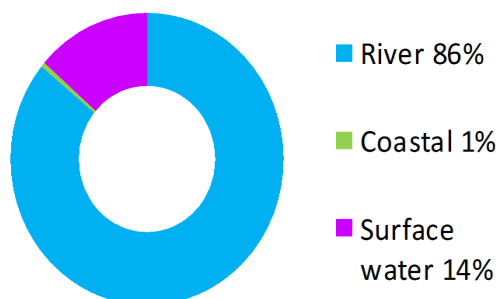


Aberdeen City - Deeside (Potentially Vulnerable Area 06/18)

Local Plan District	Local authority	Main catchment
North East	Aberdeen City Council	River Dee (Grampian), Aberdeen South coastal

Summary of flooding impacts



At risk of flooding

- 8,100 residential properties
- 2,000 non-residential properties
- £12 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	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
Maintain flood protection scheme	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

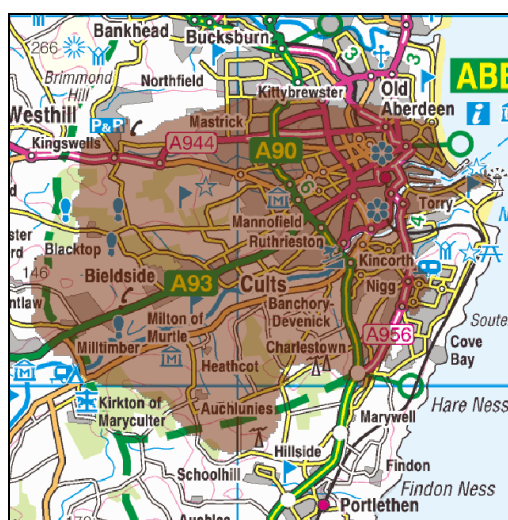
Actions

Aberdeen City - Deeside (Potentially Vulnerable Area 06/18)

Local Plan District	Local authority	Main catchment
North East	Aberdeen City Council	River Dee (Grampian), Aberdeen South coastal

Background

This Potentially Vulnerable Area includes the centre and west of the city of Aberdeen. It is approximately 75km², includes the centre of Aberdeen City and several vital transport routes pass through it.



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The main river is the River Dee 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 8,100 residential and 2,000 non-residential properties at risk of flooding.

The Annual Average Damages are approximately £12 million with the majority caused by river flooding.

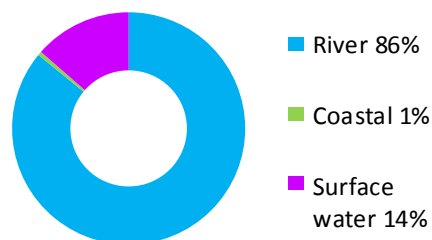


Figure 1: Annual Average Damages by flood source

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. The risk of flooding to utilities in Table 1 does not include Scottish Water data. Scottish Water undertook a national assessment of above ground assets at medium likelihood of flooding (including water treatment works, wastewater treatment works, and pumping stations). Within this Potentially Vulnerable Area there are two assets identified as being at risk of flooding.

A number of schools and healthcare facilities are at risk of flooding. Transport links affected by flooding include the A90, A93, A96, A944, A956, A978 and the Aberdeen to Dundee / Aberdeen to Inverness railway lines. The River Dee Special Area of Conservation and one cultural heritage site are also 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 65,000)	860	8,100	11,000
Non-residential properties (total 7,200)	520	2,000	2,400
People	1,900	18,000	25,000
Community facilities	<10 Educational buildings	10 Includes; educational buildings and healthcare facilities	30 Includes; educational buildings, healthcare facilities and emergency services
Utilities assets	20	60	80
Transport links (excluding minor roads)	Roads at 250 locations Rail at 30 locations	Roads at 580 locations Rail at 60 locations	Roads at 700 locations Rail at 70 locations
Environmental designated areas (km ²)	1.3	1.5	1.5
Designated cultural heritage sites	2	3	3
Agricultural land (km ²)	1.8	2.5	2.6

