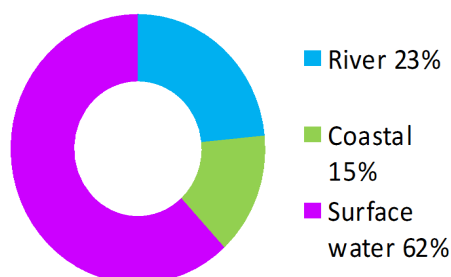


Largs to Stevenston (Potentially Vulnerable Area 12/03)

Local Plan District	Local authority	Main catchment
Ayrshire	North Ayrshire Council	Saltcoats to Largs coastal

Summary of flooding impacts



At risk of flooding

- 960 residential properties
- 380 non-residential properties
- £1.2 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.

Flood protection scheme/works	<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
Maintain flood protection scheme	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

Actions

Largs to Stevenston (Potentially Vulnerable Area 12/03)

Local Plan District	Local authority	Main catchment
Ayrshire	North Ayrshire Council	Saltcoats to Largs coastal

Background

This Potentially Vulnerable Area is approximately 100km². It is located in the north of the Ayrshire Local Plan District and extends from Stevenston, Saltcoats and Ardrossan in the south, to Waterhead Moor in the north (shown below). It incorporates the towns of Largs and West Kilbride.



The area has a risk of river, coastal and surface water flooding. The majority of damages are caused by surface water flooding.

There are approximately 960 residential properties and 380 non-residential properties at risk of flooding. The Annual Average Damages are approximately £1.2 million.

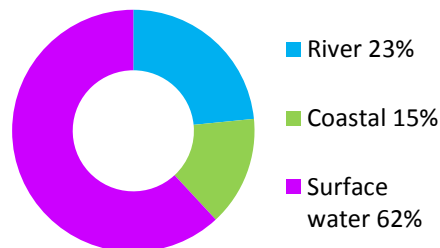


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

Surface water flooding is likely to impact the Ardrossan, Saltcoats and West Kilbride areas where a large number of residential properties are at risk. There is also potential for flooding of agricultural land in the north west of the area. The areas at highest risk from surface water flooding will require the preparation of surface water management plans.

River flooding occurs throughout the area but is primarily attributed to the Gogo Water. Largs has the potential to be affected by river flooding, which is most likely to occur to the west of the A78 Irvine Road and to the main rail link south of Largs station. West Kilbride is another area where there is a notable risk of river flooding. The Kilbride Burn, which flows south towards West Kilbride, passes beneath the B781 and the main rail link north of West Kilbride rail station. There are a number of constrictions within this area that are likely to cause the water within the Kilbride Burn to overflow. A study on the Kilbride Burn, West Kilbride was undertaken to assess the local impact of river flooding. The study identified Cubrieshaw Bridge as a constraint to river flows. Areas at risk are primarily agricultural land, although residential areas are also at risk. River flooding to land and properties is also likely to occur within Ardrossan from the Master Gott Burn, which is largely culverted.

Coastal flooding is not widespread in this area however there are a number of residential and non-residential properties at risk, particularly near Saltcoats. Three other areas at risk include the north side of West Kilbride, the vicinity of Ardrossan Harbour and a residential area adjacent to Auchenharvie Golf Course.

It should be noted that along the coastline there may be an additional level of risk due to wave overtopping which was not taken into account at the modelling stage of this assessment. As a consequence areas at risk of flooding may not have been identified.

There is the potential for interaction between sources of flooding within the area which may affect the A78 and land adjacent to the RSPB reserve.

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 damages associated with floods of different likelihood are shown in Figure 2. Residential properties affected by surface water flooding experience the highest economic impact at approximately 40% of the damages. Non-residential properties also provide a substantial portion of the damages.

Within this Potentially Vulnerable Area it is estimated that climate change will increase the number of residential properties at risk of flooding from approximately 960 to 2,000 and the number of non-residential properties from approximately 380 to 710.

