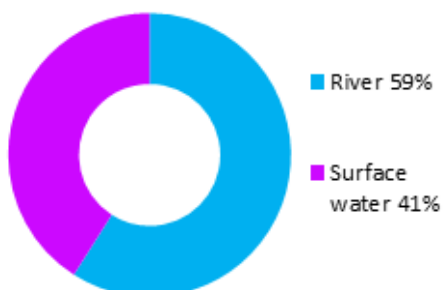


Hillfoots Villages (Potentially Vulnerable Area 09/04)

| Local Plan District | Local authority | Main catchment |
|---------------------|---|----------------|
| Forth | Clackmannanshire Council, Stirling Council | River Devon |

Summary of flooding impacts



At risk of flooding

- 720 residential properties
- 170 non-residential properties
- £1.6 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> | <i>New flood warning</i> | 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 |

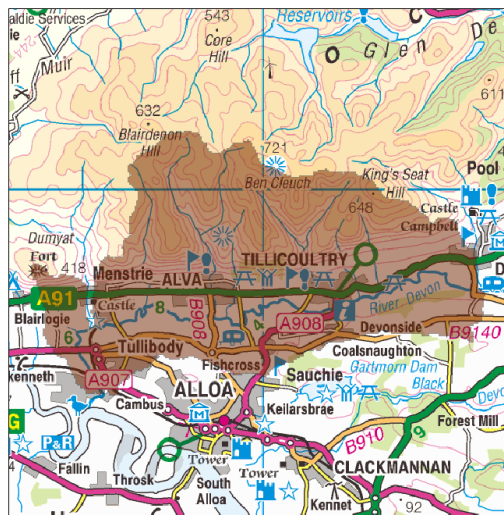
Actions

Hillfoots Villages (Potentially Vulnerable Area 09/04)

| Local Plan District | Local authority | Main catchment |
|---------------------|--|----------------|
| Forth | Clackmannanshire Council, Stirling Council | River Devon |

Background

This Potentially Vulnerable Area is 61km² and is part of the Stirling catchment (shown below). This is a large, very steep catchment which covers the Hillfoots villages including Menstrie, Alva, Tullibody, Dollar and Tillicoultry. This catchment is considered particularly flashy and is at risk of flooding from many small burns, including the Menstrie Burn, Alva Burn and Tillicoultry Burn. There is also risk of flooding from the River Devon.



The area has a risk of river and surface water flooding. The majority of damages in this Potentially Vulnerable Area are caused by river flooding.

There are approximately 720 residential properties and 170 non-residential properties at risk of flooding. The Annual Average Damages are approximately £1.6 million.

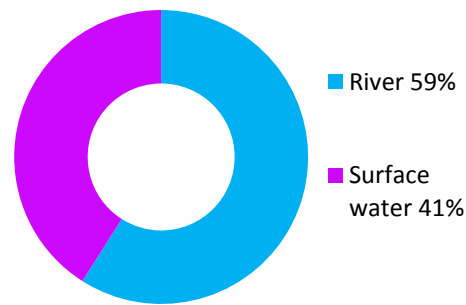


Figure 1: Annual Average Damages by flood source

Summary of flooding impacts

The risk of river flooding is greatest from the Tillicoultry Burn, the Menstrie Burn and the Alva Burn, as well as from the River Devon to Tillicoultry, Menstrie and Alva. The highest risk of surface water flooding is in Alva, Tillicoultry, Menstrie and Dollar.

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. For this Potentially Vulnerable Area the highest damages are to residential properties followed by damages to non-residential properties. The transport network within this area is also known to be prone to flooding, notably the road links across the River

Devon to the Hillfoots Villages including the A91, which is a main route for Clackmannanshire. The location of the impacts of flooding is shown in Figure 3.

