather and subsequent flooding events, which since 2007, appear to be increasing in both frequency and severity.³ These floods, like most are the result of natural processes such as heavy rain, tidal surges and raised groundwater levels. However, the risk and impact of flooding is often amplified by human activities which disturb nature's defences.

Extreme weather events have also highlighted the 'problem' of coastal erosion (encroachment of land by the sea) in recent times. Whilst this too is a natural process, human interventions including coastal engineering, land claim, river basin regulation works (especially construction of dams), dredging, vegetation clearing, gas mining and water extraction all contribute to erosion.⁴ This in turn undermines flood defences, both

¹ British Geological Survey (2012) Coastal Erosion [online] available from: <http://nia1.me/39x>

² Ibid.

³ PEDU (2012) Review of Response to Flooding on 27th and 28th June 2012 [online] available from: <http://nia1.me/1ab>

⁴ EuroSION (2004) A guide to coastal erosion management practices in Europe: lessons learned [online] available from: <http://nia1.me/39h>

natural and manmade, creating the potential for coastal flooding and damage to infrastructure and private property.⁵ As Cooper (2016) notes, this is the stage where “erosion is transformed from simply a natural process to a ‘problem’.”⁶

2.1 Unsustainable sea defence

Sea defences have traditionally been employed to manage coastal erosion, where there is a perceived threat to infrastructure, with, some arguing, little thought having been given to the wider environmental consequences.⁷ In many cases hard engineering approaches exacerbate the problem, causing more erosion further along the coastline:

*“Over the past hundred years the limited knowledge of coastal sediment transport processes at the local authority level has often resulted in inappropriate measures of coastal erosion mitigation. In many cases, measures may have solved coastal erosion locally but have exacerbated coastal erosion problems at other locations – up to tens of kilometres away”.*⁸

There is now widespread acceptance that the traditional ‘hold the line and build our way out of trouble’⁹ response to flood and coastal erosion risk is no longer sustainable.¹⁰ This practice has, according to some academics,

*“...had severe impacts on natural coastal ecosystems, compromising their ability to adapt and survive rising global sea levels [...] the inevitable outcome is an ever increasing maintenance bill for sea defence and an even more degraded environment with implications for the quality of life of residents, the tourism industry, and the coastal ecosystem.”*¹¹

2.2 Sustainable coastal management

Increasingly those charged with managing flood risk and coastal erosion are being encouraged to take a more strategic view by “working with natural forces rather than against them [...] increasing overall flood resilience”.¹² The European Commission’s Directorate-General for the Environment commissioned a community wide study of coastal erosion in 2002, called EROSION.

⁵ EuroSION (2004) PART I - Major findings and Policy Recommendations of the EUROSION project [online] available from: <http://nia1.me/39g>

⁶ Cooper, A (2015) Shoreline management planning in Northern Ireland. KESS Seminar [online] available from: <http://nia1.me/399>

⁷ J.A.G. Cooper, et al., Coastal defences versus coastal ecosystems: A regional appraisal, Marine Policy (2016) IN PRESS

⁸ EC) European Commission (2004) Living with coastal erosion in Europe: Results from EuroSION study [online] available from: <http://nia1.me/390> PAGE 8

⁹ National Trust [online] A few facts about the coastline we care for. Available from: <http://nia1.me/39b>

¹⁰ Turner, R.K., et al, Coastal Management in the 21st Century: Coping Strategies for Vulnerability Reduction [online] available from: <http://nia1.me/39c>

¹¹ J.A.G. Cooper, et al., Coastal defences versus coastal ecosystems: A regional appraisal, Marine Policy (2016) IN PRESS

¹² Rawlinson, S. (2014) Infrastructure flood management. Building Magazine 11th July 2014

2.2.1 EUROSION

The EUROSION study set out to quantify the status, impact and trends of coastal erosion in Europe and assess needs for action at EU, Member State and regional levels. It was based on the assumption that coastal erosion is “...a *phenomenon that can never be completely controlled but can be managed in an economically and ecologically sustainable fashion*”.¹³

The EUROSION study found that all European coastal states are to some extent affected by coastal erosion, with about twenty thousand kilometres of coasts (20% of total) facing serious impacts. It went on, however, to note that while there was a minimal threat to land and houses (from erosion), the risks of coastal flooding due to the undermining of coastal dunes and sea defences had the potential to impact on several thousands of square kilometres and millions of people.¹⁴ In order to manage this risk, EUROSION recommended:

- Adopting a more strategic and proactive approach to coastal erosion including by:
(a) restoring the sediment balance; (b) allocating space necessary to accommodate natural erosion and coastal sediment processes and (c) the designation of strategic sediment reservoirs.
- The impact, cost and risk of human induced coastal erosion should be controlled through better internalisation of coastal erosion concerns in planning and investment decisions – effectively the cost of management should be borne by beneficiaries rather than the public purse.
- Coastal erosion should be managed through existing instruments including environmental assessment; and Integrated Coastal Zone Management (ICZM).