The location of the impacts of flooding is shown in Figure 3. Most of the impacts are within Largs, Ardrossan, Saltcoats and Stevenston with a number of different receptors impacted. The A78 is at risk of flooding at various locations including Fairlie and Ardrossan.

History of flooding

There has been regular flooding in this area for a number of years, with river flooding being the most prevalent. This has been predominately in Ardrossan, Largs and West Kilbride with reports of floods impacting roads, properties and gardens in 2002 and 2003. The most recent river flooding occurred in March and October 2004 in Saltcoats when the Penny Burn flooded the West Bryehill industrial estate.

Surface water flooding has been reported in Ardrossan, West Kilbride and Fairlie in the months of October, November and December in 1999 and 2000, with the biggest impact to roads, properties and gardens.

There have been a number of coastal floods in the area with the most recent occurring in December 2013 to January 2014 in Saltcoats. The most significant coastal flood within the area, impacting properties and people, occurred in Fairlie in November 1912.

	1 in 10 High likelihood	1 in 200 Medium likelihood	1 in 1000 Low likelihood
Residential properties (total 25,000)	220	960	1,600
Non-residential properties (total 2,000)	90	380	600
People	490	2,100	3,400
Community facilities	<10 Emergency services	<10 Includes: emergency services and healthcare facilities	<10 Includes: emergency services and healthcare facilities
Utilities assets	10	20	30
Transport links - roads (km)	5.5 (of which 2.4 is A road)	12.3 (of which 4.9 is A road)	15.6 (of which 6.4 is A road)
Transport links - rail (km)	4.0	10.8	12.5
Environmental designated areas (km ²)	0.9	1.0	1.0
Designated cultural heritage sites	5	6	10
Agricultural land (km ²)	1.0	1.4	1.8

