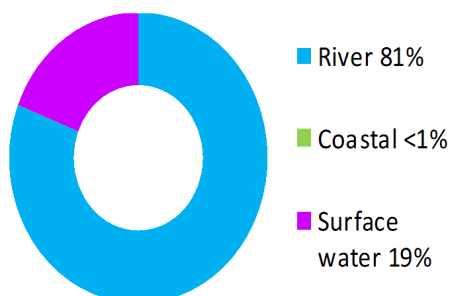


Aberdeen City - Bridge of Don (Potentially Vulnerable Area 06/15)

Local Plan District	Local authority	Main catchment
North East	Aberdeen City Council, Aberdeenshire Council	River Don, Aberdeen North coastal

Summary of flooding impacts



At risk of flooding

- 2,200 residential properties
- 470 non-residential properties
- £4.5 million 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>	New flood warning	<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	Surface water plan/study	Emergency plans/response
<i>Maintain flood protection scheme</i>	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

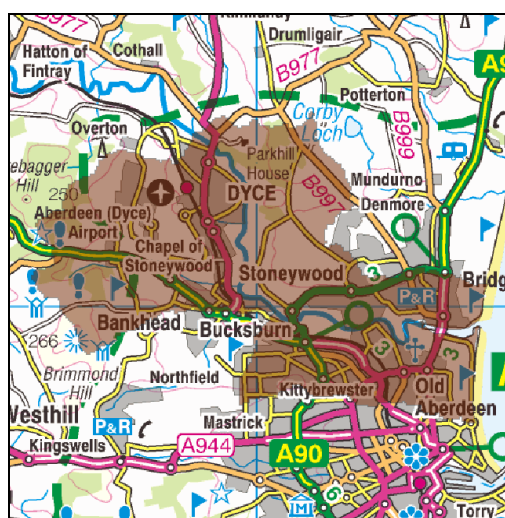
Actions

Aberdeen City – Bridge of Don (Potentially Vulnerable Area 06/15)

Local Plan District	Local authority	Main catchments
North East	Aberdeen City Council	River Don, Aberdeen North Coastal

Background

This Potentially Vulnerable Area covers the northern areas of the City of Aberdeen, extending along the River Don from Bridge of Don to Dyce. It is approximately 46km² and includes the airport and Aberdeen to Inverness railway line.



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The main river is the River Don and there are also a number of small watercourses, most of which are culverted for all or part of their route through the city.

There are approximately 2,200 residential properties and 470 non-residential properties at risk of flooding.

The Annual Average Damages are approximately £4.5 million with the majority caused by river flooding.

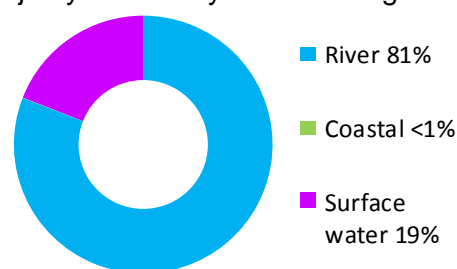


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

Flood risk in Aberdeen City is complex due to the interaction between the main rivers, small often culverted watercourses, sewerage systems, patterns of surface water runoff and tide levels. In order to better understand these complex interactions, a more detailed flood model has been developed which has helped to inform the assessment of flood risk reported below.

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.

A number of schools, healthcare facilities and an emergency services site are at risk of flooding. Transport links affected by flooding include the A956, A90, A947 and A96 roads and the Aberdeen to Inverness railway line. Flooding also affects a small number of designated cultural heritage sites, utilities and buildings at the University of Aberdeen.

