East Lothian Council

LOCAL DEVELOPMENT PLAN 2

Topic Papers: Spatial Strategy and Infrastructure:

Strategic Flood Risk Assessment

August 2024

CONTENTS

1. INTRODUCTION

1.1 The Strategic Flood Risk Assessment (SFRA) is accompanying evidence to the Evidence Report for the East Lothian Local Development Plan 2 (LDP2). Its main purpose is to provide a high-level overview of the scope and nature of all sources of existing and future flood risk within the East Lothian LDP area. The Scottish Government's Local Development Planning Guidance, page 74, states that SFRAs are "designed to inform the development planning process, primarily to avoid increasing overall flood risk by avoiding areas of flood hazard". Other purposes for the SFRA include:

- To identify gaps in flood risk information and propose how these gaps will be addressed at the later stages of the LDP2's preparation.
- To identify relevant actions in local flood risk management plans and river basin management plans for the LDP2.
- To identify any significant cross boundary flooding and water issues.
- To inform the strategic environmental assessment of LDP2 so that flood risk is fully taken into account when considering the allocation of land and the preparation of the spatial strategy, development proposals and planning policies.
- To help identify the need for site-specific flood risk assessments in particular locations.
- To provide evidence that LDP2 preparation has taken account of National Planning Framework 4 policies that are relevant to sustainable flood risk management and the climate and nature crises.
- To inform blue and green infrastructure audits, and strategies.

1.2 The SFRA will act as a screening tool to help understand whether a candidate site needs more detailed information (such as a site-specific flood risk assessment) to fully understand its current and future flood risk. In addition, the SFRA will contribute to the strategic environmental assessment, providing flood risk information for the environmental baseline and to identify, assess, mitigate and monitor the significant flood impacts of LDP2.

1.3 Information in the SFRA is a snapshot in time and the SFRA will be revised during the later stages of LDP2 preparation, as appropriate, for example, in response to

consultation feedback from key agencies or through the gatecheck process, or if new or updated information becomes available.

Flood Risk Definitions

1.4 In the SFRA, the term 'flood' and 'flooding' interchangeably is used to refer "the temporary covering by water from any source of land not normally covered by water". 'Flood risk' means "the combination of the probability of a flood and of the potential adverse consequences, associated with a flood, for human health, the environment, cultural heritage and economic activity". Both definitions are as stated in the Flood Risk Management (Scotland) Act 2009.

1.5 Figure 1, below, defines the sources of flood risk using SEPA's definitions. River (fluvial), surface water (pluvial) and coastal flood risk are the main sources of flood risk in the East Lothian Council area.

Figure 1: Types of Flood Source

Flood Source	Definition
River (Fluvial)	Flooding from a river or other watercourse
Coastal	Flooding that results from high sea levels or a combination of high sea levels and stormy conditions.
Surface water Flooding (Pluvial)	Flooding that occurs when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.
Groundwater	Flooding is caused by water rising from underlying rocks or flowing from springs. However, in Scotland, groundwater is generally a contributing factor to flooding rather than the primary source.
Sewer Flooding	Flooding as a result of the sewer or other artificial drainage system (e.g. road drainage) capacity being exceeded by rainfall runoff or when the drainage system cannot discharge water at the outfall due to high water levels (river and sea levels) in receiving waters.

Reservoir Flooding and flooding from other infrastructure	The failure of infrastructure such as reservoirs and canals could result in flooding by releasing large volumes of water very quickly.

The East Lothian Local Development Plan Area

1.6 The Forth Estuary Local Plan District incorporates East Lothian. It covers a population of 160,700 people. However the East Lothian LDP covers only the entire administrative area of East Lothian, extending to some 270 square miles and including 43 miles of coastline along the Firth of Forth. East Lothian has six main towns and extends from Musselburgh in the west to Dunbar and beyond to the area's administrative boundary with Scottish Borders Council in the east.

