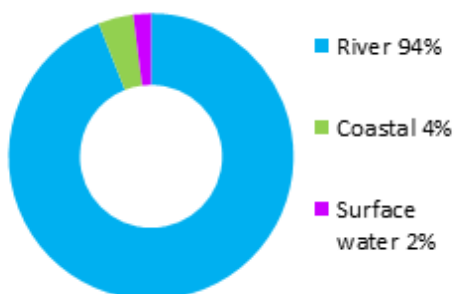


## Stirling (Cornton and Causewayhead) (Potentially Vulnerable Area 09/05)

Local Plan District	Local authority	Main catchment
Forth	Clackmannanshire Council, Stirling Council	River Forth

### Summary of flooding impacts



#### At risk of flooding

- 340 residential properties
- 50 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.

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>
<i>Flood protection study</i>	<i>Natural flood management study</i>	Maintain flood warning	Awareness raising	<i>Surface water plan/study</i>	Emergency plans/response
<i>Maintain flood protection scheme</i>	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

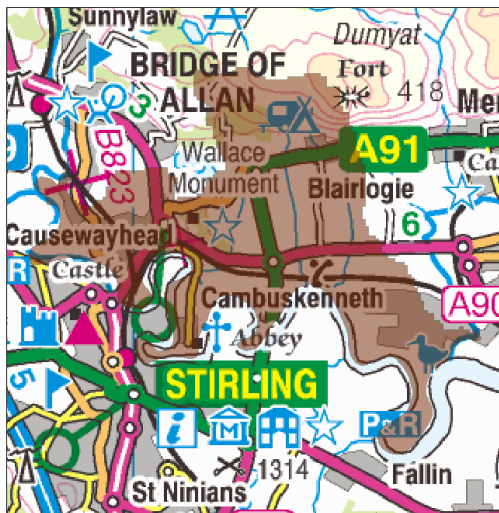
Actions

# Stirling (Cornton and Causewayhead), (Potentially Vulnerable Area 09/05)

Local Plan District	Local authority	Main Catchment
Forth	Clackmannanshire Council, Stirling Council	River Forth

## Background

This Potentially Vulnerable Area is 15km<sup>2</sup> and part of the Stirling catchment (shown below). It includes the north bank of the lower River Forth where it meets the Firth of Forth and includes the urban areas of Cornton and Causewayhead. Other watercourses in the area include the Logie Burn and the Powis Burn which are small tributaries of the River Forth.

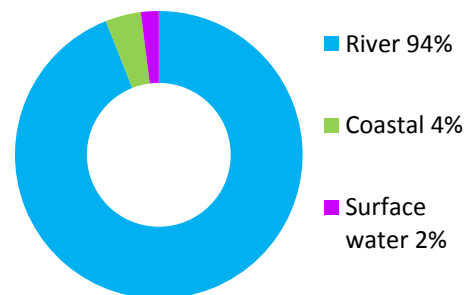


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The interaction between river and coastal flooding where the River Forth meets the Firth of Forth is an important factor in flooding in the north of Stirling.

The area has a risk of river, coastal and surface water flooding. The majority of damages in this Potentially Vulnerable Area are caused by river flooding.

There are approximately 340 residential properties and 50 non-residential properties at risk of flooding. The Annual Average Damages from flooding are approximately £390,000.



**Figure 1: Annual Average Damages by flood source**

## Summary of flooding impacts

The highest risk of river flooding is from the River Forth and Allan Water to Cornton and Causewayhead.

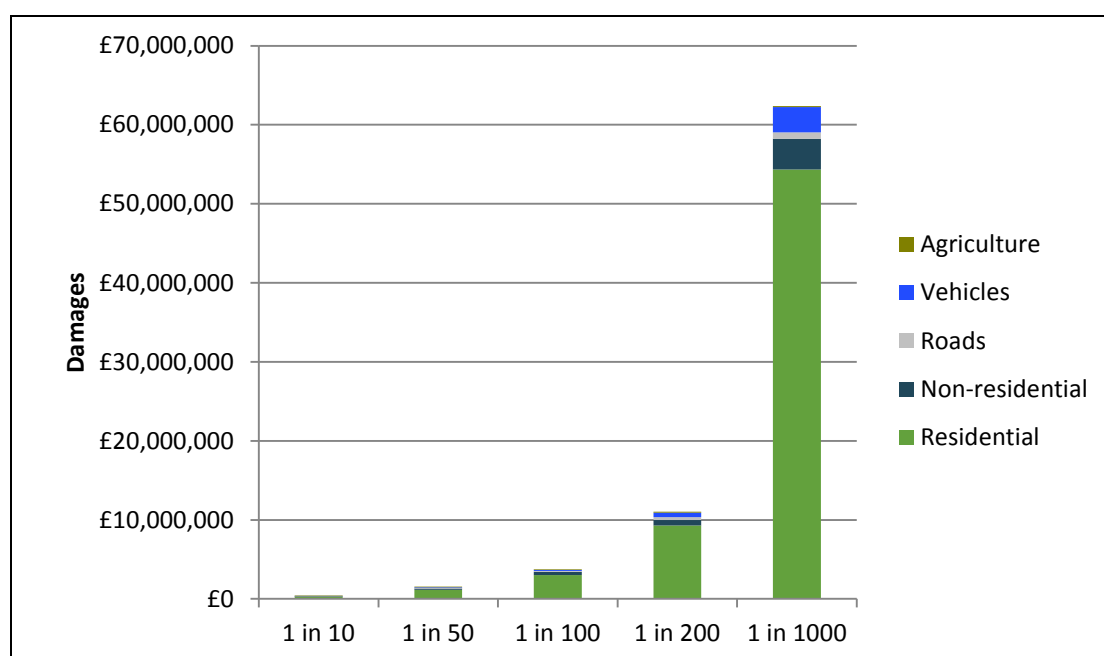
The risk of flooding to people, property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1.

