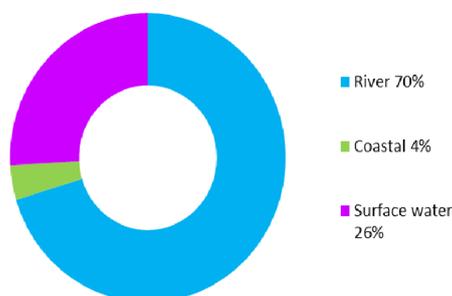


Stonehaven (Potentially Vulnerable Area 06/23)

Local Plan District	Local authority	Main catchment
North East	Aberdeenshire Council	Kincardine and Angus coastal

Summary of flooding impacts



At risk of flooding

- 860 residential properties
- 240 non-residential properties
- £890,000 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	<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

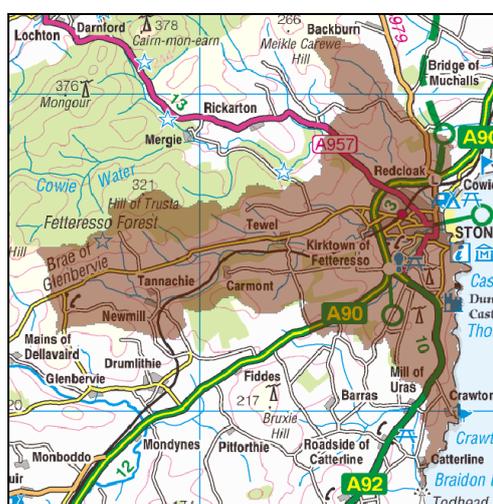
Stonehaven (Potentially Vulnerable Area 06/23)

Local Plan District	Local authority	Main catchments
North East	Aberdeenshire Council	Kincardine and Angus coastal

Background

This Potentially Vulnerable Area covers Stonehaven and the surrounding rural area. It is approximately 68km².

The Aberdeen to Dundee railway line, and the A90, A957 and A92 pass through the area.



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The main rivers in the area are Carron and the Cowie. Stonehaven has suffered from major flooding in recent years from the River Carron and from the sea.

There are approximately 860 residential and 240 non-residential properties at risk of flooding.

The Annual Average Damages are approximately £890,000, with the majority due to river flooding.

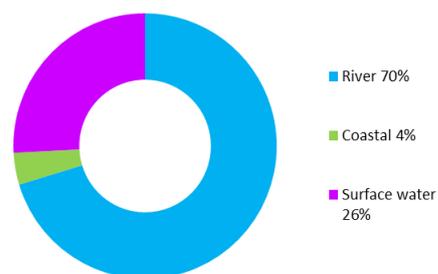


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

River flood risk is mainly from the River Carron and the Glaslaw Burn. Floods from the Carron can extend along Low Wood Road and Dunnottar Avenue in the south, and throughout the low-lying parts of town along Barclay Street in the north. Flooding also extends to the south east along High Street and Arbuthnott Court into the Old Town. Surface water flooding also impacts on the town, particularly around the leisure centre and in the Old Town. Flooding from wave overtopping is not fully represented in the general assessment of flood risk and the number of properties at risk and the damages from coastal flooding are known to currently be underestimated. Flooding from wave overtopping has been included in the setting of objectives and selection of actions.

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. Dunnottar School, the police station and the main supermarket are at risk of flooding. Transport routes affected by flooding include the A90, A92, A957 and the Aberdeen to Dundee railway in several locations. Six designated cultural heritage sites and a small area of designated environmental sites are at risk.

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.

	1 in 10 High likelihood	1 in 200 Medium likelihood	1 in 1000 Low likelihood
Residential properties (total 5,200)	140	860	950
Non-residential properties (total 590)	60	240	260
People	300	1,900	2,100
Community facilities	<10 Emergency services	<10 Includes; educational buildings and emergency services	<10 Includes; educational buildings and emergency services
Utilities assets	<10	<10	10
Transport links (excluding minor roads)	Roads at 100 locations Rail at 30 locations	Roads at 160 locations Rail at 40 locations	Roads at 170 locations Rail at 40 locations
Environmental designated areas (km ²)	0.1	0.1	0.1
Designated cultural heritage sites	4	6	7
Agricultural land (km ²)	0.5	0.6	0.7