Table 1: Summary of flooding impacts¹

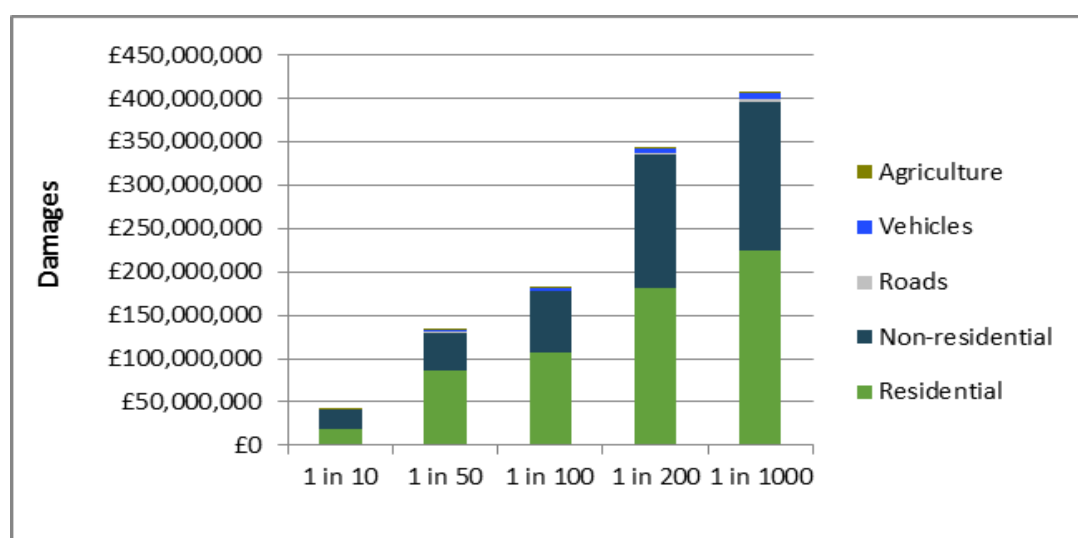


Figure 2: Damages by flood likelihood

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

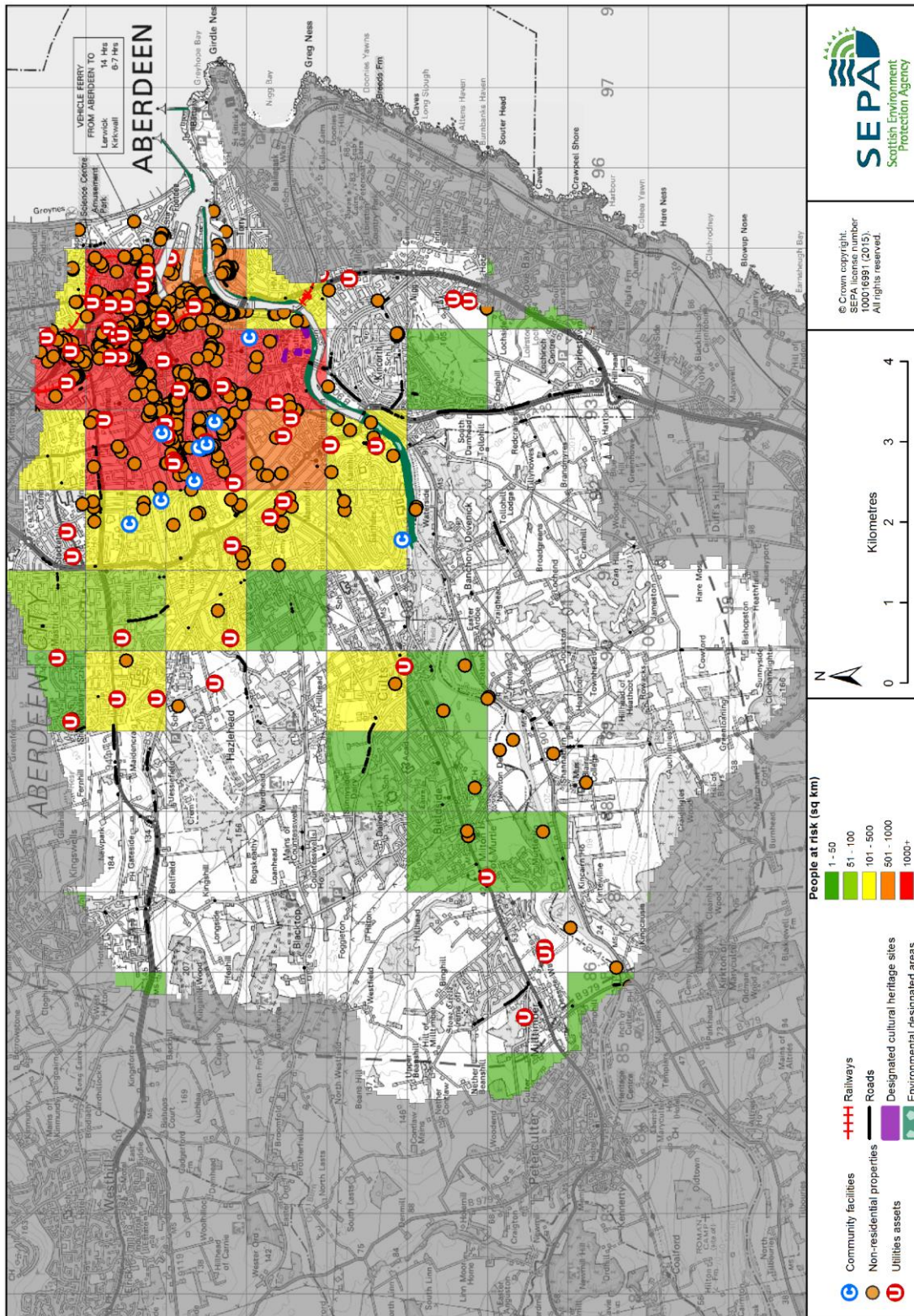


Figure 3: Impacts of flooding

History of flooding

Floods on the River Dee are reported in 1768, 1789, 1790, 1829, 1873, 1876, 1881, 1882, 1892, 1894, 1909, 1920, 1922, 1926, 1927, 1928, 1929, 1938 and 1946. The Denburn is reported to have flooded in 1869, 1872, and 1874. In 1873 the Broadford Burn flooded and surface water floods were reported in 1869, 1873, 1882, 1896, 1897, and 1940. These historic floods affected property, agriculture, railway lines, roads, and a golf course. Fatalities occurred in 1876, when a ferry sank during a high spate on the River Dee.

In October 2001 there was a surface water flood, which exceeded the capacity of the drainage systems and subsequently affected properties at Berryden Road in Ashgrove, Culter House Road in Milltimer, Hazeldene Road in Hazelhead, and Broomhill Avenue. The high water table during this flood also led to groundwater flooding at Craigbuckler Church in Springfield Road.

Further areas within Aberdeen City that have been affected from flooding include Links Road, Frederick Street, Culter House Road, Bellenden Walk, Inchgarth Road, Boyd Orr Avenue, Cranford Terrace, Craigton Road, Craigieburn Park, Springfield Place, Albyn School playing fields, Countesswells Road, Hazelhead Policies, Kirk Brae, Baird's Brae, Manse Road, West Cults Farm, Deeside Gardens, Contlaw Brae, Baillieswells Road, Abbotshall Road, Burnieboozle Crescent, Riverside Drive, and Polmuir Road. The causes of the reported flooding include blocked or inadequate drainage systems, blockages and overtopping of watercourses including the West Burn of Rubuslaw and the Cults Burn, and choked drainage ditches.