Table 1: Summary of flooding impacts¹

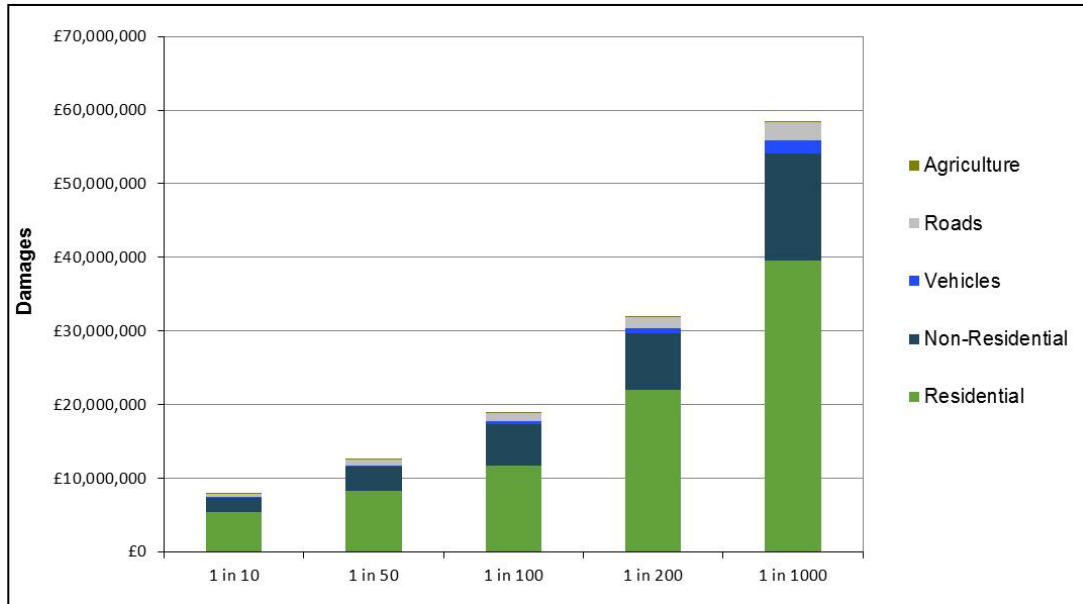


Figure 2: Damages by flood likelihood

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

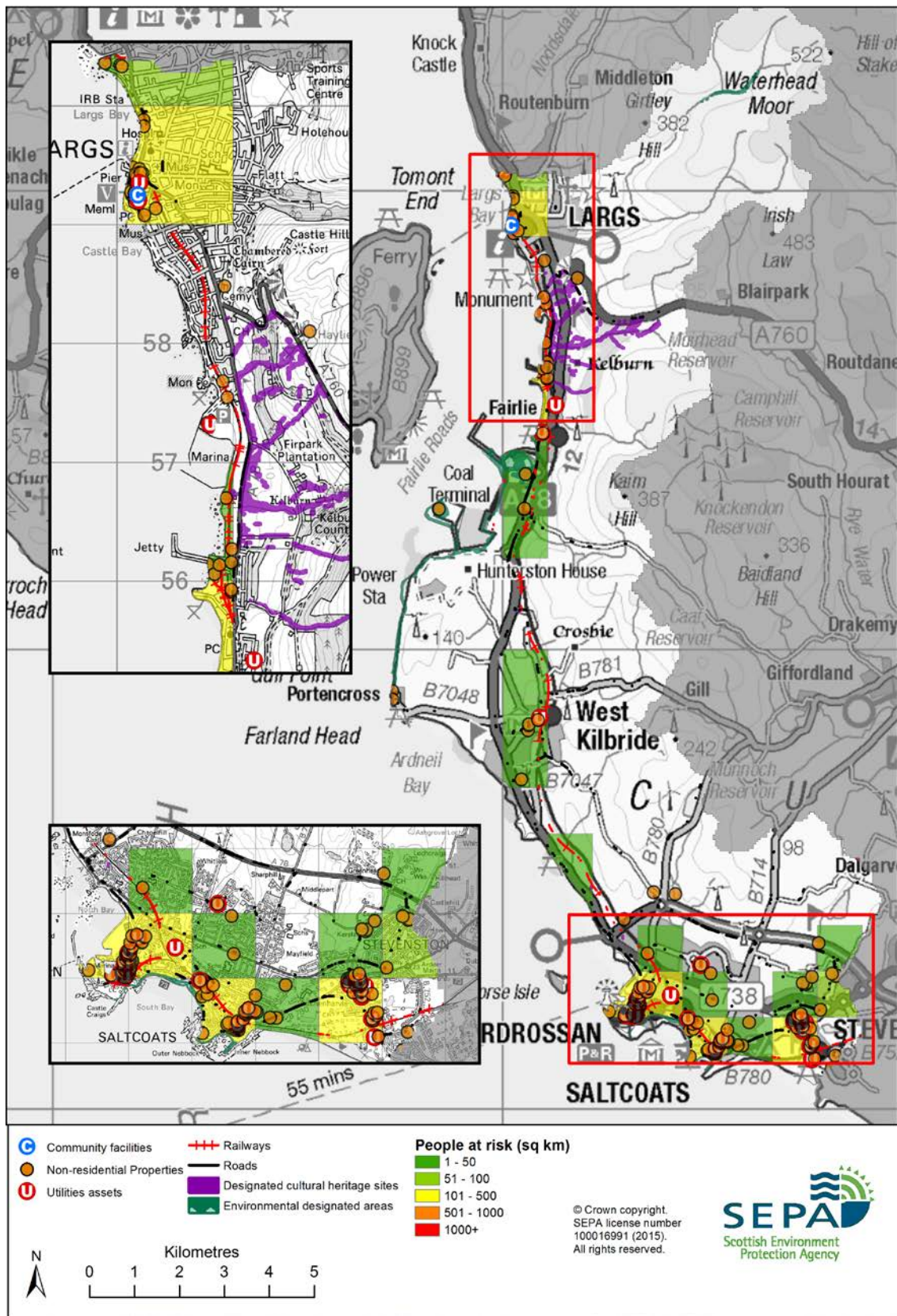


Figure 3: Impacts of flooding

Objectives to manage flooding in Potentially Vulnerable Area 12/03

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 Largs to Stevenston Potentially Vulnerable Area.

