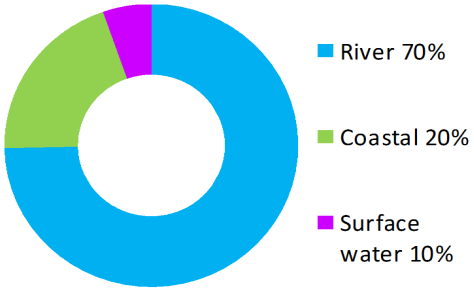
Irvine to Troon (Potentially Vulnerable Area 12/07)

Local Plan District	Local authority	Main catchment
Ayrshire	North Ayrshire Council, South Ayrshire Council	Monkton to Irvine coastal

Summary of flooding impacts



At risk of flooding

- 1,000 residential properties
- 520 non-residential properties
- £1.3 million Annual Average Damages

(damages by flood source shown left)

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.

Summary of actions to manage flooding

The actions below have been selected to manage flood risk.

Flood protection scheme/works	Natural flood management works	*New flood warning*	*Community flood action groups*	*Property level protection scheme*	*Site protection plans*
Flood protection study	*Natural flood management study*	Maintain flood warning	Awareness raising	Surface water plan/study	Emergency plans/response
Maintain flood protection scheme	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

Irvine to Troon (Potentially Vulnerable Area 12/07)

Local Plan District	Local authority	Main catchment
Ayrshire	North Ayrshire Council, South Ayrshire Council	Monkton to Irvine coastal

Background

This Potentially Vulnerable Area is located on the west coast of the Ayrshire Local Plan District between Monkton and Irvine. It is approximately 30km^2 (shown below).

There are approximately 1,000 residential properties and 520 non-residential properties at risk of flooding. The Annual Average Damages are approximately £1.3 million.

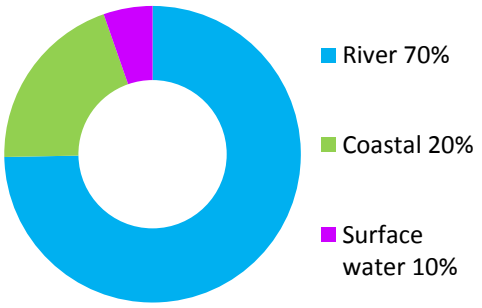


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

River flooding is predicted in Irvine from a number of small burns. One area shown to be at risk is Muirhead, with flooding attributed to the Darley Burn. This burn is culverted beneath the A759 which may cause flood water to collect upstream, affecting a number of residential properties. Sections of road and rail routes are also predicted to be impacted by flooding (notably the A78).

The area has frontage onto the Firth of Clyde, with a number of areas at risk. The area with the highest projected risk is Troon Harbour between Port Ranald Drive and South Beach Esplanade, where a number of residential properties could experience coastal flooding. Historically at this location waves have overtopped seawalls and flood water has become trapped. Past reports indicate that the shorefront to the north of Troon has exhibited periods of accumulation and erosion of sand dunes. Interaction between sources of coastal and river flooding is expected to occur in the lower reaches of the River Irvine and Gailes Burn. There is also a possibility of interaction between river and surface water flooding around Muirhead. It is locally understood that flooding generally occurs during heavy rainfall and is accentuated by high tidal conditions.

Surface water flooding is predicted to affect properties and transport routes in the area, with a potential interaction between river and surface water flooding. The areas at highest risk from surface water flooding require the preparation of surface water management plans.

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 river flooding experience the highest economic impact at approximately 65% 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 1,000 to 1,600 and the number of non-residential properties from approximately 520 to 690.

The location of the impacts of flooding is shown in Figure 3. Most of the impacts are within Irvine and Troon with flooding to people, non-residential properties, community facilities, utilities, roads and railways.

History of flooding

There are very few recorded floods within this area. River and surface water floods were reported in Barassie and Loans areas with limited impact to people and property. Coastal flooding took place at Titchfield Road in Troon in January 2014 resulting in short term road closures and the flooding of gardens. There have also been reports of coastal flooding in Troon in 1911, 1912, 1938 and 1936 which flooded seafront roads and shops.