2.2.2 Integrated Coastal Zone Management (ICZM)

Integrated Coastal Zone Management (ICZM) is intended to create a framework to facilitate the integration of activities of all those involved in the development, management and use of the coastal zone. It aims to establish sustainable levels of economic and social activity in coastal areas while protecting the environment. The principles of ICZM are as follows:

- taking a long term view;
- a broad holistic approach;
- adaptive management;
- working with natural processes;
- support and involvement of relevant administrative bodies;
- use of a combination of instruments;
- participatory planning;

¹³ Euroasion [online] EUROSION portal. Available from: <http://nia1.me/39f>

¹⁴ Euroasion (2004) PART I - Major findings and Policy Recommendations of the EUROSION project [online] available from: <http://nia1.me/39g>

- reflecting local characteristics.

An extensive demonstration project commissioned by the EC during the 1990s, that included two projects in Northern Ireland, led to a recommendation for Member States to apply the principles of ICZM – this was adopted by Member states on 30 May 2002.

- Member States then undertook a national stocktake of the main legislation, institutions, and stakeholders with an interest in using and managing the coast – this was published in 2004; and
- based on this, national, or regional strategies in the case of the UK, were delivered in 2006.

2.2.3 ICZM Strategy for Northern Ireland

The Department of the Environment (DoE) was given the lead role in compiling Northern Ireland's ICZM strategy, published in 2006 as required. However, no single body has responsibility for implementation or delivery. It is a non-statutory document that effectively provides a framework under which all users, planners, managers and developers involved with the coastal zone should operate and make decisions. The strategy calls for the integration of ICZM processes into policies on approaches to climate change and coastal protection.¹⁵

Mechanisms for monitoring the implementation of the strategy were established with an independent, non-statutory body made up of a cross-section of interests (the Coastal and Marine Forum) given this role. This body also provides expert advice, co-ordinates research, and provides support towards the achievement of the strategy objectives. However, at the time of writing details or indeed output from this body have been unavailable. Therefore, the extent to which the strategy has been implemented successfully is unknown.

2.2.4 The Floods Directive

The purpose of the EU Floods Directive is to help Member States establish a framework for managing flood risk, with the aim to reduce the adverse consequences of flooding on human health, the environment, cultural heritage and economic activity. The Floods Directive was transposed into Northern Ireland legislation via the Water Environment (Floods Directive) Regulations (Northern Ireland) 2009. The main requirements of the legislation and the dates for their completion are as follows:

- Carry out a Preliminary Flood Risk Assessment for each River Basin District and on the basis of this assessment identify areas for which potential significant flood risks exist or might be considered likely to occur – by 22 Dec 2011;
- Prepare flood hazard maps and flood risk maps for each Significant Flood Risk Area (SFRA) identified - by 22 Dec 2013;

¹⁵ DoE (2006) Towards an Integrated Coastal Zone Management Strategy for Northern Ireland [online] available from: <http://nia1.me/390>

- Publish Flood Risk Management Plans that focus on prevention, protection and preparedness – by 22 Dec 2015.

The Directive requires these deliverables to be reviewed, and if necessary updated, on a six yearly cycle.

3 Coastal erosion in the UK

Rates of coastal erosion vary greatly around the UK. According to the Marine Climate Change Impacts Partnership (CCIP) 17.3% of the UK coast is currently suffering from erosion. England is most affected, with 29.8% of its coastline suffering from erosion; the coastline of England is also the most protected with 45.6% of its length lined with coastal defence works or fronted by artificial beaches. 19.5% of the Northern Ireland coast is suffering erosion, compared to 23.1% of the Welsh and 11.6% of the Scottish coastlines. Details of the extent of coastal erosion and protection across the UK is detailed in table one below.¹⁶

Table 1: Coastal erosion and protection in the UK

Region	Coast Length	Coast length which is eroding		Coast length with defence works and artificial beaches	
	km	km	%	km	%
NE England	297	80	26.9	111	37.4
NW England	659	122	18.5	329	49.9
Yorkshire and Humber	361	203	56.2	156	43.2
East Midlands	234	21	9.0	234	99.8
East England	555	168	30.3	382	68.8
Southeast England	788	244	31.0	429	54.4
Southwest England	1379	437	31.7	306	22.2
England	4273	1275	29.8	1947	45.6
Wales	1498	346	23.1	415	27.7
Scotland	11154	1298	11.6	733	6.6
Northern Ireland	456	89	19.5	90	19.7
Total	17381	3008	17.3	3185	18.3