Reduce the risk of river and coastal flooding to residential properties in Largs

Indicators:

Target area:

- 200 residential properties
- £140,000 Annual Average Damages



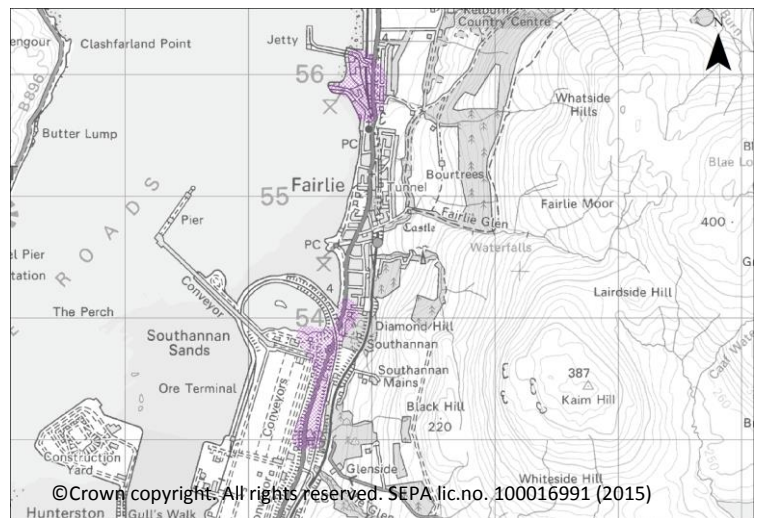
Objective ID: 12004

Reduce the risk of river flooding to residential properties and non-residential properties in Fairlie

Indicators:

Target area:

- <10 residential properties
- <10 non-residential properties
- £19,000 Annual Average Damages



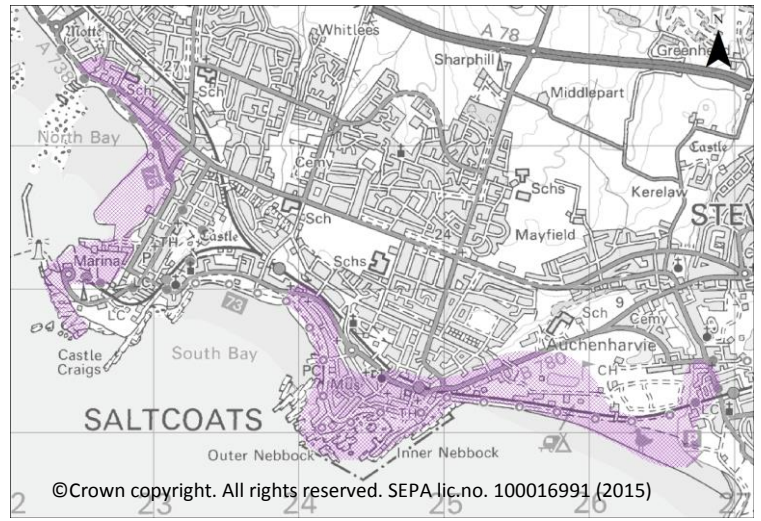
Objective ID: 12006

Reduce the risk of coastal flooding to residential properties in Ardrossan, Saltcoats and Stevenston

Indicators:

Target area:

- 10 residential properties
- £29,000 Annual Average Damages



Objective ID: 12009

Target area	Objective	ID	Indicators within PVA
Saltcoats	Reduce the physical or disruption risk related to the transport network for rail.	12300	<ul style="list-style-type: none"> • 70m of rail track at 4 locations
Kilwinning, Saltcoats, Ardrossan and Stevenston	Reduce the economic damages and risk to people from surface water flooding in Kilwinning, Saltcoats, Ardrossan and Stevenston	12041	* See note below
Applies across Ayrshire Local Plan District	Avoid an overall increase in flood risk	12039	<ul style="list-style-type: none"> • 960 residential properties • £1.2 million Annual Average Damages
Applies across Ayrshire Local Plan District	Reduce overall flood risk	12082	<ul style="list-style-type: none"> • 960 residential properties • £1.2 million Annual Average Damages
Applies across Ayrshire 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 12/03 there are 560 residential properties at risk and Annual Average Damages of £780,000.

