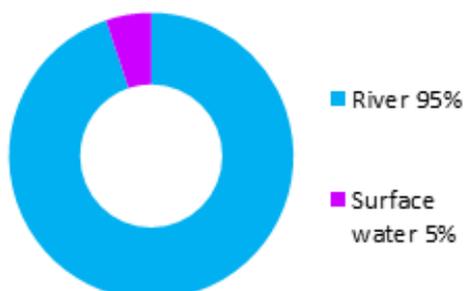


Trossachs (Potentially Vulnerable Area 09/01)

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

Summary of flooding impacts



At risk of flooding

- 200 residential properties
- 90 non-residential properties
- £770,000 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>	New flood warning	Community flood action groups	<i>Property level protection scheme</i>	<i>Site protection plans</i>
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

Actions

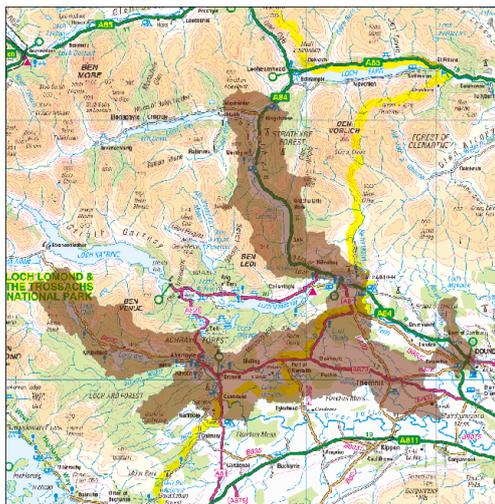
Trossachs (Potentially Vulnerable Area 09/01)

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

Background

This Potentially Vulnerable Area covers an area of 238km² and is part of the River Forth catchment (shown below). This is a steep, rural area which contains part of the Loch Lomond and Trossachs National Park and the urban areas of Aberfoyle and Callander. The main watercourses are the River Forth and the River Teith.

The River Forth originates north of Loch Ard forest in the west and flows through Aberfoyle down towards Stirling.



© Crown copyright. SEPA licence number 100016991 (2015). All rights reserved.

The River Teith runs from its source in the north west, through Callander and Doune down towards Stirling.

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

There are approximately 200 residential properties and 90 non-residential properties at risk of flooding. The Annual Average Damages are approximately £770,000.

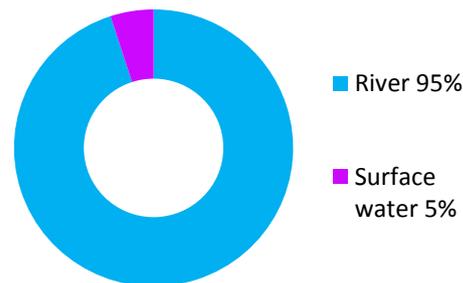


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

The highest risk of river flooding is from the River Forth to Aberfoyle.

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 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 3,400)	60	200	220
Non-residential properties (total 640)	30	90	110
People	140	430	480
Community facilities	<10 Educational buildings	<10 Includes: educational buildings and emergency services	<10 Includes: educational buildings and emergency services
Utilities	<10	<10	<10
Transport links (excluding minor roads)	4 A roads, 6 B roads at 125 locations	4 A roads, 6 B roads at 138 locations	4 A roads, 6 B roads at 222 locations
Environmental designated areas (km ²)	6.8	7.1	7.2
Designated cultural heritage sites	16	18	19
Agricultural land (km ²)	6.8	9.4	10.9

