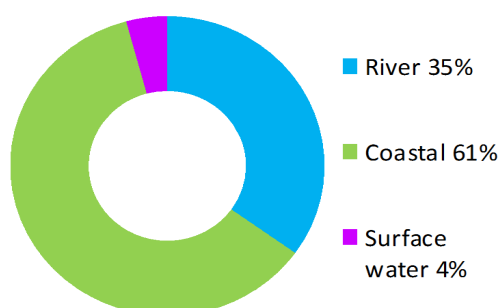


Stranraer (Potentially Vulnerable Area 14/15)

Local Plan District	Local authority	Main catchment
Solway	Dumfries and Galloway Council	Stranraer coastal

Summary of flooding impacts



At risk of flooding

- 290 residential properties
- 60 non-residential properties
- £360,000 Annual Average Damages

(damages by flood source shown left)

Summary of flooding impacts

Summary of objectives to manage flooding

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

Many organisations, such as Scottish Water and energy companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in the Flood Risk Management Strategies.

Objectives

Summary of actions to manage flooding

The actions below have been selected to manage flood risk.

Flood protection scheme/works	<i>Natural flood management works</i>	<i>New flood warning</i>	<i>Community flood action groups</i>	<i>Property level protection scheme</i>	<i>Site protection plans</i>
Flood protection study	<i>Natural flood management study</i>	Maintain flood warning	Awareness raising	<i>Surface water plan/study</i>	Emergency plans/response
Maintain flood protection scheme	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

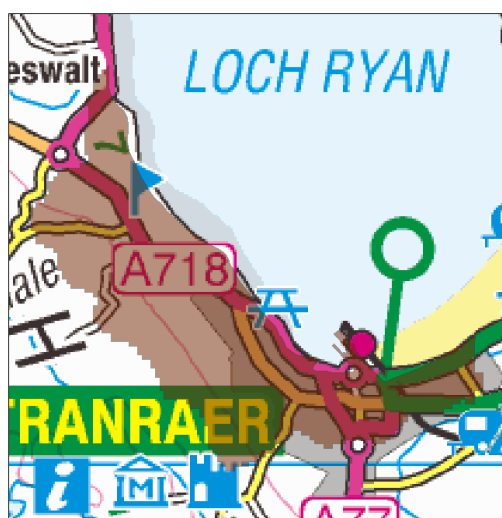
Actions

Stranraer (Potentially Vulnerable Area 14/15)

Local Plan District	Local authority	Main catchment
Solway	Dumfries and Galloway Council	Stranraer coastal

Background

This Potentially Vulnerable Area is located to the western extent of the Solway Local Plan District and incorporates the town of Stranraer (shown below). It is approximately 10km².



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There are approximately 290 residential properties and 60 non-residential properties at risk of flooding. The Annual Average Damages are approximately £360,000.

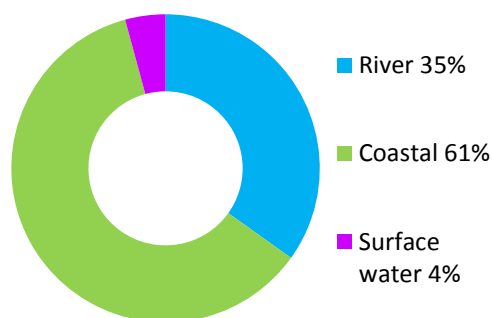


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

Whilst this report only covers part of Stranraer, the whole town is being assessed for future actions to mitigate flood risk. There is potential for coastal flooding to occur within the area, particularly in the harbour area and former ferry terminal, which lies on the shores of Loch Ryan. Coastal floods are also likely to impact on local transport links which run along the shoreline, including the A718 and the A77. A number of nearby residential properties, community facilities and utilities are also at risk.