The damages associated with floods of different likelihood are shown in Figure 2. For this Potentially Vulnerable Area the highest damages are to residential properties followed by damages to non-residential properties. The transport network (including the A84, A907 and the main railway route) is also notably impacted. The location of the impacts of flooding is shown in Figure 3.

The figures presented for Annual Average Damages include damages to residential properties, non-residential properties, transport and agriculture.

	1 in 10 High likelihood	1 in 200 Medium likelihood	1 in 1000 Low likelihood
Residential properties (total 2,600)	<10	340	1,400
Non-residential properties (total 500)	<10	50	310
People	20	740	3,100
Community facilities	0	0	<10 Public services
Utilities	0	<10	20
Transport links (excluding minor roads)	3 A roads, 2 B roads at 18 locations  1 Railway route at 3 locations: Dunblane to Stirling	3 A roads, 2 B roads at 53 locations  1 Railway route at 13 locations: Dunblane to Stirling	3 A roads, 2 B roads at 77 locations  1 Railway route at 16 locations: Dunblane to Stirling
Environmental designated areas (km <sup>2</sup> )	0.1	0.1	0.1
Designated cultural heritage sites	6	7	7
Agricultural land (km <sup>2</sup> )	1.9	2.9	3.9

**Table 1:** Summary of flooding impacts



**Figure 2:** Damages by flood likelihood

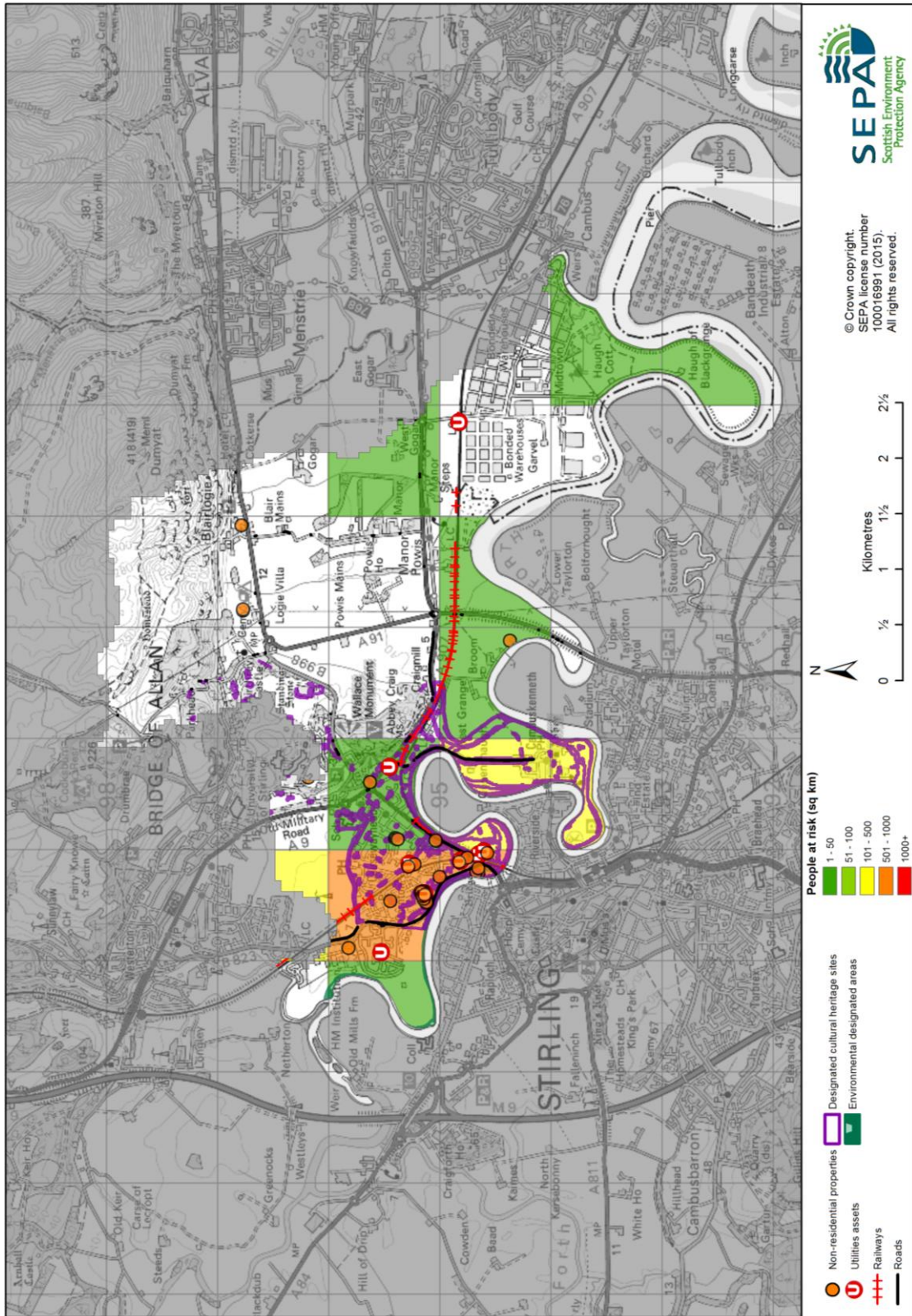


Figure 3: Impacts of flooding

## History of flooding

The following significant floods have been recorded in this area:

- 14 December 2006: High levels on the River Allan and River Forth caused significant flooding throughout the area with properties and infrastructure affected in Stirling (Riverside, Bridgehaugh and Cornton), Bridge of Allan and Dunblane. The highest river level recorded at the SEPA gauging station on the River Forth at Craigforth was 3.97m above normal levels.