Table 1: Summary of flooding impacts

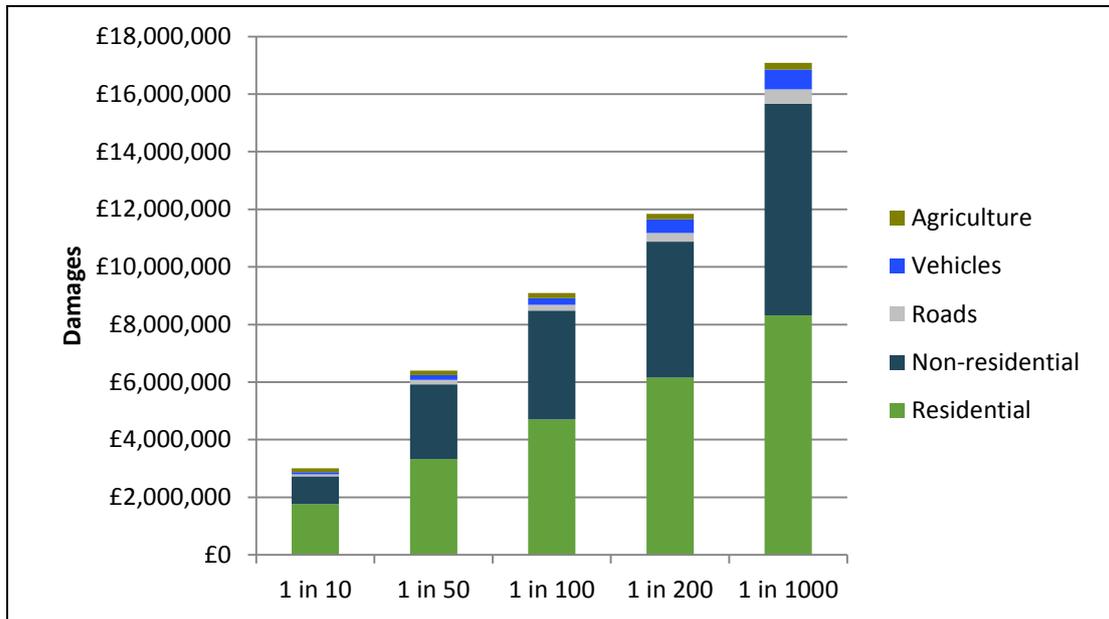


Figure 2: Damages by flood likelihood

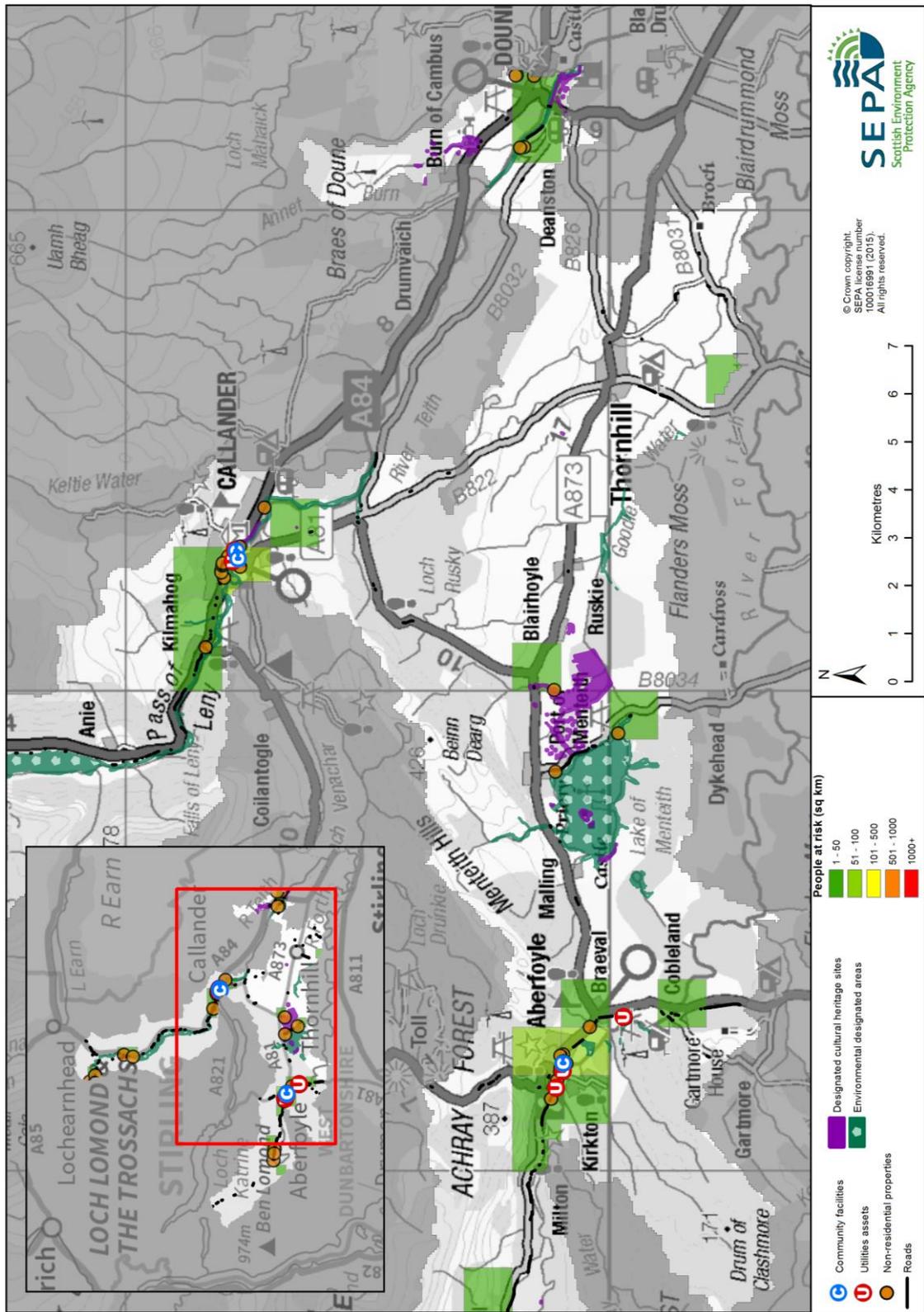


Figure 3: Impacts of flooding

History of flooding

This area has a long history of flooding. The following significant floods have been recorded:

- 8 September 2009: River Forth caused property flooding on Main Street, Aberfoyle.
- 15 January 2007: River Forth caused property flooding on Main Street, Aberfoyle.
- 14 December 2006: River Forth caused property flooding on Main Street in Aberfoyle and Main Street in Callander, the campsite at Strathyre was flooded and the A84 was closed between Strathyre and Callander.
- 1 December 2006: River Teith caused property flooding adjacent to Meadows car park in Callander. On the same date, River Forth flooded 10 commercial properties at Aberfoyle, one pumping station and two sections of the B829.
- 1 January 2005: River Teith caused property flooding in Callander adjacent to Meadows car park. The Main Street was flooded to Dreadnought Hotel.
- 1 August 2004: Extreme rainfall caused widespread surface water flooding across Callander. Primary source of water was Callander Craggs with direct runoff into properties via golf course and overtopping of small watercourses. Areas affected included Ancaster Road, Bridge Street, Gullipen View, Leny Feus, Main Street, Marshall Crescent and Tulipan Crescent.
- 18 August 2004: High levels on the River Keltie caused structural damage to Old Keltie Bridge; 15-20 properties were flooded on Ancaster Road, and further properties were flooded on Tulipan Crescent in Callander. There was a landslip at Glenample requiring bridge and road reconstruction at Edinample Bridge and South Lochearn Road.
- 1 September 1998: Extreme rainfall caused widespread surface water flooding across Callander. Primary source of water was Callander Craggs with direct runoff into properties, overwhelming of sewer network and overtopping of small watercourses. Areas affected included Ancaster Road, Bridge Street, Bridgend, Cross Street, Livingston Avenue, Main Street, South Church Street, Stirling Road, Tulipan Crescent and Willoughby Place.
- 3 January 1993: River Teith caused flooding to more than 15 properties in the vicinity of the Meadows car park in Callander.
- 1990: Flooding from the River Teith reached the Dreadnought Hotel on Main Street, Callander. The Caledonian Hotel flooded to a depth of 0.6m.
- 1913: Flooding from the River Teith reached the Dreadnought Hotel on Main Street.
- 12-14 June 1905: Several properties on Main Street and Leny Road, Callander flooded from the River Teith.

