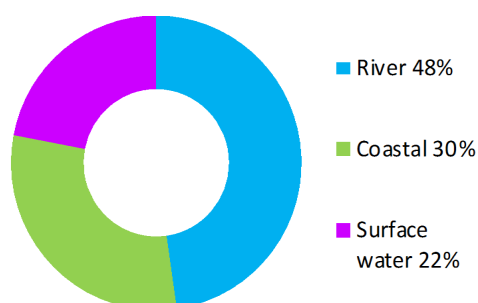


Thurso (Potentially Vulnerable Area 01/01)

Local Plan District	Local authority	Main catchment
Highland and Argyll	The Highland Council	River Thurso, Thurso coastal

Summary of flooding impacts



At risk of flooding

- 10 residential properties
- 10 non-residential properties
- £77,000 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>	<i>Maintain flood warning</i>	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

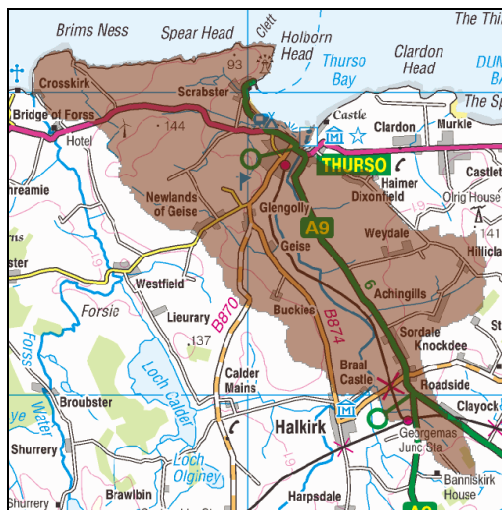
Thurso (Potentially Vulnerable Area 01/01)

Local Plan District	Local authority	Main catchment
Highland and Argyll	The Highland Council	River Thurso, Thurso coastal

Background

This Potentially Vulnerable Area is approximately 81km² and includes the town of Thurso and rural areas to the south and west (shown below).

The Potentially Vulnerable Area includes the smaller settlements of Scrabster, Crosskirk, Newlands of Geise, Glengolly, Sordale, Achingills, Weydale and Dixonfield.



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The A9 and A836 roads pass through the area.

The main river flowing through the area is the River Thurso, which is tidal in its lower reaches.

There are approximately 10 residential and 10 non-residential properties at risk of flooding.

The Annual Average Damages are approximately £77,000 with the majority caused by river flooding.

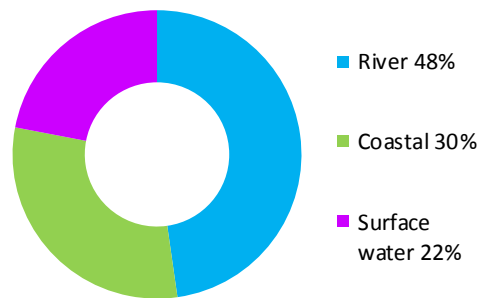


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

The main areas of coastal flood risk are at Scrabster and Thurso, while river flood risk primarily affects Thurso from the River Thurso and the Wolf Burn.

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 transport network is affected by flooding notably the A9, A836, B870 and B874. The Wick to Inverness railway line and the branch line to Thurso are at risk of being flooded at several locations.

Six designated cultural heritage sites and small areas of environmental importance are at risk. These include Special Areas of Conservation, Special Protection Areas, and Sites of Special Scientific Interest at Pennylands, Holborn Head, Ushat Head, and North Caithness Cliffs.

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

	1 in 10 High likelihood	1 in 200 Medium likelihood	1 in 1000 Low likelihood
Residential properties (total 3,700)	<10	10	20
Non-residential properties (total 530)	<10	10	20
People	10	30	40
Community facilities	0	0	0
Utilities assets	0	0	0
Transport links (excluding minor roads)	Roads at 30 locations Rail at 10 locations	Roads at 30 locations Rail at 10 locations	Roads at 40 locations Rail at 20 locations
Environmental designated areas (km ²)	0.8	0.8	0.9
Designated cultural heritage sites	6	6	6
Agricultural land (km ²)	2	3	3