The figures presented for Annual Average Damages include damages to residential properties, non-residential properties, transport and agriculture.

| | 1 in 10 High likelihood | 1 in 200 Medium likelihood | 1 in 1000 Low likelihood |
|---|--------------------------------------|---------------------------------------|---------------------------------------|
| Residential properties (total 11,000) | 140 | 720 | 860 |
| Non-residential properties (total 790) | 30 | 170 | 220 |
| People | 310 | 1,600 | 1,900 |
| Community facilities | 0 | <10 Educational buildings | <10 Educational buildings |
| Utilities | <10 | 40 | 40 |
| Transport links (excluding minor roads) | 3 A roads, 3 B roads at 63 locations | 3 A roads, 3 B roads at 100 locations | 3 A roads, 3 B roads at 133 locations |
| Environmental designated areas (km ²) | 0.1 | 0.1 | 0.1 |
| Designated cultural heritage sites | 6 | 6 | 6 |
| Agricultural land (km ²) | 3.4 | 4.8 | 5.5 |

Table 1: Summary of flooding impacts

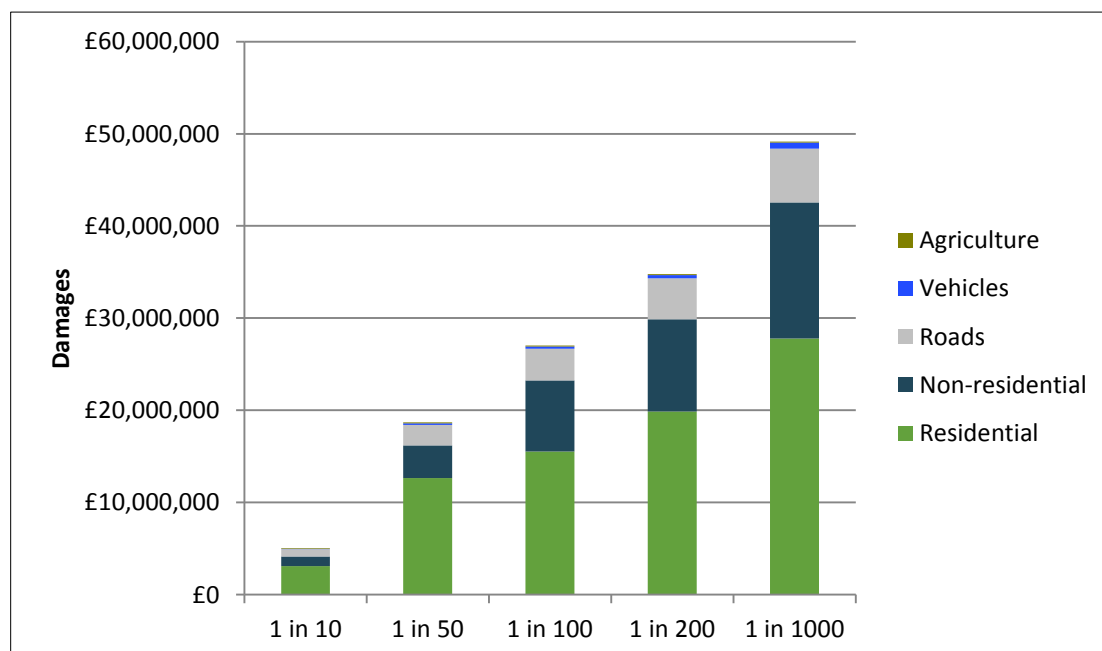


Figure 2: Damages by flood likelihood

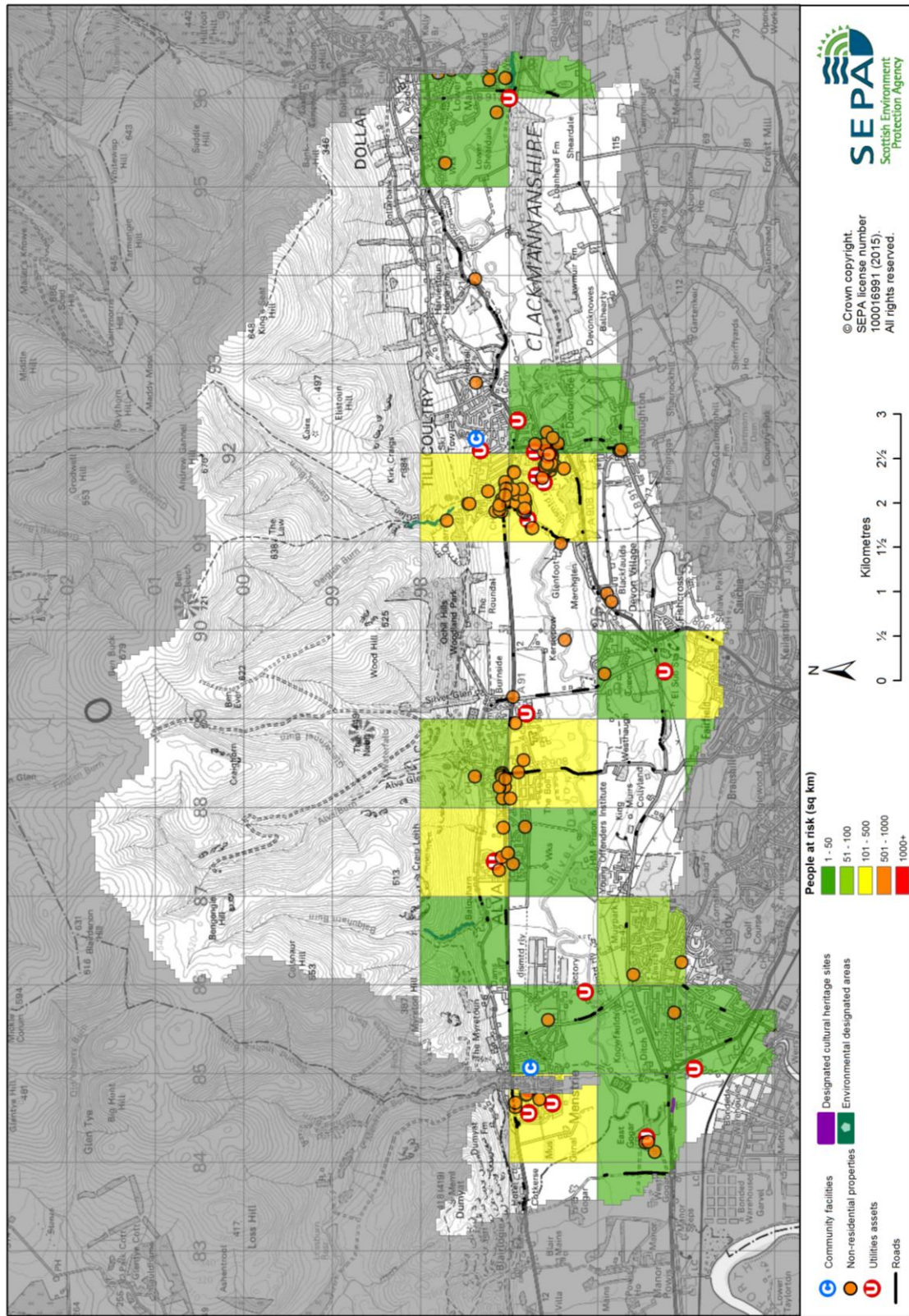


Figure 3: Impacts of flooding

History of flooding

There is a long history of flooding in this area. The following significant floods have been recorded in this area:

- 29 August 2012: Menstrie Burn flooding affected approximately 20 properties, and necessitated the evacuation of Menstrie House care home and the closing of the A91 road.
- 21 August 2012: Surface water flooding affected approximately 15 properties in Dollar on Princes Crescent, Tarmangie Drive, The Ness and White Wisp Gardens.
- 6 August 2012: Very heavy rainfall caused a large surface water flood in Dollar. Approximately 20 properties were directly affected on Princes Crescent, Tarmangie Drive, The Ness and White Wisp Gardens in Dollar.
- 20 January 2011: All of the main access roads to/from Tillicoultry were closed due to flooding from the River Devon.
- 28 September 2009: Menstrie Burn flooding caused seven homes to be evacuated in Ochil Road.
- 25 January 2008: River Devon burst its banks after 182mm of rain fell in just three days. Four commercial properties and 15 residential properties were flooded on Elistoun Drive and surrounding roads.
- 9 August 2004: 30-40 properties around Burnside Road, Menstrie were affected by flooding from the Menstrie Burn. This flooding was exacerbated by tree debris and the failure of a metal bridge in Menstrie.
- 28 August 1877: Heavy overnight rainfall resulted in the overtopping of both the Quarrel Burn and River Devon leading to the death of two people in Tillicoultry. Much of the town was inundated with flood waters and multiple bridges and homes were washed away. There was extensive damage to property in Dollar. Alloa railway station and Alloa Brewery were submerged.
- 10 October 1845: Flooding from the Black Devon resulted in the death of one person.
- 1785: Flooding of River Devon caused the bridge over the River Devon to collapse at Racks Mill, Dollar.

Objectives to manage flooding in Potentially Vulnerable Area 09/04

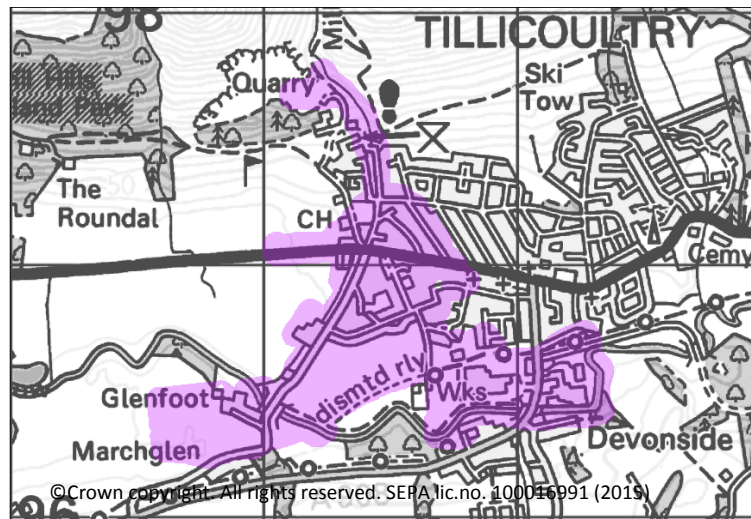
Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target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

Reduce economic damages to residential and non-residential properties in Tillicoutry caused by flooding from the River Devon and Tillicoutry Burn

Indicators:

- £320,000 Annual Average Damages from residential properties
- £170,000 Annual Average Damages from non-residential properties

Target area:



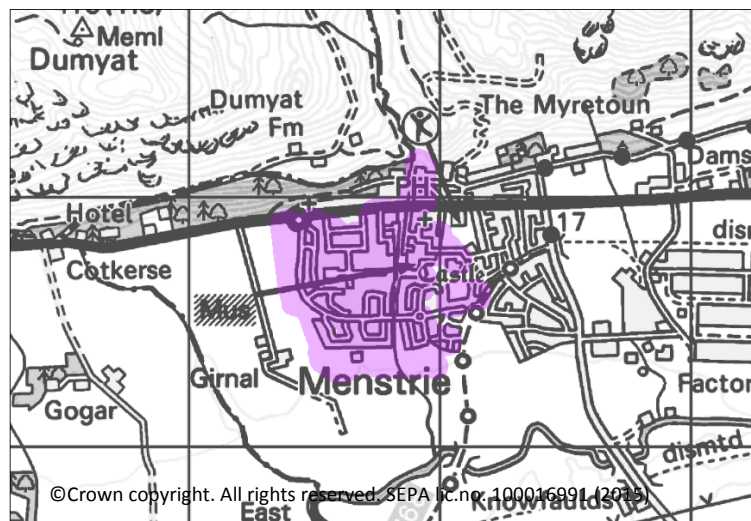
Objective ID: 9010

Reduce economic damages to residential and non-residential properties, flood risk to community facilities and risk to people in Menstrie caused by flooding from the Menstrie Burn