1.7 Although Musselburgh is the largest town, Haddington is the area's administrative centre. Other large towns include Tranent, North Berwick, Prestonpans and Dunbar. To the south are the Lammermuir Hills and to the west are the Midlothian and City of Edinburgh Council administrative areas. The Firth of Forth and East Lothian's attractive coastline are to the north. East Lothian's varied landscape character comprises a central agricultural plain framed by the backdrop of the Lammermuir Hills and with a long coastline to the north. East Lothian is one of the fastest growing areas of Scotland with an estimated population of 112,300, a 25% increase between 2000 and 2022. It is both a growing and ageing population which is placing increased demand on infrastructure and services.

1.8 The geography of the area is varied; the coastline is mostly low-lying and attracts people from within East Lothian and beyond. The towns of Musselburgh, Prestonpans, North Berwick and Dunbar, and the communities of Cockenzie, Port Seton, Longniddry, Aberlady, Gullane and Dirleton are all coastal. The northern part of East Lothian is generally flat and fertile, containing many of the area's principal settlements and major transport routes, including the A1, East Coast Mainline and North Berwick branch line. This area includes the towns of Haddington and Tranent, and the communities of Wallyford, Blindwells, Gladsmuir, Athelstaneford, East Linton and Innerwick. To the south the area is more undulating and rural and lies in the foothills of the Lammermuir Hills. It includes the villages of Ormiston, Pencaitland, East Saltoun, Humbie, Gifford, Stenton and Oldhamstocks.

1.9 The major rivers flowing through East Lothian are the Rivers Tyne and Esk, which rise in Midlothian and feed the fertile farmland in East Lothian before emptying into the Firth of Forth at Belhaven Bay and Musselburgh respectively. Smaller waterways include the Biel, Whittingehame and Colstoun Waters and the Peffer and Luggate Burns. Other important water bodies include the created reservoirs at Whiteadder, Hopes, Thorters, Donnolly, Lammerloch and Stobshiel, lagoons at Levenhall, ponds at Seafield and Markle, lakes at Pressmennan and Smeaton, Bara Loch and the water filled former quarry at Oxwellmains. Additionally, many other waterways including tributary burns and wetlands provide important benefits to the area.

1.10 Together they contribute to sustainable flood management, storing large amounts of water and reducing peak flows. They help to supply fresh drinking water to communities, businesses and for agricultural use and support recreation and tourism by offering attractive places to play, visit and enjoy East Lothian's natural and built heritage. They also support an array of habitats and wildlife including birds, fish, invertebrates and mammals.

Eskside West Musselburgh

2. POLICY CONTEXT

2.1 The key legislation, policy and guidance for the Strategic Flood Risk Assessment (SFRA) is set out below.

THE FLOOD RISK MANAGEMENT (SCOTLAND) ACT 2009

2.2 The Act introduced a sustainable and modern approach to flood risk management in Scotland that is better suited to meet current needs and to accommodate the impacts of climate change. It also introduced a co-ordinated and partnership approach as to how Scottish Ministers, SEPA and responsible authorities, including East Lothian Council, manage flood risk in a sustainable way within the East Lothian LDP area.

NATIONAL PLANNING FRAMEWORK 4 (NPF4)

2.3 NPF4 is the national spatial strategy for Scotland. It sets out spatial principles, regional priorities, national developments and national planning policy. NPF4's overarching policy intent for flood risk and water management is, "to strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding". This intent is underpinned by three policy outcomes:

- Places are resilient to current and future flood risk;
- Water resources are used efficiently and sustainably; and
- Wider use of natural flood risk management benefits people and nature.

2.4 NPF4 also sets out Scottish Ministers' expectations for local development plans (LDPs). The LDP should strengthen community resilience to the current and future impacts of climate change by avoiding development in areas at flood risk as a first principle. Resilience should also be supported by managing the need to bring previously used sites in built up areas into positive use; planning for adaptation measures; and identifying opportunities to implement improvements to the water environment through natural flood risk management and blue green infrastructure. Plans should consider the probability of flooding from all sources and make use of relevant flood risk and river basin management plans for the area. For areas where climate change is likely to result in increased flood exposure that becomes unmanageable, consideration should be given to alternative sustainable land use.

