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Authorised By	Ray Montgomery
Designation	Head of Infrastructure
Date	25/02/15

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REPORT TO: Members' Library Service

MEETING DATE:

BY: Depute Chief Executive - Partnership and Community Services

SUBJECT: Flood Risk Management Strategy

1 PURPOSE

- 1.1 To update Members on the Flood Risk Management Strategy and Local Flood Risk Management Plan process and to advise Members of the Public Consultation.

2 RECOMMENDATIONS

- 2.1 That Members note the ongoing process of producing a Flood Risk Management Strategy & Local Flood Risk Management Plan (LFRMP) and the information published for the Public Consultation.

3 BACKGROUND

- 3.1 A report to the Cabinet meeting in May 2014 outlined the requirements of the Flood Risk Management (Scotland) Act 2009 and recommended approval of the Coastal Characterisation Report as part of the ongoing Flood Risk Management Strategy process.
- 3.2 A report to the Cabinet meeting in October 2014 recommended approval of the Objectives and Short List of Actions as part of the ongoing Flood Risk Management Strategy process.
- 3.3 A Public Consultation on SEPA's Flood Risk Management Strategy commenced in December 2014 with the publication of the Characterisation Reports. Characterisation Reports for the East Lothian PVAs are attached to this Report.
- 3.4 In March 2015, the Short List of Actions & LFRMP Delivery Plans will be published as the second phase of the Public Consultation. The Public Consultation will close in June 2015.

- 3.5 The Short List of Actions has been appraised by SEPA and grouped into Factsheets for Objectives and Potential Actions for each Potentially Vulnerable Area (PVA). Factsheets for the East Lothian PVAs are attached to this Report.
- 3.6 A Delivery Plan for the Actions identified in the Factsheets has been produced for the Forth Estuary Local Plan District (FELPD) by the Lead Local Authority (City of Edinburgh Council) in conjunction with the other Local Authorities in the FELPD. The LFRMP Delivery Plans for the East Lothian PVAs are attached.
- 3.7 The full document for the Forth Estuary Local Plan District (LPD10) Public Consultation is also attached to this Report.

4 POLICY IMPLICATIONS

- 4.1 The Flood Risk Management (Scotland) Act 2009 places a statutory responsibility on the Local Authority to exercise their flood risk related functions with a view to reducing overall flood risk and complying with the EC Floods Directive. A key responsibility is the preparation of a Flood Risk Management Strategy & Local Flood Risk Management Plan in accordance with the Directive.

5 EQUALITIES IMPACT ASSESSMENT

- 5.1 This report is not applicable to the well being of equalities groups and an Equalities Impact Assessment is not required.

6 RESOURCE IMPLICATIONS

- 6.1 Financial - The financial provision for the preparation of the Flood Risk Management Strategy and Plans will be allocated from the 2014/15 and 2015/16 Flooding and Coastal Protection budgets.

Provision for Flood Protection Works identified in the Flood Risk Management Plan will be required in future years and will be influenced by future settlements from the Scottish Government

- 6.2 Personnel - None
- 6.3 Other - None

7 BACKGROUND PAPERS

- 7.1 Appendix 1 – LPD 10 Public Consultation Document East Lothian PVAs
- 7.2 Appendix 2 – LPD 10 Public Consultation Document (Full). Please note that, due to the size of the document, appendix 2 is published in two parts in Members' Library Bullet Refs: 32/15 and 33/15 - March 2015 Bulletin.

AUTHOR'S NAME	David Northcott
DESIGNATION	Team Manager - Structures, Flooding & Street Lighting
CONTACT INFO	David Northcott
DATE	25/02/15

Musselburgh (Potentially Vulnerable Area 10/21)

Local Plan District	Local Authorities	Main Catchment
10 Forth Estuary	City of Edinburgh Council, East Lothian Council	Edinburgh Coastal

Background

This Potentially Vulnerable Area covers an area of 12km² and is part of the Almond and Edinburgh Group catchment. This is a small sized, partially urbanised area in the north east of the catchment covering Musselburgh (Figure 1). Its main watercourse is the River Esk which passes through the centre of Musselburgh before discharging into the Firth of Forth at Fisherrow Sands.

The majority of damages are caused by river flooding (Figure 2). The highest risk of river flooding is from the River Esk to Musselburgh. The highest risk of coastal flooding is from the Firth of Forth to Musselburgh and Inveresk. The highest risk of surface water flooding is in Wallyford and Pinkie Brae (Musselburgh).

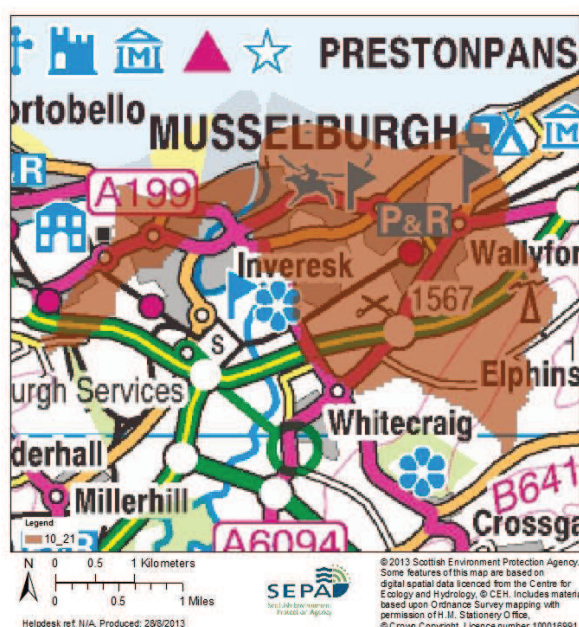


Figure 1: Musselburgh Potentially Vulnerable Area

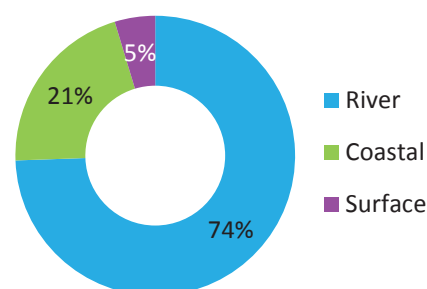


Figure 2: Annual Average Damages by flood source

Summary of flooding impacts

Approximately 1,300 residential properties and 270 non-residential properties are at a medium likelihood of flooding from one or more sources. A summary of the impacts from flooding can be seen in Table 1 and a map showing the impacts from all sources at a medium likelihood of flooding can be seen in Figure 4.

The total Annual Average Damages from all sources of flooding are approximately £3.2 million. This includes damages to residential properties, non-residential properties, transport and agriculture. The economic damages incurred for each return period can be seen in Figure 3. For this Potentially Vulnerable Area the highest

damages are to residential properties followed by damages to non-residential properties.

In 2010 Scottish Water carried out a Flood Risk Assessment Study of water and wastewater assets across Scotland. Of the assets assessed, one wastewater asset was identified as being at risk of flooding within this Potentially Vulnerable Area.

	High likelihood	Medium likelihood	Low likelihood
No. of residential properties	280	1,300	1,600
No. of non-residential properties	60	270	320
No. of people	620	2,800	3,500
Community facilities	<10 Educational buildings <10 Care homes	<10 Educational buildings <10 Care homes	<10 Educational buildings <10 Care homes
Utilities	<10 Energy sites	~10 Energy sites <10 Scottish Water assets	~10 Energy sites <10 Scottish Water assets
Transport links (excluding minor roads)	7 Roads affected at 26 locations <ul style="list-style-type: none"> • 5 A roads • 2 B roads 1 Railway route affected at 6 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	7 Roads affected at 83 locations <ul style="list-style-type: none"> • 5 A roads • 2 B roads 1 Railway route affected at 11 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	8 Roads affected at 106 locations <ul style="list-style-type: none"> • 5 A roads • 3 B roads 1 Railway route affected at 11 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh
Environmental designated areas (km²)	0.3km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC 	0.3km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC 	0.3km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC
No. of cultural heritage sites	9	10	10
Agricultural land (km²)	0.3km ²	0.6km ²	0.7km ²

Table 1: Summary of flood impacts from all sources

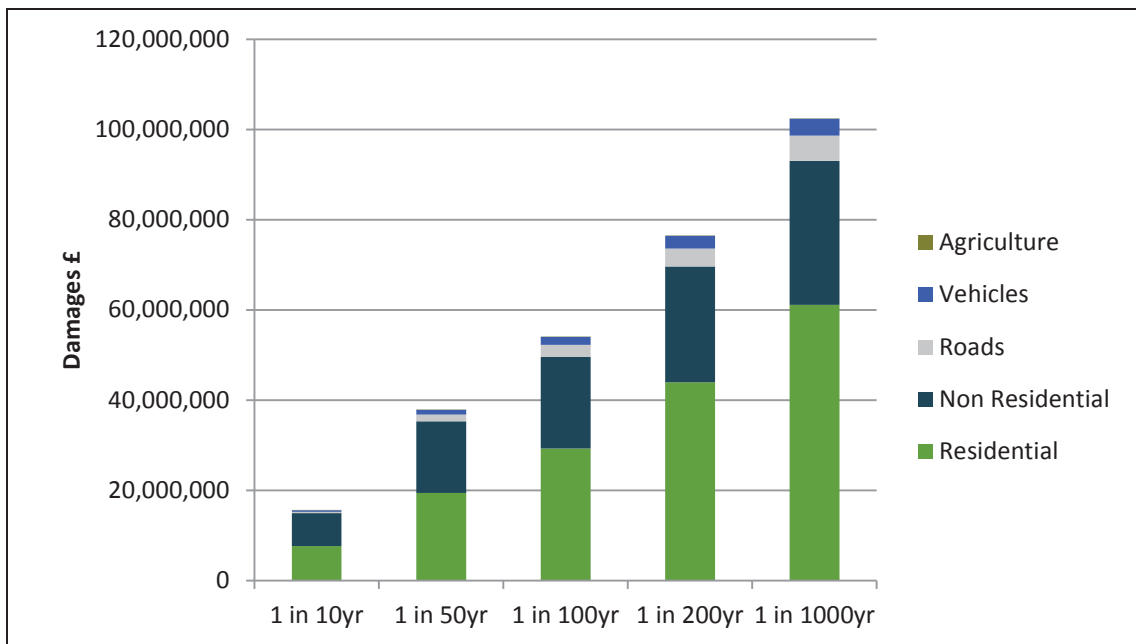


Figure 3: Damages by flood frequency

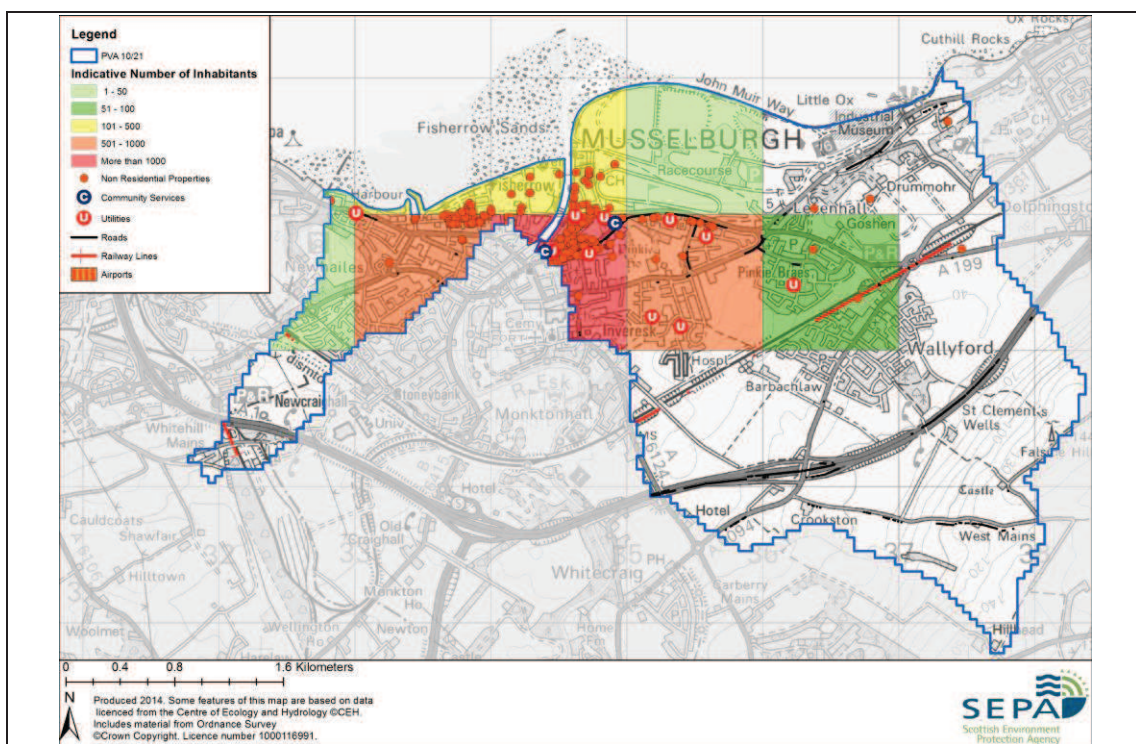


Figure 4: Impacts from all sources at a medium likelihood of flooding

History of flooding

The following river flood event has been identified as significant in this Potentially Vulnerable Area:

- 13 August 1948, River Esk: Evacuation required in Musselburgh after flooding occurred in Eskside West, Eskside East, Shorthope Street, Millhill and areas of the High Street.