The damages associated with floods of different likelihood are shown in Figure 2. For this Potentially Vulnerable Area the highest damages are to non-residential properties followed by damages to residential properties. 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 32,000)	450	2,200	3,600
Non-residential properties (total 2,900)	180	470	610
People	980	4,800	8,000
Community facilities	<10 Educational buildings	30 Includes: educational buildings, healthcare facilities and emergency services	40 Includes: educational buildings, healthcare facilities and emergency services
Utilities assets	10	40	60
Transport links (excluding minor roads)	Roads at 180 locations Rail at 20 locations Aberdeen airport	Roads at 320 locations Rail at 40 locations Aberdeen airport	Roads at 380 locations Rail at 40 locations Aberdeen airport
Environmental designated areas (km ²)	0	0	0
Designated cultural heritage sites	2	3	3
Agricultural land (km ²)	0.5	0.9	1.2

Table 1: Summary of flooding impacts¹

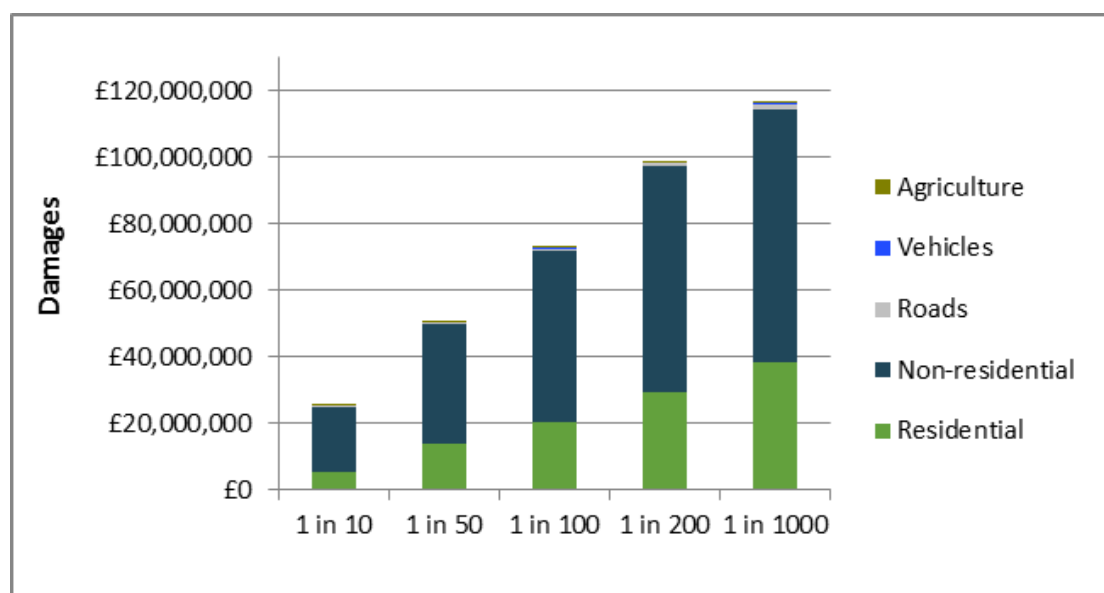


Figure 2: Damages by flood likelihood

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

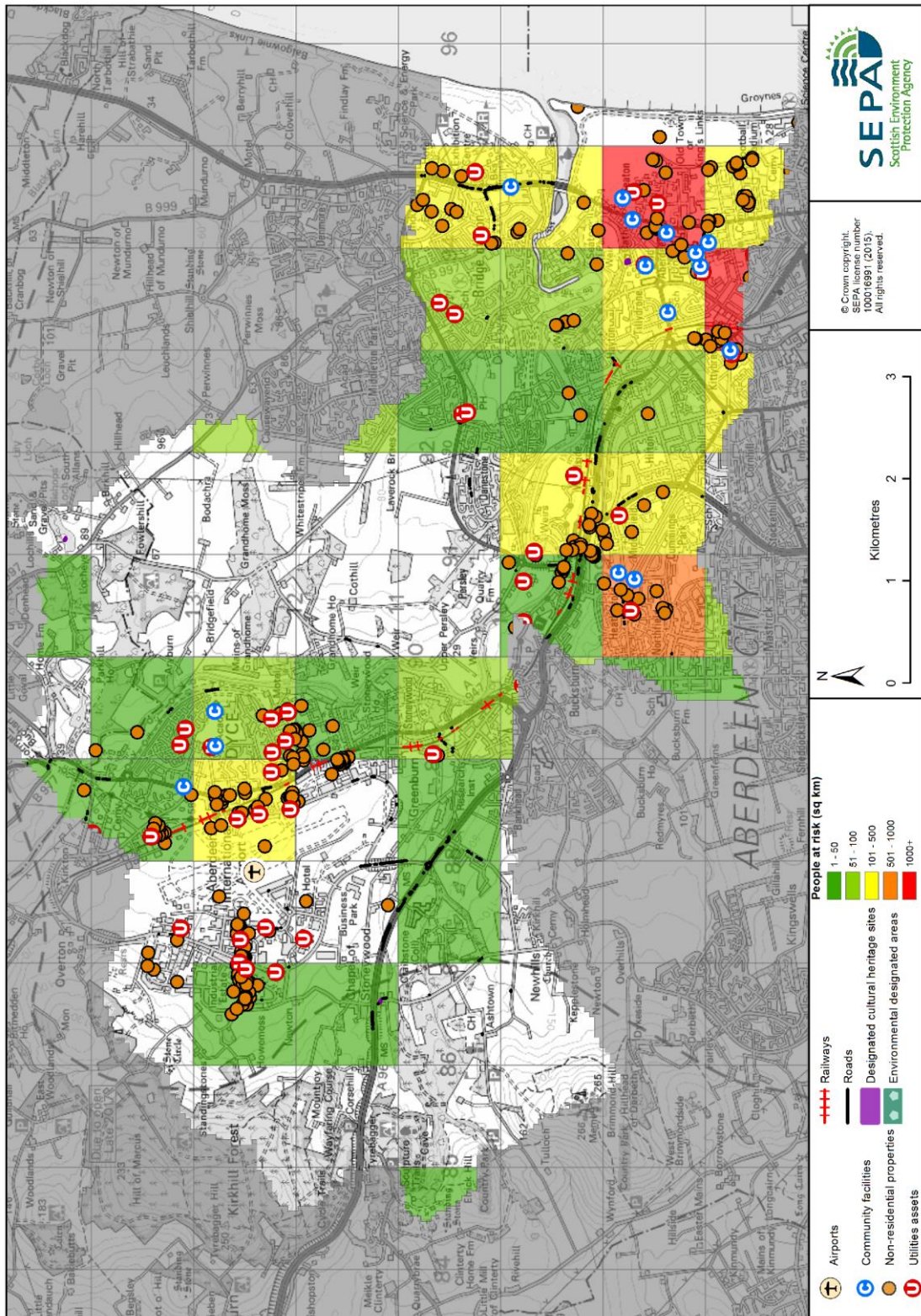


Figure 3: Impacts of flooding

History of flooding

The earliest recorded flood was in 1916 when the River Don submerged land in the Dyce area.

There was groundwater flooding in 2001, when the high water table flooded basements in Hilton Avenue, Hilton. Heavy rain resulted in surface water on the A947 Parkhill Bridge in February 2009, which caused a road traffic accident at the Newmarcher to Parkhill Crossroads.

Flooding from the Silverburn due to a blockage of the watercourse was reported at Burnside Drive, Kingswell Park and Ride facility, Broadfold Drive and Cloverhill Road. Incidents have been reported due to inadequate culvert capacity, affecting Farburn Terrace and industrial units on Airport Commerce. There are reports of blockages causing flooding in the University grounds, Hilton Avenue and Cummings Park Circle. Flood incidents have also been reported at Kettock's Mill, Polo Gardens in Stoneywood and Laurel Place, Whitestripes Road, Muggiemoss Road, A96 Inverurie Road, Lade Crescent, Union Road, North Kirkhill, and Manor Drive. The only coastal flood on record was in 1921, when there was a particularly high tide.