2.5 NPF4 Policy 22 is the specific policy on flood risk. Criterion a) of the policy states that development proposals at risk of flooding or in a flood risk area will only be supported if they are for:

i. Essential infrastructure where the location is required for operational reasons;

ii. Water compatible uses;

iii. Redevelopment of an existing building or site for an equal or less vulnerable use; or

iv. Redevelopment of previously used sites in built up areas where the LDP has identified a need to bring these into positive use and where proposals demonstrate that long term safety and resilience can be secured in accordance with relevant SEPA advice.

2.6 These exemptions are subject to meeting the relevant conditions set elsewhere in Policy 22. For planning purposes the NPF4 glossary defines the terms 'at risk of flooding' or 'in a flood risk area' as land or built form with an annual probability of being flooded of greater than 0.5% (also known as 1 in 200 years) that includes an appropriate allowance for future climate change. SEPA's Future Flood Maps indicates this risk of flooding.

Local Development Planning Guidance

2.7 The specific requirement for the SFRA can be traced back to the Scottish Government's Local Development Planning Guidance. The preparation of a SFRA at the Evidence Report stage evidences that flood risk information has been gathered to enable NPF4 policy to be taken into account when preparing the LDP.

3. Approach Taken

3.1 East Lothian Council is following the four-step process as described in detail in SEPA's Guidance for Planning Authorities on Strategic Flood Risk Assessment. An SFRA methodology paper has been developed by East Lothian Council and we are following the process outlined. This process is summarised below and constitutes the Council's approach to the SFRA.

Step 1 – Gather and Review appropriate flood risk information

Step 2 – Gap Analysis

Step 3 – Prepare the Outputs

Step 4 – Discuss with SEPA

4. SEPA Flood Hazard Maps

4.1 SEPA's Flood Hazard Maps were created as part of the actions outlined within the Flood Risk Management (Scotland) Act 2009 and provide a national overview of flood risk, including flood extents and depths from a number of different sources including river (fluvial), surface water (pluvial) and coastal.

4.2 The most recent versions of the SEPA Flood Hazard Maps include "Future Flood Maps", which provide information on the predicted flood extents and depths from river and coastal flooding at the 0.5% Annual Exceedance Probability (AEP), also referred to as the 1 in 200 year flood event, with the incorporation of a climate change. The Future Flood Maps are based on the UK Climate Projections' high emission scenarios, assuming limited or no global action to reduce greenhouse gas emissions by the 2080s. The "Future Flood Maps" can indicate, for planning purposes, the areas at risk of flooding and are most aligned to the "functional flood plain" definition within NPF4 Policy 22.

4.3 SEPA's explanatory note provides a detailed technical explanation of the Future Flood Maps and how they relate to the planning process. The latest version of the SEPA Flood Hazard Maps (v2.1) was issued to East Lothian Council in late 2023 and can be viewed on both SEPA's website and on this interactive map.

5. Climate Change Allowances

5.1 A climate change allowance is a prediction of anticipated change in peak river flow, peak rainfall intensity or sea level rise caused by future climate change.

5.2 SEPA has published guidance, "Climate changes allowances for flood risk assessment in land use planning", most recently Version 4 in 2023, that sets out their required climate change allowances for each of Scotland's 12 river basin regions.

5.3 The whole of the East Lothian LDP area falls within the Forth River Basin Region. Peak river flow, peak rainfall intensity and sea level rise allowances can be found within SEPA's guidance.

Climate Change Allowances for the Forth River Basin Region, as of v4 (2023).

Type of Allowance	Description of Allowance	Value of Allowance
Peak river flow	Total change to the year 2100	56%
Peak rainfall intensity	Total change to the year 2080	39%
Sea level rise	Cumulative rise (in metres) from 2017 to 2100	0.86m

Worked Examples

Example 1: Fluvial – construction of an industrial park near the functional flood plain in East Lothian, in a catchment above 50km^2 (e.g. River Tyne or Esk)

River Basin Region	Type of Allowance	Applicable climate change uplift value
Forth	Peak river flow	56%

Comments – for catchments above 50km2, peak river flow should be used

Example 2: Fluvial – redevelopment of a site for a new craft distillery next to the banks of a burn (below 10km^2 catchment)

River Basin Region	Type of Allowance	Applicable climate change uplift value
Forth	Peak rainfall intensity	39%

Comments – for catchments below 30km2, peak rainfall allowance should be used.