River flooding originates from three main sources, the Black Stank Burn, the Town Burn and the Sheuchan Burn. The Black Stank Burn drains agricultural land to the south east of Stranraer. It flows along the south east boundary of the Potentially Vulnerable Area and then in an easterly direction, where it becomes the Bishop Burn and discharges to Loch Ryan. The Black Stank has a very flat gradient and is known to overflow into the Town Burn just outside the area. The Town Burn flows north west through Stranraer, where it is extensively culverted until its outfall at the harbour.

The interaction between the Black Stank and the Town Burn creates flooding to the town centre. The Town Burn is heavily culverted and has flooding issues from Gallowhill into culvert entrances.

The Sheuchan Burn is known to cause flooding problems at Nursery Avenue, Leafield, Liddesdale Road, Springbank Road, Brookfield and Mayfield Avenue. Risk has been substantially reduced by recent works carried out, at Sheuchan Bridge and the outfall of the Sheuchan Burn.

There are areas within the Potentially Vulnerable Area where interactions between river and coastal flooding may increase the identified risk. These include Stranraer harbour at the Town Burn outfall, the A77 Cairnryan Road at the mouth of the Bishop Burn, and where the Sole Burn discharges to Loch Ryan. There are known surface water interactions around Station Street/Edinburgh Road and with the Black Stank. Surface water flooding may also affect open land and properties in the Moorefield area and Galloway community hospital.

The risk of flooding to people and property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1. Most of the receptors at risk of flooding lie within Stranraer along the burns within the town and include people, non-residential properties, community facilities, utilities, roads and railways. Further impacts to roads along the coast can also be seen with the potential for disruption.

Within this Potentially Vulnerable Area it is estimated that climate change will increase the number of residential properties at risk of flooding from approximately 290 to 420 and the number of non-residential properties from approximately 60 to 70.

The damages associated with floods of different likelihood are shown in Figure 2. Residential properties affected by coastal and river flooding experience the highest economic impact at approximately 70% of the damages. Non-residential properties and roads infrastructure also provide a notable portion of the damages.

The location of the impacts of flooding is shown in Figure 3.

History of flooding

The majority of recorded floods relate to the Stranraer area. Records show that river flooding is the main source of flooding in the area, primarily in Mayfield. In 1970-1971 the ferry terminal marshalling yard was inundated due to overtopping of the Black Stank / Bishop Burn, which led to water passing along the railway from south to north. Other notable river floods took place in October 1926, August 1999 and September-October 2002.

Surface water flooding occurred in Stranraer in January 1942, which resulted in the evacuation of residential and non-residential properties; further flooding occurred in 2007, 2012 and 2013.

Coastal flooding has mainly affected the Harbour of Stranraer from tidal surges in Loch Ryan, the most recent flooding being in January 2014. The highest tidal levels in Stranraer occurred in 1894 and led to significant coastal flooding. Further notable coastal flooding occurred in January 1928, when peak tides and a northerly storm led to flooding on North Strand Street, and in 1938-1939 when the north end of King Street became inundated with water. In 1852 coastal flooding also caused destruction to roads and properties.

	1 in 10 High likelihood	1 in 200 Medium likelihood	1 in 1000 Low likelihood
Residential properties (total 3,700)	10	290	400
Non-residential properties (total 380)	<10	60	70
People	30	640	880
Community facilities	<10 Emergency services	<10 Emergency services	<10 Emergency services
Utilities assets	<10	<10	10
Transport links - roads (km)	1.3 (of which <0.1 is A road)	2.7 (of which 0.3 is A road)	3.5 (of which 0.6 is A road)
Transport links - rail (km)	0.7	1.4	1.9
Environmental designated areas (km ²)	0	0	0
Designated cultural heritage sites	0	0	0
Agricultural land (km ²)	<0.1	<0.1	<0.1

