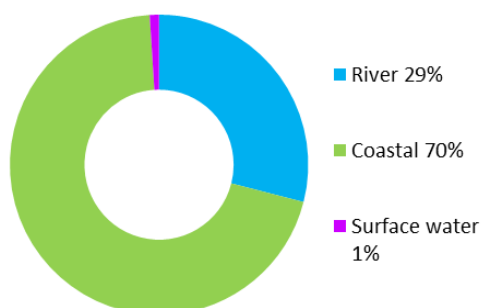


Isle of Arran (Potentially Vulnerable Area 12/08)

Local Plan District	Local authority	Main catchment
Ayrshire	North Ayrshire Council	Brodick to Kilmory – Arran coastal

Summary of flooding impacts



At risk of flooding

- 120 residential properties
- 40 non-residential properties
- £390,000 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.

<i>Flood protection scheme/works</i>	<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	<i>Strategic mapping and modelling</i>	Flood forecasting	Self help	Maintenance	Planning policies

Actions

Isle of Arran (Potentially Vulnerable Area 12/08)

Local Plan District	Local authority	Main catchment
Ayrshire	North Ayrshire Council	Brodick to Kilmory – Arran coastal

Background

This Potentially Vulnerable Area is located on the Isle of Arran in the Firth of Clyde (shown below). The area stretches from Brodick Bay to Torrylinnwater Foot in the south of the island. It is approximately 90km².



River flooding is predominantly from the Strathwhillan Burn and the Glen Cloy Burn in the north of the area, as well as the Benlister Burn and the Monamore Burn. The majority of damages are caused by coastal flooding.

There are approximately 120 residential properties and 40 non-residential properties at risk of flooding. The Annual Average Damages are approximately £390,000.

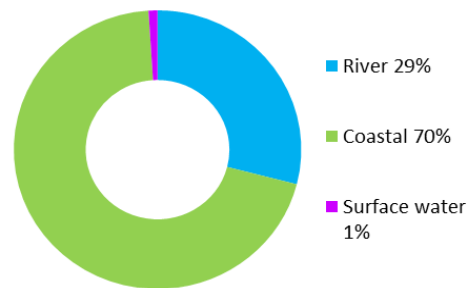


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

The Glen Cloy Burn and the Strathwhillan Burn affect areas in Brodick with risk to residential and non-residential properties. In Margnaheglis, the Blairmore Burn presents a risk of flooding to a number of residential properties. Flooding from the Benlister Burn is also predicted to affect residential and non-residential properties in Lamlash.

Coastal flooding is not widespread throughout the area, however, there a number of residential and non-residential areas at risk. The national assessment of coastal flood risk does not include flooding from wave overtopping. There is potential for an increased risk from coastal sources as wave overtopping is considered to be a risk in this area. In Brodick, coastal flooding is predicted to cause flooding of the A841 and nearby properties. Properties along the A841 within Lamlash and south toward the Benlister Burn are at risk of coastal flooding. Coastal erosion is known to occur in the area of Brodick beach and particularly at Brodick golf course.

Interaction between sources of coastal and river flooding is predicted to occur in the lower reaches of the four watercourses, the Glen Cloy Burn, Strathwhillan Burn, Blairmore Burn and Benlister Burn, where they enter the Firth of Clyde.

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. The damages associated with floods of different likelihood are shown in Figure 2. Residential properties affected by river flooding experience the highest economic impact at approximately 60% of the damages.

The location of the impacts of flooding is shown in Figure 3. Most impacts are within Brodick, Lamlash and Whiting Bay with flooding to people, non-residential properties and roads and to three designated cultural heritage sites along with small areas of environmentally designated sites.

	1 in 10 High likelihood	1 in 200 Medium likelihood	1 in 1000 Low likelihood
Residential properties (total 2,200)	40	120	200
Non-residential properties (total 380)	20	40	70
People	90	260	440
Community facilities	0	0	<10 Emergency services
Utilities assets	0	0	<10
Transport links - roads (km)	2.0	3.8	4.5
Environmental designated areas (km ²)	0	0.1	0.1
Designated cultural heritage sites	3	3	3
Agricultural land (km ²)	0.2	0.3	0.3