Example 3: Coastal – conversion of an industrial dockside building to residential use in coastal town in East Lothian

River Basin Region	Type of Allowance	Applicable climate change uplift value
Forth	Sea level rise	0.86m

Comments – As the site is affected by coastal flooding, sea level rise should be used.

6. Natural Flood Management Maps

6.1 As part of SEPA's duties under the Flood Risk Management (Scotland) Act, they have developed Natural Flood Management Maps, viewable on SEPA's website.

6.2 These maps identify areas with catchments and along coastlines where implementing a specified naturebased solution could be most effective for sustainable flood risk management and merit further investigation.

6.3 SEPA have developed maps for each of the following potential solutions: run-off reduction; floodplain storage; sediment management; estuarine surge attenuation and wave energy dissipation.

7. Flood Defences and Schemes

7.1 Scottish Government's Flood Defence Asset Database (SFDAD) provides a record of the flood protection schemes constructed by local authorities under flood legislation. In the East Lothian LDP area, there is one existing, constructed scheme.

Existing: Prestonpans Flood Prevention Scheme 1972

7.2 The Prestonpans FPS 1972 was constructed as circa 65m of protective seawall with concrete and masonry sections to protect against coastal flood risk. This scheme was constructed in 1972, under the Flood Prevention (Scotland) Act 1961.

7.3 The standard of protection at the time of construction is unknown. However, the most recent assessment of the scheme indicated that this scheme provides a 1 in 200 year level of protection from coastal flood risk. However, it is anticipated that the incorporation of the effects of climate change will reduce the level of protection provided.

Proposed: Musselburgh Flood Protection Scheme

Current Status: Ongoing

7.4 SEPA identified Musselburgh as a Potentially Vulnerable Area (PVA) as part of their duties under the Flood Risk Management (Scotland) Act 2009. It was recommended that, amongst other actions, a flood protection scheme was to be built in Musselburgh, which was ranked 11th of 42 schemes on the 2016-22 Cycle One national programme of flood protection schemes. The scheme was then included in the 2016-22 Forth Estuary Local Flood Risk Management Plan, and subsequent editions.

7.5 In March 2024, the Scheme's Outline Design was published under the Flood Risk Management (Scotland) Act 2009. The scheme proposes a number of actions including flood walls, flood embankments, replacement bridges, reservoir modifications, a debris trap, surface water pumping stations, culverting, repairs to existing structures, erosion protection measures, seepage protection measures, drainage works, landscaping works, road works, accommodation works, and environmental mitigation measures.

7.6 It is proposed that the scheme will protect in the order of 3,200 residential and non-residential properties to a 0.5% AEP (Annual Exceedance Probability) Flood Event (also known as a 1 in 200 year return period flood event) from the River Esk, Pinkie Burn, Musselburgh Mill Lade, and Firth of Forth plus an allowance for climate change.

7.7 Full details of the scheme can be found at the Musselburgh Flood Protection Scheme website. Flood Risk mapping in Musselburgh can be found here

Haddington Flood Protection Scheme

7.8 SEPA identified Haddington as a Potentially Vulnerable Area (PVA) as part of their duties under the Flood Risk Management (Scotland) Act 2009. It was recommended that, amongst other actions, a flood protection scheme was to be built in Haddington. The scheme was then included in the 2016-22 Forth Estuary Local Flood Risk Management Plan.

7.9 In 2024, Haddington FPS was removed from the list of Cycle One flood protection schemes and as of 2024, is due to be re-prioritised against all other national Cycle Two flood protection schemes.

8. Past Flooding Events

8.1 Flooding from multiple sources has affected, and will continue to affect, the East Lothian area. East Lothian's largest rivers, the River Tyne, River Esk and Biel Water have all flooded to varying levels in the past, affecting the towns of Haddington, Musselburgh and West Barns most significantly. In 1948, the largest flood in recent memory took place, affecting all of the major rivers in East Lothian and causing significant damage to properties and businesses, as well as destroying two footbridges.