Table 1: Summary of flooding impacts¹

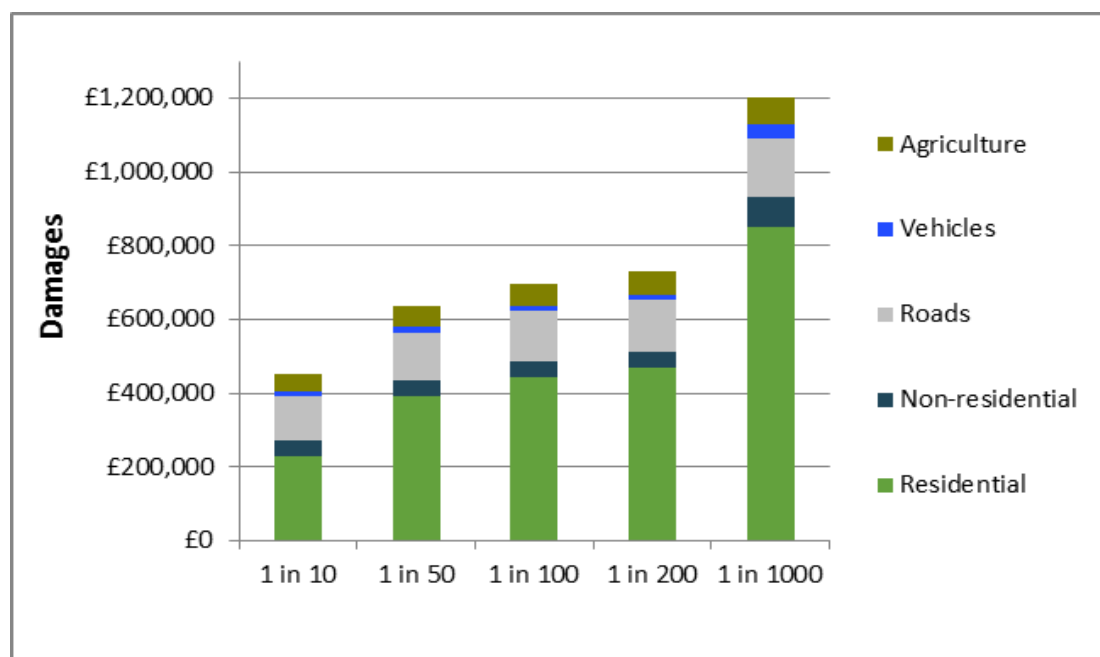


Figure 2: Damages by flood likelihood

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

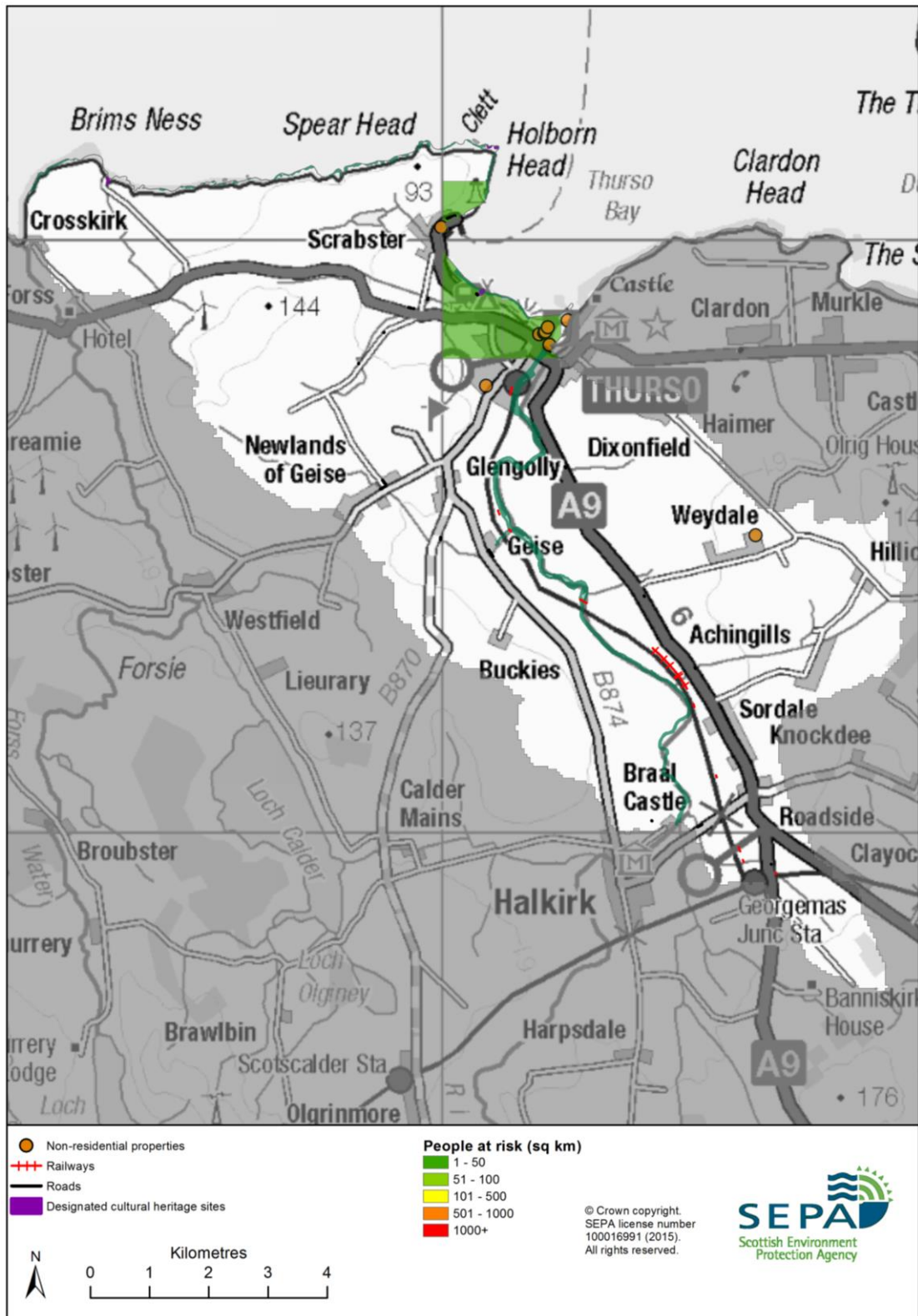


Figure 3: Impacts of flooding

History of flooding

There is an extensive history of flooding in this Potentially Vulnerable Area, primarily from the River Thurso, with several floods being caused by the interaction of the river with high tides. It should be noted that the flood maps do not consider combined river and coastal floods and may thus underestimate flood risk.

- 2006: Olig Street, High Street and Heatherfield Road in Thurso were affected by surface water flooding;
- October 2006: Extensive flooding occurred to residential and non-residential properties, a power station, roads and car parks. This was caused by drainage systems being unable to cope with volume of surface water runoff and the Wolf Burn bursting its banks;