Table 1: Summary of flooding impacts¹

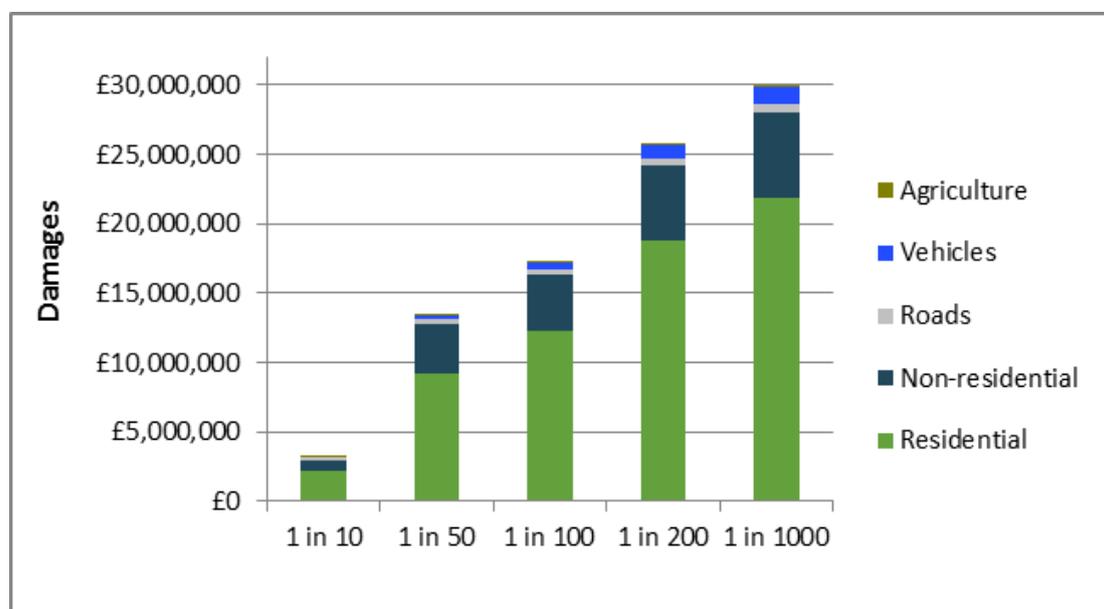


Figure 2: Damages by flood likelihood

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

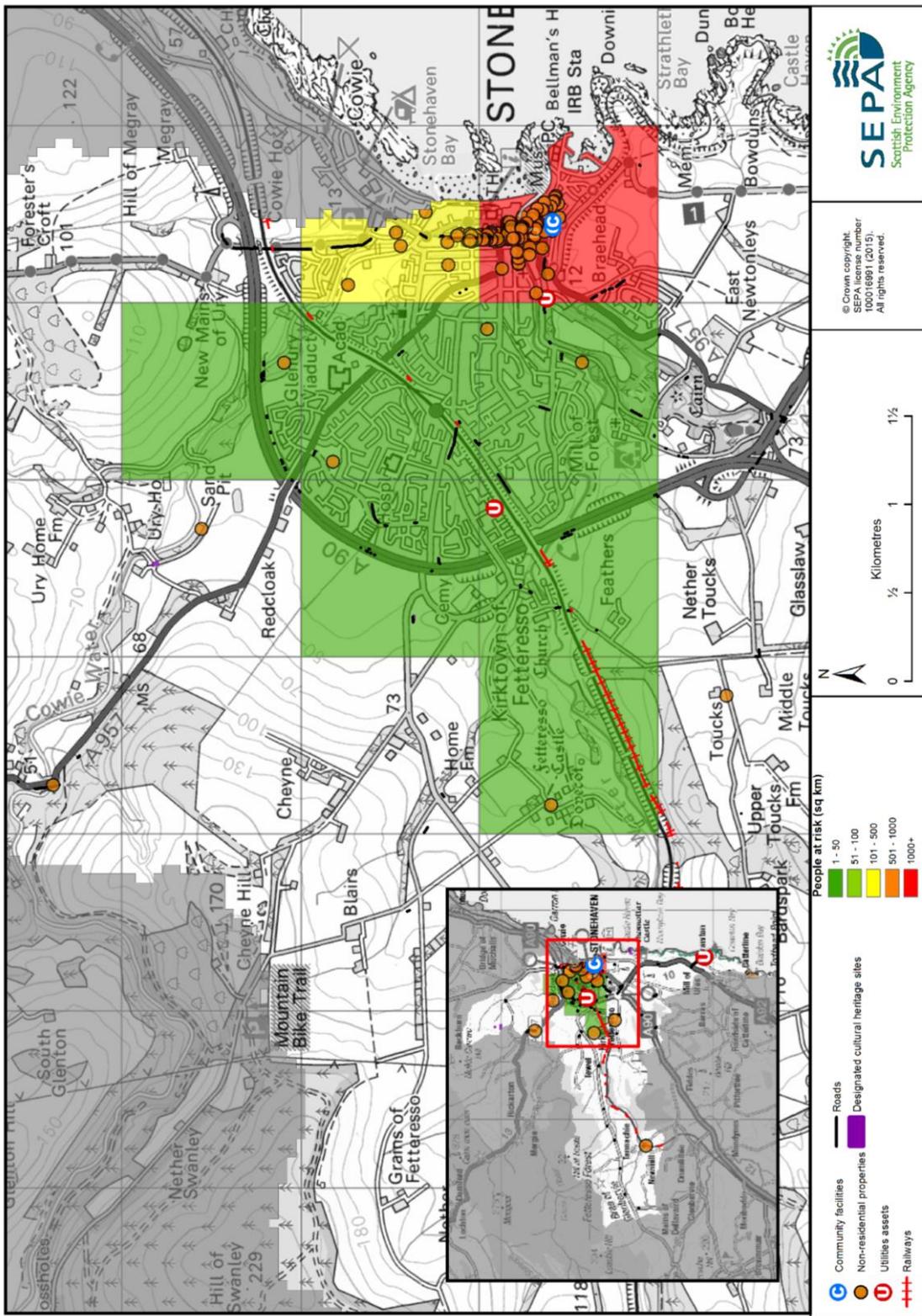


Figure 3: Impacts of flooding

History of flooding

There is a long record of flooding in Stonehaven dating back to the early 1800s, with flooding affecting property, agriculture, bridges and roads. A number of these floods resulted in several feet of water in the town.

There is extensive and valuable local knowledge of historic flooding and further work is required to fully reconcile this knowledge with existing recorded events listed below.

The earliest recorded flood on Carron Water was in 1829, with additional floods recorded in 1835 (when large areas of the town were submerged by several feet of water) 1836, 1878 (when one fatality occurred), 1881, and 1895. There are floods recorded on Cowie in 1878, 1881, 1882, 1884, 1895, 1896 and 1949. In December 1985 there was a flood on both the Carron and Cowie rivers, which affected Arduthie Street, Carron Terrace, and Cameron Street. In 2002, the Carron flooded Low Wood Road.

In November 2009, the Carron burst its banks at the green bridge and flooded 97 properties in Stonehaven with 50 people needing to be evacuated. The River Carron and its tributary, the Glaslaw Burn, flooded again in December 2012 when 40 properties were evacuated and suffered significant damage. Surface water also contributed significantly to this flood.

In 1998, the Farrochie Burn flooded Arduthie Gardens in Stonehaven affecting three properties; it flooded again in 2002. In 2006, a trash screen became blocked with debris and caused Farrochie Burn to flood a public park and road. In 2006, Victoria Street was flooded from an unnamed watercourse, with a culvert blockage causing the water to back up. In 2008 the gardens of Touck Cottages were affected by surface runoff from agricultural land.

On 15 December 2012, a coastal storm overtopped the sea defences and around 20 properties were flooded internally. Around 25 vulnerable residents had to be evacuated and there was significant structural damage to further seafront properties from wave action. Seafront properties were again affected in October 2014 by wave overtopping and many vulnerable people were evacuated from their homes.

Wave overtopping frequently impacts seafront businesses to the north of the River Cowie. Residential properties in Cowie village are also affected during periods of high water levels and wave activity.

The village of Catterline is affected by surface water flooding. Erosion of the toe of the coastal slopes by wave action, combined with the impact of surface water and springs on slope stability, have contributed to coastal landslips in the village. This erosion threatens a significant proportion of the property in the village and the access road to the harbour. The neighbouring village of Crawton has also suffered from flooding.