	1 in 10 High likelihood	1 in 200 Medium likelihood	1 in 1000 Low likelihood
Residential properties (total 8,200)	50	1,000	1,400
Non-residential properties (total 1,100)	<10	520	660
People	110	2,300	3,000
Community facilities	0	<10 Includes: educational buildings and healthcare facilities	<10 Includes: educational buildings and healthcare facilities
Utilities assets	<10	20	30
Transport links - roads (km)	1.3 (of which 0.3 is A road)	4.8 (of which 0.6 is A road)	6.7 (of which 0.7 is A road)
Transport links - rail (km)	0.7	1.7	2.0
Environmental designated areas (km^2)	0.6	0.6	0.6
Designated cultural heritage sites	3	3	3
Agricultural land (km^2)	0.9	1.2	1.7

Table 1: Summary of flooding impacts[1]

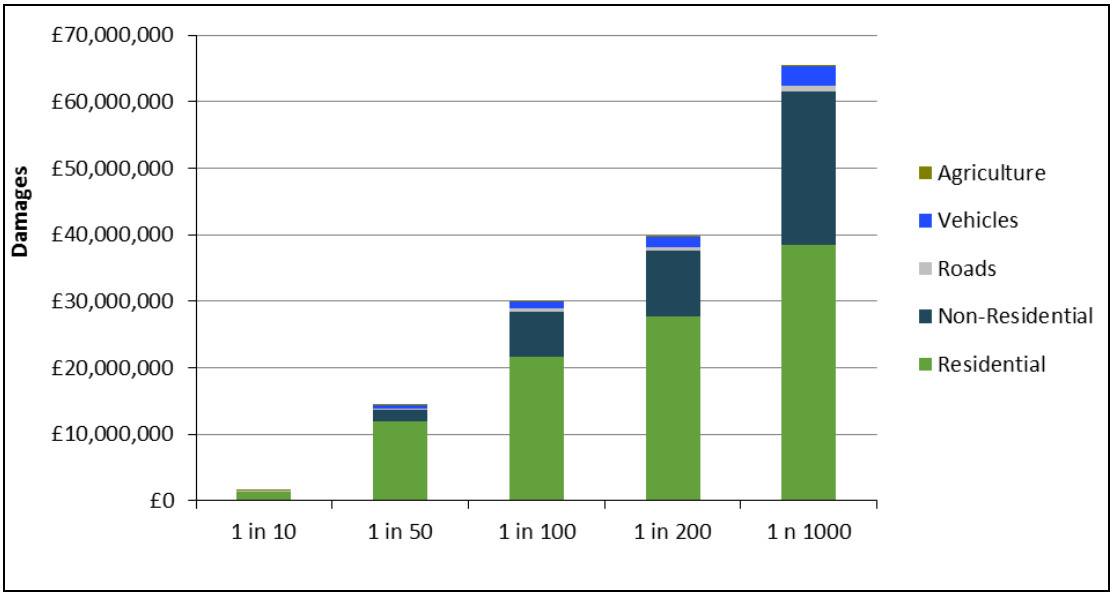


Figure 2: Damages by flood likelihood

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

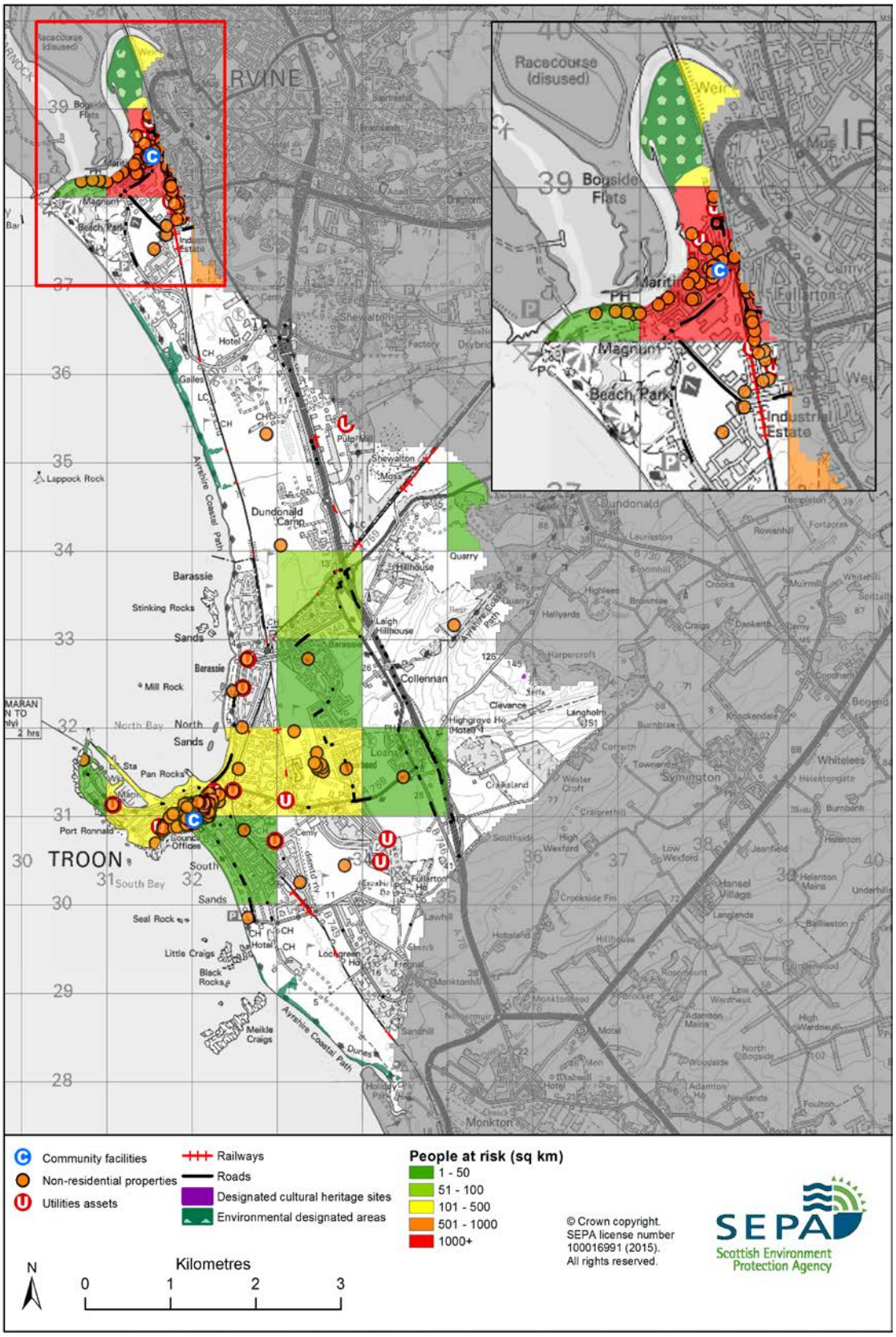
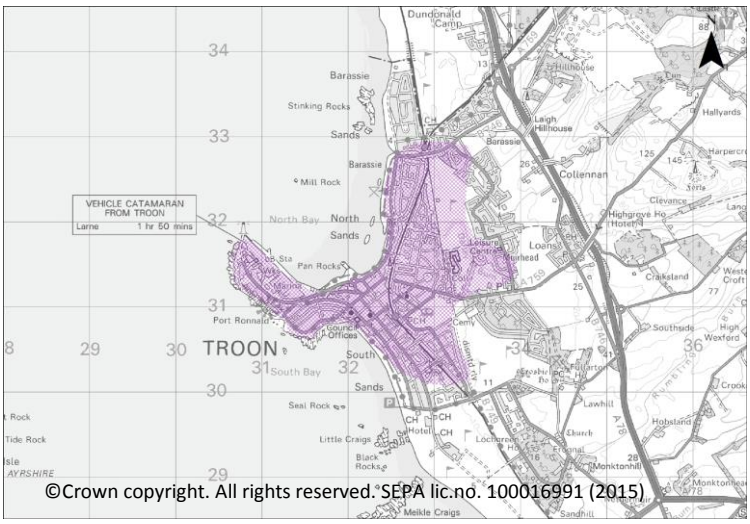