Source: CCIP (2009)

This variation of erosion patterns across the UK means that the impacts of climate change – sea level rise (SLR) and increased storminess – will have different implications depending on the nature of the coast and the current regime of erosion.¹⁷

¹⁶ Masselink, G. and Russell, P. (2009) CCIP Annual Report Card 2007-2008 Scientific Review - Coastal Erosion and Coastal Geomorphology [online] available from: <http://nia1.me/3a2>

¹⁷ (EC) European Commission (2009) The economics of climate change adaptation in EU coastal areas [online] available from: <http://nia1.me/39j>

3.1 Threat to infrastructure

The most recent climate change risk assessment¹⁸ suggests the increasing frequency and severity of flooding from a range of sources represents the most significant climate change risk to UK infrastructure.

Assets and networks across all infrastructure sectors are already exposed to multiple sources of flooding, and the number of assets exposed to significant levels of flood risk could double by the 2080s with projected changes in the UK climate.

- *Coastal infrastructures, particularly ports, are at risk from rising sea levels and a consequential increase in the height of onshore waves and storm surges.*
- *High onshore waves will also accelerate rates of coastal erosion and put increasing lengths of the UK rail network at risk, as well as sea walls that protect coastal settlements.*

This report highlights the need for more action to manage increasing risk to existing networks (including flood and coastal erosion risk management infrastructure), from sea-level rise and increased rate of erosion.

Interestingly, it highlights the urgent need for research in Northern Ireland suggesting current knowledge of the threat posed by coastal erosion and flooding remains limited.¹⁹

3.2 Coastal erosion and flood risk in Northern Ireland

According to Rivers Agency significant coastal flooding is a relatively infrequent occurrence in Northern Ireland,²⁰ although there have been some major events in recent times, notably the tidal surge of January 2014, which caused almost £1.4m worth of damage to roads, including £382,000 to fix the sea wall at the Rostrevor Road near Warrenpoint, Co. Down which collapsed.²¹ A section of the Whitechurch Road, which is the main coastal route between Millisle and Ballywalter, also collapsed during this event.²²

It was not only roads that were affected by that particular incident; *“several homes and businesses at Portaferry in the Strangford constituency were flooded [which was]*

¹⁸ CCC) Committee on Climate Change (2016) Climate Change Risk Assessment 2017 [online] available from: <http://nia1.me/39p>

¹⁹ (CCC) Committee on Climate Change (2016) Synthesis Report Appendix – Urgency scoring tables [online] available from: <http://nia1.me/39j> PAGE 47

²⁰ Rivers Agency (2011)

²¹ BBC [online] £1.4m roads repair bill after Northern Ireland storms. Available from: <http://nia1.me/39t>

²² Official Report (Hansard) Monday 13 January 2014. Volume 90, No 5 [online] available from: <http://nia1.me/39u>

devastating for residents and businesses”.²³ Caravan parks along the Ards peninsula, also suffered significant damage.²⁴

3.2.1 Climate change implications

While these events have been relatively infrequent, climate change projections indicate that an increase in relative sea levels around the NI coastline coupled with an increase in the storminess of the weather will lead to more extensive and frequent coastal flooding.

The Climate Change Risk Assessment (CCRA) for Northern Ireland published in January 2012, indicates that increases in flooding and coastal erosion affecting people, properties (including built heritage) and infrastructure, as well as coastal squeeze and coastal erosion affecting beaches, intertidal areas, grazing marshes etc. are potentially significant threats for Northern Ireland from climate change. That said the extent of coastal erosion in Northern Ireland is lower than some other parts of the UK,²⁵ as shown in table one (above).

3.2.2 Threat to infrastructure

While much of Northern Ireland’s strategic road network is inland there are stretches of the road and rail networks in exposed coastal areas. Table two shows the major assets and networks in NI at high risk of flooding from the sea.²⁶

Table 2. Infrastructure assets and networks in Northern Ireland located in areas at 1:75 or greater annual chance of flooding from the sea (present day)

Receptor	Number/Length
Clean and wastewater sites	1
Electricity generation sites	0
Electricity transmission and distribution assets	0
Strategic road network (km)	191
Rail network (km)	44
Rail stations	2
Mobile phone masts	33
Active landfill sites	0

Source: CCC (2016)

²³ Official Report (Hansard) Monday 13 January 2014. Volume 90, No 5 [online] available from: <http://nia1.me/39u>

²⁴ Ibid.