Objectives to manage flooding in Potentially Vulnerable Area 09/01

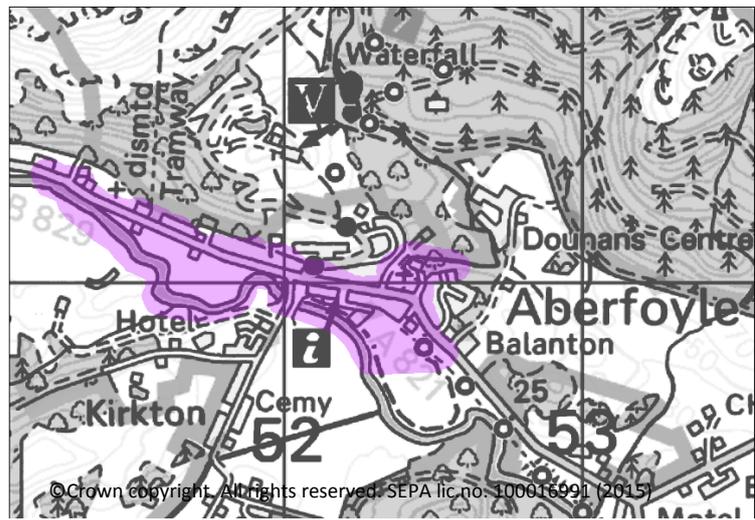
Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target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

Reduce economic damages to residential and non-residential properties in Aberfoyle caused by flooding from the River Forth

Indicators:

- £100,000 Annual Average Damages from residential properties
- £120,000 Annual Average Damages from non-residential properties

Target area:

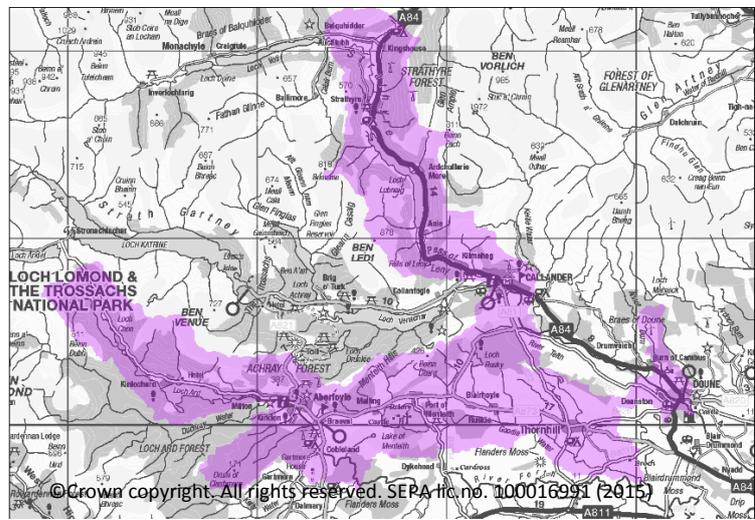


Reduce economic damages to residential and non-residential properties in the Trossachs Potentially Vulnerable Area caused by river flooding

Indicators:

- £170,000 Annual Average Damages from residential properties
- £67,000 Annual Average Damages from non-residential properties

Target area:



Target area	Objective	ID	Indicators within PVA
Callander	Reduce economic damages and number of residential properties at risk of surface water flooding in Callander where practical	9033	* See note below
Applies across Forth Local Plan District	Avoid an overall increase in flood risk	9001	<ul style="list-style-type: none"> • 200 residential properties • £770,000 Annual Average Damages
Applies across Forth Local Plan District	Reduce overall flood risk	9032	<ul style="list-style-type: none"> • 200 residential properties • £770,000 Annual Average Damages
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.		

* This objective will be monitored using surface water flood risk across the Potentially Vulnerable Area. For 09/01 there are 20 residential properties at risk and Annual Average Damages of £29,000.

Actions to manage flooding in Potentially Vulnerable Area 09/01

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 Trossachs Potentially Vulnerable Area.

Selected actions					
Flood protection scheme/works	<i>Natural flood management works</i>	New flood warning	Community flood action groups	<i>Property level protection scheme</i>	<i>Site protection plans</i>
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

Action (ID):	FLOOD PROTECTION SCHEME/WORKS (90030006)				
Objective (ID):	Reduce economic damages to residential and non-residential properties in the Trossachs Potentially Vulnerable Area caused by river flooding (9003)				
Delivery lead:	Stirling Council				
Priority:	National:		Within local authority:		
	42 of 42		3 of 3		
Status:	Under development	Indicative delivery:	2016-2021		
Description:	A flood protection scheme has been proposed for Callander. The scheme would consist of flood embankments and protect the Meadows car park and residential properties from the 1 in 50 year event.				
Potential impacts					
Economic:	The proposed scheme may benefit 15 residential properties and 15 non-residential properties at risk of flooding in this location, with estimated damages avoided of £210,000.				
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. In addition there is one road which has been identified as potentially benefitting from this action. There may be negative impacts through disturbance to the local community during the construction phase.				
Environmental:	Flood protection schemes can have both positive and negative impacts on the ecological quality of the environment depending on how they are designed. 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. In				