The following coastal flood event has been identified as significant in this Potentially Vulnerable Area:

- 30 March 2010: A tidal surge coinciding with the highest mean tides of the year caused extensive flooding along the East Coast of Scotland, with the Firth of Forth being one of the worst affected areas. Locations within this coastal area affected included Leith, Musselburgh, Prestonpans, Port Seton, Dunbar and North Berwick. Impacts included flooding of properties, damage to harbours, seawalls and roads with Edinburgh City Council estimating the costs to repair damages in the region of £650,000.

In addition to the above, there is a history of groundwater flooding in Musselburgh, particularly around the Pinkie area.

Summary of existing local actions to manage risk

There are no formal flood protection schemes in this Potentially Vulnerable Area. However, other actions and natural features may reduce the risk of flooding. These are referenced in the river, coastal and surface water flooding reports.

There are three flood warning target areas within this Potentially Vulnerable Area:

- Musselburgh - River flood warning, Esk;
- Portobello Esplanade - Coastal flood warning, Firth of Forth;
- Musselburgh Coastal - Coastal flood warning, Firth of Forth.

SEPA and the local authorities work closely with many other organisations that have flooding related duties and interests. These include the police, fire and rescue services, the Scottish Government and the Scottish Flood Forum. SEPA and the local authorities, often in partnership with these organisations, undertake various awareness raising campaigns that include community events, information leaflets, educational plays in schools, the use of social media and advertising.

In addition to the above, the following community groups are known to help with flood resilience within this Potentially Vulnerable Area:

- East Lothian Bio-diversity Group;
- East Lothian Tenants and Residents Panel;
- Musselburgh Waterfront Group;
- Musselburgh and Inveresk Community Council.

Numerous local community councils also operate throughout the East Lothian Council.

The following local incentives or subsidies have been put in place in order to provide property owners with property level resilience/resistance measures:

- The City of Edinburgh Council owns 450m of temporary pallet barriers that can be utilised to protect properties from river flooding. In addition to this, the Council has 8,000 sandbags and there are a further 1,500 sandbags located in fire stations throughout the city which can be utilised by the public during

flood events. The Council also operates Emergency Action Packs that are used to determine where people should be deployed during flood events. This includes drawings, maps and sandbag construction drawings;

- East Lothian Council strategically deploy temporary flood barriers and sand bags when properties are threatened by flooding.

Musselburgh

Potentially Vulnerable Area 10/21

Objectives and potential actions

Unless otherwise stated, information on the following objectives is contained in this document.

IMPORTANT; potential actions that apply across the whole local plan district including flood warning, land use planning, surface water management planning, and other generic actions are described in the Forth Estuary Local Plan District document.

Location	Objective	Objective ID
Applies across Forth Estuary Local Plan District	Avoid an overall increase in flood risk. For further information see <i>Forth Estuary Local District Local Plan District objectives and potential actions</i> .	10001
Applies across Forth Estuary Local Plan District	Reduce overall flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10099
Musselburgh	Reduce economic damages to residential and non-residential properties in Musselburgh caused by flooding from the River Esk and coastal flooding.	10075
	Reduce risk to people in Musselburgh from flooding from the River Esk.	10076

Musselburgh

Potentially Vulnerable Area 10/21

Objectives and potential actions

Objective(s):	Musselburgh objective target area
<p>Reduce economic damages to residential and non-residential properties in Musselburgh caused by flooding from the River Esk and coastal flooding.</p> <p>Reduce risk to people in Musselburgh from flooding from the River Esk.</p>	
<p>Objective ID:</p> <p>10075, 10076</p>	
<p>Indicators:</p> <p>£1.6 million annual average damages (residential properties)</p> <p>1.2 million annual average damages (non-residential properties)</p> <p>2,800 people at risk (from a medium likelihood flood)</p> <p>1 care home</p>	

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Potential action	Action ID	Description
Sediment management	100750700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Wave attenuation	100750800	<i>Wave attenuation uses the natural characteristics of coastal land cover either to reduce the impact of waves and coastal erosion, or to act as a physical barrier to tidal waters.</i>
Construction of direct flood defences	100751400	<p>Within Musselburgh, the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood.</p> <p><i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i></p>
Property level protection	100751700	<p>Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection.</p> <p><i>Property level protection can reduce flood impacts by restricting water entering a property, or using construction techniques which increase the resilience of property to flood water. It is most beneficial for flood depths less than 0.6m, in areas prone to frequent flooding.</i></p>
Site protection plans	100752100	<i>Site protection plans are developed to identify whether normal operation of a facility can be maintained during a flood. This may be due to existing protection or resilience of the facility or the network.</i>
Improved understanding	100752200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

Delivery Plan for Consultation

Musselburgh (North) (Potentially Vulnerable Area 10/21)

Action	Action ID	Description	Status and Timing	Funding	Responsibility
ONGOING AND CONFIRMED ACTIONS. Actions that are either underway or where the funding has been confirmed for 2016-2021.					
Maintain Esk flood warning scheme	100993291 810	This action has been identified for all existing flood warning schemes. It will be appropriate where the existing scheme meets the needs of the local community.	Ongoing	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Maintain Firth of Forth flood warning scheme	100993491 810	This action has been identified for all existing flood warning schemes. It will be appropriate where the existing scheme meets the needs of the local community.	Ongoing.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Surface water management plan	10052238	The area will 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.	Ongoing. Results of study will be apparent by 2015.	Proportional funding by appropriate Council's Revenue Budgets	City of Edinburgh Council, East Lothian Council, Mid Lothian Council
Edinburgh & Lothians Integrated catchment study	10052239	An integrated catchment study is being carried out to improve knowledge and understanding of surface water flood risk and interactions with other sources of	Ongoing. Results of study will be apparent by 2017.	Proportional funding of the study by appropriate Council's Revenue Budget and Scottish Water	Scottish Water led in partnership with City of Edinburgh Council, East Lothian Council,

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		flooding e.g. with the sewer network, watercourses and the sea.			Mid Lothian Council
Modelling and assessments to improve knowledge of flood hazards and impacts	100752200 100762200	Improved knowledge of the risks from different events helps to develop plans to avoid or mitigate future flooding to sensitive areas - Musselburgh	Ongoing	Revenue budget	East Lothian Council
Flood forecasting and warning	100751800 100761800	Flood warning actions enable people and organisations to prepare for an event. They enable the risk of the event to be reduced by moving people / possessions out of the floodplain and by placing temporary barriers to reduce flooding impacts.	Ongoing	Revenue budget	East Lothian Council SEPA
Self Help / Awareness Raising		Self help actions (individuals taking action to protect themselves and their property against flooding e.g. PLP - Property Level Protection) can be undertaken by any individuals, businesses, organisations or communities at risk of flooding. They are applicable to all sources and probabilities of flooding. They focus on awareness and understanding of the flood risk.	Ongoing	Self - funded	Individuals, businesses, organisations or communities at risk of flooding
Emergency Plans		Emergency response plans are applicable for all flood sources and likelihoods. They set out the steps to be taken during a flood event to maximise safety and minimise	Ongoing	Proportional funding by appropriate Council's Revenue Budgets	East Lothian Council Midlothian Council

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		impacts where possible.			City of Edinburgh Council Emergency Services
Land Use Planning		Application of national and local planning policies, including objectives and actions identified in the LPD development plan.	Ongoing	Proportional funding by appropriate Council's Revenue Budgets	East Lothian Council Midlothian Council City of Edinburgh Council
Watercourse Maintenance		Watercourse maintenance can prevent debris accumulating within channels, which may otherwise result in an increased flood risk. It can be undertaken as a regular planned activity or in response to a flood event.	Ongoing	Proportional funding by appropriate Council's Revenue Budgets	East Lothian Council Midlothian Council City of Edinburgh Council Landowners

POTENTIAL ACTIONS. The actions below are being consulted upon to support the process of identifying preferred actions. Preferred actions may not be able to be implemented during the period 2016-2021 due to project lead-in times and / or funding constraints.

Improve Esk	100993291	This action has been identified	Potential actions are drawn	The maintenance of SEPA's flood	SEPA
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Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
flood warning scheme	821	because it is technically possible to improve the existing flood warning scheme. It will be selected where the costs of improvement are justified based on the potential benefits.	from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	
Simplify Esk flood warning scheme	100993291830	This action has been identified because other structural actions are being considered in this area which may reduce the need for a detailed flood warning scheme.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Improve sign-up of Firth of Forth flood warning scheme	100993491822	This action has been identified because the sign-up rate in some of the FWTAs within this scheme is less than the target of 40%. If the action is progressed, the sign-up rate for the relevant FWTAs will be improved via a targeted communications campaign.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Simplify Firth of Forth flood warning scheme	100993491830	This action has been identified because other structural actions are being considered in this area which may reduce the need for a detailed flood warning scheme.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide	SEPA

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
			timing of those actions that are identified as being of priority are dependent on funding.	grant funding to enable SEPA to implement new flood warning schemes.	
Sediment Management	100750700 100760700	Sediment management can help control the sediment balance in the catchment, maintain channel capacity and reduce the impact of siltation at structures and other key areas.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Wave attenuation	100750800	Wave attenuation actions use the natural characteristics of different types of coastal land cover to either reduce the impact of waves and coastal erosion or to act as a physical barrier to tidal waters.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Property level protection	100751700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. Property level protection can reduce flood impact by restricting water entering a property, or using construction techniques which are resilient to flood water. It is most beneficial for flood depths <0.6m in areas of high probability flooding	Awareness raising from SEPA will help property owners determine their required protection levels.		Property owner
Construction of Direct flood Defences	100751400 100761400	Within Musselburgh, the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood event.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		Direct defence actions aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at flood risk.			
Site protection plans	100752100	Site protection plans are developed to identify whether normal operation of a facility can be maintained during an event. This may be due to existing protection or resilience of the facility or the network.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		Business Owners

Lasswade, Penicuik, Dalkeith and Musselburgh (Potentially Vulnerable Area 10/22)

Local Plan District	Local Authorities	Main Catchment
10 Forth Estuary	Midlothian Council, City of Edinburgh Council, East Lothian Council	River Esk (Lothian)

Background

This Potentially Vulnerable Area covers an area of 97km² and is part of the Almond and Edinburgh Group catchment. This is a large, mainly rural area covering southern Musselburgh, Dalkeith, Lasswade, Bonnyrigg and Penicuik (Figure 1). Its main watercourse is the River Esk, forming after the confluence of the River North Esk and River South Esk on the outskirts of Dalkeith. Other notable watercourses include the Park Burn and the Bilston Burn.

The majority of flood damages are caused by surface water flooding (Figure 2). The highest risk of surface water flooding is in Dalkeith, Lasswade and Bonnyrigg. The highest risk of river flooding is from the River Esk, the River South Esk, the River North Esk and the Loan Burn to Musselburgh, Dalkeith and Newbattle, Lasswade and Bonnyrigg and Penicuik. Musselburgh also receives some coastal flooding from the Firth of Forth.

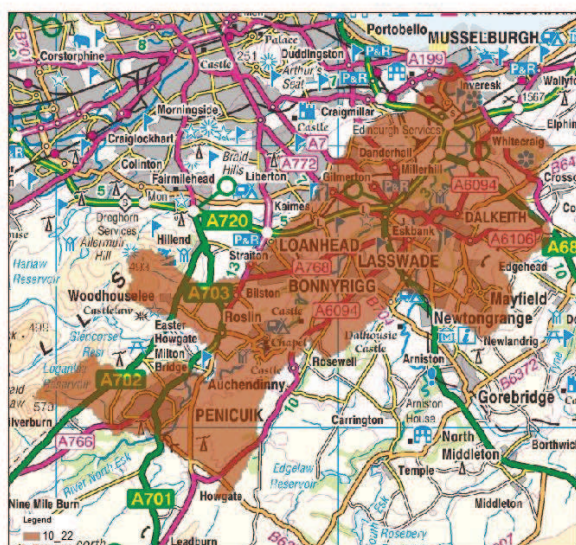


Figure 1: Lasswade, Penicuik, Dalkeith, Musselburgh Potentially Vulnerable Area

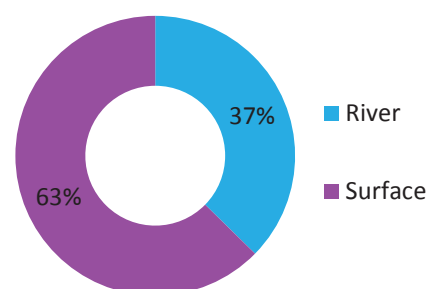


Figure 2: Annual Average Damages by flood source

Summary of flooding impacts

Approximately 300 residential properties and 320 non-residential properties are at a medium likelihood of flooding from one or more sources. A summary of the impacts from flooding can be seen in Table 1. A map showing the impacts from all sources at a medium likelihood of flooding can be seen in Figure 4.

The total Annual Average Damages from all sources of flooding are approximately £1.7 million. This includes damages to residential properties, non-residential properties, transport and agriculture. The economic damages incurred for each return period can be seen in Figure 3. For this Potentially Vulnerable Area the highest damages are to roads followed by damages to non-residential properties.