Large parts of Aberdeen were affected by surface water flooding in July 2015. Many manhole covers became dislodged, roads were submerged and Aberdeen Airport's terminal building was flooded.

Objectives to manage flooding in Potentially Vulnerable Area 06/15

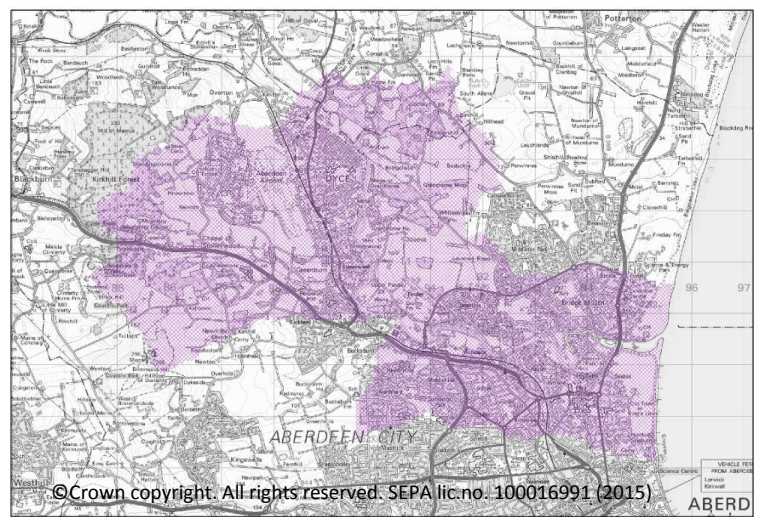
Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target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

Reduce flood risk in Aberdeen (Bridge of Don) from the River Don and small watercourses including open and culverted lengths

Indicators:

- 4,500 people
- £1.1 million Annual Average Damages from residential properties
- £2.3 million Annual Average Damages from non-residential properties

Target area:



Objective ID: 601502

Target area	Objective	ID	Indicators within PVA
Aberdeen	Reduce risk from surface water flooding in Aberdeen	601507	* See note below
Applies across North East Local Plan District	Avoid an overall increase in flood risk	600001	<ul style="list-style-type: none"> • 2,200 residential properties • £4.5 million Annual Average Damages
Applies across North East Local Plan District	Reduce overall flood risk	600002	<ul style="list-style-type: none"> • 2,200 residential properties • £4.5 million Annual Average Damages
Applies across North East 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 06/15 there are 130 residential properties at risk and Annual Average Damages of £870,000.

Actions to manage flooding in Potentially Vulnerable Area 06/15

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 Aberdeen City - Bridge of Don Potentially Vulnerable Area.

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

Action (ID):	NEW FLOOD WARNING (6000020010)		
Objective (ID):	Reduce overall flood risk (600002)		
Delivery lead:	SEPA		
Status:	Not started	Indicative delivery:	2016-2021
Description:	Flood warning is required for communities at risk of coastal flooding along the Aberdeenshire coast from Peterhead to Montrose. A flood forecasting system will be required before the flood warning scheme can be developed.		

Action (ID):	FLOOD PROTECTION STUDY (6015020005)		
Objective (ID):	Reduce risk from surface water flooding in Aberdeen (601507) Reduce flood risk in Aberdeen (Bridge of Don) from the River Don and small watercourses including open and culverted lengths (601502)		
Delivery lead:	Aberdeen City Council		
Priority:	National: 1 and 5 of 168	Within local authority: 1 and 2 of 4	
Status:	Not started	Indicative delivery:	2016-2021
Description:	Three separate flood protection studies apply to this area and together they should address flood risk from the River Don, small watercourses and surface water flooding in this area. The studies should identify the most sustainable range of options. For small watercourses and surface water flooding, the studies should be		