Table 1: Summary of flood impacts¹

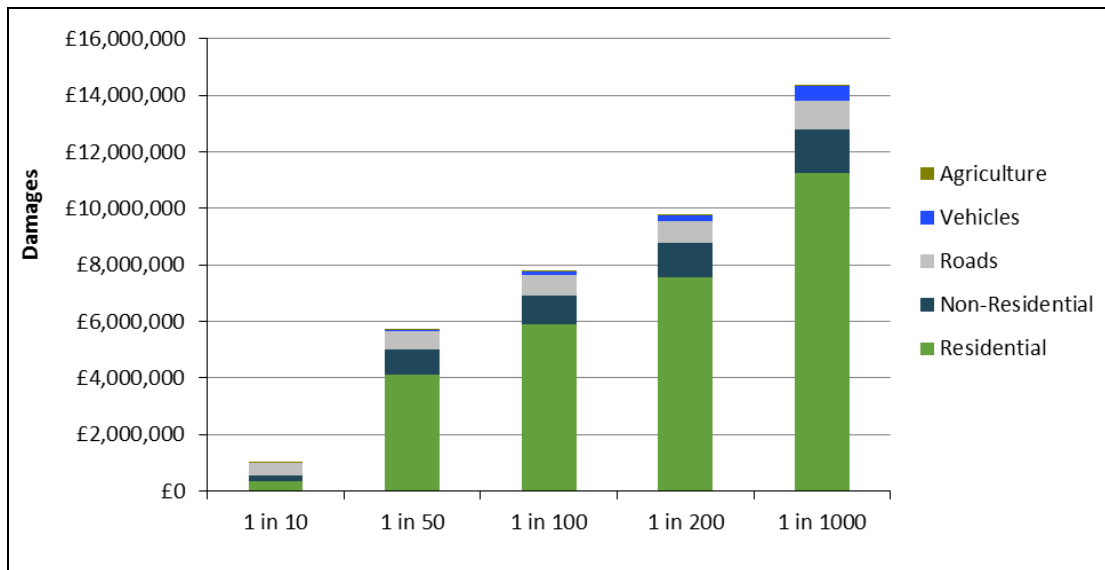


Figure 2: Damages by flood likelihood

¹ Some receptors are counted more than once if flooded from multiple sources

Objectives to manage flooding in Potentially Vulnerable Area 14/15

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for Stranraer Potentially Vulnerable Area.

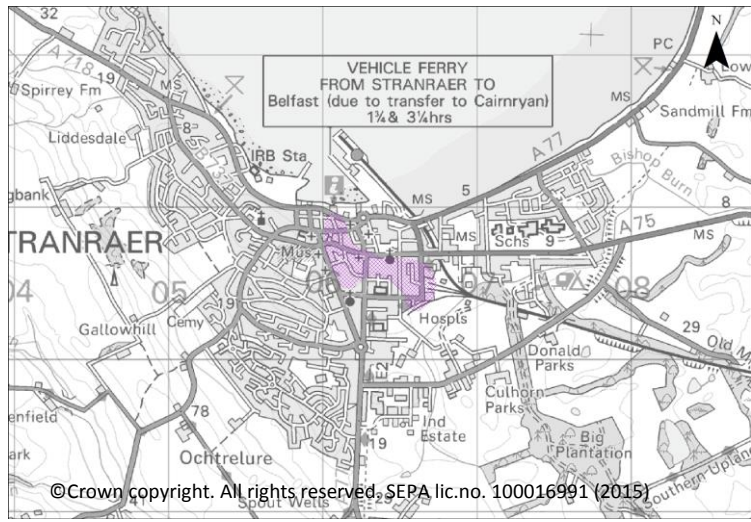
Reduce the risk of river and surface water flooding to residential and non-residential properties in Stranraer

Indicators:

- 160 residential properties
- 30 non-residential properties
- £130,000 Annual Average Damages

Objective ID: 14019

Target area:



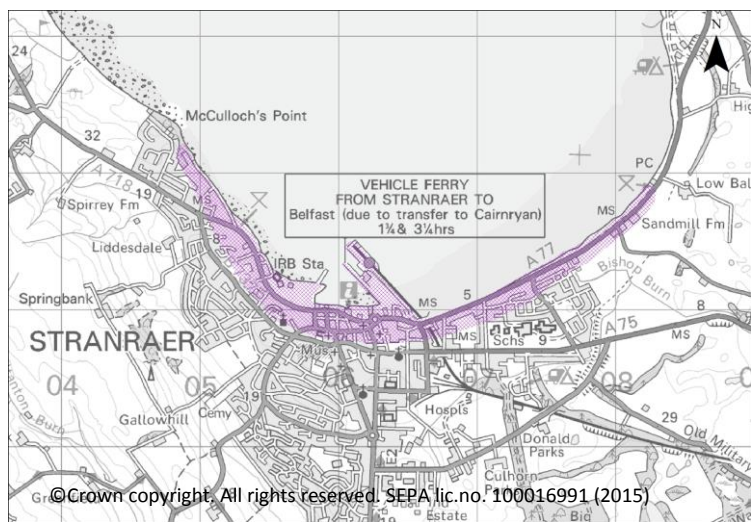
Reduce the risk of coastal flooding to residential and non residential properties in Stranraer

Indicators:

- 140 residential properties
- 30 non-residential properties
- £180,000 Annual Average Damages

Objective ID: 14020

Target area:



Target area	Objective	ID	Indicators within PVA
Stranraer	Reduce the physical or disruption risk related to the transport network for rail.	14300	<ul style="list-style-type: none"> • 40m of rail track at 3 locations
Applies across Solway Local Plan District	Avoid an overall increase in flood risk	14033	<ul style="list-style-type: none"> • 290 residential properties • £360,000 Annual Average Damages
Applies across Solway Local Plan District	Reduce overall flood risk	14040	<ul style="list-style-type: none"> • 290 residential properties • £360,000 Annual Average Damages
Applies across Solway Local Plan District	Organisations such as Scottish Water, energy companies and Historic Environment Scotland actively maintain and manage their own assets, including the risk of flooding. These actions are not detailed further in the Flood Risk Management Strategies.		

Actions to manage flooding in Potentially Vulnerable Area 14/15

Actions describe where and how flood risk will be managed. These actions have been set by SEPA and agreed with flood risk management authorities following consultation. Selection of actions to deliver the agreed objectives was based on a detailed assessment and comparison of economic, social and environmental criteria. The actions shaded and then described below have been selected as the most appropriate for Stranraer Potentially Vulnerable Area.

Selected actions					
Flood protection scheme/works	<i>Natural flood management works</i>	<i>New flood warning</i>	<i>Community flood action groups</i>	<i>Property level protection scheme</i>	<i>Site protection plans</i>
Flood protection study	<i>Natural flood management study</i>	Maintain flood warning	Awareness raising	<i>Surface water plan/study</i>	Emergency plans/response
Maintain flood protection scheme	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

Action (ID):	FLOOD PROTECTION SCHEME/WORKS (140190006)				
Objective (ID):	Reduce the risk of river and surface water flooding to residential and non-residential properties in Stranraer (14019)				
Delivery lead:	Dumfries and Galloway Council				
Priority:	National:		Within local authority:		
	21 of 42		2 of 4		
Status:	Under development	Indicative delivery:	2016-2021		
Description:	It is recommended that the council progress work on the proposed flood protection scheme in Stranraer. Assessment of the flood risk within Stranraer identified a number of works to reduce flooding to people and properties. The Stranraer Flood Protection Works is split into different items. The two outstanding items of work. The first will help to alleviate flooding to properties in the Ochrelure area, by increasing hydraulic capacity issues at the head of the system. The favoured option includes diversion of flows. The second item of work is concerned with flooding on the Town Burn mainly downstream of the railway culvert. The preferred option for the Station Road area is to regulate flow passing through the railway culvert and therefore alleviate flood risk in this area.				
Potential impacts					
Economic:	The proposed scheme may benefit 160 residential properties and 31 non-residential properties at risk of flooding in this location, damages avoided are estimated to be £960,000. The flood protection scheme has an estimated benefit cost ratio of 2.6.				
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people located within the flood protection scheme area. There may be				