8.2 Coastal flooding can impact upon our coastal towns, including Musselburgh, Prestonpans, Cockenzie/Port Seton, North Berwick and Dunbar. Severe storm events have not only caused flooding but overtopping of the sea defences and damage to important infrastructure such as harbours. It is anticipated that this risk will worsen with climate, and coastal change. In Musselburgh, there is a tidal influence up the River Esk, which causes out of bank flow around the Loretto footpath and New Street.

8.3 Surface water flooding during heavy and intense rainfall events has affected East Lothian on a number of occasions, this includes surface water runoff from agricultural land and road flooding. These incidents are site-specific and can occur throughout East Lothian.

8.4 High groundwater levels have caused flooding to properties, most significantly within basements, in areas such as East Musselburgh. A large area of East Lothian was used for mining in the past and the risk of mine water exists in several areas.

8.5 Below is a list of the major flood events that have affected East Lothian in the recent past. Areas where there has been minor flooding, such as a road flooded, property was not affected or the flooding was limited to out of bank flow are not included in the list.

8.6 There may be events that were not reported to the Council and which are not included in our records. East Lothian Council are aware of a number of smaller scale, local flood issues and will use this knowledge within the assessment of sites, where appropriate.

Flood Events

8.7 Musselburgh

- 1948 August – River Esk - 1 in 200 year flood event. Affected Musselburgh, flooding the town significantly and washing away the Goosegreen footbridge.
- 1966 August – River Esk. Widespread flooding of areas such as Eskside East and West, Shorthope St and the High St
- 1990 October – River Esk. 1 in 50 year flood event. Flooding of areas such as Eskside East and West, Shorthope St and the High St
- 2000 April – River Esk. 1 in 25 year flood event. Flooding of areas such as Inveresk and Musselburgh Golf Course
- 2024 May – River Esk. 1 in 30 year flood event. Flooding of areas such as Inveresk and Musselburgh Golf Course.

8.8 There is a history of minor flooding in Musselburgh, including a significant number of coastal events affect the Musselburgh area, affecting the Loretto footpath and New St. Overtopping along the shoreline can also occur. This type of event happens on a regular basis, for example in the recent past there has been flooding in these areas in 2022, 2023 and 2024.

8.9 Haddington

- 1948 August – River Tyne. Out of bank flow from the River Tyne. Haddington's High Street was under several feet of water and 50 families were registered as homeless.
- 2009 September – River Tyne. River Tyne broke its banks and flooded the nearby school, two businesses and 1 residential property.
- 2012 July and September – River Tyne. River flooding. High river levels in the Tyne caused drains and watercourses to back up as they were unable to discharge to the river, resulting in property flooding.
- 2019 June - River Tyne. There was a near-miss on 13 June 2019 when sandbags were deployed at Waterside and Giffordgate to increase the level of the walls there.

8.10 Macmerry

- 2012 June – Macmerry. Surface water flood event. Flooded properties and the area around Whiteloch Road, Greenmill Brae and Station Court

8.11 Tranent

8.12 Tranent is most significantly impacted by surface water runoff. Most recent events include;

- 2011 – Surface water and sewer flooding to Sanderson Wynd Primary School
- 2014 – Surface water flooding to a business in 2014.

8.13 West Barns

- 1948 – Biel Water. Significant flooding of properties and businesses. The majority of the low-lying land north and west of West Barns was submerged in water.
- 2007 – Biel Water. Out of bank flows flooding properties on Edinburgh Road and Duke St. 15 residential properties and 1 business were flooded.

8.14 Dunbar

- 2002 – Belhaven Hospital – flooded from river flooding. Patients had to be evacuated after the generator room was shut down and wards closed.

8.15 North Berwick

8.16 There is a history of minor coastal flooding in the area, from wave overtopping

- 2018 March - for example in in 2018, waves overtopped the sea defences
- 2023 October – Storm Babet caused significant damage to North Berwick Harbour (and erosion issues along other coastline such as Port Seton and Cockenzie)

8.17 Cockenzie & Port Seton

8.18 Cockenzie & Port Seton have a history of minor flooding, from coastal and surface water issues. Most significantly in the recent past;

- 2016 January - A culvert blocked, flooding the road and Seton Sands Holiday Park, with damage to caravan pitches.