²⁵ (CCC) Committee on Climate Change (2016) UK Climate Change Risk Assessment Evidence Report: Summary for Northern Ireland [online] available from: <http://nia1.me/39m>

²⁶ (CCC) Committee on Climate Change (2016) UK Climate Change Risk Assessment Evidence Report: Summary for Northern Ireland [online] available from: <http://nia1.me/39m> Ibid PAGE 36

Sea level rises in the range between 20cm and less than 40cm are expected in NI this century. Therefore, the number of assets and length of existing infrastructure networks located in areas exposed to a high risk of flooding from the sea is projected to increase with climate change (Table 3).²⁷

Table 3. Projected change in number/length of infrastructure assets and networks in Northern Ireland located in areas exposed to a 1:75 or greater annual chance of flooding from the sea under a 4°C rise in global mean temperature by the end of the century.

Receptor	% Change
Clean and wastewater sites	No Change
Electricity generation sites	No change
Electricity transmission and distribution assets	No change
Strategic road network	+28%
Rail network	+13%
Rail stations	+5%
Mobile phone masts	+142%
Active landfill sites	No change

Source: CCC (2016)

3.2.3 Rivers Agency's Preliminary Flood Risk Assessment (PFRA) for Northern Ireland

Article 4 of the Floods Directive (2007/60/EC) requires that each Member State undertakes a Preliminary Flood Risk Assessment (PFRA). As the competent authority, Rivers Agency published this in 2011.²⁸ The PFRA for Northern Ireland assesses the potential adverse consequences of future floods on human health, economic activity, cultural heritage and the environment taking into account long term developments such as climate change. It considers flooding from all of the main flood sources including rivers, the sea, surface water runoff (also known as pluvial flooding) and impounded water bodies (such as dams and reservoirs).

The Directive also requires that Member States produce Flood Risk Management Plans (FRMP) coordinated at the level of River Basin District (RBD, of which NI has three). Rivers Agency took the decision to further sub divide these into 'sub plans' which fit within the boundaries of the RBDs, as shown in figure one.

²⁷ Ibid.

²⁸ Rivers Agency (2011) Preliminary Flood Risk Assessment for NI (PFRA) [online] available from: <http://nia1.me/39z>

Figure One: River Basin Districts and Sub Plan Areas



Rivers Agency's preliminary flood risk assessment estimates that:

- 46,000 or 5% of the 830,000 properties in Northern Ireland are at risk of flooding from rivers (fluvial) or the sea (coastal);
- Approximately 15,500 of these properties are protected to some extent by flood defence systems and the culvert network.

The report noted that while the threat is not as widespread (the PFRA estimates approximately 1,800 people or 720 households are at risk of coastal flooding²⁹) **coastal flooding has the potential to have a greater impact on public safety, economic activity and the environment.**

According to the PFRA, Belfast is at significant risk from both tidal and fluvial flooding. With a large proportion of the city centre within the 'undefended' 1 in 200-year coastal floodplain – as many as 8000 properties are potentially at risk of flooding from the sea.

²⁹ PAGE 77 Rivers Agency (2011) Preliminary Flood Risk Assessment for NI (PFRA) [online] available from: <http://nia1.me/39z>

3.3 Responsibility for coastal erosion and flood risk management in Northern Ireland

The Department for Infrastructure (DfI) has overall responsibility for flood risk management and policy in Northern Ireland. However, no single Executive Department has the responsibility for coastal erosion risk management.³⁰ The Executive's policy on coastal protection is determined by what is commonly known as the "Bateman Formula". Under this long-standing "Formula", central government departments have a responsibility to construct, maintain and repair the coastal defences in their possession. For example,

- The Department for Infrastructure's (DfI) Rivers Agency (RA) has powers to maintain 26km of sea defences and two tidal barriers designed to reduce the risk of flooding (but not coastal erosion) to low lying coastal land;
- DfI's Transport NI has responsibility for coastal defences that protect the public road and railway network;
- The Department of Agriculture, Environment and Rural Affairs (DAERA) is the marine licensing authority for deposits in the marine area below the mean high water spring tide, and also has responsibility for marine and coastal conservation;
- DAERA is also the marine planning authority for Northern Ireland and is due to publish the first draft Marine Plan for consultation in 2016;
- The EU Floods Directive³¹ which came into force in 2007 requires the production of flood risk assessments for all river basin districts and coastal areas within Member States. DfI's Rivers Agency is the competent authority.

4 Flood and coastal erosion risk management in the UK and Ireland

In 2007 there were more than 200 major floods globally, causing £40 billion worth of damage.³² In England alone widespread flooding caused an estimated £3.2 billion worth of damage,³³ prompting the UK Government to commission Sir Michael Pitt to carry out a wide ranging review of the UK's flood risk management policy.