- 10 January 2005: High levels on the River Allan and River Forth caused flooding throughout the area. Properties and infrastructure were affected in Stirling (Riverside, Bridgehaugh and Cornton). This event was not as damaging as in December 2006.
- 1908: Significant flooding in Stirling area (Riverside and Bridgehaugh).



## Objectives to manage flooding in Potentially Vulnerable Area 09/05

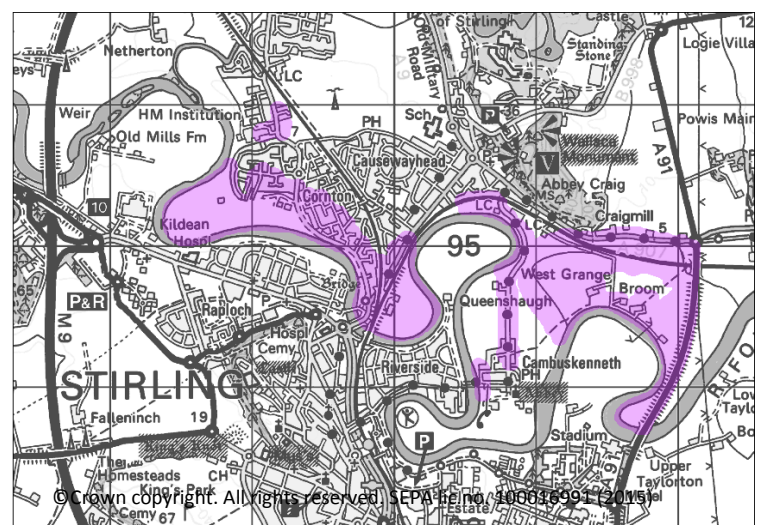
Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target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

### Reduce economic damages to residential and non-residential properties and risk to people in Stirling caused by flooding from the River Forth

Indicators:

Target area:

- 710 people
- £300,000 Annual Average Damages from residential properties
- £19,000 Annual Average Damages from non-residential properties



Objective ID: 9014, 9015

Target area	Objective	ID	Indicators within PVA
Applies across Forth Local Plan District	Avoid an overall increase in flood risk	9001	<ul style="list-style-type: none"> <li>• 340 residential properties</li> <li>• £390,000 Annual Average Damages</li> </ul>
Applies across Forth Local Plan District	Reduce overall flood risk	9032	<ul style="list-style-type: none"> <li>• 340 residential properties</li> <li>• £390,000 Annual Average Damages</li> </ul>
Applies across Forth 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 09/05

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 Stirling (Cornton and Causewayhead) Potentially Vulnerable Area.