Environmental:	addition, a number of nationally and locally designated sites are present in the study area and could be positively or negatively impacted. These include conservation areas, listed buildings and national parks.
-----------------------	--

Action (ID):	FLOOD PROTECTION SCHEME/WORKS (90020006)		
Objective (ID):	Reduce economic damages to residential and non-residential properties in Aberfoyle caused by flooding from the River Forth (9002)		
Delivery lead:	Stirling Council		
Status:	Under development	Indicative delivery:	2016-2021
Description:	Flood protection works have been proposed for Aberfoyle to protect residential properties and local businesses from high likelihood flooding (1 in 5 year standard of protection). The works would consist of flood embankments and would also help maintain access to the school and emergency service access beyond Aberfoyle. The works depend on the provision of flood warning by SEPA and would be carried out simultaneously with flood warning provisions.		
Potential impacts			
Economic:	The proposed scheme may benefit seven residential properties and 13 non-residential properties at risk of flooding in this location.		
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. In addition there are three utilities and one road (key road providing single access point to school and villages for 14 miles) 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.		
Environmental:	Flood protection schemes can have both positive and negative impacts on the ecological quality of the environment depending on how they are designed. 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 Trossachs Woods Special Area of Conservation.		

Action (ID):	NEW FLOOD WARNING (90320010)		
Objective (ID):	Reduce overall flood risk (9032)		
Delivery lead:	SEPA		
Status:	Not started	Indicative delivery:	2016-2021
Description:	Flood warning is required for properties at risk of flooding from the River Forth in Aberfoyle and flooding of the B829 single access road from Aberfoyle to Milton, Kinlochard, Stronachlacher and Inversnaid. Further feasibility assessment will be required to assess the delivery potential of a new flood warning scheme in this area.		

Action (ID):	FLOOD PROTECTION STUDY (90020005)		
Objective (ID):	Reduce economic damages to residential and non-residential properties in Aberfoyle caused by flooding from the River Forth (9002)		
Delivery lead:	Stirling Council		
Priority:	National:	Within local authority:	
	39 of 168	1 of 2	
Status:	Under development	Indicative delivery:	2016-2021
Description:	A flood protection study has been carried out by Stirling Council for Aberfoyle assessing flood storage and sediment management. No economically viable option has been identified (benefit cost ratio of 0.37) but Stirling Council will self-fund a 1 in 5 year flood protection scheme. The study can be revisited in future to further examine options to reduce flood risk in conjunction with investigations of flood warning by SEPA.		
Potential impacts			
Economic:	The study could benefit 62 residential properties and 46 non-residential properties at risk of flooding in this location, with potential damages avoided of up to £9.3 million.		
Social:	Social impacts will depend on the outcome of the study and recommended actions. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. In addition the study could benefit one community facility, one emergency service, two utilities and two roads located within the study area.		
Environmental:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment and designated sites. Where possible opportunities to enhance and restore the environment should be sought, for example through natural flood management. To be in accord with the FRM 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 Trossachs Woods Special Area of Conservation. Listed buildings, national parks, Sites of Special Scientific Interest and ancient woodlands are also present in the study area and could be positively or negatively impacted.		

Action (ID):	NATURAL FLOOD MANAGEMENT STUDY (90020003)		
Objective (ID):	Reduce economic damages to residential and non-residential properties in Aberfoyle caused by flooding from the River Forth (9002)		
Delivery lead:	SEPA in partnership with other organisations		
Status:	Ongoing	Indicative delivery:	2016-2021
Description:	The ongoing Duchray catchment pilot study is looking at a range of natural flood management options including runoff control and sediment management to help reduce flood risk in Aberfoyle. The study has been undertaken in partnership with Loch Lomond and the		

	Trossachs National Park and the Forestry Commission and is due to be completed in 2016. The study should inform any future flood protection studies.
Potential impacts	
Economic:	The economic impact of natural flood management actions is difficult to define. However, these actions can reduce flood risk for high likelihood events. Forty residential and non-residential properties could potentially benefit from natural flood management actions in this location.
Social:	Social impacts will depend on the outcome of the study and recommended actions. 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:	Natural flood management actions can have a positive impact on the ecological quality of the environment by restoring and enhancing natural habitats. Listed buildings, national parks, Sites of Special Scientific Interest and ancient woodlands are also present in the study area and could be positively or negatively impacted.