	High likelihood	Medium likelihood	Low likelihood
No. of residential properties	60	300	470
No. of non-residential properties	140	320	370
No. of people	130	660	1,000
Community facilities	<10 Educational buildings	<10 Educational buildings <10 Child day care centres	<10 Educational buildings <10 Child day care centres <10 Emergency services buildings
Utilities	10 Energy sites	20 Energy sites	30 Energy sites <10 Scottish Water assets
Transport links (excluding minor roads)	26 Roads affected at 286 locations <ul style="list-style-type: none"> • 15 A roads • 11 B roads 1 Railway route affected at 2 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	26 Roads affected at 427 locations <ul style="list-style-type: none"> • 15 A roads • 11 B roads 1 Railway route affected at 5 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	27 Roads affected at 497 locations <ul style="list-style-type: none"> • 15 A roads • 12 B roads 1 Railway route affected at 7 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh
Environmental designated areas (km²)	0.1km ² <ul style="list-style-type: none"> • 4 SSSIs 	0.1km ² <ul style="list-style-type: none"> • 4 SSSIs 	0.1km ² <ul style="list-style-type: none"> • 4 SSSIs
No. of cultural heritage sites	27	29	29
Agricultural land (km²)	0.8km ²	1.1km ²	1.2km ²

Table 1: Summary of flooding impacts

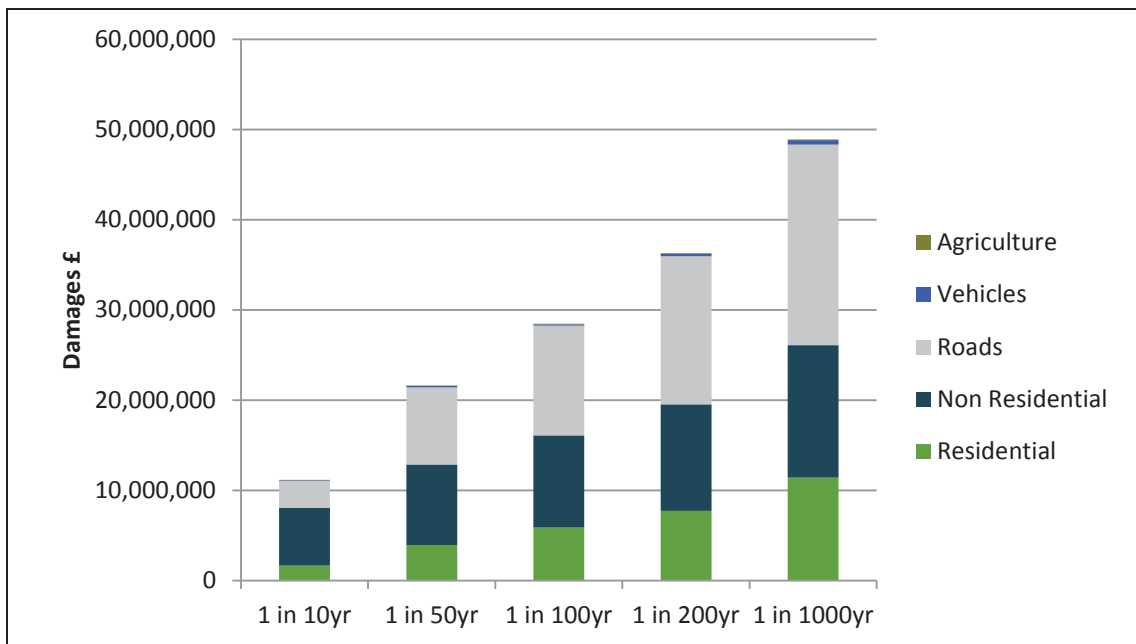


Figure 3: Damages by flood frequency

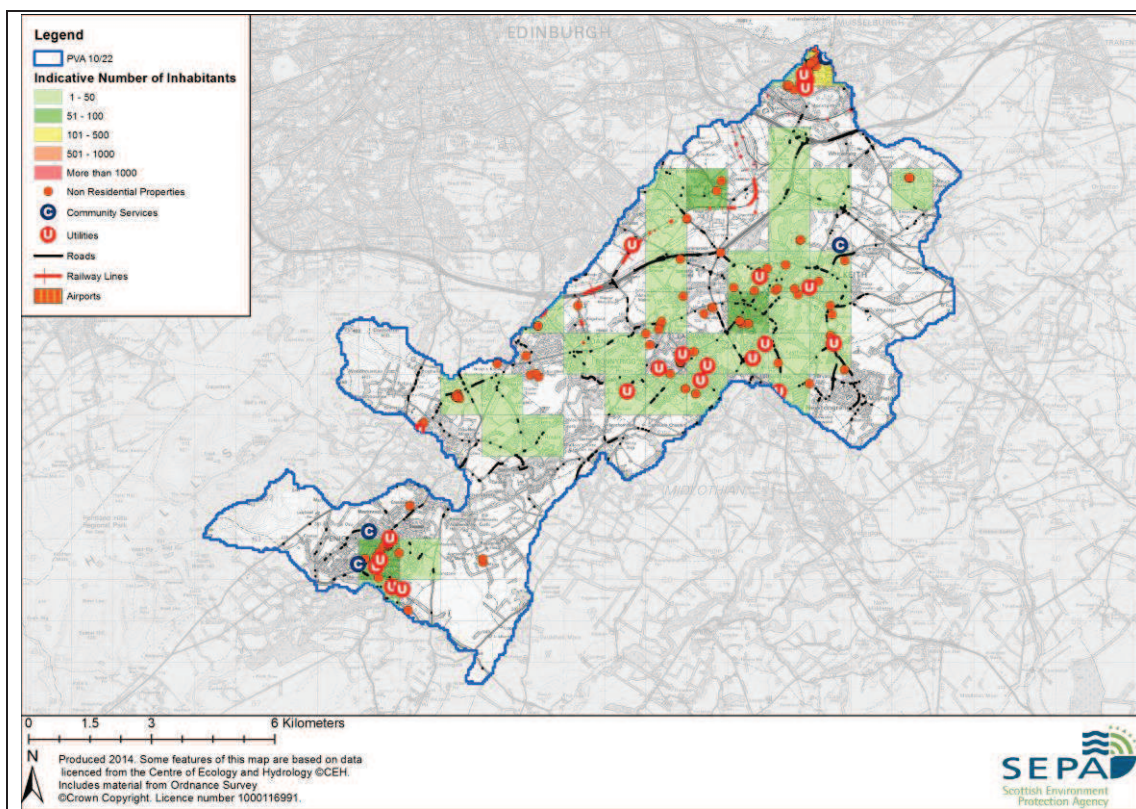


Figure 4: Impacts from all sources at a medium likelihood of flooding

History of flooding

The following river floods have been identified as significant in this Potentially Vulnerable Area:

- 6 October 1990: Musselburgh was affected by flooding from the River Esk;
- 13 August 1948: Evacuation required in Musselburgh after flooding occurred in Eskside West, Eskside East, Shorthope Street, Millhill and areas of the High Street.

No significant coastal or surface water floods have been recorded in this Potentially Vulnerable Area.

Summary of existing local actions to manage risk

There are two formal flood protection schemes to reduce the risk of flooding in this Potentially Vulnerable Area. These are:

- Rullion Road, Penicuik Flood Prevention Scheme 1994: Construction of ditches to divert surface run-off from residential property;
- C53 Polton Road Bridge Relief Culvert Flood Prevention Scheme.

Other actions and natural features may also reduce the risk of flooding. These are referenced in the river, coastal and surface water flooding reports.

There are two flood warning target areas within this Potentially Vulnerable Area:

- Musselburgh - River flood warning, Esk;
- Musselburgh Coastal - Coastal flood warning, Firth of Forth.

SEPA and the local authorities work closely with many other organisations that have flooding related duties and interests. These include the police, fire and rescue services, the Scottish Government and the Scottish Flood Forum. SEPA and the local authorities, often in partnership with these organisations, undertake various awareness raising campaigns that include community events, information leaflets, educational plays in schools, the use of social media and advertising.

In addition to the above, the following community groups are known to help with flood resilience within this Potentially Vulnerable Area:

- East Lothian Bio-diversity Group;
- East Lothian Tenants and Residents Panel;
- Musselburgh Waterfront Group;
- Musselburgh and Inveresk Community Council.

Numerous local community councils also operate throughout the East Lothian Council.

The following local incentives or subsidies have also been put in place in order to provide property owners with property level resilience/resistance actions:

- East Lothian Council strategically deploys temporary flood barriers and sand bags when properties are threatened by flooding.

Some local authorities have their own policies regarding property level protection. Contact your local authority or view their website for more information.

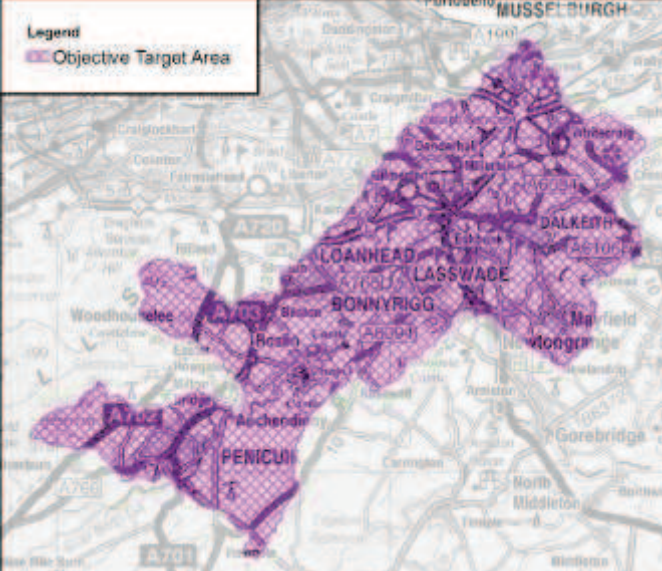
Lasswade, Penicuik, Dalkeith, Musselburgh Potentially Vulnerable Area 10/22 Objectives and potential actions

Unless otherwise stated, information on the following objectives is contained in this document.

IMPORTANT; potential actions that apply across the whole local plan district including flood warning, land use planning, surface water management planning, and other generic actions are described in the Forth Estuary Local Plan District document.

Location	Objective	Objective ID
Applies across Forth Estuary Local Plan District	Avoid an overall increase in flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10001
Applies across Forth Estuary Local Plan District	Reduce overall flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10099
Remainder of the Potentially Vulnerable Area	Reduce economic damages to residential and non-residential properties caused by river flooding.	10077
Musselburgh	Reduce economic damages to residential and non-residential properties in Musselburgh caused by flooding from the River Esk.	10078
Bilston, Dalkeith and Musselburgh	Reduce risk to people in Bilston, Dalkeith and Musselburgh from river flooding.	10079

Lasswade, Penicuik, Dalkeith, Musselburgh Potentially Vulnerable Area 10/22 Objectives and potential actions

Objective(s):	Remainder of the PVA objective target area
Reduce economic damages to residential and non-residential properties caused by river flooding.	
Objective ID:	
10077	
Indicators:	
£65,000 annual average damages (residential properties)	
£39,000 annual average damages (non-residential properties)	

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Potential action	Action ID	Description
Maintenance of existing flood protection schemes	100770100	Existing defences along the Bilston Burn and an unnamed watercourse provide protection to residential and/or non-residential properties up to a 1 in 100 year flood. <i>Ongoing maintenance of existing defences will ensure they continue to offer protection from flooding. This applies to all types of existing defences although appropriate maintenance activities may vary.</i>
Runoff control	100770500	An area with the potential to be used for runoff control has been identified. Further analysis has shown that due to its positioning within the catchment and / or its size, this action may not reduce flood risk in the target area. <i>Runoff control looks to enhance the ability of the catchment to capture and slow water reaching the receiving watercourses. These actions often achieve the greatest benefits in areas of frequent flooding.</i>
Sediment management	100770700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Construction of direct flood defences	100771400	The potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood. <i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i>
Property level protection	100771700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. <i>Property level protection can reduce flood impacts by restricting water entering a property, or using construction techniques which increase the resilience of property to flood water. It is most beneficial for flood depths less than 0.6m, in areas prone to frequent flooding.</i>

Lasswade, Penicuik, Dalkeith, Musselburgh

Potentially Vulnerable Area 10/22

Objectives and potential actions

Site protection plans	100772100	<i>Site protection plans are developed to identify whether normal operation of a facility can be maintained during a flood. This may be due to existing protection or resilience of the facility or the network.</i>
Improved understanding	100772200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

Lasswade, Penicuik, Dalkeith, Musselburgh

Potentially Vulnerable Area 10/22

Objectives and potential actions

Objective(s): Musselburgh objective target area

Reduce economic damages to residential and non-residential properties in Musselburgh caused by flooding from the River Esk.