Table 1: Summary of flooding impacts¹

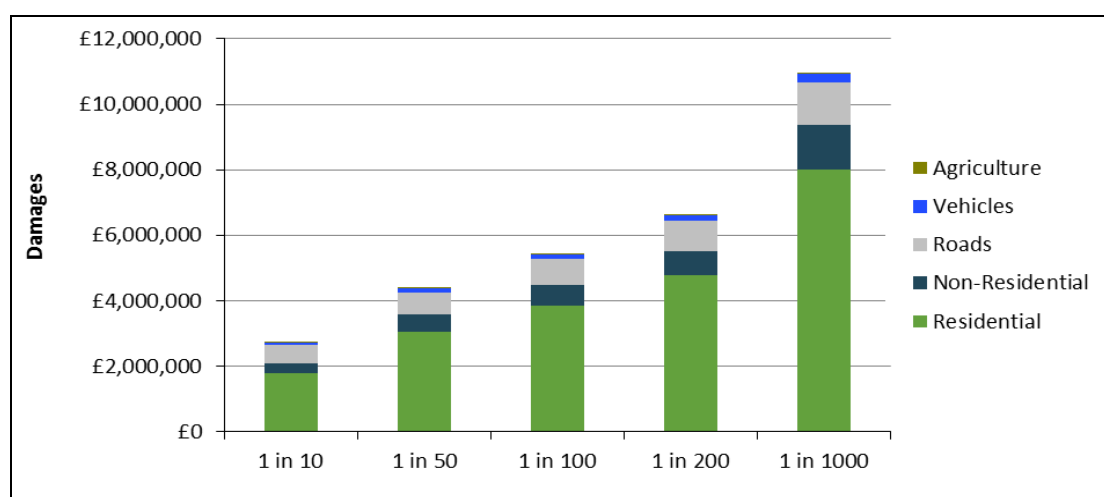


Figure 2: Damages by flood likelihood

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

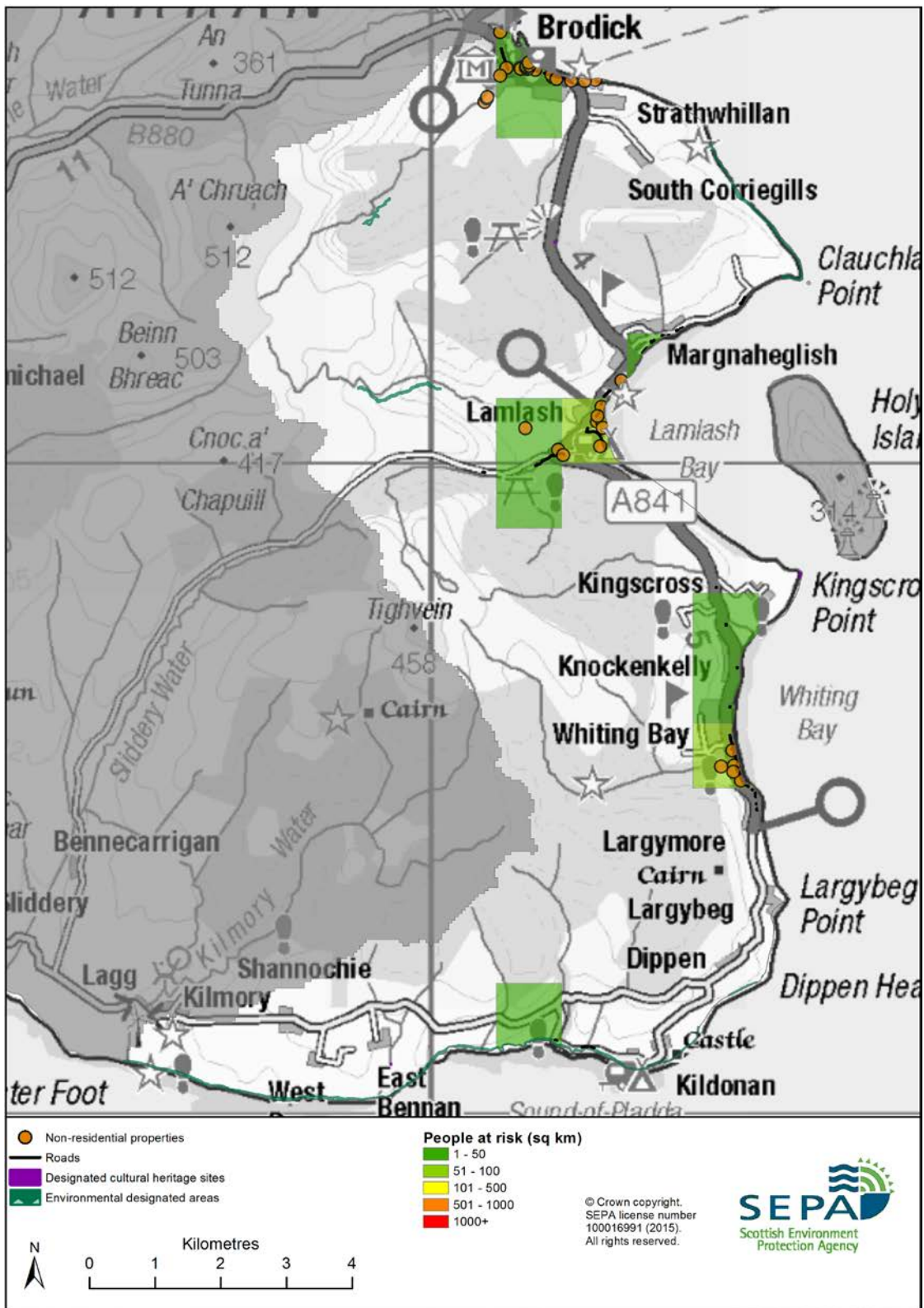


Figure 3: Impacts of flooding

History of flooding

On 19 June 2005, heavy overnight rain followed by a torrential thunderstorm led to flooding around Brodick. The Cloy Burn was blocked at Auchrannie Lodges by a large tree being washed down at Kilmichael and being held by a footbridge. Water from the Cloy Burn entered streets, gardens and properties in Glen Place and Glen Road.

The Isle of Arran was hit by the worst flooding in more than 20 years in January 2014. Waves damaged coastal roads around the island and a tidal surge, combined with severe gale force winds, caused extensive flooding. The tides on the island were the highest seen since 5 January 1991. However, there were no reports of flooded properties on the island. There have been reports of coastal flooding at Lamlash with one such event occurring in August 1930 due to a tidal surge from the Firth of Clyde which flooded the harbour at Lamlash Bay.

Properties in Lamlash were also threatened by torrential rain on 10 August 2008 that triggered surface water runoff down Hillside Road and Park Terrace. In October 2004 river flooding caused flooding to the golf course road and residential gardens in Whiting Bay. There are also records from 2007 of flooding to roads and residential gardens.

Objectives to manage flooding in Potentially Vulnerable Area 12/08

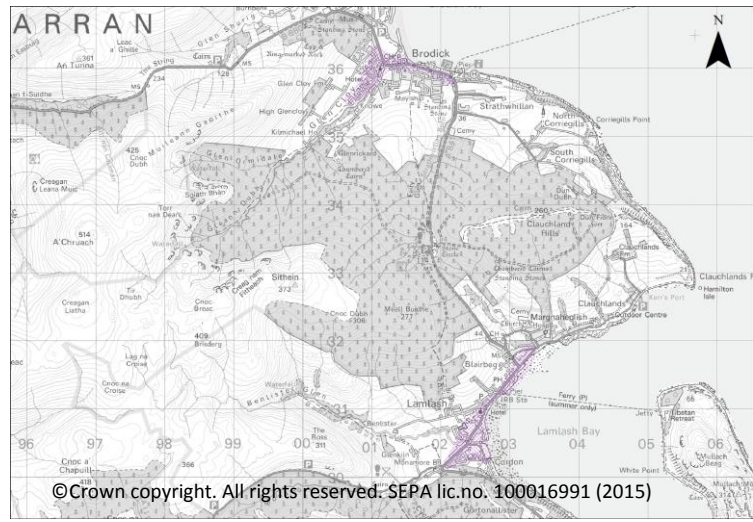
Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target 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 the Isle of Arran Potentially Vulnerable Area.

Reduce the risk of river and coastal flooding to residential properties in Brodick and Lamlash

Indicators:

Target area:

- 210 residential properties
- £490,000 Annual Average Damages



Objective ID: 12023

Target area	Objective	ID	Indicators within PVA