Objectives to manage flooding in Potentially Vulnerable Area 06/23

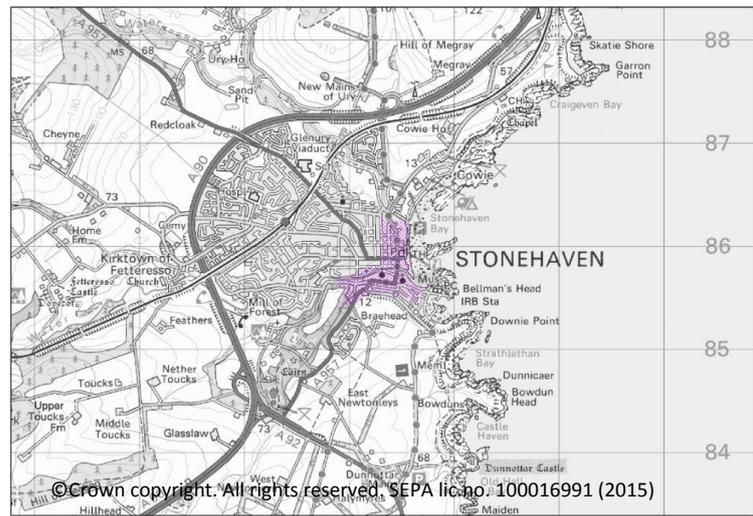
Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target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

Reduce flood risk in Stonehaven from the River Carron and Glaslaw Burn

Indicators:

Target area:

- 820 people
- £450,000 Annual Average Damages from residential properties
- 1 educational building
- 1 emergency service



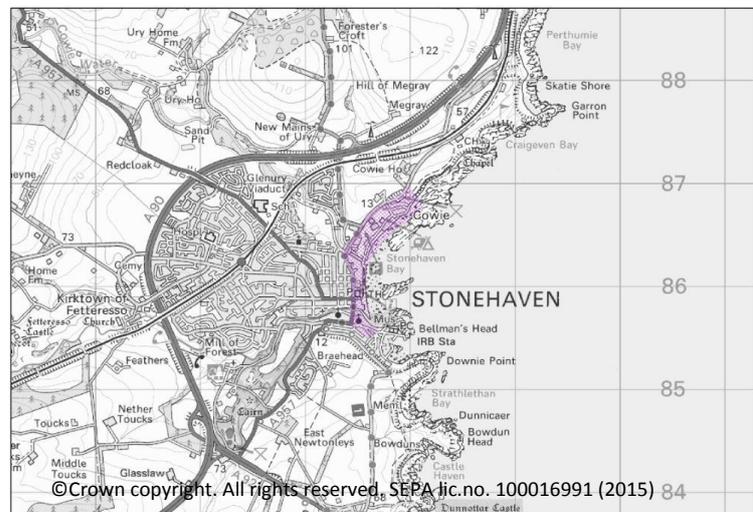
Objective ID: 602301

Reduce risk in Stonehaven from coastal flooding

Indicators:

Target area:

- 110 people
- £27,000 Annual Average Damages from residential properties
- £3,100 Annual Average Damages from non-residential properties



Objective ID: 602302

Target area	Objective	ID	Indicators within PVA
Stonehaven	Reduce risk from surface water flooding in Stonehaven	602307	* See note below
Applies across North East Local Plan District	Avoid an overall increase in flood risk	600001	<ul style="list-style-type: none"> • 860 residential properties • £890,000 Annual Average Damages
Applies across North East Local Plan District	Reduce overall flood risk	600002	<ul style="list-style-type: none"> • 860 residential properties • £890,000 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 06/23 there are 180 residential properties at risk and Annual Average Damages of £230,000.

Actions to manage flooding in Potentially Vulnerable Area 06/23

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 Stonehaven 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	<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):	FLOOD PROTECTION SCHEME/WORKS (6023010006)				
Objective (ID):	Reduce flood risk in Stonehaven from the River Carron and Glaslaw Burn (602301)				
Delivery lead:	Aberdeenshire Council				
Priority:	National:		Within local authority:		
	32 of 42		1 of 2		
Status:	Under development	Indicative delivery:	2016-2021		
Description:	A Flood Order was published in July 2015 with a flood protection scheme undergoing detailed design to reduce flood risk to Stonehaven from the River Carron and Glaslaw Burn. The scheme will include a combination of new culverts and alterations to bridges, removal of weirs and installing trash screens and the construction of direct defences. It is being designed to a 1 in 200 year standard of protection including an allowance for climate change.				
Potential impacts					
Economic:	A flood protection scheme could reduce flood risk to 372 residential properties at risk of flooding in this location, with estimated damages avoided of £20 million. The benefit-cost ratio of the proposed works is 1.23.				
Social:	A flood protection scheme could reduce risk to an estimated 818 people. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. Two utility sites (energy production/electricity), a school, an emergency service site and the A957 could benefit from flood protection works.				
Environmental:	Flood protection works can have both positive and negative impacts on the ecological quality of the environment depending on how they				