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

<b>Action (ID):</b>	<b>FLOOD PROTECTION SCHEME/WORKS (90140006)</b>				
<b>Objective (ID):</b>	Reduce economic damages to residential and non-residential properties and risk to people in Stirling caused by flooding from the River Forth (9014, 9015)				
<b>Delivery lead:</b>	Stirling Council				
<b>Priority:</b>	National:		Within local authority:		
	<b>40 of 42</b>		<b>2 of 3</b>		
<b>Status:</b>	<b>Under development</b>	Indicative delivery:	<b>2016-2021</b>		
<b>Description:</b>	A flood protection scheme has been proposed for Stirling. The scheme would consist of flood embankments and would provide a 1 in 200 year standard of protection. The scheme has a low benefit to cost ratio, but has been identified as the only option for Stirling. Part of this proposed flood protection scheme is located in PVA 09/07. The benefits and impacts have been assessed for the whole scheme.				
<b>Potential impacts</b>					
<b>Economic:</b>	The proposed scheme has estimated damages avoided of £17.7 million and an estimated benefit cost ratio of 0.69 (Riverside); 0.57 (Raploch); 0.39 (Cornton, Causewayhead); 0.03 (North Cornton).				
<b>Social:</b>	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. In addition there are three utilities and one railway line which have been identified as potentially benefitting from this action. There may be negative impacts through disturbance to the local community during the construction phase.				

<b>Environmental:</b>	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. The proposed flood protection study is located on the Upper Forth Estuary (water body ID 200437). The physical condition of this stretch of estuary is identified by SEPA to be at less than good status. Future works could improve the condition of the estuary or degrade it. Opportunities to improve the condition of the estuary should be considered by coordinating with river basin management planning. To be in accord with the FRM Strategy, the responsible authority (and where applicable, the licensing authority) should seek to ensure that the works will not have an adverse effect on the integrity of the River Teith Special Area of Conservation and Firth of Forth Special Protection Area. In addition, a number of nationally and locally designated sites are also present in the study area and could be positively or negatively impacted. These include conservation areas, scheduled monuments and battlefields.
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<b>Action (ID):</b>	<b>STRATEGIC MAPPING AND MODELLING (90320016)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	SEPA		
<b>Status:</b>	<b>Not started</b>	Indicative delivery:	<b>2016-2021</b>
<b>Description:</b>	SEPA will seek to develop flood mapping in the Dunbar to Stirling area to improve understanding of coastal flood risk. The extent and timing of improvements will depend on detailed scoping and data availability. Where this work coincides with local authority studies, SEPA will work collaboratively to ensure consistent modelling approaches are applied.		

<b>Action (ID):</b>	<b>STRATEGIC MAPPING AND MODELLING (90320019)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	Scottish Water		
<b>Status:</b>	<b>Not started</b>	Indicative delivery:	<b>2016-2021</b>
<b>Description:</b>	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.		



<b>Action (ID):</b>	<b>MAINTAIN FLOOD WARNING (90320030)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	SEPA		
<b>Status:</b>	<b>Existing</b>	Indicative delivery:	<b>Ongoing</b>
<b>Description:</b>	Continue to maintain the Bridgehaugh, Cornton and Riverside and Cambuskenneth, flood warning areas which cover the River Forth and are part of the Stirling river flood warning scheme.		

<b>Action (ID):</b>	<b>FLOOD FORECASTING (90320009)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	SEPA		
<b>Status:</b>	<b>Existing</b>	Indicative delivery:	<b>Ongoing</b>
<b>Description:</b>	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.		

<b>Action (ID):</b>	<b>SELF HELP (90320011)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	—		
<b>Status:</b>	<b>Existing</b>	Indicative delivery:	<b>Ongoing</b>
<b>Description:</b>	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.		

<b>Action (ID):</b>	<b>AWARENESS RAISING (90320013)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	Responsible authorities		
<b>Status:</b>	<b>Existing</b>	Indicative delivery:	<b>Ongoing</b>
<b>Description:</b>	<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>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.</p> <p>Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.</p>		

<b>Action (ID):</b>	<b>MAINTENANCE (90320007)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	Local authorities, asset / land managers		
<b>Status:</b>	<b>Existing</b>	Indicative delivery:	<b>Ongoing</b>
<b>Description:</b>	<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>		

<b>Action (ID):</b>	<b>EMERGENCY PLANS/RESPONSE (90320014)</b>		
<b>Objective (ID):</b>	Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	Category 1 and 2 Responders		
<b>Status:</b>	<b>Existing</b>	Indicative delivery:	<b>Ongoing</b>
<b>Description:</b>	<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>		

<b>Action (ID):</b>	<b>PLANNING POLICIES</b> (90010001)		
<b>Objective (ID):</b>	Avoid an overall increase in flood risk (9001) Reduce overall flood risk (9032)		
<b>Delivery lead:</b>	Planning authority		
<b>Status:</b>	<b>Existing</b>	Indicative delivery:	<b>Ongoing</b>
<b>Description:</b>	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.		