Indicators:

- 330 people
- £210,000 Annual Average Damages from residential properties
- £20,000 Annual Average Damages from non-residential properties
- One educational building

Target area:



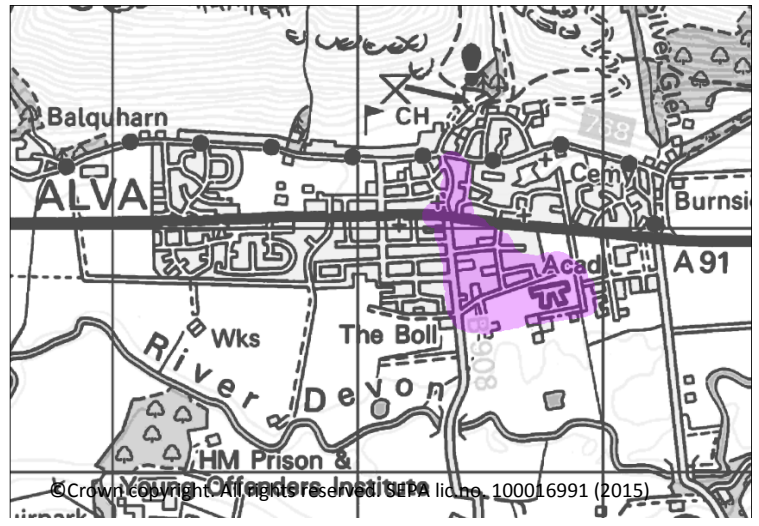
Objective ID: 9011, 9013

Reduce economic damages to residential and non-residential properties in Alva caused by flooding from the River Devon, Alva Burn and unnamed burns

Indicators:

Target area:

- £31,000 Annual Average Damages from residential properties
- £4,900 Annual Average Damages from non-residential properties



Objective ID: 9012

| Target area | Objective | ID | Indicators within PVA |
|--|---|------|---|
| Dollar | Reduce economic damages and number of residential properties at risk of surface water flooding in Dollar where practical | 9008 | * See note below |
| Alloa, Alva, Menstrie, Tillicoultry, Coalsnaughton and Devonside | Reduce economic damages and number of residential properties at risk of surface water flooding in Alloa, Alva, Menstrie, Tillicoultry, Coalsnaughton and Devonside where practical | 9026 | * See note below |
| Applies across Forth Local Plan District | Avoid an overall increase in flood risk | 9001 | <ul style="list-style-type: none"> • 720 residential properties • £1.6 million Annual Average Damages |
| Applies across Forth Local Plan District | Reduce overall flood risk | 9032 | <ul style="list-style-type: none"> • 720 residential properties • £1.6 million Annual Average Damages |
| Applies across Forth 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 09/04 there are 270 residential properties at risk and Annual Average Damages of £640,000.

Actions to manage flooding in Potentially Vulnerable Area 09/04

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 the Hillfoots Villages Potentially Vulnerable Area.

| Selected actions | | | | | |
|--------------------------------------|---------------------------------------|--------------------------|--------------------------------------|---|------------------------------|
| <i>Flood protection scheme/works</i> | <i>Natural flood management works</i> | <i>New flood warning</i> | 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): | FLOOD PROTECTION STUDY (90100005) | | |
| Objective (ID): | Reduce economic damages to residential and non-residential properties in Tillicoultry caused by flooding from the River Devon and Tillicoultry Burn (9010) | | |
| Delivery lead: | Clackmannanshire Council | | |
| Priority: | National: | | Within local authority: |
| | 21 of 168 | | 1 of 2 |
| Status: | Not started | Indicative delivery: | 2016-2021 |
| Description: | A flood protection study has been recommended for Tillicoultry to assess whether flood storage, direct flood defences, and sediment management could reduce flood risk. The study should also investigate the viability of property level protection. The study should take a catchment approach and consider the potential benefits and disbenefits and interaction between actions upstream and downstream. | | |
| Potential impacts | | | |
| Economic: | The study could benefit 319 residential properties and 95 non-residential properties at risk of flooding in this location, with potential damages avoided of up to £13 million. | | |
| Social: | Social impacts will depend on the outcome of the study and recommended actions. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. In addition the study could benefit four utilities and two roads located within the study area. | | |
| Environmental: | Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment and designated sites. Where possible opportunities to | | |