- 2005: A combined tidal and river flood affected a number of commercial and residential properties after the River Thurso breached its defences on both the east and west bank to the north of Thurso Bridge;
- October 2004: Roads and gardens flooded from a variety of sources including surface water, groundwater and river water;
- 1909: River Thurso recorded as flooding;
- 1892: Coastal flooding damaged the harbour breakwater and flooded the harbour area;
- 1873: River Thurso recorded as flooding;
- 1863: River Thurso burst its banks and swept away a bridge opposite Brawl Castle.

Objectives to manage flooding in Potentially Vulnerable Area 01/01

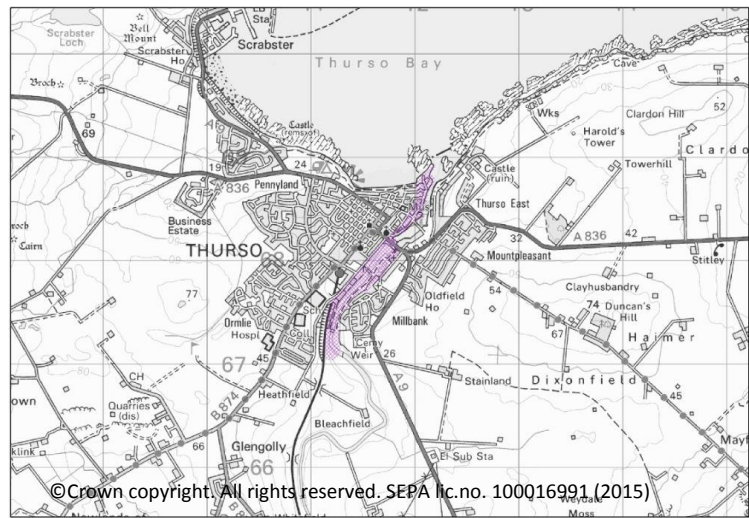
Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target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