Applies across Ayrshire Local Plan District	Avoid an overall increase in flood risk	12039	<ul style="list-style-type: none"> • 120 residential properties • £390,000 Annual Average Damages
Applies across Ayrshire Local Plan District	Reduce overall flood risk	12082	<ul style="list-style-type: none"> • 120 residential properties • £390,000 Annual Average Damages
Applies across Ayrshire 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 12/08

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 the Isle of Arran Potentially Vulnerable Area.

Selected actions					
<i>Flood protection scheme/works</i>	<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	<i>Strategic mapping and modelling</i>	Flood forecasting	Self help	Maintenance	Planning policies

Action (ID):	FLOOD PROTECTION STUDY (121030005)		
Objective (ID):	Reduce the risk of river and coastal flooding to residential properties in Brodick and Lamlash (12023)		
Delivery lead:	North Ayrshire Council and South Ayrshire Council		
Priority:	National:		Within local authority:
	8 of 168		1 of 5
Status:	Not started	Indicative delivery:	2016-2021
Description:	A shoreline management plan is recommended, this study is not limited to Potentially Vulnerable Areas but should cover the whole of the Ayrshire coastline and any areas beyond this which may be influenced by changes in coastal processes. The study should investigate flooding and coastal erosion, wave overtopping and the current coastal protection offered. The study will help to develop an understanding of coastal issues and identify where further work may be required to mitigate against flooding.		
Potential impacts			
Economic:	The study should consider how to reduce flood risk along the Ayrshire coastline. For the entire study area potential damages avoided are estimated to be up to £26 million.		
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community.		
Environmental:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment.		