4.1 The Pitt Review

The Pitt Review³⁴, published in 2008, called for urgent and fundamental changes in the way the UK was adapting to the increased risk of flooding.³⁵ Pitt made 92

³⁰ AQW 797/16-21

³¹ Directive 2007/60/EC of the European Parliament and of the council on the assessment and the management of flood risks (EU Floods Directive)

³² (ICE) Institution of Civil Engineers [online] Pitt Review Lessons learned from the 2007 floods. Available from: <http://nia1.me/391>

³³ Defra (2010) The costs of the summer 2007 floods in England [online] available from: <http://nia1.me/393>

³⁴ Sir Michael Pitt (2008) The Pitt Review: Learning lessons from the 2007 floods [online] available from: <http://nia1.me/396>

³⁵ Press Notice: Sir Michael Pitt Publishes Final Report, 25th June 2008 [online] available from: <http://nia1.me/394>

recommendations in all, including giving one body (the Environment Agency) a national overview of all flood risk over a long (minimum 25 year) term.

The UK Government accepted Pitts recommendations and many of these are now fully implemented; in terms of legislation and policy:

- The Environment Agency's (EA) strategic role in managing all sources of flood risk has been underpinned in legislation through the *Flood Risk Regulations 2009*³⁶ and the *Flood and Water Management Act 2010*³⁷; while
- The Environment Agency (EA), with Defra, has produced and published The *National Flood and Coastal Erosion Risk Management Strategy for England*³⁸.

4.2 Policy Response

Flood and Coastal Erosion Risk Management (FCERM) is a devolved matter for each administration in the UK. This section sets out the legislative and policy framework for each UK region and the Republic of Ireland (ROI); the bodies responsible for implementing policy and the funding mechanisms and provision for FCERM.

4.3 England

Defra has overall national responsibility for policy on flood and coastal erosion risk management (FCERM) in England.

4.3.1 Policy and legislation

The Flood and Water Management Act (FWMA) 2010 is the overarching legislation covering FCERM in England. The purpose of the Act is to:

- Introduce the concept of flood risk management and the framework for the delivery of flood and coastal erosion risk management through national and local strategies;
- Provide new definitions, for example "flood", "coastal erosion", "Risk Management Authorities", "Lead Local Flood Authority"; and
- Establish the roles and responsibilities of the different risk management authorities.³⁹

The Flood Risk Regulations (2009) transpose the EU Floods Directive into law in England and Wales.

³⁶ The Flood Risk Regulations 2009 [online] available from: <http://nia1.me/395>

³⁷ Flood and Water Management Act 2010 [online] available from: <http://nia1.me/397>

³⁸ Defra (2011) Understanding the risks, empowering communities, building resilience: the national flood and coastal erosion risk management strategy for England [online] available from: <http://nia1.me/398>

³⁹ Flood and Water Management Act 2010 [online] available from: <http://nia1.me/397>

4.3.2 Planning and implementation

The Environment Agency (EA) is responsible for the strategic management of all sources of flooding and coastal erosion.

- The EA produces, maintains and delivers the FCERM strategy;
- The EA also has operational responsibility to maintain existing infrastructure relating to "main rivers" and tidal defences;
- To invest in new and improved risk management infrastructure;
- To administer capital grant to LLFAs and internal drainage boards (IDBs); and
- As of 2015 the EA must produce Flood Risk Management Plans (FRMP), that cover flooding from main rivers, the sea and reservoirs every six years.

[Lead Local Flood Authorities](#) (LLFA) (unitary authorities or county councils) must develop local strategies for flood and coastal erosion risk management that are consistent with the national strategy for FCERM. They must maintain a register of flood risk assets.

England has 12 Regional Flood and Coastal Committees (RFCC). They're made up of members appointed by LLFAs and the EA, with a chair appointed by the Secretary of State.

The Department for Communities and Local Government (DCLG) is responsible for planning policy, including policy affecting the development of land which is at risk from flooding or coastal erosion.

4.3.3 Funding

The majority of FCERM funding comes from central government via Defra.

- £3.2 billion has been invested in FCERM over the five years from April 2010 to March 2015.⁴⁰
- Defra is committed to a six-year flood defence capital investment fund of £2.3bn to 2021.⁴¹
- Defra gives the majority of its FCERM funding to the EA as Grant-in-Aid.
- The EA spends this funding directly on FCERM, but also passes some on as grants to Local Authorities or Internal Drainage Boards.
- This includes grants for capital investment to LLFAs.
- LLFAs receive additional (revenue and non-grant eligible expenditure) funding from the DCLG.