	based on the outputs from the Aberdeen Integrated Catchment Study and coordinated with the surface water management plan to take a comprehensive approach to flood risk management in Aberdeen.
Potential impacts	
Economic:	Considering all three study areas in Aberdeen City, a total of 10,500 residential and 1,800 non-residential properties could benefit, with potential damages avoided of up to £520 million. In reality the studies should look to identify flooding hotspots, where actions should be targeted. Further study will identify the true benefits of these actions.
Social:	Thirteen educational buildings, 14 health care facilities, 33 utilities, and one emergency service could benefit from any actions taken. Around 23,000 people could benefit from flood protection works. However, this will depend on locations identified for actions. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people.
Environmental:	To be in accord with the FRM Strategy, the responsible authority should seek to ensure, as part of the studies, that the action will not have an adverse effect on the integrity of the River Dee Special Area of Conservation. Cultural heritage sites, including one garden and designed landscape site, could benefit from flood protection works identified in the studies. However, this will depend on the final location and extent of the works. The flood protection studies should consider how to avoid/minimise potential impacts through good design and timing of works and consider how to avoid or minimise potential negative effects such as loss or disturbance of sediment, disruption to natural processes and loss of habitat. The physical condition of the River Don, River Dee and Bucks Burn (water body IDs 23265, 23315 and 23266) are identified by river basin management planning to be at less than good status. Future works could improve the condition of the rivers or degrade them. Opportunities to improve the condition of the rivers should be considered by coordinating with river basin management planning.

Action (ID):	SURFACE WATER PLAN/STUDY (6015070018)		
Objective (ID):	Reduce risk from surface water flooding in Aberdeen (601507)		
Delivery lead:	Aberdeen City 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. An integrated catchment study has been carried out to support the surface water management plan process and improve knowledge and understanding of surface water flood risk and interactions with other sources of flooding e.g. with the sewer network, watercourses and the sea.		

Action (ID):	STRATEGIC MAPPING AND MODELLING (6000020016)		
Objective (ID):	Reduce overall flood risk (600002)		
Delivery lead:	SEPA		
Status:	Not started	Indicative delivery:	2016-2021
Description:	SEPA will be seeking to develop the flood hazard mapping in the Green Burn (right hand tributary at Dyce) and in the Middle Don (from Kintore to Dyce) areas to improve understanding of the flood risk. The extent and timing of the completed improvements will be dependent on detailed scoping and data availability.		

Action (ID):	STRATEGIC MAPPING AND MODELLING (6000020019)		
Objective (ID):	Reduce overall flood risk (600002)		
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 WARNING (6000020030)		
Objective (ID):	Reduce overall flood risk (600002)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Continue to maintain the 'Aberdeen (Don)' flood warning area which is part of the Don river flood warning scheme.		

Action (ID):	FLOOD FORECASTING (6000020009)		
Objective (ID):	Reduce overall flood risk (600002)		
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>The Potentially Vulnerable Area is within the 'Aberdeenshire and Aberdeen City' flood alert area.</p>		

Action (ID):	SELF HELP (6000020011)		
Objective (ID):	Reduce overall flood risk (600002)		
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>Aberdeen City Council provides grants towards the fitting of flood guards on individual properties.</p>		

Action (ID):	AWARENESS RAISING (6000020013)		
Objective (ID):	Reduce overall flood risk (600002)		
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 and promote Floodline. This will be achieved through SEPA led education events. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.</p>		

Action (ID):	MAINTENANCE (6000020007)		
Objective (ID):	Reduce overall flood risk (600002)		
Delivery lead:	Aberdeen City Council and 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 (6000020014)		
Objective (ID):	Reduce overall flood risk (600002)		
Delivery lead:	Category 1 and 2 Responders		
Status:	Existing	Indicative delivery:	Ongoing
Description:	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.		

Action (ID):	PLANNING POLICIES (6000010001)		
Objective (ID):	Avoid an overall increase in flood risk (600001) Reduce overall flood risk (600002)		
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.		