Objective ID:

10078

Indicators:

£100,000 annual average damages (residential properties)

£390,000 annual average damages (non-residential properties)

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Potential action	Action ID	Description
Sediment management	100780700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Construction of direct flood defences	100781400	Within Musselburgh, the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood. <i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i>
Property level protection	100781700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. <i>Property level protection can reduce flood impacts by restricting water entering a property, or using construction techniques which increase the resilience of property to flood water. It is most beneficial for flood depths less than 0.6m, in areas prone to frequent flooding.</i>
Site protection plans	100782100	<i>Site protection plans are developed to identify whether normal operation of a facility can be maintained during a flood. This may be due to existing protection or resilience of the facility or the network.</i>
Improved understanding	100782200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

Lasswade, Penicuik, Dalkeith, Musselburgh Potentially Vulnerable Area 10/22 Objectives and potential actions

Objective(s):	Bilston, Dalkeith and Musselburgh objective target area
Reduce risk to people in Bilston, Dalkeith and Musselburgh from river flooding.	
Objective ID:	
10079	
Indicators:	
370 people at risk (from a medium likelihood flood)	

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Potential action	Action ID	Description
Sediment management	100790700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Construction of direct flood defences	100791400	Within Bilston, Dalkeith and Musselburgh, the potential to construct direct defences has been identified to reduce the risk to residential properties from a medium likelihood flood. <i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i>
Property level protection	100791700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. <i>Property level protection can reduce flood impacts by restricting water entering a property, or using construction techniques which increase the resilience of property to flood water. It is most beneficial for flood depths less than 0.6m, in areas prone to frequent flooding.</i>
Improved understanding	100792200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

Delivery Plan for Consultation

Lasswade, Penicuik, Dalkeith, Musselburgh (South) (Potentially Vulnerable Area 10/22)

Action	Action ID	Description	Status and Timing	Funding	Responsibility
ONGOING AND CONFIRMED ACTIONS. Actions that are either underway or where the funding has been confirmed for 2016-2021.					
Maintain Esk flood warning scheme	100993291 810	This action has been identified for all existing flood warning schemes. It will be appropriate where the existing scheme meets the needs of the local community.	Ongoing	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Surface water management plan	10052238	The area will 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.	Ongoing. Results of study will be apparent by 2015.	Proportional funding of the study by appropriate Council's Revenue Budget	City of Edinburgh Council, East Lothian Council, Mid Lothian Council
Edinburgh & Lothians Integrated catchment study	10052239	An integrated catchment study is being carried out to 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.	Ongoing. Results of study will be apparent by 2017.	Proportional funding of the study by appropriate Council's Revenue Budget and Scottish Water	Scottish Water led in partnership with City of Edinburgh Council, East Lothian Council, Mid Lothian Council
Flood forecasting and warning	100781800 100791800	Flood warning actions enable people and organisations to prepare for an event. They enable the risk of the event to be reduced by moving people / possessions out of the floodplain and by placing temporary	Ongoing	Revenue budget	East Lothian Council SEPA

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		barriers to reduce flooding impacts.			
Modelling and assessments to improve knowledge of flood hazards and impacts	100772200 100782200 100792200	Improved knowledge of the risks from different events helps to develop plans to avoid or mitigate future flooding to sensitive areas - Musselburgh	Ongoing	Revenue budget	East Lothian Council
Maintenance of existing flood protection schemes	100770100	Existing defences along the Bilston Burn and an unnamed watercourse provide protection to residential and/or non-residential properties up to a 1 in 100 year event. Ongoing maintenance of existing defences will ensure they continue to offer protection from flooding. This applies to all types of existing defences although appropriate maintenance activities may vary.	Ongoing.	Midlothian Council annual revenue budget.	Midlothian Council
Self Help / Awareness Raising	-	Self help actions (individuals taking action to protect themselves and their property against flooding e.g. PLP - Property Level Protection) can be undertaken by any individuals, businesses, organisations or communities at risk of flooding. They are applicable to all sources and probabilities of flooding. They focus on awareness and understanding of the flood risk.	Ongoing	Self - funded	Property-owners SEPA
Emergency Plans	-	Emergency response plans are applicable for all flood sources and	Ongoing	Proportional funding by appropriate Council's Revenue Budgets	East Lothian Council

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		likelihoods. They set out the steps to be taken during a flood event to maximise safety and minimise impacts where possible.			Midlothian Council City of Edinburgh Council Emergency Services
Land Use Planning	-	Application of national and local planning policies, including objectives and actions identified in the LPD development plan.	Ongoing	Proportional funding by appropriate Council's Revenue Budgets	East Lothian Council Midlothian Council City of Edinburgh Council
Watercourse Maintenance	-	Watercourse maintenance can prevent debris accumulating within channels, which may otherwise result in an increased flood risk. It can be undertaken as a regular planned activity or in response to a flood event.	Ongoing	Proportional funding by appropriate Council's Revenue Budgets	East Lothian Council Midlothian Council City of Edinburgh Council Landowners

POTENTIAL ACTIONS. The actions below are being consulted upon to support the process of identifying preferred actions. Preferred actions may not be able to be implemented during the period 2016-2021 due to project lead-in times and / or funding constraints.

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
Improve Esk flood warning scheme	100993291 821	This action has been identified because it is technically possible to improve the existing flood warning scheme. It will be selected where the costs of improvement are justified based on the potential benefits.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Simplify Esk flood warning scheme	100993291 830	This action has been identified because other structural actions are being considered in this area which may reduce the need for a detailed flood warning scheme.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Runoff Control	100770500	An area with the potential to be used for runoff control has been identified. Further analysis has shown that due to its positioning within the catchment and / or its size, this action will not reduce flood risk in the target area.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Sediment Management	100770700 100780700 100790700	Sediment management can help control the sediment balance in the catchment, maintain channel capacity and reduce the impact of siltation at structures and other key areas.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability. Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding settlement from the Scottish Government.		East Lothian Council Midlothian Council

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
Construction of Direct flood Defences	100771400 100781400 100791400	The potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood event.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council Midlothian Council
Property level protection	100771700 100781700 100791700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. Property level protection can reduce flood impact by restricting water entering a property, or using construction techniques which are resilient to flood water. It is most beneficial for flood depths < 0.6m in areas of high probability flooding.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability. Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding settlement from the Scottish Government.		Property Owners Property owners, Midlothian Council
Site protection plans	100772100 100782100	Site protection plans are developed to identify whether normal operation of a facility can be maintained during an event. This may be due to existing protection or resilience of the facility or the network.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability. Raising awareness of vulnerable sites through provision of council and SEPA data will help business owners determine their required protection levels.		Business Owners
Modelling and other assessments to improve knowledge of flood hazards and impacts	100772200 100792200	Improved knowledge of the risks from different events helps to develop plans to avoid or mitigate future flooding to sensitive areas.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding settlement from the Scottish Government.		Midlothian Council

Cockenzie and Port Seton, Longniddry, Prestonpans (Potentially Vulnerable Area 10/23)

Local Plan District	Local Authorities	Main Catchment
10 Forth Estuary	East Lothian Council	East Lothian Coastal

Background

This Potentially Vulnerable Area covers an area of 65km² and is part of the East Lothian and Berwickshire Group catchment. This is a moderately sized coastal area in the west of the catchment covering Cockenzie and Port Seton, Tranent, Prestonpans and Longniddry (Figure 1).

Its main watercourses are the Redhouse Burn and the Seton Dean. The flood risk in this area comes from river and surface water. The highest risk of surface water flooding is in Tranent. The majority of flood damages are caused by surface water flooding (Figure 2).

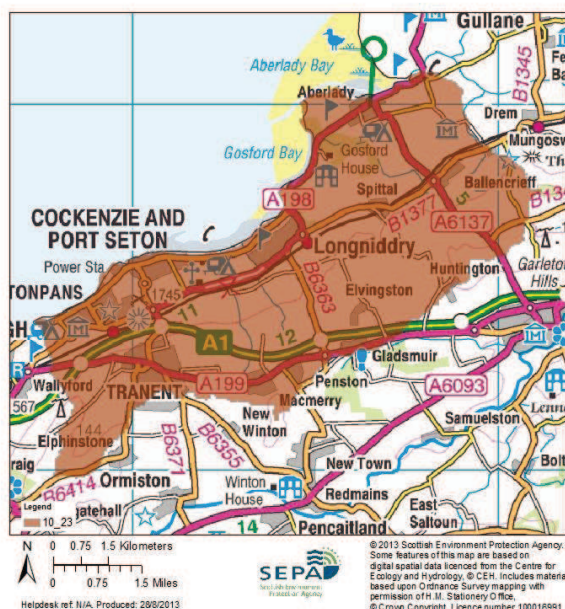


Figure 1: Potentially Vulnerable Area 10/23

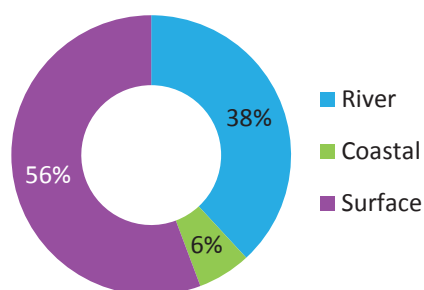


Figure 2: Annual Average Damages by flood source

Summary of flooding impacts

Approximately 120 residential properties and 60 non-residential properties are at a medium likelihood of flooding from one or more sources. A summary of the impacts from flooding can be seen in Table 1 and a map showing the impacts from all sources at a medium likelihood of flooding can be seen in Figure 4.

The total Annual Average Damages from all sources of flooding are approximately £700,000. This includes damages to residential properties, non-residential properties, transport and agriculture. The economic damages incurred for each return period can be seen in Figure 3. For this Potentially Vulnerable Area the highest damages are to roads followed by damages to residential properties.

In 2010 Scottish Water carried out a Flood Risk Assessment Study of water and wastewater assets across Scotland. Of the assets assessed, one wastewater asset was identified as being at risk of flooding within this Potentially Vulnerable Area.

	High likelihood	Medium likelihood	Low likelihood
No. of residential properties	50	120	180
No. of non-residential properties	30	60	70
No. of people	110	260	400
Community facilities	0	0	0
Utilities	<10 Energy sites	10 Energy sites <10 Scottish Water assets	10 Energy sites <10 Scottish Water assets
Transport links (excluding minor roads)	11 Roads affected at 103 locations <ul style="list-style-type: none"> • 4 A Roads • 7 B Roads 1 Railway route affected at 23 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	11 Roads affected at 158 locations <ul style="list-style-type: none"> • 4 A Roads • 7 B Roads 1 Railway route affected at 28 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	11 Roads affected at 174 locations <ul style="list-style-type: none"> • 4 A Roads • 7 B Roads 1 Railway route affected at 29 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh
Environmental designated areas (km²)	0.5km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC 	0.5km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC 	0.6km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC
No. of cultural heritage sites	15	19	19
Agricultural land (km²)	1.4km ²	1.9km ²	2.1km ²

Table 1: Summary of flooding impacts

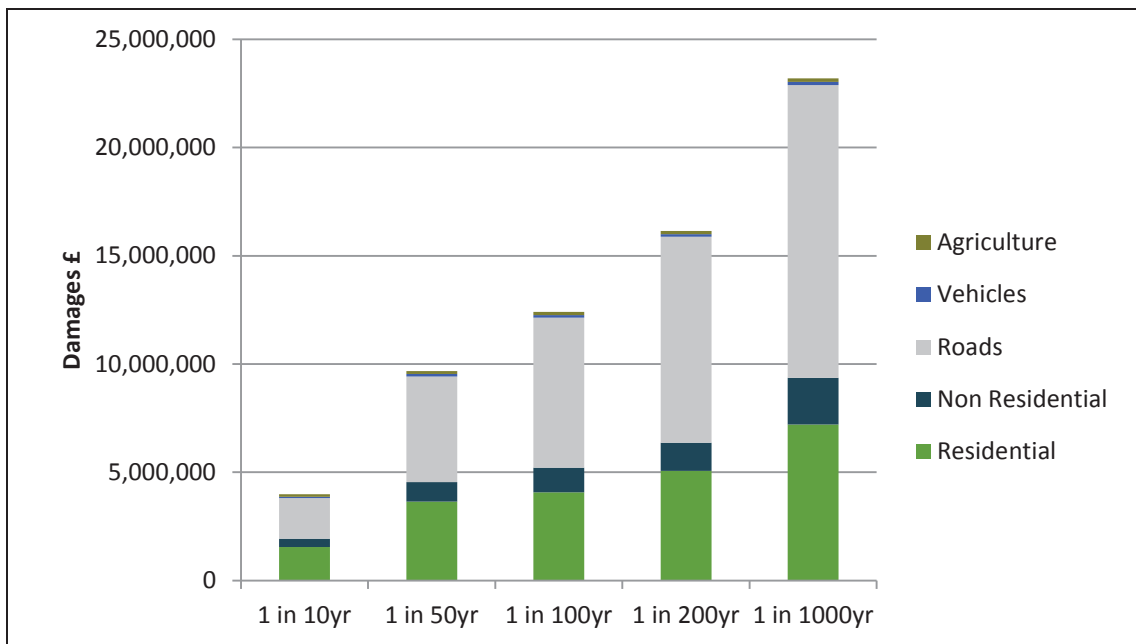


Figure 3: Damages by flood frequency

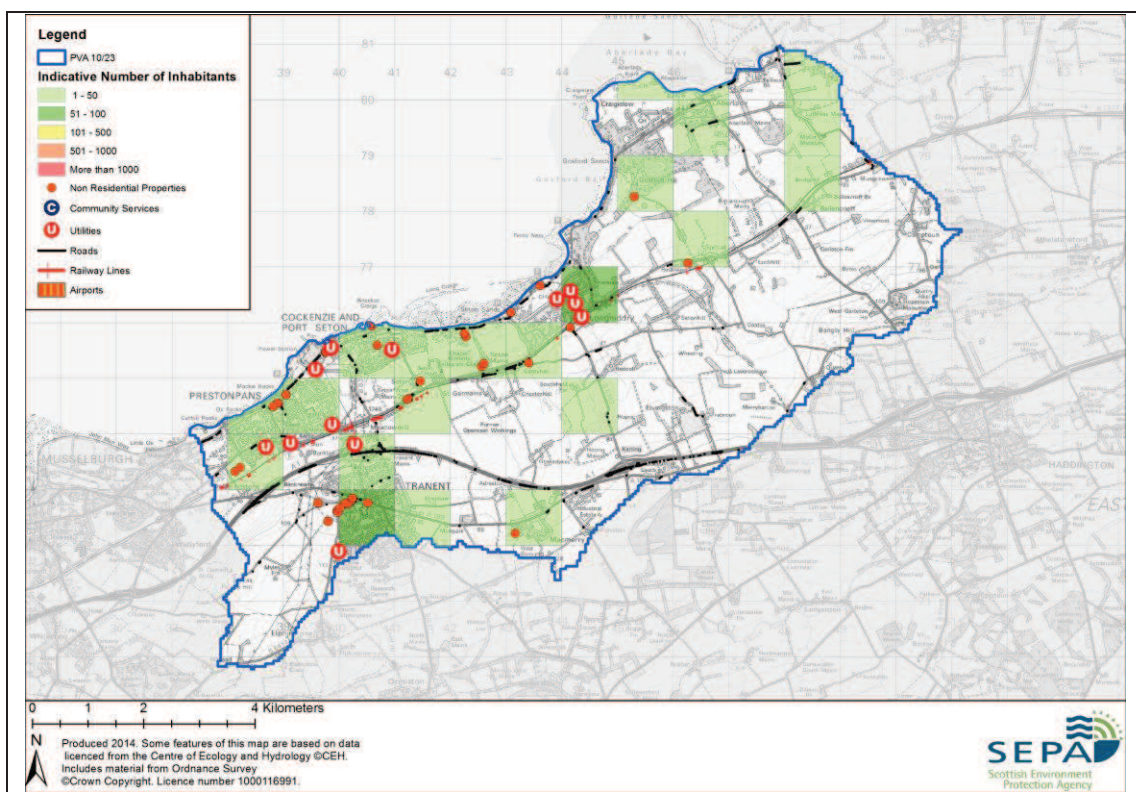


Figure 4: Impacts from all sources at a medium likelihood of flooding

History of flooding

The following coastal flood has been identified as significant in this Potentially Vulnerable Area:

- 30 March 2010: A tidal surge coinciding with the highest mean tides of the year caused extensive flooding along the East Coast of Scotland, with the Firth of Forth being one of the worst affected areas. Locations within this coastal area affected included Leith, Musselburgh, Prestonpans, Port Seton, Dunbar and North Berwick. Impacts included flooding of properties, damage to harbours, seawalls and roads with Edinburgh City Council estimating the costs to repair damages in the region of £650,000.

No significant river or surface water floods have been recorded in this Potentially Vulnerable Area.

Summary of existing local actions to manage risk

There is one formal flood protection scheme in this Potentially Vulnerable Area; this is the Prestonpans Flood Protection Scheme. Other actions and natural features may also reduce the risk of flooding. These are referenced in the river, coastal and surface water flooding reports.

There is one flood warning target area within this Potentially Vulnerable Area:

- Prestonpans, Cockenzie and Port Seton - Coastal flood warning, Firth of Forth and Tay

SEPA and the local authorities work closely with many other organisations that have flooding related duties and interests. These include the police, fire and rescue services, the Scottish Government and the Scottish Flood Forum. SEPA and the local authorities, often in partnership with these organisations, undertake various awareness raising campaigns that include community events, information leaflets, educational plays in schools, the use of social media and advertising.

In addition to the above, the following community groups are known to help with flood resilience within this catchment:

- East Lothian Bio-diversity Group;
- East Lothian Tenants and Residents Panel;
- Coastal Regeneration Group for Port Seton and Cockenzie.

Numerous local community councils also operate throughout the East Lothian Council.

The following local incentives or subsidies have also been put in place in order to provide property owners with property level resilience/resistance actions:

- East Lothian Council strategically deploys temporary flood barriers and sand bags when properties are threatened by flooding.

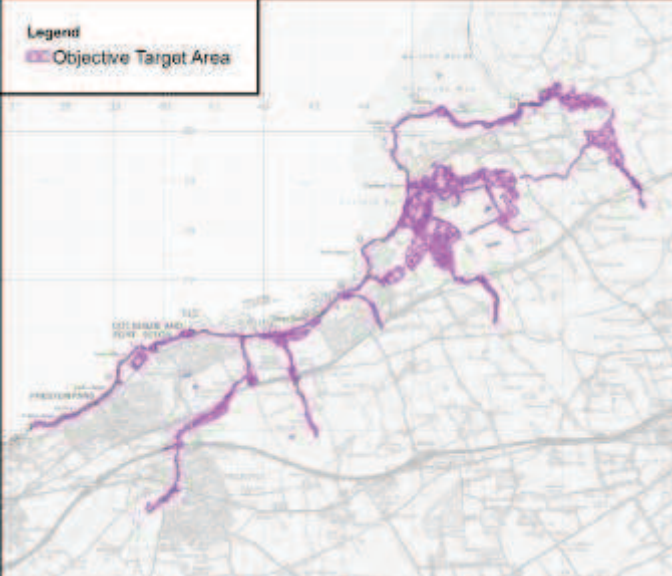
Cockenzie, Port Seton, Longniddry, Prestonpans Potentially Vulnerable Area 10/23 Objectives and potential actions

Unless otherwise stated, information on the following objectives is contained in this document.

IMPORTANT; potential actions that apply across the whole local plan district including flood warning, land use planning, surface water management planning, and other generic actions are described in the Forth Estuary Local Plan District document.

Location	Objective	Objective ID
Applies across Forth Estuary Local Plan District	Avoid an overall increase in flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10001
Applies across Forth Estuary Local Plan District	Reduce overall flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10099
Cockenzie, Port Seton, Longniddry and Prestonpans	Reduce economic damages to residential and non-residential properties caused by river and coastal flooding.	10080
Tranent	Reduce risk to people in Tranent from river flooding.	10081

Cockenzie, Port Seton, Longniddry, Prestonpans Potentially Vulnerable Area 10/23 Objectives and potential actions

Objective(s):	Cockenzie, Port Seton, Longniddry and Prestonpans objective target area
Reduce economic damages to residential and non-residential properties caused by river and coastal flooding.	
Objective ID:	
10080	
Indicators:	
£230,000 annual average damages (residential properties)	
£40,000 annual average damages (non-residential properties)	

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Potential action	Action ID	Description
Maintenance of existing flood protection schemes	100800100	Existing defences along the coast provide protection to residential and/or non-residential properties. <i>Ongoing maintenance of existing defences will ensure they continue to offer protection from flooding. This applies to all types of existing defences although appropriate maintenance activities may vary.</i>
Sediment management	100800700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Wave attenuation	100800800	<i>Wave attenuation uses the natural characteristics of coastal land cover either to reduce the impact of waves and coastal erosion, or to act as a physical barrier to tidal waters.</i>
Modification of conveyance	100801100	<i>Conveyance modification aims to reduce flooding by moving flow more efficiently: speeding it up, removing constrictions or increasing channel capacity. The potential benefits of these actions are greatest in areas of frequent flooding.</i>
Installation / modification of river control structures	100801200	<i>Control structures on a river can reduce flood levels either by restricting or increasing flow in the channel. The impact of these structures can vary significantly depending on type and location of the structures being added or modified.</i>
Construction of direct flood defences	100801400	Within Cockenzie, Port Seton, Longniddry and Prestonpans the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood. <i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i>


Cockenzie, Port Seton, Longniddry, Prestonpans

Potentially Vulnerable Area 10/23

Objectives and potential actions

Property level protection	100801700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. <i>Property level protection can reduce flood impacts by restricting water entering a property, or using construction techniques which increase the resilience of property to flood water. It is most beneficial for flood depths less than 0.6m, in areas prone to frequent flooding.</i>
Site protection plans	100802100	<i>Site protection plans are developed to identify whether normal operation of a facility can be maintained during a flood. This may be due to existing protection or resilience of the facility or the network.</i>
Improved understanding	100802200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

Cockenzie, Port Seton, Longniddry, Prestonpans Potentially Vulnerable Area 10/23 Objectives and potential actions

Objective(s):	Tranent objective target area
Reduce risk to people in Tranent from river flooding.	
Objective ID:	
10081	
Indicators:	
90 people at risk (from a medium likelihood flood)	

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Potential action	Action ID	Description
Sediment management	100810700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Modification of conveyance	100811100	<i>Conveyance modification aims to reduce flooding by moving flow more efficiently: speeding it up, removing constrictions or increasing channel capacity. The potential benefits of these actions are greatest in areas of frequent flooding.</i>
Installation / modification of river control structures	100811200	<i>Control structures on a river can reduce flood levels either by restricting or increasing flow in the channel. The impact of these structures can vary significantly depending on type and location of the structures being added or modified.</i>
Construction of direct flood defences	100811400	<i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i>
Improved understanding	100812200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

Delivery Plan for Consultation

Cockenzie & Port Seton, Longniddry, Prestonpans (Potentially Vulnerable Area 10/23)

Action	Action ID	Description	Status and Timing	Funding	Responsibility
ONGOING AND CONFIRMED ACTIONS. Actions that are either underway or where the funding has been confirmed for 2016-2021.					
Maintain Firth of Forth flood warning scheme	100993491810	This action has been identified for all existing flood warning schemes. It will be appropriate where the existing scheme meets the needs of the local community.	Ongoing.		SEPA
Surface water management plan	10052238	The area will 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.	Ongoing. Results of study will be apparent by 2015.	Revenue Budget	City of Edinburgh Council, East Lothian Council, Mid Lothian Council
Edinburgh & Lothians Integrated catchment study	10052239	An integrated catchment study is being carried out to 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.	Ongoing. Results of study will be apparent by 2017.	Revenue Budget	Scottish Water led in partnership with City of Edinburgh Council, East Lothian Council, Mid Lothian Council
Maintenance of existing flood protection schemes	100800100	Existing defences along the coast provide protection to residential and/or non-residential properties.	Ongoing	Revenue budget	East Lothian Council
Flood forecasting and warning	100801800	Flood warning actions enable people and organisations to prepare for an event. They enable the risk of the event to be reduced by moving people / possessions out of the	Ongoing	Revenue budget	East Lothian Council SEPA

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		floodplain and by placing temporary barriers to reduce flooding impacts.			
Self Help / Awareness Raising	100801900 100811900	Self help actions (individuals taking action to protect themselves and their property against flooding e.g. PLP - Property Level Protection) can be undertaken by any individuals, businesses, organisations or communities at risk of flooding. They are applicable to all sources and probabilities of flooding. They focus on awareness and understanding of the flood risk.	Ongoing	Self - funded	Property-owners SEPA
Emergency Plans	100802000 100812000	Emergency response plans are applicable for all flood sources and likelihoods. They set out the steps to be taken during a flood event to maximise safety and minimise impacts where possible.	Ongoing	Revenue budget	East Lothian Council Emergency Services
Land Use Planning	100800300 100800400 100810300 100810400	Application of national and local planning policies, including objectives and actions identified in the LPD development plan.	Ongoing	Revenue budget	East Lothian Council
Watercourse Maintenance	100801600 100811600	Watercourse maintenance can prevent debris accumulating within channels, which may otherwise result in an increased flood risk. It can be undertaken as a regular planned activity or in response to a flood event.	Ongoing	Revenue budget	East Lothian Council Landowners

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
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POTENTIAL ACTIONS. The actions below are being consulted upon to support the process of identifying preferred actions. Preferred actions may not be able to be implemented during the period 2016-2021 due to project lead-in times and / or funding constraints.

Improve sign-up of Firth of Forth flood warning scheme	100993491 822	This action has been identified because the sign-up rate in some of the FWTAs within this scheme is less than the target of 40%. If the action is progressed, the sign-up rate for the relevant FWTAs will be improved via a targeted communications campaign.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Simplify Firth of Forth flood warning scheme	100993491 830	This action has been identified because other structural actions are being considered in this area which may reduce the need for a detailed flood warning scheme.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Sediment Management	100800700 100810700	Sediment management can help control the sediment balance in the catchment, maintain channel capacity and reduce the impact of siltation at structures and other key areas.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Wave attenuation	100800800	Wave attenuation actions use the natural characteristics of different types of coastal land cover to either reduce the impact of waves and coastal erosion or to act as a	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		physical barrier to tidal waters.			
Modification of Conveyance	100801100 100811100	Conveyance modification aims to reduce flooding by moving flow more efficiently: speeding it up, removing constrictions or increasing cross sectional area. The potential benefits of these actions are greatest during high probability events.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Installation / modification of fluvial control structures	100801200 100811200	Fluvial control structures can reduce flood levels to a target area by either restricting or increasing channel flow. The impact of these structures can vary significantly depending on type and location of the structures being added or modified	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Construction of Direct flood Defences	100801400 100811400	Within Cockenzie, Port Seton, Longniddry, Prestonpans and Tranent the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood event.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Property level protection	100801700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		Property Owners
Site protection plans	100802100 100812100	Site protection plans are developed to identify whether normal operation of a facility can be maintained during an event. This may be due to existing	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		Business Owners

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
		protection or resilience of the facility or the network.			
Modelling and assessments to improve knowledge of flood hazards and impacts	100802200 100812200	Improved knowledge of the risks from different events helps to develop plans to avoid or mitigate future flooding to sensitive areas.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council

Haddington (Potentially Vulnerable Area 10/24)

Local Plan District	Local Authorities	Main Catchment
10 Forth Estuary	East Lothian Council	River Tyne

Background

This Potentially Vulnerable Area covers an area of 16km² and is part of the East Lothian and Berwickshire Group catchment. This is a small, rural area covering Haddington and its immediate surrounding areas to the north, south and east (Figure 1). Its main watercourse is the River Tyne which flows through the south of Haddington before flowing through the town centre and out to the east.