Flooding has been reported from the North Burn of Rubislaw and the Gilcomstoun Burn, as well as surface water incidents due to blocked or inadequate drainage. The areas reported as being affected include Carden Place, Jack's Brae, Fraser Street, Blenheim Lane, Trinity Quay, Forest Road, Angusfield Avenue, Cornhill Gardens, Berryden Road, Westburn Road and Springhall Road. The Polmuir Burn is reported to have caused flooding to basements due to blockages at Brighton Place.

The Cults Burn is reported to have caused flooding at Inchgarth Road due to backing up from the River Dee and blockages. Flooding has been reported at Milltimber Farm and North Deeside Road in the Guttrie catchment and at Wellington Circle in the Tullos catchment. There were three flood events at Fountain Hall, Albert Lane from the Denburn and two sewer flood events in the Merchant Quarter in 2012.

Large parts of Aberdeen were affected by flooding in July 2015, when heavy rainfall caused the drainage system to overflow, dislodging manhole covers. Many roads were affected by flooding, including Market Street, Guild Street and Holburn Street. Cars on Polmuir Road started to float due to the depth of the water. A nursery had to be evacuated due to flooding in its basement.

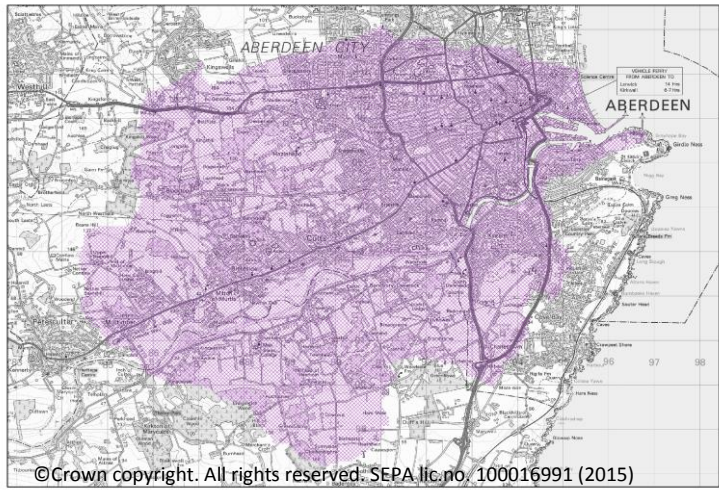
The largest coastal event reported was a large storm surge event in 1949. Fittie / Footdee has also been affected by overtopping of the sea wall.

Objectives to manage flooding in Potentially Vulnerable Area 06/18

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 - Deeside Potentially Vulnerable Area.

Reduce flood risk in Aberdeen (Deeside) from the River Dee and from small watercourses including open and culverted lengths
 Indicators: Target area:

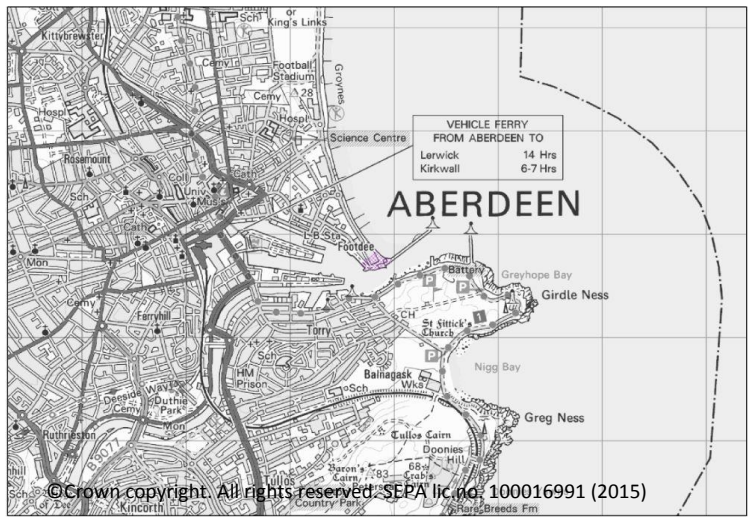
- 15,000 people
- £6.0 million Annual Average Damages from residential properties
- £3.8 million Annual Average Damages from non-residential properties