Action (ID):	FLOOD PROTECTION STUDY (120230005)		
Objective (ID):	Reduce the risk of river and coastal flooding to residential properties in Brodick and Lamlash (12023)		
Delivery lead:	North Ayrshire Council		
Priority:	National:	Within local authority:	
	35 of 168	2 of 5	
Status:	Not started	Indicative delivery:	2016-2021
Description:	<p>A shoreline management plan is recommended for the Ayrshire coastline to gain a greater understanding of coastal issues and ensure potential mitigation actions will not create further issues elsewhere.</p> <p>A study is recommended to further investigate river flood risk combined with coastal flood risk to Brodick and Lamlash. This study should build on the work within the shoreline management plan to provide a detailed investigation of the current and future risk. The study should examine the most sustainable combination of actions to manage flooding.</p>		
Potential impacts			
Economic:	The flood protection study should consider how to reduce flood risk to 178 residential properties and 31 non-residential properties in this location, with potential damages avoided of up to £20.3 million.		
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community.		
Environmental:	<p>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 action will not have an adverse effect on the integrity of the Arran Moors Special Protection Area. Sand dune restoration at Brodick and Lamlash has the potential to impact upon the coastal processes and sediment supply in the area, with the potential for impacts on Cloughlands Point Site of Special Scientific Interest. The impacts could be positive or negative and would require further study. Dune restoration in the area could provide greater areas of habitat for flora and fauna to colonise. There are no international level environmental designations that are likely to be directly impacted by this conveyance action. There is the potential for this action to have short term temporary impacts through disturbance to species and reduced water quality during construction. Increasing conveyance in these watercourses may increase erosion downstream of the action. There is likely to be a direct loss of natural and semi-natural habitat in the footprint and vicinity of the defences. There is the potential for temporary negative impacts on the connectivity to the Arran Moors Special Protection Area and Site of Special Scientific Interest along the Benlister Burn and Glen Cloy Burn during construction works. There is the potential for negative impacts on WFD status from this action. There are no local level environmental designations that are likely to be impacted by these actions. Improved design of the culverts may enable better fish</p>		

Environmental:	passage. There may be temporary negative impacts to water quality during construction. There are unlikely to be significant impacts on heritage features from this action, however sensitive construction may be required in the vicinity of the Brodick Parish Church listed buildings.
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Action (ID):	MAINTAIN FLOOD PROTECTION SCHEME (120230017)		
Objective (ID):	Reduce the risk of river and coastal flooding to residential properties in Brodick and Lamlash (12023)		
Delivery lead:	North Ayrshire Council		
Status:	Existing	Indicative delivery:	Ongoing
Description:	There are a range of formal and informal coastal defences in Brodick and Lamlash. These defences offer some level of protection to the properties in this area. These defences will be maintained, and will continue to manage flooding according to the design standard at the time of construction. Levels of flood risk are likely to increase over time as a consequence of climate change.		

Action (ID):	MAINTAIN FLOOD WARNING (120820030)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Continue to maintain the Arran Lamlash Cordon and the Arran Seafront and Montrose Terrace flood warning areas which are part of the Firth of Clyde coastal flood warning scheme.		

Action (ID):	FLOOD FORECASTING (120820009)		
Objective (ID):	Reduce overall flood risk (12082)		
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 (120820011)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	—		
Status:	Existing	Indicative delivery:	Ongoing
Description:	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.		

Action (ID):	AWARENESS RAISING (120820013)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	Responsible authorities		
Status:	Existing	Indicative delivery:	Ongoing
Description:	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. From 2016 SEPA will undertake flood risk education and awareness raising activities. In addition, SEPA will engage with community resilience groups and participate in property level protection events delivered by the Scottish Flood Forum where possible. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.		

Action (ID):	MAINTENANCE (120820007)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	North Ayrshire Council, asset / land managers		
Status:	Existing	Indicative delivery:	Ongoing
Description:	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.		

Action (ID):	EMERGENCY PLANS/RESPONSE (120820014)		
Objective (ID):	Reduce overall flood risk (12082)		
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>		

Action (ID):	PLANNING POLICIES (120390001)		
Objective (ID):	Avoid an overall increase in flood risk (12039) Reduce overall flood risk (12082)		
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>		