⁴⁰ Defra (2015) *Central Government Funding for Flood and Coastal Erosion Risk Management in England* [online] available from: <http://nia1.me/38p>

⁴¹ Ibid (page 4)

LLFAs can secure additional income through the planning system, from contributions secured from major beneficiaries and through fees, charges and local taxation. This has seen additional income of £281.5 from April 2010 to March 2015.⁴²

Another source of funding is that raised through the Partnership Funding scheme, which allows central government to contribute to a range of schemes rather than meeting the full costs of a limited number of schemes. The funding raised through this method for the previous four years was:

- 2011/12 - £5.4m;
- 2012/13 - £19.6m;
- 2013/14 - £54.5m;
- 2014/15 - £60.5m.⁴³

4.4 Wales

The FWMA extends to Wales. However, there is a separate national FCERM strategy for Wales⁴⁴.

4.4.1 Planning and implementation

The FWMA assigns responsibility for producing the Welsh FCERM strategy to the Welsh Government (WG). Natural Resources Wales (NRW)⁴⁵ is responsible for implementing the strategy and for all other FCERM management responsibilities carried out by the EA in England. As of 2015 NRW must produce a FRMP for the whole of Wales every six years.

The FWMA assigns specific responsibilities for managing flood risk to 'Welsh Risk Management Authorities' (RMA) (described as LLFA in England). There are 28 RMAs including:

- Natural Resources Wales;
- 22 councils in Wales; and
- Five water companies.

Some councils are designated as coastal risk management authorities under the Coast Protection Act 1949. This provides them with powers (not a duty) to protect the land against erosion or encroachment from the sea.

The Environment (Wales) Act 2016 has created a Flood and Coastal Erosion Committee that reports to the Minister for Natural Resources.

⁴² Ibid (page 7)

⁴³ Grant, L. and Chisholm, A. (2015) *Breaking the Bank? Funding for flood and coastal erosion risk management in England*. Chartered Institute of Water and Environmental Management [online] available from: <http://nia1.me/38t>

⁴⁴ Welsh Government (2012) National Strategy for Flood and Coastal Erosion Risk Management [online] available from: <http://nia1.me/38m>

⁴⁵ Natural Resources Wales took over all of Environment Agency Wales' responsibilities on 1 April 2013

4.4.2 Funding

The Welsh Government is the primary funder of flood and coastal erosion risk management in Wales.⁴⁶ The WG provides capital and revenue funding for NRW and councils to manage risks of coastal flooding and erosion:

- £219 million capital from 10-11 to 16-17 (£120 million for coastal schemes); and⁴⁷
- £162m of revenue funding over this period⁴⁸.

NRW funds maintenance of coastal defences through a mix of capital and revenue budgets depending on the size and nature of repairs. In future there will be two main funding programmes:

- The Flood and Coastal Investment Programme will allocate funding to NRW and councils based on national priorities.
- The Coastal Risk Management Programme will provide (up to) £150 million capital funding to support council coastal protection. Schemes delivered between 2018-19 and 2020-21. The Welsh Government's funding is dependent on councils contributing 25% towards the cost of these projects within the Programme.⁴⁹

4.5 Scotland

The Scottish Government has overall responsibility for policy on flood management in Scotland. However, there is no statutory basis for the management of coastal erosion.

4.5.1 Policy and Legislation

- The Flood Risk Management (Scotland) Act 2009 (FRMA) sets out the requirement for Flood Risk Management Strategies (FRMS) and Local Flood Risk Management Plans (LFRMP) in Scotland.
- The Floods Directive was transposed into Scottish law by the FRMA.

4.5.2 Planning and Implementation

The FRMA designates the Scottish Environment Protection Agency (SEPA) as the strategic flood risk management authority in Scotland.

- SEPA has produced Scotland's FRMS - There are 14 in total, one for each of the Local Plan Districts in Scotland;⁵⁰
- While the FRMS address the risk of flooding from rivers, the coast and surface water, the FRMA does not require SEPA or responsible authorities to assess or manage coastal erosion. However, SEPA has included consideration of erosion in

⁴⁶ Welsh Government (2014) Flood and Coast Investment Programme (FaCIP) [online] available from: <http://nia1.me/38o>

⁴⁷ Audit Wales (2016) Coastal Flood and Erosion Risk Management in Wales [online] available from: <http://nia1.me/38n>

⁴⁸ Ibid (Page 16)

⁴⁹ Audit Wales (2016) Coastal Flood and Erosion Risk Management in Wales [online] available from: <http://nia1.me/38n>

⁵⁰ SEPA [online] Flood Risk Management Strategies, available from: <http://nia1.me/39y>

the FRMS by identifying areas that are likely to be susceptible to erosion and where erosion can exacerbate flood risk.⁵¹

- Local authorities are responsible for producing LFRMP in parallel with the FRMS, working in partnership with SEPA, Scottish Water and other responsible authorities.
- Property owners and landowners have primary responsibility for protection of their land and property from flooding.