Objective ID: 601801

Reduce risk from coastal flooding in the Footdee area of Aberdeen
 Indicators: Target area:

- 210 people
- £45,000 Annual Average Damages from residential properties
- £11,000 Annual Average Damages from non-residential properties



Objective ID: 601802

Target area	Objective	ID	Indicators within PVA
Aberdeen	Reduce risk from surface water flooding in Aberdeen (Deeside)	601810	* See note below
Applies across North East Local Plan District	Avoid an overall increase in flood risk	600001	<ul style="list-style-type: none"> • 8,100 residential properties • £12 million Annual Average Damages
Applies across North East Local Plan District	Reduce overall flood risk	600002	<ul style="list-style-type: none"> • 8,100 residential properties • £12 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 06/18 there are 1,200 residential properties at risk and Annual Average Damages of £1.7 million.

Actions to manage flooding in Potentially Vulnerable Area 06/18

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 - Deeside Potentially Vulnerable Area.

Selected actions					
<i>Flood protection scheme/works</i>	<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
Maintain flood protection scheme	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 (6018010005)		
Objective (ID):	Reduce flood risk in Aberdeen (Deeside) from the River Dee and from small watercourses including open and culverted lengths (601801)		
Delivery lead:	Aberdeen City Council		
Priority:	National: 5 of 168	Within local authority: 2 of 4	
Status:	Not started	Indicative delivery:	2016-2021
Description:	The Aberdeen City Flood Study should address flood risk from the River Dee, small watercourses and surface water flooding in this area. The study should identify the most sustainable range of options. For small watercourses and surface water flooding, it 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 conditions of the River Don and River Dee (water body IDs 23265 and 23315) 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):	FLOOD PROTECTION STUDY (6018020005)		
Objective (ID):	Reduce risk from coastal flooding in the Footdee area of Aberdeen (601802)		
Delivery lead:	Aberdeen City Council		
Priority:	National:	Within local authority:	
	131 of 168	4 of 4	
Status:	Not started	Indicative delivery:	2016-2021
Description:	The current SEPA national coastal flood maps do not identify properties to be at flood risk. However, there is a history of flooding due to wave overtopping. Therefore a hydraulic study should be undertaken to establish the risk of coastal flooding including wave overtopping. Once the flood risk has been defined, the study should progress to find the most sustainable combination of actions to manage the risk.		
Potential impacts			
Economic:	The study should confirm the number of properties at risk of coastal flooding and the potential damages avoided, which are currently		

Economic:	estimated at up to £1.7 million.
Social:	The social impacts of potential actions will be considered when there is improved understanding of the current flood risk. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. 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. 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 Dee Special Area of Conservation (SAC) or the Moray Firth SAC. The physical condition of the Dee (Aberdeen) Estuary (water body ID 200103) is identified by river basin management planning to be at less than good status. Future works could improve the condition of the estuary or degrade it. Opportunities to improve the condition of the estuary should be considered by coordinating with river basin management planning.

Action (ID):	SURFACE WATER PLAN/STUDY (6018100018)		
Objective (ID):	Reduce risk from surface water flooding in Aberdeen (Deeside) (601810)		
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 (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 PROTECTION SCHEME (6018030017)		
Objective (ID):	Reduce flood risk in Aberdeen (Deeside) from the River Dee and from small watercourses including open and culverted lengths (601801)		
Delivery lead:	Aberdeen City Council		
Status:	Existing	Indicative delivery:	Ongoing
Description:	Continue to maintain the Fraser Road Flood Protection Scheme which reduces the risk of flooding from the Gilcomston Burn.		

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 (Dee)' and 'Maryculter' flood warning areas which are part of the Dee 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:	Flood action groups are active in the Merchant Quarter and in the Queens Cross / Fountainhall area of Aberdeen.		

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 community and promote Floodline using targeted direct mailings.</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:	Aberdeen City 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:	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.		