9. Dynamic Coast

9.1 Dynamic Coast is a project commissioned nationally to provide the strategic evidence base on the extent of coastal erosion in Scotland.

9.2 Dynamic Coast have created a number of online maps identifying land precited to be at risk of coastal erosion at several different climate change scenarios. Several areas of land and infrastructure are identified as having the potential to be impacted by future coastal erosion. Where erosion occurs, coastal flooding could get worse.

9.3 Further information on Dynamic Coast can be found from this website.

Coastal Erosion at Links Road Port Seton

10. Reservoir Inundation Maps

10.1 Under the Reservoirs (Scotland) Act 2011 (the 2011 Act), SEPA are the regulatory authority for reservoir safety in Scotland.

10.2 Ensuring that reservoirs are correctly managed and maintained is essential. They provide Scotland with drinking water, power, resources for business and social amenities. The consequences of poor management and maintenance could be devastating and lead to a serious risk of flooding which impacts our communities, businesses, infrastructure and environment.

10.3 The Reservoir (Scotland) Act 2011 modernised the regulatory regime for the construction, alteration and management of controlled reservoirs in Scotland capable of holding 10,000 or more cubic metres of water. The legislation requires SEPA to establish and maintain a register including information such as the name (if any), location and maximum water capacity of the controlled reservoir. The register also assigns a risk designation (of high, medium or low) to each controlled reservoir taking into account the impacts of an uncontrolled release of water on features below the reservoir. These features could include residential properties, businesses, communities, transport links, agriculture, cultural heritage and the environment.

10.4 It must be stressed the designation of risk is not an indication of flood risk within the planning process and that these maps would not generally be used in assessment of suitability of a site, with regards to NPF4. However, they do provide useful insight into the risk from reservoir failure.

10.5 On SEPA's website, the register and associated maps can be viewed and show the extent of land that would be flooded in the unlikely event of a controlled reservoir failing.

10.6 Figure 2 shows the list of reservoirs that have the potential to impact East Lothian. Many catchments extend across local authority boundaries so some of these are located in different LDP areas but their impacts would be felt in East Lothian.

FIGURE 2: TABLE OF RESERVOIRS WITH POTENTIAL INUNDATION IMPACTS IN EAST LOTHIAN

Reservoir	Local Authority Area	Controlled Reservoir Ref No	Volume	National Grid Reference (NGR)
Portmore	Midlothian	RES/R/1128225	1,164,000	NT 25989 50216
Edgelaw	Midlothian			NT 29959 58176 D/s of Portmore
Gladhouse	Midlothian	RES/R/1128121	8,278,000	NT 29870 53599
Rosebery	Midlothian			NT 30722 56624 D/s of Gladhouse
Stobshiel	East Lothian	RES/R/1127965	245,455	NT 50090 61958
Lammerloch	East Lothian	RES/R/1127964	127,273	NT 51321 63482
Hopes	East Lothian	RES/R/1127963	1,418,000	NT 54676 62078
Donnolly	East Lothian	RES/R/1127962	191,000	NT 57785 68691
Thorters	East Lothian	RES/R/1127966	286,363	NT 60644 69556
Pressmennan Lake	East Lothian	RES/R/1128397	210,000	NT 62839 73217
Whiteadder	East Lothian *Note drains to Scottish Borders	RES/R/1127967	7,955,000	NT 65226 63566

11. Flood Risk Management Planning

11.1 As part of their actions under the Flood Risk Management (Scotland) Act 2009, SEPA developed a National Flood Risk Assessment for Scotland, this NFRA has been further updated in 2018. This assisted in the creation of 14 Local Plan Districts based on river catchments and a number of Potentially Vulnerable Areas throughout the country.

11.2 Flood Risk Management Plans and Local Flood Risk Management Plans have been created, for each Local Plan District. East Lothian sits within the Forth Estuary Local Plan District.