Action (ID):	SURFACE WATER PLAN/STUDY (90330018)		
Objective (ID):	Reduce economic damages and number of residential properties at risk of surface water flooding in Callander where practical (9033)		
Delivery lead:	Stirling Council		
Status:	Ongoing	Indicative delivery:	2016-2021
Description:	The area must be covered by a surface water management plan or plans that set objectives for the management of surface water flood risk and identify the most sustainable actions to achieve the objectives.		

Action (ID):	STRATEGIC MAPPING AND MODELLING (90320016)		
Objective (ID):	Reduce overall flood risk (9032)		
Delivery lead:	SEPA		
Status:	Not started	Indicative delivery:	2016-2021
Description:	SEPA will seek to incorporate additional surface water data into the flood maps to improve understanding of flood risk. Approximately 800km ² of improved surface water data is currently available within this Local Plan District. The inclusion of additional surface water hazard data resulting from the completion of local authority surface water management plans and Scottish Water integrated catchment studies will be considered as these projects are completed.		

Action (ID):	STRATEGIC MAPPING AND MODELLING (90320019)		
Objective (ID):	Reduce overall flood risk (9032)		
Delivery lead:	Scottish Water		
Status:	Not started	Indicative delivery:	2016-2021
Description:	Scottish Water will carry out an 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 (90020017)		
Objective (ID):	Reduce economic damages to residential and non-residential properties in Aberfoyle caused by flooding from the River Forth (9002)		
Delivery lead:	Stirling Council		
Status:	Not started	Indicative delivery:	Ongoing
Description:	Maintain the flood embankment in Aberfoyle once completed in 2016. The embankment will have a design standard of protection of 1 in 5 years.		

Action (ID):	MAINTAIN FLOOD WARNING (90320030)		
Objective (ID):	Reduce overall flood risk (9032)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Continue to maintain the Callander flood warning area which covers the River Teith and the Callander to Stirling flood warning area which covers the River Teith to the confluence with the River Forth, both of which form part of the Stirling river flood warning scheme.		

Action (ID):	FLOOD FORECASTING (90320009)		
Objective (ID):	Reduce overall flood risk (9032)		
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):	COMMUNITY FLOOD ACTION GROUPS (90020012)		
Objective (ID):	Reduce economic damages to residential and non-residential properties in Aberfoyle caused by flooding from the River Forth (9002)		
Delivery lead:	Community		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Aberfoyle Flood Forum operates in this area. The membership includes representation of residents and the business community. The group acts as a pressure group to promote flooding concerns in Aberfoyle and wider area.		

Action (ID):	COMMUNITY FLOOD ACTION GROUPS (90030012)		
Objective (ID):	Reduce economic damages to residential and non-residential properties in the Trossachs Potentially Vulnerable Area caused by river flooding (9003)		
Delivery lead:	Community		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Callander Flood Action Group operates in this area. The forum takes on flood warden duties, raises public awareness, liaises with relevant authorities, provides assistance to residents on property protection and is helping to develop a community resilience plan.		

Action (ID):	SELF HELP (90320011)		
Objective (ID):	Reduce overall flood risk (9032)		
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 (90320013)		
Objective (ID):	Reduce overall flood risk (9032)		
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. SEPA will engage with the community and promote Floodline. This will be achieved through property level protection events delivered by the Scottish Flood Forum and SEPA led education events. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.		

Action (ID):	MAINTENANCE (90320007)		
Objective (ID):	Reduce overall flood risk (9032)		
Delivery lead:	Stirling 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 (90320014)		
Objective (ID):	Reduce overall flood risk (9032)		
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 (90010001)		
Objective (ID):	Avoid an overall increase in flood risk (9001) Reduce overall flood risk (9032)		
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>		