Social:	changes in visual amenity and land use as a result of this action.
Environmental:	Flood protection schemes can have both positive and negative impacts on the ecological quality of the environment depending on how they are designed. This flood protection scheme is proposed for the Black Stank (water body ID 10483). The physical condition of this river is identified by river basin management planning to be at less than good status. Future works could improve the condition of the river or degrade it. Opportunities to improve the condition of the river should be considered by coordinating with river basin management planning. There are no international or national level environmental designations that are likely to be impacted by this action. Creation of a culvert to discharge to the Black Stank may increase erosion and sedimentation downstream of the action. There will be a loss of habitat in the footprint of the works, which should re-establish over time. There is likely to be a loss of natural and semi-natural habitats in the footprint of the storage area.

Action (ID):	FLOOD PROTECTION SCHEME/WORKS (14300021)		
Objective (ID):	Reduce the physical or disruption risk related to the transport network for rail. (14300)		
Delivery lead:	Network Rail		
Status:	Under development	Indicative delivery:	2016-2021
Description:	Network Rail will carry out civil engineering work which will reduce flood risk to identified sections of the rail network within this Potentially Vulnerable Area.		

Action (ID):	FLOOD PROTECTION STUDY (141220020)		
Objective (ID):	Reduce the risk of coastal flooding to residential and non residential properties in Stranraer (14020)		
Delivery lead:	Dumfries and Galloway Council		
Priority:	National: 1 of 168	Within local authority: 1 of 10	
Status:	Not started	Indicative delivery:	2016-2021
Description:	<p>A study is recommended to further develop the understanding of coastal flooding along the Solway coastline. This study should build on from the completed Flood Risk Assessment for the Stranraer Harbour area and the previous shoreline management plan to investigate flooding and coastal erosion, wave overtopping and the current coastal protection offered. The study may focus in detail on Potentially Vulnerable Areas however it could also look at the risk to other areas.</p> <p>The study will help to develop an understanding of coastal issues and identify where further work may be required to mitigate against flooding.</p>		
Potential impacts			

Economic:	There are 259 residential properties and 64 non-residential properties at risk of flooding over the extent of this study. The potential damages avoided over this area are estimated to be up to £26.1 million.
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. Natural flood management actions can restore and enhance natural environments and create opportunities for recreation and tourism.
Environmental:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. To be in accord with the flood risk management strategy, the responsible authority should seek to ensure as part of the study that the Solway coastal study will not have an adverse effect on the integrity of the Loch of Inch and Torrs Warren Special Protection Area, Upper Solway Flats and Marshes Special Protection Area, Luce Bay and Sands Special Area of Conservation, and Solway Firth Special Area of Conservation. There is the potential for impacts on several coastal Sites of Special Scientific Interest.

Action (ID):	STRATEGIC MAPPING AND MODELLING (140400019)		
Objective (ID):	Reduce overall flood risk (14040)		
Delivery lead:	Scottish Water		
Status:	Not started	Indicative delivery:	2016-2021
Description:	Scottish Water will review the assessment of flood risk within the highest risk sewer catchments to improve knowledge and understanding of surface water flood risk.		

Action (ID):	MAINTAIN FLOOD PROTECTION SCHEME (140190017)		
Objective (ID):	Reduce the risk of river and surface water flooding to residential and non-residential properties in Stranraer (14019)		
Delivery lead:	Dumfries and Galloway Council		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Stranraer Flood Protection Works is split into work items which are currently at different stages of completion. Works to date include upgrading of culverts, installation of trash screens, silt traps and automatic air bricks to properties. The standard of protection of these works is generally 200 years. The works should all be maintained once completed. Levels of flood risk are likely to increase over time as a consequence of climate change.		

Action (ID):	MAINTAIN FLOOD WARNING (140400030)		
Objective (ID):	Reduce overall flood risk (14040)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Continue to maintain the Loch Ryan flood warning area which is part of the Solway coastal flood warning scheme.		