The majority of damages are caused by river flooding (Figure 2). The highest risk of river flooding is from the River Tyne to Haddington and the highest risk of surface water flooding is also in Haddington.

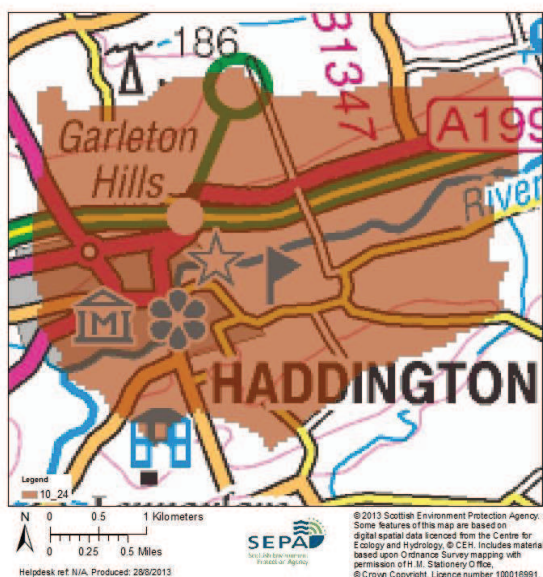


Figure 1: Haddington Potentially Vulnerable Area

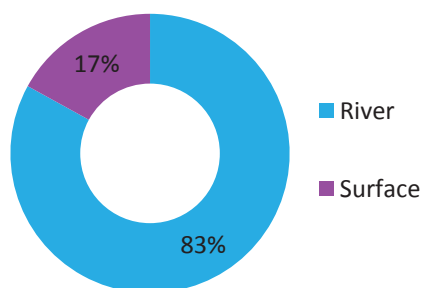


Figure 2: Annual Average Damages by flood source

Summary of flooding impacts

Approximately 230 residential properties and 180 non-residential properties are at a medium likelihood of flooding from one or more sources. A summary of the impacts from flooding can be seen in Table 1. A map showing the impacts from all sources at a medium likelihood of flooding can be seen in Figure 4.

The total Annual Average Damages from all sources of flooding are approximately £700,000. This includes damages to residential properties, non-residential properties, transport and agriculture. The economic damages incurred for each return period can be seen in Figure 3. For this Potentially Vulnerable Area the highest damages are to residential properties followed by damages to non-residential properties.

	High likelihood	Medium likelihood	Low likelihood
No. of residential Properties	70	230	330
No. of non-residential properties	30	180	210
No. of people	150	510	730
Community facilities	0	<10 Educational buildings	<10 Educational buildings
Utilities	<10 Energy sites	<10 Energy sites <10 Communications sites	<10 Energy sites <10 Communications sites
Transport links (excluding minor roads)	5 Roads affected at 25 locations <ul style="list-style-type: none"> • 4 A roads • 1 B roads 	7 Roads affected at 59 locations <ul style="list-style-type: none"> • 5 A roads • 2 B roads 	7 Roads affected at 68 locations <ul style="list-style-type: none"> • 5 A roads • 2 B roads
Environmental designated areas (km ²)	0	0	0
No. of cultural heritage sites	5	5	5
Agricultural land (km ²)	0.6km ²	0.8km ²	0.9km ²

Table 1: Summary of flooding impacts

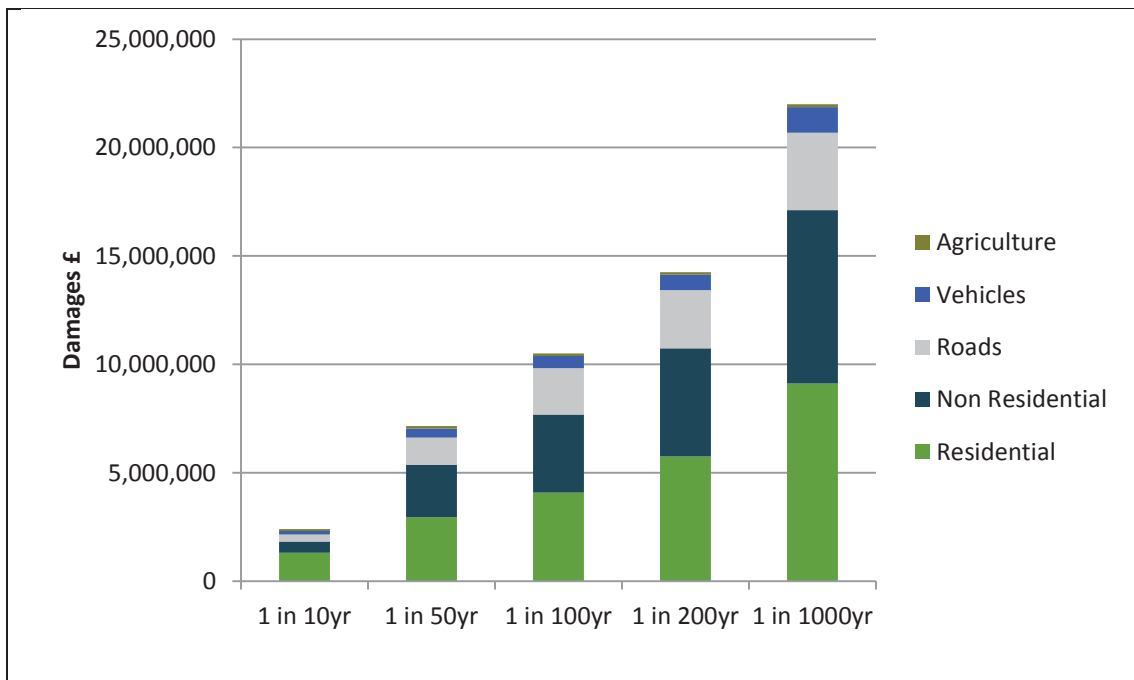


Figure 3: Damages by flood frequency

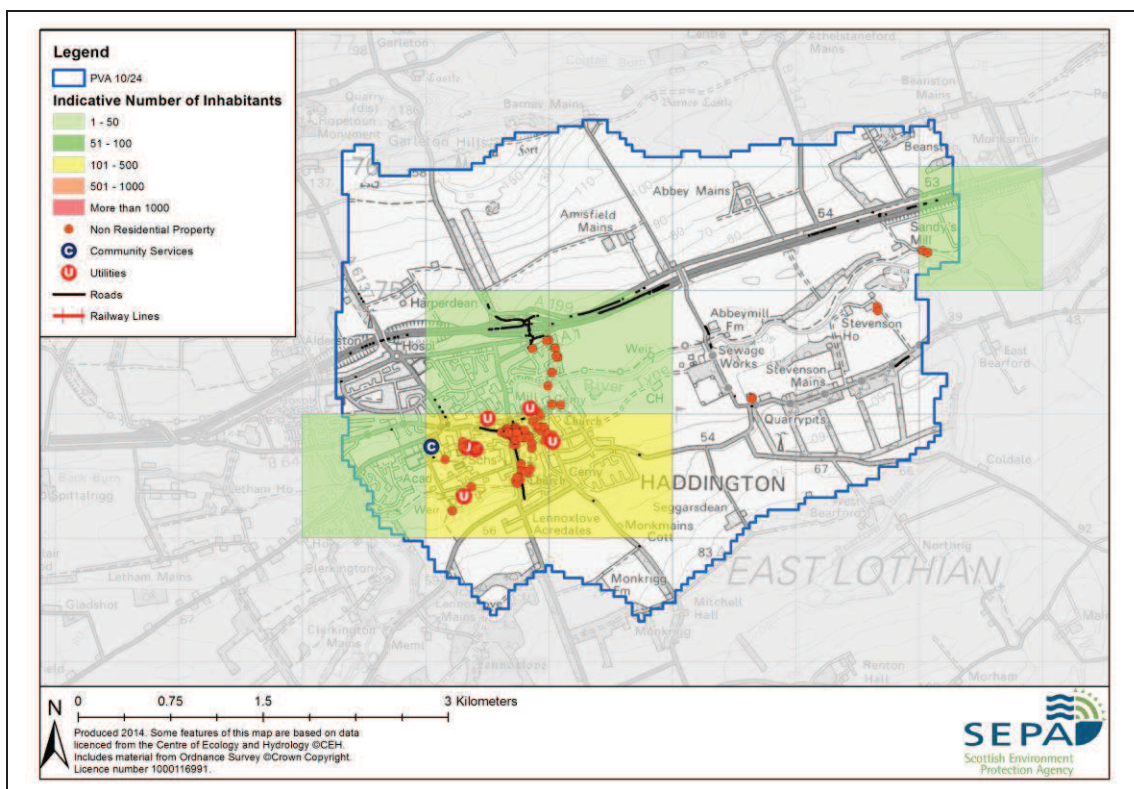


Figure 4: Impacts from all sources at a medium likelihood of flooding

History of flooding

The following river floods have been identified as significant in this Potentially Vulnerable Area.

- 7 July and 25 Sept 2012: Property flooding in Haddington due to drains and watercourses backing up and unable to discharge into the River Tyne due to high river levels. Wider property flooded avoided by actions taken by East Lothian Council;
- 12 August 1948: The waters of the River Tyne rose 2 inches above the levels reached during the large flood of 1775. High Street flooded to a depth of 57 inches. The flood event is known to have affected a large area with railway lines and road bridges damaged or destroyed and multiple buildings flooded;
- 1926 and 1932: Photographic evidence of large flood events in Haddington;
- October 1775: Large flood event in Haddington inundating most of the town.

No significant surface water floods have been recorded in this Potentially Vulnerable Area.

Summary of existing local actions to manage risk

There are no formal flood protection schemes in this Potentially Vulnerable Area. However, other actions and natural features may reduce the risk of flooding. These are referenced in the river, coastal and surface water flooding reports.

There are three flood warning target areas within this Potentially Vulnerable Area:

- Haddington (Red) - River flood warning, Tyne;
- Haddington (Orange) - River flood warning, Tyne;
- Haddington (Green) - River flood warning, Tyne.

SEPA and the local authorities work closely with many other organisations that have flooding related duties and interests. These include the police, fire and rescue services, the Scottish Government and the Scottish Flood Forum. SEPA and the local authorities, often in partnership with these organisations, undertake various awareness raising campaigns that include community events, information leaflets, educational plays in schools, the use of social media and advertising.

In addition to the above, the following community groups are known to help with flood resilience within this Potentially Vulnerable Area:

- East Lothian Bio-diversity Group;
- East Lothian Tenants and Residents Panel;
- Friends of the River Tyne.

Numerous local community councils also operate throughout East Lothian Council.

The following local incentives or subsidies have also been put in place in order to provide property owners with property level resilience/resistance actions:

- East Lothian Council strategically deploys temporary flood barriers and sand bags when properties are threatened by flooding.

Haddington

Potentially Vulnerable Area 10/24

Objectives and potential actions

Unless otherwise stated, information on the following objectives is contained in this document.

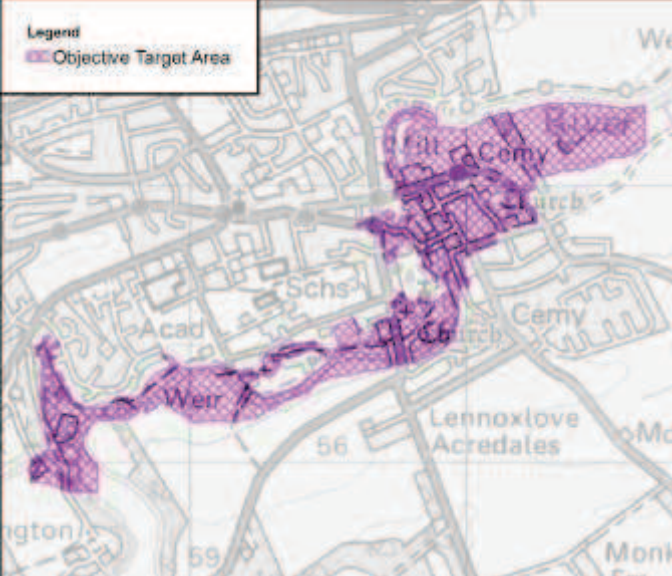
IMPORTANT; potential actions that apply across the whole local plan district including flood warning, land use planning, surface water management planning, and other generic actions are described in the Forth Estuary Local Plan District document.