Reduce risk in Thurso (Riverside area) from coastal flooding

Indicators:

- £2,100 Annual Average Damages from non-residential properties

Target area:



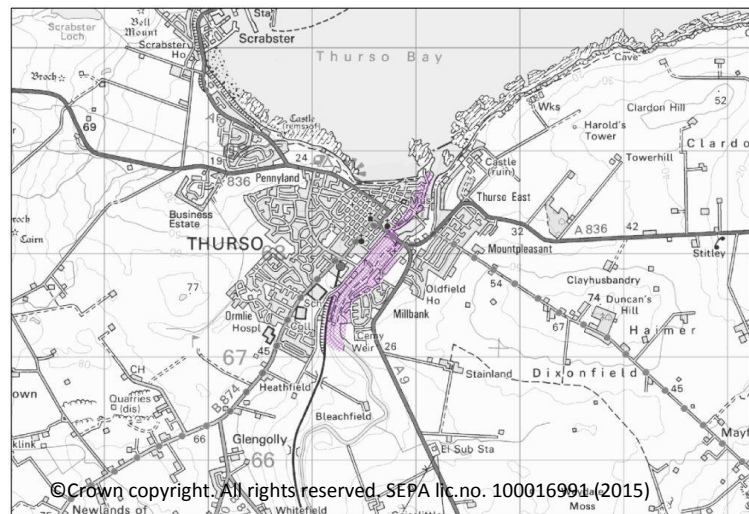
Objective ID: 100101

Reduce flood risk in Thurso (Riverside area) from the River Thurso

Indicators:

- £2,200 Annual Average Damages from non-residential properties

Target area:



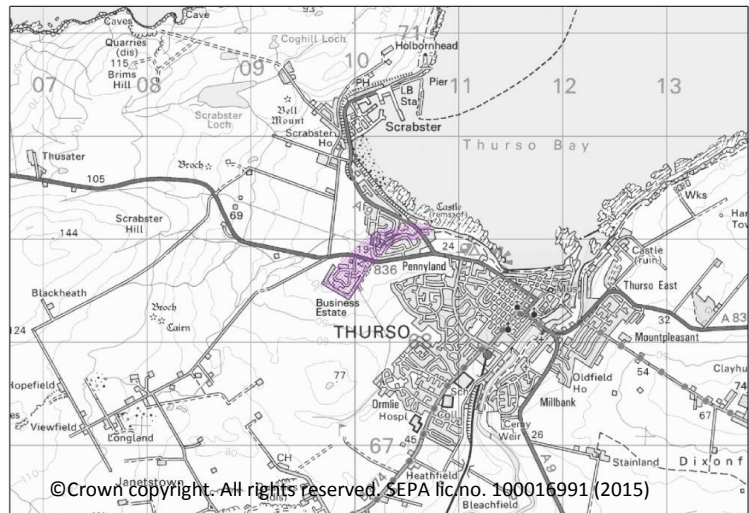
Objective ID: 100102

Reduce flood risk in Thurso (Burnside) from the Wolf Burn

Indicators:

Target area:

- £21,000 Annual Average Damages from residential properties



Objective ID: 100103

Target area	Objective	ID	Indicators within PVA
Applies across Highland and Argyll Local Plan District	Avoid an overall increase in flood risk	100001	<ul style="list-style-type: none"> • 10 residential properties • £77,000 Annual Average Damages
Applies across Highland and Argyll Local Plan District	Reduce overall flood risk	100002	<ul style="list-style-type: none"> • 10 residential properties • £77,000 Annual Average Damages
Applies across Highland and Argyll 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 01/01