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| Environmental: | enhance and restore the environment should be sought, for example through natural flood management. Conservation areas and listed buildings are also present in the study area and could be positively or negatively impacted. |
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|--------------------------|--|-------------------------|------------------|
| Action (ID): | FLOOD PROTECTION STUDY (90110005) | | |
| Objective (ID): | Reduce economic damages to residential and non-residential properties, flood risk to community facilities and risk to people in Menstrie caused by flooding from the Menstrie Burn (9011, 9013) | | |
| Delivery lead: | Clackmannanshire Council | | |
| Priority: | National: | Within local authority: | |
| | 61 of 168 | 2 of 2 | |
| Status: | Ongoing | Indicative delivery: | 2016-2021 |
| Description: | <p>A flood protection / natural flood management study should be carried out for Menstrie. Initial study has been completed following a flood event on 29 August 2012. Most of the short-term and maintenance-related matters identified in the study have been addressed. Further information about rainfall and gauge data for the catchment is being gathered to inform further modelling and consequent economic appraisal of possible direct defences. The natural flood management component should build on existing natural flood management works, but look at the wider catchment area and should examine run off control and sediment management. Further assessment should also be undertaken to assess the potential benefits of a property level protection scheme in Menstrie. Due to very short flood warning times, automatic property level protection would be recommended. The study might lead to implementation of actions at later stages of the flood risk management cycle, subject to availability of funding.</p> | | |
| Potential impacts | | | |
| Economic: | The study could benefit 149 residential properties and 10 non-residential properties at risk of flooding in this location, with potential damages avoided of up to £5.8 million. Thirty-five of these residential and non-residential properties are at risk from high likelihood events and may benefit from natural flood management actions. | | |
| Social: | Social impacts will depend on the outcome of the study and recommended actions. 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 one community facility is located within the study area and could benefit from potential actions. Natural flood management actions can restore and enhance natural environments and create opportunities for recreation and tourism. | | |
| Environmental: | Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment and designated sites. Where possible opportunities to enhance and restore the environment should be sought, for example through natural flood management. Listed buildings and ancient woodlands are also present in the study area and could be positively or negatively impacted. | | |

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|------------------------|--|----------------------|------------------|
| Action (ID): | SURFACE WATER PLAN/STUDY (90080018) | | |
| Objective (ID): | Reduce economic damages and number of residential properties at risk of surface water flooding in Dollar where practical (9008) | | |
| Delivery lead: | Clackmannanshire 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. | | |

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|------------------------|--|----------------------|------------------|
| Action (ID): | SURFACE WATER PLAN/STUDY (90260018) | | |
| Objective (ID): | Reduce economic damages and number of residential properties at risk of surface water flooding in Alloa, Alva, Menstrie, Tillicoultry, Coalsnaughton and Devonside where practical (9026) | | |
| Delivery lead: | Clackmannanshire Council | | |
| Status: | Not started | Indicative delivery: | 2016-2027 |
| 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. | | |

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|------------------------|---|----------------------|------------------|
| Action (ID): | SURFACE WATER PLAN/STUDY (90260019) | | |
| Objective (ID): | Reduce economic damages and number of residential properties at risk of surface water flooding in Alloa, Alva, Menstrie, Tillicoultry, Coalsnaughton and Devonside where practical (9026) | | |
| Delivery lead: | Scottish Water in partnership with local authorities | | |
| Status: | Ongoing | 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 (90320019) | | |
| Objective (ID): | Reduce overall flood risk (9032) | | |
| 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. | | |