4.5.3 Funding

Funds for flood and coastal defence works are included in the General Capital Grant to local authorities. Until 2015/16 the funding was distributed to local authorities with a competitive element based on the funding requirements for large new projects costing more than £2 million⁵². From 2016/17 onwards it will be distributed in line with the priorities set out in the 14 Flood Risk Management Strategies published in December 2015 which, taken together, provide the first ever national plan for flood risk management in Scotland and set out a programme for investment over the next six years.

There are 42 formal Flood Protection Schemes or engineering works planned to start between 2016-2021 in Scotland. The estimated cost of these works is £235 million.⁵³

4.6 Republic of Ireland

The Office of Public Works (OPW), an operational agency of the Irish government, has overall responsibility for FCERM. The Arterial Drainage Acts of 1945 and 1995 provide the OPW with powers for drainage and improvement of agricultural land and the undertaking of localised flood defence schemes to reduce flood risk in urban areas.

OPW has powers to Maintain coastal protection schemes constructed under the Coast Protection Act, 1963.

The Floods Directive was transposed into Irish law by the EU (Assessment and Management of Flood Risks) Regulations SI 122 of 2010.⁵⁴

4.6.1 Planning and Implementation

The Irish Government undertook a wide-ranging review of national flood policy in 2004. The scope of the review included a review of the roles and responsibilities of the different bodies with responsibilities for managing flood risk, and to set a new policy for flood risk management in Ireland into the future.⁵⁵

⁵¹ SEPA [online] Flood Risk Management Strategies. Available from: <http://nia1.me/39y>

⁵² SPICE (2010) Flooding: Frequently Asked Questions [online] available from: <http://nia1.me/38r>

⁵³ Scottish Government (2016) Flood Risk Management Plan for Scotland - Part 1 [online] available from: <http://nia1.me/38g>

⁵⁴ EUROPEAN COMMUNITIES (ASSESSMENT AND MANAGEMENT OF FLOOD RISKS) REGULATIONS 2010 [online] available from: <http://nia1.me/38u>

⁵⁵ OPW [online] National Flood Policy. Available from: <http://nia1.me/38x>

The report acknowledged that the approach to flood risk management had been reactive with responsible agencies spread across government without the benefit of an integrated policy on flooding.⁵⁶ The recommendations of the report included:

- Appointment of the OPW as lead agency for delivery of flood risk management policy. This includes close liaison with a range of local authorities, organisations and stakeholders that also have responsibilities for managing flood risk;
- Catchment Flood Risk Management Plans should be developed as focal points for flood risk management planning;
- A greater focus should be placed on non-structural flood risk management measures, supported, where necessary, by traditional structural flood relief measures; and
- Research should be undertaken in various sectors to develop a strategic information base.

The functions and responsibilities in relation to coastal protection and coastal flooding transferred from the Department of Agriculture, Fisheries and Food to the OPW on 1st January 2009. The main roles for the OPW in this area are presently:

- Undertaking risk assessments associated with coastal flooding and coastal erosion at selected coastal sites;
- Provision of an advisory service in relation to coastal flooding and coastal erosion to support the preparation of annual coastal protection funding programmes, the CFRAM (Catchment Flood Risk Assessment and Management) programme⁵⁷, and to inform broader policy development; and
- Maintenance of coastal protection schemes constructed under the Coast Protection Act, 1963.

The management of problems of coastal erosion, in any particular area, is first and foremost a matter for the relevant local authority. The local authority must assess the problem and, if it considers that specific measures and works are required, it can submit an application to the OPW for funding to implement those measures under the OPW's Minor Coastal Works Scheme.⁵⁸

The CFRAM Programme is a strategic approach to flooding enabling the Government to set national priorities for State investment in flood defences. In terms of a specific coastal strategy, the Irish Government commissioned a long-term Irish Coastal Protection Strategy Study (ICPSS) in 2003, which was completed in 2013. The ICPSS has surveyed and assessed the coastal erosion risk along the entire Irish coastline and this information is being used by local authorities to develop appropriate plans and strategies for the sustainable management of the coastline in their counties.