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 Thurso 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	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 STUDY (1001030005)		
Objective (ID):	Reduce flood risk in Thurso (Burnside) from the Wolf Burn (100103)		
Delivery lead:	The Highland Council		
Priority:	National:		Within local authority:
	142 of 168		18 of 23
Status:	Not started	Indicative delivery:	2022-2027
Description:	A study is required to further investigate the feasibility of improving conveyance along the Wolf Burn (Burnside) and the tributary to the north-west of the Thurso Business Park, with consideration of property level protection for any residual flood risk. Other actions may also be considered in order to develop the most sustainable range of options. The study should look to confirm the extent of works required and the business case for flood protection works. The study should also look to confirm the level of flood risk for Thurso Business Park which may be underestimated based on the history of flooding in the area.		
Potential impacts			
Economic:	The flood protection study should confirm the economic impacts and number of properties at risk. The study could benefit seven residential properties at risk of flooding in this location, with potential damages avoided of up to £620,000. There may also be additional benefits for the Thurso Business Park, which has historically had flooding problems which have not been captured in the analysis.		
Social:	The social benefits will be confirmed once the hydraulic study has been carried out. Currently it is estimated that 15 people may directly benefit from flood protection works. A reduction in flood risk would		

Social:	have a positive benefit to the health and wellbeing of the community and socially vulnerable people. Flood protection works may also reduce disruption to the wider community of Thurso and surrounding areas through reduced flooding to the A9 and A836. Natural flood management actions can restore and enhance natural environments and create opportunities for recreation and tourism. Negative impacts through disturbance to the local community during the construction phase should be considered.
Environmental:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Opportunities to mitigate any environmental impacts may include design and timing of works. There are unlikely to be any significant impacts on the Pennylands Site of Special Scientific Interest or the North Caithness Cliffs Special Protection Area as the works would be outside of their boundaries. 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 River Thurso Special Area of Conservation.

Action (ID):	FLOOD PROTECTION STUDY (1001010005)		
Objective (ID):	Reduce flood risk in Thurso (Riverside area) from the River Thurso (100102) Reduce risk in Thurso (Riverside area) from coastal flooding (100101)		
Delivery lead:	The Highland Council		
Priority:	National:		Within local authority:
	156 of 168		22 of 23
Status:	Not started	Indicative delivery:	2016-2021
Description:	A hydraulic study is required to further improve the understanding of flood risk in this area from combined coastal and river flooding. Following the improvements to the understanding of flood risk, the study should progress to focus on coastal revetments, direct defences and property level protection if justified by the level of flood risk. Other actions may also be considered in order to develop the most sustainable range of options. Due to the history of flooding in Thurso and the need to better understand the risk of combined river and coastal flooding, this study will be taken forward in cycle 1.		
Potential impacts			
Economic:	The flood protection study should confirm the economic impacts and number of properties at risk. Currently it is estimated that potential damages of up to £230,000 could be avoided. The history of flooding however suggests that the potential benefits are likely to be higher.		
Social:	The social benefits including to people and to community facilities will be confirmed once the hydraulic study has been carried out. Negative impacts through disturbance to the local community during the construction phase should be considered.		
Environmental:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Opportunities to mitigate any environmental impacts may include design and timing of works. There are unlikely to be any		

Environmental:	significant impacts on the North Caithness Cliffs Special Protection Area from flood protection works due to its distance offshore from Thurso. 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 River Thurso Special Area of Conservation.
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Action (ID):	STRATEGIC MAPPING AND MODELLING (1000020019)		
Objective (ID):	Reduce overall flood risk (100002)		
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):	FLOOD FORECASTING (1000020009)		
Objective (ID):	Reduce overall flood risk (100002)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>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.</p> <p>This Potentially Vulnerable Area is within the 'Caithness and Sutherland' flood alert area.</p>		

Action (ID):	SELF HELP (1000020011)		
Objective (ID):	Reduce overall flood risk (100002)		
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 (1000020013)		
Objective (ID):	Reduce overall flood risk (100002)		
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>From 2016 SEPA will engage with the community through local participation in national initiatives, including partnership working with Neighbourhood Watch Scotland. In addition, SEPA will engage with local authorities and community resilience groups where possible. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.</p>		

Action (ID):	MAINTENANCE (1000020007)		
Objective (ID):	Reduce overall flood risk (100002)		
Delivery lead:	The Highland 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>		

Action (ID):	EMERGENCY PLANS/RESPONSE (1000020014)		
Objective (ID):	Reduce overall flood risk (100002)		
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 (1000010001)		
Objective (ID):	Avoid an overall increase in flood risk (100001) Reduce overall flood risk (100002)		
Delivery lead:	Planning authority		
Status:	Existing	Indicative delivery:	Ongoing
Description:	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.		