11.3 Flood Risk Management Plans (previously called flood risk management strategies) coordinate efforts to tackle flooding in Scotland.

11.4 They set the national direction of future flood risk management, helping to target investment and coordinate actions across public bodies. The plans identify the main flood hazards and impacts, setting out objectives for reducing risk and the best combination of actions to achieve this, such as the appropriateness of an alleviation scheme or improving flood warning arrangements.

11.5 This information is used as a basis for better decision-making across flood risk management organisations such as local authorities, SEPA and Scottish Water. A Flood Risk Management Plan (FRMP) is available for each of the 14 Local Plan Districts in Scotland.

11.6 The FRMP is approved by the Scottish Government and published by SEPA as Scotland's strategic flood risk management authority.

11.7 The FRMP for the Forth Estuary Local Plan District covers all of the East Lothian LDP area.

11.8 Local Flood Risk Management Plans (LFRMPs) complement the FRMPs, providing additional local detail on how bodies will work together to reduce the effects of flooding in our communities. These plans are published by local authorities. Falkirk Council act as Lead Local Authority for the Forth Estuary Local Plan District and worked with the other relevant local authorities, including East Lothian Council, to publish the Forth Estuary Local Flood Risk Management Plan. The FRMPs and LFRMPs cover six year periods and are in their second cycle, covering 2022-2028. The FRMP is available at Local Flood Risk Management Plan. Cycle 2. 2022-2028 (falkirk.gov.uk)

12. Potentially Vulnerable Areas

12.1 Potentially Vulnerable Areas (PVAs) are where significant flood risk exists now or is likely to occur in the future. Identifying PVAs helps SEPA, East Lothian Council and other partners plan to protect people, properties, businesses, communities, infrastructure and the environment from flooding.

12.2 Within East Lothian, 5 PVA's were included in the 2022-28 FRMP and LFRMP's, listed below. In the 2022-28 publication, within each PVA, "Target Areas" are identified, with a target area number. An interactive map of East Lothian Council's PVA's is available at East Lothian Council SEPA Potentially Vulnerable Areas Map - Overview (arcgis.com)

- PVA 02/10/23 – Musselburgh
    - TA 304 - Musselburgh
- PVA 02/10/26 – North Berwick
    - TA 305 – North Berwick
- PVA 02/10/27 – Dunbar and West Barns
    - TA 222 – Dunbar
    - TA 322 – West Barns
- PVA 02/10/29 – Cockenzie, Port Seton, Longniddry and Prestonpans
    - TA 212 - Cockenzie and Port Seton
    - TA 297 - Longniddry
    - TA 309 - Prestonpans
    - TA 319 - Tranent
    - TA 31900 - Macmerry
- PVA 02/10/30 – Haddington
    - TA 233 - Haddington

12.3 Within each PVA, a number of actions are identified for each PVA are listed within the LFRMP's and these can be viewed here. Further information on actions, including flood studies and surface water management plans are listed below. An action within the Musselburgh PVA is to develop a flood protection scheme, information is provided on this at 7.4.

13. Flood Studies

13.1 A flood study is a technical study, assessing the flood risk in a certain area, generally providing a list of proposed mitigation actions that may be able to be taken forward in that area.

13.2 Within the Forth Estuary Local Flood Risk Management Plan 2022-28, the following flood studies were proposed;

Delivery Lead – East Lothian Council

- Cockenzie, Longniddry, Port Seton and Prestonpans
- Dunbar, West Barns and North Berwick
- Tranent and Macmerry

14. Surface Water Management Plans

14.1 Surface water flooding is a significant problem in Scotland and the risk of surface water flooding is likely to increase in the future as a result of climate change. It is therefore important that land use planning policies take such risks into account when considering new development.

14.2 Surface water management plans aim to develop an understanding of the surface water flood risk in a certain area and to identify potential mitigation measures and long-term solutions for mitigation and adapting to this risk.