Action (ID):	FLOOD FORECASTING (140400009)		
Objective (ID):	Reduce overall flood risk (14040)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	The Scottish Flood Forecasting Service is a joint initiative between SEPA and the Met Office that produces daily, national flood guidance statements which are issued to Category 1 and 2 Responders. The service also provides information which allows SEPA to issue flood warnings, giving people a better chance of reducing the impact of flooding on their home or business. For more information please visit SEPA's website.		

Action (ID):	SELF HELP (140400011)		
Objective (ID):	Reduce overall flood risk (14040)		
Delivery lead:	—		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Everyone is responsible for protecting themselves and their property from flooding. Property and business owners can take simple steps to reduce damage and disruption to their homes and businesses should flooding happen. This includes preparing a flood plan and flood kit, installing property level protection, signing up to Floodline and Resilient Communities initiatives, and ensuring that properties and businesses are insured against flood damage.</p> <p>Dumfries and Galloway Council has a Pilot Flood Product Subsidy Scheme in place, it is recommended that this should be continued. Residential or business properties that are identified as being at risk of flooding are eligible for the scheme. There are various products to reduce the impact of flooding to properties which can be purchased as part of the scheme.</p>		

Action (ID):	AWARENESS RAISING (140400013)		
Objective (ID):	Reduce overall flood risk (14040)		
Delivery lead:	Responsible authorities		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>SEPA and the responsible authorities have a duty to raise public awareness of flood risk. Improved awareness of flood risk and actions that prepare individuals, homes and businesses for flooding can reduce the overall impact.</p> <p>SEPA will engage with the community and promote Floodline in the Loch Ryan coastal flood warning area. This will be achieved through direct mailing for flood warning areas and education events.</p> <p>Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.</p>		

Action (ID):	MAINTENANCE (140400007)		
Objective (ID):	Reduce overall flood risk (14040)		
Delivery lead:	Dumfries and Galloway Council, asset / land managers		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Local authorities have a duty to assess watercourses and carry out clearance and repair works where such works would substantially reduce flood risk. They produce schedules of clearance and repair works and make these available for public inspection. Scottish Water undertake inspection and repair on the public sewer network. Asset owners and riparian landowners are responsible for the maintenance and management of their own assets including those which help to reduce flood risk.</p> <p>Dumfries and Galloway Council own a number of coastal defences in Stranraer including concrete walls, sheet pile walls, gabions and rock armour. There are also a number of privately owned seawalls.</p>		

Action (ID):	EMERGENCY PLANS/RESPONSE (140400014)		
Objective (ID):	Reduce overall flood risk (14040)		
Delivery lead:	Category 1 and 2 Responders		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Providing an emergency response to flooding is the responsibility of many organisations, including local authorities, the emergency services and SEPA. Effective management of an emergency response relies on emergency plans that are prepared under the Civil Contingencies Act 2004 by Category 1 and 2 Responders. The emergency response by these organisations is co-ordinated through regional and local resilience partnerships. This response may be supported by the work of voluntary organisations.</p> <p>Dumfries and Galloway Council along with the Scottish Fire and Rescue Service, SEPA and the Scottish Flood Forum have procured a Flood Pod. The Pod can be deployed to an area at risk of a flood emergency and is filled with flood protection equipment which is issued to the public.</p>		

Action (ID):	PLANNING POLICIES (140330001)		
Objective (ID):	Avoid an overall increase in flood risk (14033) Reduce overall flood risk (14040)		
Delivery lead:	Planning authority		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Scottish Planning Policy and accompanying Planning Advice Notes set out Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. In terms of flood risk management, the policy supports a catchment-scale approach to sustainable flood risk management and aims to build the resilience of our cities and towns, encourage sustainable land management in our rural areas, and to address the long-term vulnerability of parts of our coasts and islands. Under this approach, new development in areas with medium to high likelihood of flooding should be avoided. For further information on the application of national planning policies see Annex 2.</p>		