Actions to manage flooding in Potentially Vulnerable Area 12/03

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 Largs to Stevenston Potentially Vulnerable Area.

Selected actions					
Flood protection scheme/works	<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
Maintain flood protection scheme	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

Action (ID):	FLOOD PROTECTION SCHEME/WORKS (120060006)		
Objective (ID):	Reduce the risk of river flooding to residential properties and non-residential properties in Fairlie (12006)		
Delivery lead:	Transport Scotland and Network Rail		
Status:	Under development	Indicative delivery:	2016-2021
Description:	North Ayrshire Council, Transport Scotland and Network Rail are all working in partnership on the Keppen Burn Culvert Upgrade. These works are at detailed design stage.		
Potential impacts			
Economic:	The economic impacts have not been defined at this stage.		
Social:	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:	Flood protection schemes can have both positive and negative impacts on the ecological quality of the environment depending on how they are designed.		

Action (ID):	FLOOD PROTECTION SCHEME/WORKS (12300021)		
Objective (ID):	Reduce the physical or disruption risk related to the transport network for rail. (12300)		
Delivery lead:	Network Rail		

Status:	Under development	Indicative delivery:	2016-2021
Description:	Network Rail will carry out civil engineering work which will reduce flood risk to identified sections of the rail network within this PVA		

Action (ID):	NEW FLOOD WARNING (120820010)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	SEPA		
Status:	Not started	Indicative delivery:	post 2021
Description:	The area under consideration includes properties in Fairlie affected by coastal flooding. Flood warning in this location can potentially be delivered through an extension to the Firth of Clyde flood forecasting system and warning scheme. Further assessment will help to determine appropriate timescales for delivery.		

Action (ID):	FLOOD PROTECTION STUDY (121030005)		
Objective (ID):	Reduce the risk of river and coastal flooding to residential properties in Largs (12004)		
Delivery lead:	North Ayrshire Council and South Ayrshire Council		
Priority:	National:	Within local authority:	
	8 of 168	1 of 5	
Status:	Not started	Indicative delivery:	2016-2021
Description:	A shoreline management plan is recommended, this study is not limited to Potentially Vulnerable Areas but should cover the whole of the Ayrshire coastline and any areas beyond this which may be influenced by changes in coastal processes. The study should investigate flooding and coastal erosion, wave overtopping and the current coastal protection offered. The study will help to develop an understanding of coastal issues and identify where further work may be required to mitigate against flooding.		
Potential impacts			
Economic:	The study should consider how to reduce flood risk along the Ayrshire coastline. For the entire study area potential damages avoided are estimated to be up to £26 million.		
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community.		
Environmental:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. This study is proposed for the coastline. Irvine Bay (water body ID 200021), within this study area, is identified by river basin management planning to be at less than good status. Opportunities to improve the condition of the estuary should be considered by coordinating with river basin management planning.		

Action (ID):	FLOOD PROTECTION STUDY (120040005)		
Objective (ID):	Reduce the risk of river and coastal flooding to residential properties in Largs (12004)		
Delivery lead:	North Ayrshire Council		
Priority:	National:	Within local authority:	
	90 of 168	5 of 5	
Status:	Not started	Indicative delivery:	2016-2021
Description:	<p>A study is recommended to further investigate the river and coastal flood risk in Largs and if there is significant interaction between the two. The study should include updating the existing modelling on the Gogo Water, and further investigation into enhancing and extending the existing coastal defences.</p> <p>The Ayrshire Shoreline Management Plan (action 12103005) will also cover Largs and should be used to provide background information for this study.</p>		
Potential impacts			
Economic:	The flood protection study should consider how to reduce flood risk to 201 residential properties and 72 non-residential properties in this location, with potential damages avoided of up to £3.7 million.		
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people located within the flood protection study area. In addition there are one educational building and five utilities 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 studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. There are no international, national or local level environmental designations that are likely to be impacted by this action. There is likely to be a loss of natural and semi-natural habitat in the footprint and vicinity of the defences. There is the potential for negative impacts on local water quality and disturbance to flora and fauna in Largs Bay and at the downstream end of the Gogo Water during the construction period. There is the potential for negative impacts to the numerous listed buildings in the area, and their setting, in particular the public fountain, the War Memorial and the harbour.		