⁵⁶ OPW [2014] Report of the Flood Policy Review Group [online] available from: <http://nia1.me/3a1>

⁵⁷ OPW [online] CFRAM Programme. Available from: <http://nia1.me/38z>

⁵⁸ OPW [online] Other Bodies that Deal with Flood Risk Matters, available from: <http://nia1.me/3a0>

4.6.2 Funding

Expenditure to protect the coast from flooding and erosion over the period 1998-2015 totals €95 million. About 75% is supported through National Development Plans, the remaining 25% has to be matched by local authorities.⁵⁹

OPW operates a Minor Flood Mitigation Works and Coastal Protection Scheme, under which applications from local authorities are considered for measures costing not more than €500,000 in each instance.⁶⁰

Funding for coastal erosion risk management studies may also be applied for under this scheme. Funding of up to 90% of the cost is available for projects which meet the eligibility criteria including a requirement that the proposed measures are cost beneficial.

⁵⁹ European Commission (2009) The Economics of climate change adaptation in EU coastal areas: Ireland Study [online] available from: <http://nia1.me/39r>

⁶⁰ Dáil Éireann Debate Vol. 908 No. 1. Written Answer: Coastal Erosion [online] available from: <http://nia1.me/38v>

5 Summary and conclusions

Recent incidents have highlighted that while relatively infrequent, the impact of coastal flooding can be even more severe than fluvial flooding. There is also acknowledgement that extreme weather events, coastal erosion and sea level rise caused by climate change will combine to increase incidences of coastal flooding in the future.

Already in GB and Ireland, acknowledgment of the threats related to climate change have resulted in a clear shift in flood defence policy from one of building flood defences and reacting to incidents retrospectively to that of managing flood risk and planning in a strategic manner.

To a large extent this more strategic approach has been driven by the requirements of the EU Water Framework Directive and the EU Floods Directive with the latter, in particular, prescribing a three step approach to flood risk management:

1. Preliminary Flood Risk Assessment that considers impacts on human health and life, the environment, cultural heritage and economic activity (by 2011);
2. Risk Assessment: By 2013 produce flood hazard and risk maps; and
3. Flood Risk Management Plans: Flood Risk Management Plans to be completed by December 2015 are intended to show policy makers, developers, and the public the nature of the risk and the measures proposed to manage these risks.

This work carried out under the floods directive to date provides a strong basis on which to develop a strong and sustainable approach to flood risk management in Northern Ireland. The Floods Directive in Northern Ireland was transposed into domestic legislation via the Water Environment (Floods Directive) Regulations (Northern Ireland) 2009 and this identified the Rivers Agency as the body responsible for implementing it. Despite this there continues to be a number of bodies with responsibility for coastal defence that continue to function independently. These bodies carry out coastal protection functions which fall within their assigned remit on the basis of the "Bateman Formula".

In England and Wales, the approach taken has been to assign strategic oversight of flood and coastal erosion management to one body. Indeed, the FWMA is the only legislation that recognises the inseparable processes of coastal erosion and coastal flooding. This FWMA clarifies the roles of all those involved in flood and erosion risk management and gives one body overall authority for strategic planning ensuring a consistent approach is taken within each coastal area.

Within the other administrations (Scotland and Ireland) the organisational roles and responsibilities with regards to flood risk management are also well defined and whilst there is no statutory provision for the management of coastal erosion there are binding strategies in place requiring due attention to be given to this issue.

In Northern Ireland, Rivers Agency has acknowledged that *"work needs to commence on a Floods Bill to enable the effective delivery of all components of Flood Risk*

*Management*⁶¹ and it is reasonable to anticipate a similar approach to that taken in England and Wales may be adopted.

Table five summarises the relevant legislation, policy and bodies involved in flood and coastal erosion risk management in GB and Ireland.

Table 5: summarises the relevant legislation, policy and bodies involved in flood and coastal erosion risk management in GB and Ireland.

	Legislation	Stat basis for coastal erosion mgt.	Strategy	Lead authority	Implementation Body	Funding allocated
England	The Flood and Water Management Act (FWMA) 2010	Yes	The national flood and coastal erosion risk management strategy for England	Environment Agency	Lead Local Flood Authorities (LLFA) (unitary authorities or county councils)	£3.2 bn. 2010-15 £2.3 bn. 2016-21
Wales	The Flood and Water Management Act (FWMA) 2010	Yes	National Strategy for Flood and Coastal Erosion Risk Management for Wales	Natural Resources Wales	Risk Management Authorities	£381 m. 2010-17 £115 m. 2018-21
Scotland	The Flood Risk Management (Scotland) Act 2009	No	14 regional Flood Risk Management Strategies	SEPA (no overview of coastal erosion)	Local oversight from councils with multi-agency implementation	£235 m. 2016-21
Republic of Ireland	Arterial Drainage Act 1945 (as amended)	No	The national CFRAM programme	OPW (no overview of coastal erosion)	Local Authorities	€95 m. 1998-2015

⁶¹ Rivers Agency (2015) North Eastern River Basin flood risk management plan [online] available from: <http://nia1.me/3a4>