Environmental:	are designed. Direct defences will be set back from the river where possible to reduce potential negative impacts on the ecological quality of the rivers and minimise tree loss. The removal of the weir will improve fish passage along the river which is important for salmon, trout and otter. The development of the design should look to maintain and enhance the attractive build environment along the riverside where possible, incorporating finishes, materials and details that complement this.
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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 (6023020005)		
Objective (ID):	Reduce risk in Stonehaven from coastal flooding (602302)		
Delivery lead:	Aberdeenshire Council		
Priority:	National: 86 of 168	Within local authority:	4 of 12
Status:	Not started	Indicative delivery:	2016-2021
Description:	A flood protection study is required to consider flood protection works to reduce the risk of coastal flooding in Stonehaven. The flood protection study should consider wave attenuation (beach management / recharge), coastal management actions (revetments), the construction of direct defences, relocation of properties and property level protection. Other actions may also be considered to develop the most sustainable range of options. The number of properties at risk of flooding from wave overtopping will be confirmed as part of the study. The estuary of the River Cowie up to the A957 road bridge will be included in this study.		
Potential impacts			
Economic:	The study could benefit 47 residential and seven non-residential properties at risk of flooding in this location, with potential damages avoided of up to £4 million. Flood protection works would have additional benefits of reducing structural damage from direct wave action to property along the seafront.		
Social:	The development of flood protection works following the study would potentially reduce risk to 106 people. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. Natural flood management actions can restore and enhance natural environments and create		

Social:	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. Natural flood management actions can have a positive impact by restoring and enhancing natural habitats. Opportunities to mitigate any environmental impacts may include design and timing of works. Beach recharge will very often involve proposals to obtain the donor sediment from the low intertidal or shallow sub tidal zone in the vicinity. There are potential adverse effects on biodiversity, active coastal processes, and even coastal flood risk if sediment extraction allows greater wave attack inshore. The flood protection study should ensure the actions avoid or minimise the potential loss of natural habitat and do not interfere with coastal processes. The flood protection study should consider how to avoid or minimise potential negative effects on the Garron Point Site of Special Scientific Interest to the north.

Action (ID):	SURFACE WATER PLAN/STUDY (6023070018)		
Objective (ID):	Reduce risk from surface water flooding in Stonehaven (602307)		
Delivery lead:	Aberdeenshire 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. Flood risk from the Farrochie Burn in Stonehaven will be covered by the surface water management plan		

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 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 WARNING (6000020030)		
Objective (ID):	Reduce overall flood risk (600002)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Continue to maintain the 'Stonehaven' flood warning area which is on the Carron Water and is part of the Stonehaven 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):	COMMUNITY FLOOD ACTION GROUPS (6000020012)		
Objective (ID):	Reduce overall flood risk (600002)		
Delivery lead:	Community		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Stonehaven Flood Action Group vigorously represent the local community on flood risk issues and have been actively involved in working with Aberdeenshire Council and SEPA in seeking and implementing solutions to flood risk in Stonehaven. The group have raised and distributed over £12,000 to assist residents to improve property level protection both individually and collectively. The group also share alerts and help raise awareness of flood risk in the town. There is also a flood warden scheme, supported by Aberdeenshire Council, to warn and inform of potential floods from the River Carron and Glaslaw Burn.</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>Aberdeenshire Council provide a small range of flood protection products for individual property protection, which are available for all types of flooding, at cost price with free delivery across Aberdeenshire.</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>SEPA will engage with the community and promote Floodline through education events undertaken jointly with the Stonehaven Flood Action Group.</p> <p>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:	Aberdeenshire 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 (6000020014)		
Objective (ID):	Reduce overall flood risk (600002)		
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> <p>Aberdeenshire Council provides sandbags at pre-arranged locations in the town when forecast conditions indicate that the likelihood of need is very high. Aberdeenshire Council also deploys flood barriers in these conditions to help divert flood water away from properties and back into the river channel where possible. Aberdeenshire Council operates a water level monitor on the River Carron.</p>		

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