Action (ID):	SURFACE WATER PLAN/STUDY (120411018)		
Objective (ID):	Reduce the economic damages and risk to people from surface water flooding in Kilwinning, Saltcoats, Ardrossan and Stevenston (12041)		
Delivery lead:	North Ayrshire Council		

Status:	Not started	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):	SURFACE WATER PLAN/STUDY (120411019)		
Objective (ID):	Reduce the economic damages and risk to people from surface water flooding in Kilwinning, Saltcoats, Ardrossan and Stevenston (12041)		
Delivery lead:	Scottish Water in partnership with North Ayrshire Council		
Status:	Not started	Indicative delivery:	2016-2021
Description:	An integrated catchment study will be 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 (120820016)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	SEPA		
Status:	Not started	Indicative delivery:	2016-2021
Description:	SEPA will seek to develop flood mapping in the Ayr to Ardrossan area to improve understanding of coastal flood risk. The extent and timing of improvements will depend on detailed scoping and data availability. Where this work coincides with local authority studies, SEPA will work collaboratively to ensure consistent modelling approaches are applied.		

Action (ID):	STRATEGIC MAPPING AND MODELLING (120820019)		
Objective (ID):	Reduce overall flood risk (12082)		
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 (120040017)		
Objective (ID):	Reduce the risk of river and coastal flooding to residential properties in Largs (12004)		
Delivery lead:	North Ayrshire Council		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Largs Flood Protection Scheme was constructed in 2002 and consists of a concrete seawall from Old Fish Quay to Gogo Water. This scheme provides protection to the area up to a 200 year flood. The Gogo Street Flood Protection Scheme was completed in 2013 to mitigate flooding from the Gogo Water to a standard of protection of a 1 in 75 year flood.</p> <p>These schemes will be maintained, and will continue to manage flooding according to the design standard at the time of construction. Levels of flood risk are likely to increase over time as a consequence of climate change.</p>		

Action (ID):	MAINTAIN FLOOD PROTECTION SCHEME (120090017)		
Objective (ID):	Reduce the risk of coastal flooding to residential properties in Ardrossan, Saltcoats and Stevenston (12009)		
Delivery lead:	North Ayrshire Council		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Saltcoats Flood Protection Scheme was constructed in 2006 and consists of breakwaters, seawalls and flood banks at Outer Nebbock. This scheme provides protection to the area up to a 200 year flood. This scheme will be maintained, and will continue to manage flooding according to the design standard at the time of construction. Levels of flood risk are likely to increase over time as a consequence of climate change.</p>		

Action (ID):	MAINTAIN FLOOD WARNING (120820030)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	SEPA		
Status:	Existing	Indicative delivery:	Ongoing
Description:	<p>Continue to maintain the Largs Fort Street, Largs Seafront and Saltcoats Harbour flood warning areas which are part of the Firth of Clyde coastal flood warning scheme.</p>		

Action (ID):	FLOOD FORECASTING (120820009)		
Objective (ID):	Reduce overall flood risk (12082)		
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):	SELF HELP (120820011)		
Objective (ID):	Reduce overall flood risk (12082)		
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 (120820013)		
Objective (ID):	Reduce overall flood risk (12082)		
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 communities and promote Floodline using most the appropriate mix of methods for the area. These could include direct mailings, education activities, participation in local events and relevant flooding messages in the media. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.		

Action (ID):	MAINTENANCE (120820007)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	North Ayrshire 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 (120820014)		
Objective (ID):	Reduce overall flood risk (12082)		
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 (120390001)		
Objective (ID):	Avoid an overall increase in flood risk (12039) Reduce overall flood risk (12082)		
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.		