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|------------------------|--|----------------------|----------------|
| Action (ID): | MAINTAIN FLOOD PROTECTION SCHEME (90100017) | | |
| Objective (ID): | Reduce economic damages to residential and non-residential properties in Tillicoultry caused by flooding from the River Devon and Tillicoultry Burn (9010) | | |
| Delivery lead: | Clackmannanshire Council | | |
| Status: | Existing | Indicative delivery: | Ongoing |
| Description: | Continue to maintain the existing formal flood defences along the River Devon. | | |

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|------------------------|---|----------------------|----------------|
| Action (ID): | MAINTAIN FLOOD WARNING (90320030) | | |
| Objective (ID): | Reduce overall flood risk (9032) | | |
| Delivery lead: | SEPA | | |
| Status: | Existing | Indicative delivery: | Ongoing |
| Description: | Continue to maintain the Rackmill Dollar, Sterling Mills Tillicoultry, Glenfoot Bridge at Marchglen, River Devon at Alva, River Devon at Cambus Weir and the Menstrie Industrial Site flood warning areas which are part of the Devon river flood warning scheme. | | |

| | | | |
|------------------------|--|----------------------|----------------|
| Action (ID): | FLOOD FORECASTING (90320009) | | |
| Objective (ID): | Reduce overall flood risk (9032) | | |
| 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. | | |

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|------------------------|--|----------------------|----------------|
| Action (ID): | COMMUNITY FLOOD ACTION GROUPS (90100012) | | |
| Objective (ID): | Reduce economic damages to residential and non-residential properties in Tillicoultry caused by flooding from the River Devon and Tillicoultry Burn (9010) | | |
| Delivery lead: | Community | | |
| Status: | Existing | Indicative delivery: | Ongoing |
| Description: | Tillicoultry Flood Action Group operates in this area. The group aims to increase community resilience to flooding. | | |

| | | | |
|------------------------|---|----------------------|----------------|
| Action (ID): | COMMUNITY FLOOD ACTION GROUPS (90110012) | | |
| Objective (ID): | Reduce economic damages to residential and non-residential properties, flood risk to community facilities and risk to people in Menstrie caused by flooding from the Menstrie Burn (9011, 9013) | | |
| Delivery lead: | Community | | |
| Status: | Existing | Indicative delivery: | Ongoing |
| Description: | Menstrie (The Charrier) Flood Action Group operates in this area. The groups aim to increase community resilience to flooding. | | |

| | | | |
|------------------------|---|----------------------|----------------|
| Action (ID): | COMMUNITY FLOOD ACTION GROUPS (90120012) | | |
| Objective (ID): | Reduce economic damages to residential and non-residential properties in Alva caused by flooding from the River Devon, Alva Burn and unnamed burns (9012) | | |
| Delivery lead: | Community | | |
| Status: | Existing | Indicative delivery: | Ongoing |
| Description: | Alva (Cochrane Crescent/ Grodwell Drive) Community Flood Action Group operates in this area. | | |

| | | | |
|------------------------|---|----------------------|----------------|
| Action (ID): | SELF HELP (90320011) | | |
| Objective (ID): | Reduce overall flood risk (9032) | | |
| 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. | | |

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|------------------------|---|----------------------|----------------|
| Action (ID): | AWARENESS RAISING (90320013) | | |
| Objective (ID): | Reduce overall flood risk (9032) | | |
| 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 (90320007) | | |
| Objective (ID): | Reduce overall flood risk (9032) | | |
| 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. | | |

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|------------------------|---|----------------------|----------------|
| Action (ID): | EMERGENCY PLANS/RESPONSE (90320014) | | |
| Objective (ID): | Reduce overall flood risk (9032) | | |
| 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> | | |

| | | | |
|------------------------|---|----------------------|----------------|
| Action (ID): | PLANNING POLICIES (90010001) | | |
| Objective (ID): | Avoid an overall increase in flood risk (9001) Reduce overall flood risk (9032) | | |
| 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> | | |