Figure 3: Impacts of flooding

Objectives to manage flooding in Potentially Vulnerable Area 12/07

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 Irvine to Troon Potentially Vulnerable Area.

Reduce the risk of coastal and surface water flooding to non-residential properties in Troon

Indicators:	Target area:
• 410 non-residential properties • £85,000 Annual Average Damages	
Objective ID: 12020	

Target area	Objective	ID	Indicators within PVA
Irvine	Reduce the economic damages and risk to people from surface water flooding in Irvine	12042	* See note below
Applies across Ayrshire Local Plan District	Avoid an overall increase in flood risk	12039	• 1,000 residential properties • £1.3 million Annual Average Damages
Applies across Ayrshire Local Plan District	Reduce overall flood risk	12082	• 1,000 residential properties • £1.3 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 12/07 there are 40 residential properties at risk and Annual Average Damages of £68,000.

Actions to manage flooding in Potentially Vulnerable Area 12/07

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 Irvine to Troon Potentially Vulnerable Area.

Selected actions					
Flood protection scheme/works	Natural flood management works	*New flood warning*	*Community flood action groups*	*Property level protection scheme*	*Site protection plans*
Flood protection study	*Natural flood management study*	Maintain flood warning	Awareness raising	Surface water plan/study	Emergency plans/response
Maintain flood protection scheme	Strategic mapping and modelling	Flood forecasting	Self help	Maintenance	Planning policies

Action (ID):	**NATURAL FLOOD MANAGEMENT WORKS** (120200004)		
Objective (ID):	Reduce the risk of coastal and surface water flooding to non-residential properties in Troon (12020)		
Delivery lead:	South Ayrshire Council		
Status:	**Existing**	Indicative delivery:	**Ongoing**
Description:	South Ayrshire Council are currently undertaking sand dune propagation in Troon, and some of the benefits of this actions are to help reduce the risk of coastal erosion and flooding. It is recommended that this should continue.		
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. There may be negative impacts through disturbance to the local community during the construction phase.		
Environmental:	Natural flood management actions can have a positive impact on the ecological quality of the environment by restoring and enhancing natural habitats. These natural flood management works are proposed for Irvine Bay (water body ID 200021). The physical condition of this coastline is identified by river basin management planning to be at less than good status. Natural flood management works are likely to improve the condition of the coastline. Proposed actions should be coordinated with river basin management planning. Sand dune restoration on the north and south sands has the potential to impact upon the coastal processes and sediment supply to the Troon Golf Links and Foreshore Site of Special Scientific Interest and		

Environmental:	the Western Gailes Site of Special Scientific Interest. These impacts could be positive or negative and would require further study. Dune restoration in the area could provide greater areas of habitat for flora and fauna to colonise.

Action (ID):	**FLOOD PROTECTION STUDY** (121030005)		
Objective (ID):	Reduce the risk of coastal and surface water flooding to non-residential properties in Troon (12020)		
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. Ayr Estuary (water body ID 200018), 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** (120200005)		
Objective (ID):	Reduce the risk of coastal and surface water flooding to non-residential properties in Troon (12020)		
Delivery lead:	South Ayrshire Council		
Priority:	National:		Within local authority:
	96 of 168		**2 of 3**
Status:	**Not started**	Indicative delivery:	**2022-2027**
Description:	A shoreline management plan is recommended for the Ayrshire coastline to gain a greater understanding of coastal issues and ensure potential mitigation actions will not create further issues elsewhere. In parallel a surface water management plan of Troon will examine		