14.3 Within the Forth Estuary Local Flood Risk Management Plan 2022-28, the following surface water management plans were proposed;

Delivery Lead – East Lothian Council in coordination with Scottish Water

- Haddington
- Musselburgh
- Prestonpans
- Tranent and Macmerry

15. Coastal Change Adaptation Plans

15.1 East Lothian Council has approximately 69km of coastline, with over 17km of coastal defences along this stretch. In 2002, East Lothian Council published a Shoreline Management Plan as a strategy for managing the coastline.

15.2 In 2023, Scottish Government published their "Coastal Change Adaptation Plan Guidance", this provides a template for the creation of Coastal Change Adaptation Plans. CCAP's aim to understand the risk of coastal change, including coastal erosion and coastal flood risk and provide a long-term strategy for management and adaptation of the coastline within authority areas.

15.3 East Lothian Council propose to develop a CCAP to supersede the Shoreline Management Plan within 2024-26.

16. Gap Analysis

16.1 Some evidence gaps have been identified through collection and review of the data sources for the SFRA. The gaps are summarised per information source below along with an action to address these during the later stages of LDP2 preparation.

SEPA Flood Hazard Maps

16.2 The Flood Hazard maps do not identify the river extent of small watercourses with catchments less than 3 sq. km. The extents of river, coastal and surface flooding are indicative and do not fully take account of structures, such as culverts, bridges and flood defences which can influence flooding. They also do not take account river and coastal flooding happening simultaneously. The Future Flood Maps also underestimate future river and coastal flood risk in the LDP2 area, applying smaller allowances for climate change and sea level rises than those stated for the Forth Region in SEPA's Climate Change Allowances for Flood Risk Assessment in Land Use Planning (Version 4)

16.3 Action: To address the above evidence gaps, a site-specific flood risk assessment (FRA) will be required for candidate sites in locations known to be at risk of flooding. Depending on professional judgement, a FRA may be required to consider a candidate site through the site assessment for LDP2, and/or at the planning application stage with the plan specifying the need for a FRA to inform and accompany development proposals. Generally, flood risk assessments are sought by East Lothian Council in one or a combination of the following situations:

- The site is close enough to watercourse or drainage ditch that it poses a realistic risk of flooding
- Historic instances of any form of flooding on the site
- SEPA Flood Hazard Maps indicate that the site is at risk (low, medium or high) of flooding from any source
- The site is in or adjacent to a flood bank of flood control structure
- The site is in or adjacent to coastal waters and/or below the 6m AOD contour.

16.4 The site-specific FRA will need to run scenarios using the relevant allowances as set out in the latest version of SEPA's Climate Change Allowances for Flood Risk Assessment in Land Use Planning.

Climate Change Allowance

16.5 The gaps associated with climate change allowances and the Future Flood Maps are reported in paragraph 15.2. To address the gaps, a site-specific FRA will be required in the circumstances described in paragraph 15.3.

Natural Flood Management Maps

16.6 The main limitations of the maps are that they are of a high-level nature and therefore not site specific.

16.7 Action: Opportunities for natural flood management (such as deculverting, and inland storage ponds and wetlands) at the site-specific level will be established, for example, using local knowledge, flood studies, river basin management plans, the strategic environmental assessment and site-specific flood risk assessments.

Dynamic Coast

16.8 East Lothian Council does not currently have a coastal adaptation plan in place to augment the mapping of Dynamic Coast.

16.9 Action: The Council has commenced the coastal adaptation planning process which could identify areas of our coast where:

- Natural or artificial defences will be needed in the long term;
- No active intervention is needed and free coastal change is accepted; and/or
- Managed realignment of the coast would be a more effective strategy in the long term.

Reservoir Inundation Maps

16.13 According to SEPA's guidance, the purpose of the inundation maps is only to inform the assignment of risk designations and they were not designed for other purposes, such as land use planning. It is not currently possible to assess the probability of an uncontrolled release of water from a reservoir in a manner consistent with the requirements of NPF4 for development to be free of flood risk up to 0.5% probability (including allowance for climate change). Furthermore, the probability of failure of a controlled reservoir is considered so low that it is beyond the scope of risk considered within NPF4.

16.14 Action: The Council will consider the risk of reservoir inundation for a candidate site only if it is appropriate to do so.

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