Location	Objective	Objective ID
Applies across Forth Estuary Local Plan District	Avoid an overall increase in flood risk. For further information see <i>Forth Estuary Local District Local Plan District objectives and potential actions</i> .	10001
Applies across Forth Estuary Local Plan District	Reduce overall flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10099
Haddington	Reduce economic damages to residential and non-residential properties in Haddington caused by flooding from the River Tyne.	10082

Haddington

Potentially Vulnerable Area 10/24

Objectives and potential actions

Objective(s):	Haddington objective target area
Reduce economic damages to residential and non-residential properties in Haddington caused by flooding from the River Tyne.	
Objective ID:	
10082	
Indicators:	
£370,000 annual average damages (residential properties)	
£180,000 annual average damages (non-residential properties)	

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Potential action	Action ID	Description
Runoff control	100820500	Upstream of Haddington an area with the potential to be used for runoff control has been identified. Further analysis has shown that due to its positioning within the catchment and / or its size, this action may not reduce flood risk in the target area. <i>Runoff control looks to enhance the ability of the catchment to capture and slow water reaching the receiving watercourses. These actions often achieve the greatest benefits in areas of frequent flooding.</i>
River or floodplain restoration	100820600	Upstream of Haddington land with the potential to be used for river or floodplain restoration has been identified. This could offer some reduction in flood risk along the River Tyne, Tyne Water and other watercourses for a high likelihood flood. <i>Restoring the river corridor to a more natural state aims to enhance the capacity of the floodplain to hold back water which can reduce the risk of flooding downstream.</i>
Sediment management	100820700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Modification of conveyance	100821100	<i>Conveyance modification aims to reduce flooding by moving flow more efficiently: speeding it up, removing constrictions or increasing channel capacity. The potential benefits of these actions are greatest in areas of frequent flooding.</i>
Installation / modification of river control structures	100821200	<i>Control structures on a river can reduce flood levels either by restricting or increasing flow in the channel. The impact of these structures can vary significantly depending on type and location of the structures being added or modified.</i>
Construction of direct flood defences	100821400	Within Haddington, the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood. <i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i>

Haddington

Potentially Vulnerable Area 10/24

Objectives and potential actions

Property level protection	100821700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. <i>Property level protection can reduce flood impacts by restricting water entering a property, or using construction techniques which increase the resilience of property to flood water. It is most beneficial for flood depths less than 0.6m, in areas prone to frequent flooding.</i>
Site protection plans	100822100	<i>Site protection plans are developed to identify whether normal operation of a facility can be maintained during a flood. This may be due to existing protection or resilience of the facility or the network.</i>
Improved understanding	100822200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

Delivery Plan for Consultation

Haddington (Potentially Vulnerable Area 10/24)

Action	Action ID	Description	Status and Timing	Funding	Responsibility
ONGOING AND CONFIRMED ACTIONS. Actions that are either underway or where the funding has been confirmed for 2016-2021.					
Maintain Tyne flood warning scheme	100993451810	This action has been identified for all existing flood warning schemes. It will be appropriate where the existing scheme meets the needs of the local community.	Ongoing.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Surface water management plan	10052238	The area will 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.	Ongoing. Results of study will be apparent by 2015.	Revenue Budget	City of Edinburgh Council, East Lothian Council, Mid Lothian Council
Flood forecasting and warning	100821800	Flood warning actions enable people and organisations to prepare for an event. They enable the risk of the event to be reduced by moving people / possessions out of the floodplain and by placing temporary barriers to reduce flooding impacts.	Ongoing	Revenue budget	East Lothian Council SEPA
Modelling and assessments to improve knowledge of flood hazards	100822200	Improved knowledge of the risks from different events helps to develop plans to avoid or mitigate future flooding to sensitive areas - Haddington	Ongoing	Revenue budget	East Lothian Council

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
and impacts					
Self Help / Awareness Raising	100821900	Self help actions (individuals taking action to protect themselves and their property against flooding e.g. PLP - Property Level Protection) can be undertaken by any individuals, businesses, organisations or communities at risk of flooding. They are applicable to all sources and probabilities of flooding. They focus on awareness and understanding of the flood risk.	Ongoing	Self - funded	Property-owners SEPA
Emergency Plans	100822000	Emergency response plans are applicable for all flood sources and likelihoods. They set out the steps to be taken during a flood event to maximise safety and minimise impacts where possible.	Ongoing	Revenue budget	East Lothian Council Emergency Services
Land Use Planning	100820300 100820400	Application of national and local planning policies, including objectives and actions identified in the LPD development plan.	Ongoing	Revenue budget	East Lothian Council
Watercourse Maintenance	100821600	Watercourse maintenance can prevent debris accumulating within channels, which may otherwise result in an increased flood risk. It can be undertaken as a regular planned activity or in response to a flood event.	Ongoing	Revenue budget	East Lothian Council Landowners

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
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POTENTIAL ACTIONS. The actions below are being consulted upon to support the process of identifying preferred actions. Preferred actions may not be able to be implemented during the period 2016-2021 due to project lead-in times and / or funding constraints.

Improve signup of Tyne flood warning scheme	100993451822	This action has been identified because the sign-up rate in some of the FWTAs within this scheme is less than the target of 40%. If the action is progressed, the sign-up rate for the relevant FWTAs will be improved via a targeted communications campaign.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Simplify Tyne flood warning scheme	100993451830	This action has been identified because other structural actions are being considered in this area which may reduce the need for a detailed flood warning scheme.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Haddington Integrated catchment study	10052239	An integrated catchment study is to be carried out to improve knowledge and understanding of surface water flood risk and interactions with other sources of flooding e.g. with the sewer network and watercourses.	Programmed by Scottish Water		Scottish Water led in partnership with East Lothian Council,

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
Runoff Control	100820500	Upstream of Haddington an area with the potential to be used for runoff control has been identified. Further analysis has shown that due to its positioning within the catchment and / or its size, this action will not reduce flood risk in the target area.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
River or floodplain restoration	100820600	Upstream of Haddington land with the potential to be used for river or floodplain restoration has been identified. This could offer a limited reduction in flood risk along the River Tyne, Tyne Water and other watercourses for a high likelihood event.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Sediment Management	100820700	Sediment management can help control the sediment balance in the catchment, maintain channel capacity and reduce the impact of siltation at structures and other key areas.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Modification of Conveyance	100821100	Conveyance modification aims to reduce flooding by moving flow more efficiently: speeding it up, removing constrictions or increasing cross sectional area. The potential benefits of these actions are greatest during high probability events.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council

Delivery Plan for Consultation

Action	Action ID	Description	Status and Timing	Funding	Responsibility
Installation / modification of fluvial control structures	100821200	Fluvial control structures can reduce flood levels to a target area by either restricting or increasing channel flow. The impact of these structures can vary significantly depending on type and location of the structures being added or modified	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Construction of Direct flood Defences	100821400	Within Haddington, the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood event.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Property level protection	100821700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		Property Owners
Site protection plans	100822100	Site protection plans are developed to identify whether normal operation of a facility can be maintained during an event. This may be due to existing protection or resilience of the facility or the network.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		Business Owners

Dunbar, West Barns (Potentially Vulnerable Area 10/25)

Local Plan District	Local Authorities	Main Catchment
10 Forth Estuary	East Lothian Council	East Lothian Coastal

Background

This Potentially Vulnerable Area covers an area of 19km² and is part of the East Lothian and Berwickshire Group catchment. This is a small, coastal area in the east of the catchment covering Dunbar and West Barns and its immediate surrounding rural areas (Figure 1). The main watercourse is the Biel Water which flows through the west of the Potentially Vulnerable Area towards the north east, passing around the West Barns and discharging into the North Sea at Belhaven Bay.

The highest risk of river flooding is from the Biel Water and the Hedderwick Burn to Dunbar and West Barns. The highest risk of coastal flooding is from the North Sea to Dunbar and West Barns. The flood damages are caused by river, coastal and surface water sources (Figure 2).

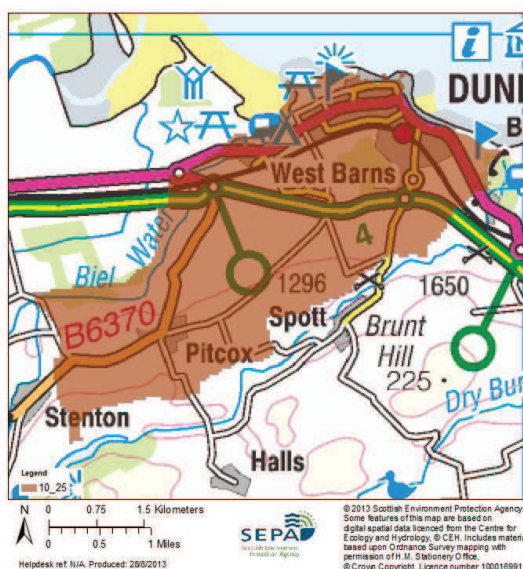


Figure 1: Dunbar, West Barns Potentially Vulnerable Area

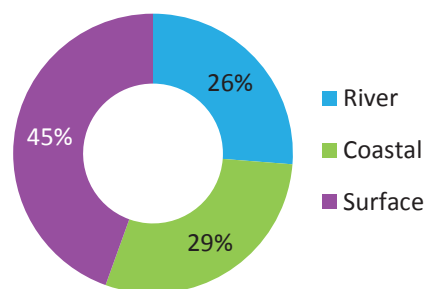


Figure 2: Annual Average Damages by flood source

Summary of flooding impacts

Approximately 40 residential properties and 20 non-residential properties are at a medium likelihood of flooding from one or more sources. A summary of the impacts from flooding can be seen in Table 1 and a map showing the impacts from all sources at a medium likelihood of flooding can be seen in Figure 4.

The total Annual Average Damages from all sources of flooding are approximately £200,000. This includes damages to residential properties, non-residential properties, transport and agriculture. The economic damages incurred for each return period can be seen in Figure 3. For this Potentially Vulnerable Area the highest damages are to roads followed by damages to residential properties.

	High likelihood	Medium likelihood	Low likelihood
No. of residential properties	10	40	60
No. of non-residential properties	10	20	20
No. of people	20	90	130
Community facilities	0	0	0
Utilities	<10 Energy sites	<10 Energy sites	<10 Energy sites
Transport links (excluding minor roads)	4 Roads affected at 39 locations <ul style="list-style-type: none"> • 3 A roads • 1 B road 1 Railway route affected at 15 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	4 Roads affected at 49 locations <ul style="list-style-type: none"> • 3 A roads • 1 B road 1 Railway route affected at 17 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh 	4 Roads affected at 57 locations <ul style="list-style-type: none"> • 3 A roads • 1 B road 1 Railway route affected at 18 locations <ul style="list-style-type: none"> • Berwick-upon-Tweed to Edinburgh
Environmental designated areas (km²)	0.2km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC 	0.2km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC 	0.2km ² <ul style="list-style-type: none"> • 1 SSSI • 1 SPA • 1 SAC
No. of cultural heritage sites	9	9	9
Agricultural land (km²)	0.3km ²	0.4km ²	0.5km ²

Table 1: Summary of flooding impacts

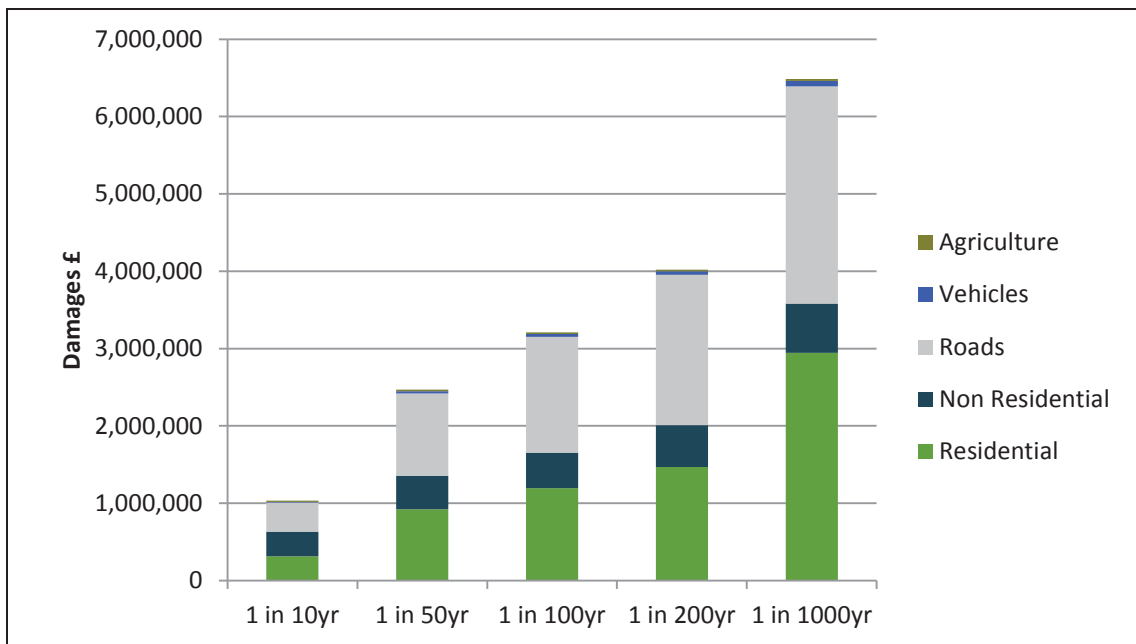


Figure 3: Damages by flood frequency

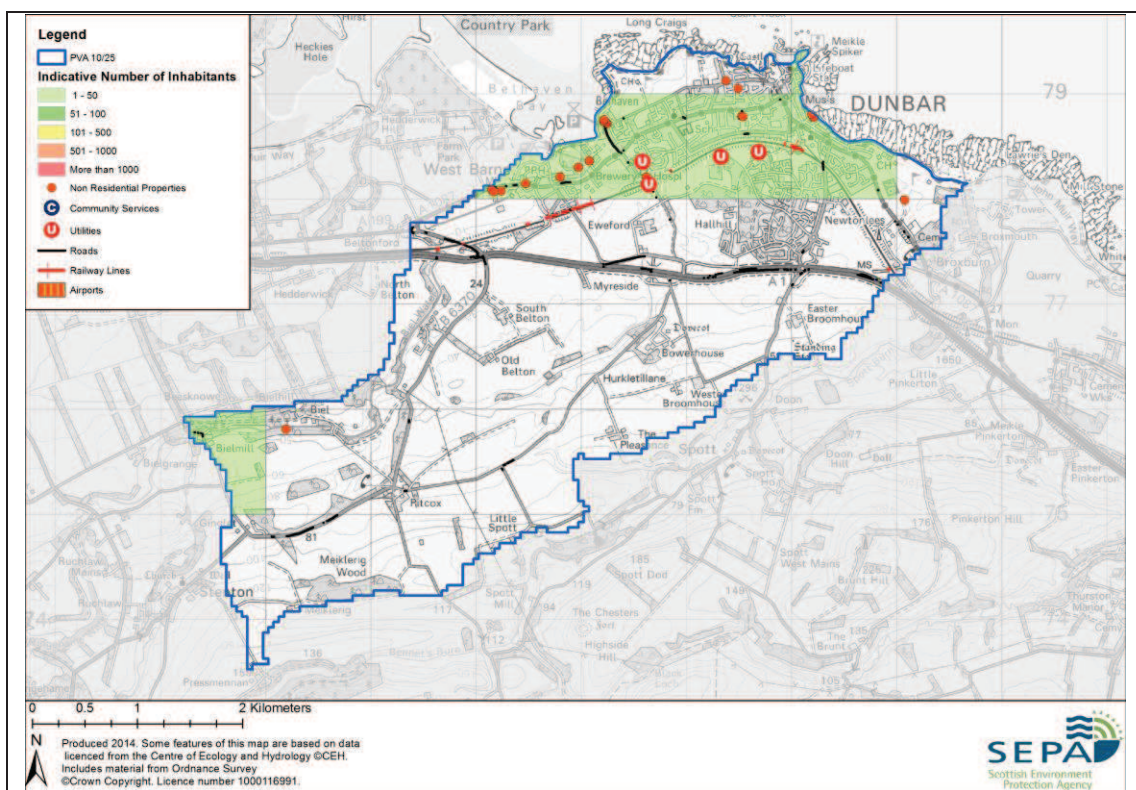


Figure 4: Impacts from all sources at a medium likelihood of flooding

History of flooding

The following river flood has been identified as significant in this Potentially Vulnerable Area:

- 22 October 2002: Belhaven hospital flooded. Patients had to be evacuated after the generator room was shut down and ward closed.