	the surface water risk and examine actions to mitigate the risk including sustainable drainage systems. The output from these studies should be reviewed to identify the requirement to examine the feasibility of a flood protection scheme to protect against flooding in the area. Any further study should examine the most sustainable combination of actions to manage flooding.
Potential impacts	
Economic:	The flood protection study should consider how to reduce flood risk to 420 residential properties and 358 non-residential properties in this location, with potential damages avoided of up to £4 million.
Social:	A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. In addition there are two community facilities, two educational buildings and two 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 and changes in visual amenity and land use as a result of this action.
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 Irvine Bay (water body ID 200021). The physical condition of this coastline is identified by river basin management planning to be at less than good status. Future works could improve the condition of the coastline or degrade it. Opportunities to improve the condition of the coastline should be considered by coordinating with river basin management planning. The Troon Golf Links and Foreshore Site of Special Scientific Interest and the Western Gailes Site of Special Scientific Interest have the potential to be affected by any alteration in sediment movement or erosion patterns caused by the structures. Direct defences can lead to erosion of the sand dunes and beach within and along the coast from where the actions are proposed due to effects on coastal processes. This results in the loss of natural habitat and could increase flood risk to other areas currently protected by the sand dunes. This is particularly true in this area as there is long-shore drift. Changes to coastal processes could benefit the Troon Golf Links and Foreshore and the Western Gailes Sites of Special Scientific Interest by reducing erosion and increasing sediment supply, or result in an adverse effect through increased erosion and a reduction in sediment supply. There may be the permanent loss of habitat from the footprint of new defences. There is the potential for slight positive impacts on water quality from the implementation of sustainable drainage systems in the area. There is potential for negative impacts on the visual setting of the war memorial heritage structure on South Beach Esplanade and the setting of the Troon Heritage Conservation Area.

Action (ID):	**SURFACE WATER PLAN/STUDY** (120422018)
Objective (ID):	Reduce the economic damages and risk to people from surface water flooding in Irvine (12042)
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** (120422019)		
Objective (ID):	Reduce the economic damages and risk to people from surface water flooding in Irvine (12042)		
Delivery lead:	Scottish Water in partnership with North Ayrshire Council		
Status:	**Not started**	Indicative delivery:	**2016-2021**
Description:	An integrated catchment study for Irvine is under development which will assess flood mitigation actions in detail. As this study progresses it should further investigate in detail the potential benefit of natural flood management for runoff control to Irvine.		

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** (120200017)		
Objective (ID):	Reduce the risk of coastal and surface water flooding to non-residential properties in Troon (12020)		
Delivery lead:	South Ayrshire Council		
Status:	**Existing**	Indicative delivery:	**Ongoing**
Description:	In Troon there are sections of seawalls, rock armour and gabion mattresses running from the golf club to the harbour and north of the harbour to Beach Road. These defences offer some level of protection to the properties in this area. These defences 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.		

Action (ID):	**MAINTAIN FLOOD WARNING** (120820030)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	SEPA		
Status:	**Existing**	Indicative delivery:	**Ongoing**
Description:	Continue to maintain the Troon Coastal, Troon Central and Prestwick Links Road flood warning areas which are part of the Firth of Clyde coastal flood warning scheme.		

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. From 2016 SEPA will engage with the community through local participation in national initiatives, including partnership working with Neighbourhood Watch Scotland. In addition, SEPA will engage with local authorities and community resilience groups where possible. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.		

Action (ID):	**MAINTENANCE** (120820007)		
Objective (ID):	Reduce overall flood risk (12082)		
Delivery lead:	Local authorities, 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. South Ayrshire Council inspects the coastal defences in this area on an annual basis and undertakes additional reactive inspections as and when required. There is an annual prioritised maintenance programme for coastal defences in the South Ayrshire Council area		

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.		