The following coastal floods have been identified as significant in this Potentially Vulnerable Area:

- 5 December 2012: A combination of wind and high tides caused large waves and coastal flooding along the east coast of Scotland. There was significant damage to North Berwick harbour and damage to the communal slipway at Dunbar harbour
- 30 March 2010: A tidal surge coinciding with the highest mean tides of the year caused extensive flooding along the east coast of Scotland. Locations within this coastal area affected included Leith, Musselburgh, Prestonpans, Port Seton, Dunbar and North Berwick. Impacts included flooding of properties, damage to harbours, seawalls and roads
- August 1949: Storm surge flooding to Dunbar.

No significant surface water floods have been recorded in this Potentially Vulnerable Area.

Summary of existing local actions to manage risk

There are no formal flood protection schemes in this Potentially Vulnerable Area. However, other actions and natural features may reduce the risk of flooding. These are referenced in the river, coastal and surface water flooding reports.

There is one flood warning target area within this Potentially Vulnerable Area:

- Dunbar including West Barns - Coastal flood warning, Firth of Forth.

SEPA and the local authorities work closely with many other organisations that have flooding related duties and interests. These include the police, fire and rescue services, the Scottish Government and the Scottish Flood Forum. SEPA and the local authorities, often in partnership with these organisations, undertake various awareness raising campaigns that include community events, information leaflets, educational plays in schools, the use of social media and advertising.

In addition to the above, the following community groups are known to help with flood resilience within this catchment:

- East Lothian Bio-diversity Group;
- East Lothian Tenants and Residents Panel;
- Dunbar Shore and Harbour Neighbourhood Group.

Numerous local community councils also operate throughout East Lothian Council.

The following local incentives or subsidies have also been put in place in order to provide property owners with property level resilience/resistance actions:

- East Lothian Council strategically deploys temporary flood barriers and sand bags when properties are threatened by flooding.

Dunbar, West Barns

Potentially Vulnerable Area 10/25

Objectives and potential actions

Unless otherwise stated, information on the following objectives is contained in this document.

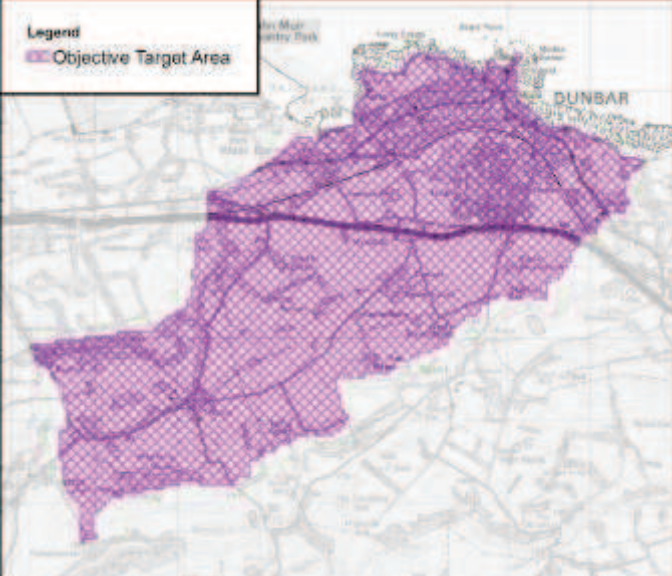
IMPORTANT; potential actions that apply across the whole local plan district including flood warning, land use planning, surface water management planning, and other generic actions are described in the Forth Estuary Local Plan District document.

Location	Objective	Objective ID
Applies across Forth Estuary Local Plan District	Avoid an overall increase in flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10001
Applies across Forth Estuary Local Plan District	Reduce overall flood risk. For further information see <i>Forth Estuary Local Plan District objectives and potential actions</i> .	10099
Dunbar and West Barns	Reduce economic damages to residential and non-residential properties caused by river and coastal flooding.	10083

Dunbar, West Barns

Potentially Vulnerable Area 10/25

Objectives and potential actions

Objective(s):	Dunbar and West Barns objective target area
Reduce economic damages to residential and non-residential properties caused by river and coastal flooding.	
Objective ID:	
10083	
Indicators:	
£70,000 annual average damages (residential properties)	
£32,000 annual average damages (non-residential properties)	

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Potential action	Action ID	Description
Runoff control	100830500	Upstream of Dunbar and West Barns an area with the potential for runoff control has been identified. Further analysis has shown that due to its positioning within the catchment and / or its size, this action may not reduce flood risk in the target area. <i>Runoff control looks to enhance the ability of the catchment to capture and slow water reaching the receiving watercourses. These actions often achieve the greatest benefits in areas of frequent flooding.</i>
River or floodplain restoration	100830600	Upstream of Dunbar and West Barns land with potential for river/ floodplain restoration has been identified. Further analysis has shown that its position within the catchment and / or its size, this action may not reduce flood risk in the target area. <i>Restoring the river corridor to a more natural state aims to enhance the capacity of the floodplain to hold back water which can reduce the risk of flooding downstream.</i>
Sediment management	100830700	<i>Sediment management can help control the influence of eroded material on flooding by maintaining channel capacity and reducing the impact of siltation.</i>
Wave attenuation	100830800	<i>Wave attenuation uses the natural characteristics of coastal land cover either to reduce the impact of waves and coastal erosion, or to act as a physical barrier to tidal waters.</i>
Modification of conveyance	100831100	<i>Conveyance modification aims to reduce flooding by moving flow more efficiently: speeding it up, removing constrictions or increasing channel capacity. The potential benefits of these actions are greatest in areas of frequent flooding.</i>
Construction of direct flood defences	100831400	Within Dunbar and West Barns, the potential to construct direct defences has been identified to reduce the risk to residential and non-residential properties from a medium likelihood flood. <i>Direct defences aim to reduce the risk of flooding by placing a designed barrier between the flooding source and the receptors at risk.</i>

Dunbar, West Barns Potentially Vulnerable Area 10/25 Objectives and potential actions

Property level protection	100831700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection. <i>Property level protection can reduce flood impacts by restricting water entering a property, or using construction techniques which increase the resilience of property to flood water. It is most beneficial for flood depths less than 0.6m, in areas prone to frequent flooding.</i>
Site protection plans	100832100	<i>Site protection plans are developed to identify whether normal operation of a facility can be maintained during a flood. This may be due to existing protection or resilience of the facility or the network.</i>
Improved understanding	100832200	<i>Improved knowledge of flood risk informs the development of plans to avoid or mitigate future flooding to sensitive areas.</i>

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Dunbar, West Barns (Potentially Vulnerable Area 10/25)

Action	Action ID	Description	Status and Timing	Funding	Responsibility
ONGOING AND CONFIRMED ACTIONS. Actions that are either underway or where the funding has been confirmed for 2016-2021.					
Maintain Firth of Forth flood warning scheme	100993491810	This action has been identified for all existing flood warning schemes. It will be appropriate where the existing scheme meets the needs of the local community.	Ongoing.		SEPA
Surface water management plan	10052238	The area will 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.	Ongoing. Results of study will be apparent by 2015.	Revenue Budget	City of Edinburgh Council, East Lothian Council, Mid Lothian Council
Flood forecasting and warning	100831800	Flood warning actions enable people and organisations to prepare for an event. They enable the risk of the event to be reduced by moving people / possessions out of the floodplain and by placing temporary barriers to reduce flooding impacts.	Ongoing	Revenue budget	East Lothian Council SEPA
Self Help / Awareness Raising	100831900	Self help actions (individuals taking action to protect themselves and their property against flooding e.g. PLP - Property Level Protection) can be undertaken by any individuals, businesses, organisations or	Ongoing	Self - funded	Property-owners SEPA

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Action	Action ID	Description	Status and Timing	Funding	Responsibility
		communities at risk of flooding. They are applicable to all sources and probabilities of flooding. They focus on awareness and understanding of the flood risk.			
Emergency Plans	100832000	Emergency response plans are applicable for all flood sources and likelihoods. They set out the steps to be taken during a flood event to maximise safety and minimise impacts where possible.	Ongoing	Revenue budget	East Lothian Council Emergency Services
Land Use Planning	100830300 100830400	Application of national and local planning policies, including objectives and actions identified in the LPD development plan.	Ongoing	Revenue budget	East Lothian Council
Watercourse Maintenance	100831600	Watercourse maintenance can prevent debris accumulating within channels, which may otherwise result in an increased flood risk. It can be undertaken as a regular planned activity or in response to a flood event.	Ongoing	Revenue budget	East Lothian Council Landowners

POTENTIAL ACTIONS. The actions below are being consulted upon to support the process of identifying preferred actions. Preferred actions may not be able to be implemented during the period 2016-2021 due to project lead-in times and / or funding constraints.

Improve sign up	100993491	This action has been identified	Potential actions are drawn	The maintenance of SEPA's flood	SEPA
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Action	Action ID	Description	Status and Timing	Funding	Responsibility
of Firth of Forth flood warning scheme	822	because the sign-up rate in some of the FWTAs within this scheme is less than the target of 40%. If the action is progressed, the sign-up rate for the relevant FWTAs will be improved via a targeted communications campaign.	from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	
Simplify Firth of Forth flood warning scheme	100993491830	This action has been identified because other structural actions are being considered in this area which may reduce the need for a detailed flood warning scheme.	Potential actions are drawn from a short list of options that are undergoing further analysis in terms of their relative cost and benefit. The delivery and timing of those actions that are identified as being of priority are dependent on funding.	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.	SEPA
Dunbar Integrated catchment study	10052239	An integrated catchment study is to be carried out to improve knowledge and understanding of surface water flood risk and interactions with other sources of flooding e.g. with the sewer network and watercourses.	Programmed by Scottish Water		Scottish Water led in partnership with East Lothian Council,
Runoff Control	100830500	Upstream of Dunbar and West Barns an area with the potential for runoff control has been identified. Further analysis has shown that due to its positioning within the catchment and	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council

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Action	Action ID	Description	Status and Timing	Funding	Responsibility
		/ or its size, this action will not reduce flood risk in the target area.			
River or floodplain restoration	100830600	Upstream of Dunbar and West Barns land with potential for river/ floodplain restoration has been identified. Further analysis has shown that its position within the catchment and / or its size, this action will not reduce flood risk in the target area.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Sediment Management	100830700	Sediment management can help control the sediment balance in the catchment, maintain channel capacity and reduce the impact of siltation at structures and other key areas.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Wave attenuation	100830800	Wave attenuation actions use the natural characteristics of different types of coastal land cover to either reduce the impact of waves and coastal erosion or to act as a physical barrier to tidal waters.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Modification of Conveyance	100831100	Conveyance modification aims to reduce flooding by moving flow more efficiently: speeding it up, removing constrictions or increasing cross sectional area. The potential benefits of these actions are greatest during high probability events.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council
Construction of Direct flood Defences	100831400	Within Haddington, the potential to construct direct defences has been identified to reduce the risk to residential and non-residential	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council

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Action	Action ID	Description	Status and Timing	Funding	Responsibility
		properties from a medium likelihood flood event.			
Property level protection	100831700	Some of the properties that have been identified to be at risk of flooding may be suitable for property level protection.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		Property Owners
Site protection plans	100832100	Site protection plans are developed to identify whether normal operation of a facility can be maintained during an event. This may be due to existing protection or resilience of the facility or the network.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		Business Owners
Modelling and assessments to improve knowledge of flood hazards and impacts	100832200	Improved knowledge of the risks from different events helps to develop plans to avoid or mitigate future flooding to sensitive areas.	If the potential action is found by SEPA and their contractors to be technically viable this will be considered subject to future funding availability.		East Lothian Council