West Lothian Strategic Flood Risk Assessment

West Lothian Local Development Plan: background paper

The purpose of the Strategic Flood Risk Assessment is to provide information on flood risk, taking into account climate change, that will enable the council to understand existing and potential flood risk to any developments that are to be allocated in the LDP.

Contents

1 Introduction

1.1 Flooding principally occurs from a combination of meteorological and hydrological extremes, such as extreme rainfall events, high tides and stormy conditions. It can also occur and be exacerbated as a result of human activity, such as development on flood plains, changes in land use practice, urban creep, structural failure and blockage of sewers, drains and culverts.

1.2 The impacts of flooding will vary at different locations. For example, flooding of agricultural land can be costly to the individual farmer, but is unlikely to involve a serious threat to human life; whilst the potential overtopping and possible failure of a structure close to a densely populated area presents a greater threat to life and property. Rapid flows due to flash flooding or following structural failures pose a greater risk to life than a steady rise in water level. The council is mindful of the need to ensure that existing developments that are perhaps changed in use or lead to more intensive human use behind defences should also be assessed on sensitivity of use in terms of climate change scenarios or to help reverse the effects of a past unsustainable development where downstream flooding is an acknowledged problem or the receiving watercourse is in a poor condition.

1.3 The land use planning system has been identified as having a key role to play in ensuring the protection and improvement of the water environment in accordance with the *European Water Framework Directive* (WFD) 2000. River Basin Management Plans (RBMPs) published by SEPA with a wide range of partner input including that of local authorities. Local authorities are "Responsible Authorities" under the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act) (Relevant Enactments and Designation of Responsible Authorities and Functions (Scotland) Order 2011 and must exercise their designated functions so as to secure compliance with the requirements of the Directive.

1.4 The council has assessed proposed development allocations to identify measures under planning control, should particular sites be progressed, that require to be considered to ensure compliance with the WFD and objectives set against individual water bodies in the underlying RBMPs.

1.5 This updates general information relating to strategic flood risk issues as set out in the *West Lothian Strategic Flood Risk Assessment* of August 2014 prepared in support of the *Main Issues Report* (MIR) for the *West Lothian Local Development Plan* (LDP).

1.6 Approximately 440 sites were assessed by the council's Flood Risk Management team and the Scottish Environment Protection Agency (SEPA) in terms of individual flood risk to that site and cumulative impacts. This originated from re-assessment of sites identified in the adopted *West Lothian Local Plan 2009* (WLLP) and also included emerging sites from the 'Expressions of Interest' (EOI) call for sites exercise undertaken by the council between January and May 2011 to inform the LDP Since that time, site submissions received after the MIR consultation, emerging council house buildings sites and sites submitted following consultation on the MIR have now been assessed. The detailed flood risk and water related issues for development sites to be included in are set out in Appendix One to the *LDP Proposed Plan* and contains information on proposed employment land allocations and Appendix Two to the *LDP Proposed Plan* contains details of the proposed housing allocations.

1.7 In identifying land allocations for development, the primary aim is to avoid locating new development in areas at risk of flooding from any source. The main objectives of the West Lothian SFRA therefore are to:

- ensure development does not take place in locations at risk of flooding nor must it increase flood risk elsewhere;
- provide the baseline for the Environmental Report prepared as part of the Strategic Environmental Assessment of sites for the LDP;
- identify areas at potential risk of flooding based on best information available; and
- provide an evidence-based strategic report to inform the LDP.

1.8 The key role of the SFRA is to help determine whether the potential development sites identified within the *Main Issues Report* (MIR) for the LDP remain suitable for development and can be taken forward to the *LDP Proposed Plan* and that new allocations that have come forward to the *LDP Proposed Plan* and that any new allocations that have come forward for consideration are also suitable for development. In identifying sites for inclusion in the *Proposed Plan* for development, it may mean that mitigation measures may not be necessary to overcome flood risk as those sites where flood risk has been identified should be 'screened' out as part of the site assessment process. It might also be possible to integrate development with the flood risk that is identified by providing appropriate mitagtory interventions such as stand offs to watercourses for example. SEPA and the council may request a Flood Risk Assessment (FRA) for large allocation sites that have an element of flood risk e.g. a watercourse flowing through the middle, but could be adequately mitigated through appropriate site design.

1.9 Where a FRA is requested by SEPA, or following internal consultation with the council's Flood Risk Management team, this may not require that the site be removed from the LDP, but that a FRA would inform the extent of the potentially developable area and type of development. In contrast, SEPA could potentially recommend that sites adjacent to watercourses be removed as development could potentially be located within an area at risk of flooding. Such sites are unlikely to receive council and SEPA support.

2 Integrating flooding, water and drainage

2.1 An integrated approach to flood risk management is important in planning for future development. A combination of structural and non-structural flood risk management measures, when taken as a whole, can successfully reduce flood risk, improve water quality and enhance the quality of place and biodiversity.

2.2 The planning system and planning decisions are identified in Scottish Government guidance on Delivering Sustainable Flood Risk Management as non-structural measures to manage flood risk. An integrated approach is required to cover the water environment, water supply and drainage capacity. The SFRA was supported by a background paper to the MIR on the Water Environment. This approach can assist in identifying the right combination of measures to tackle particular problems, and minimise risks and impacts on the environment.

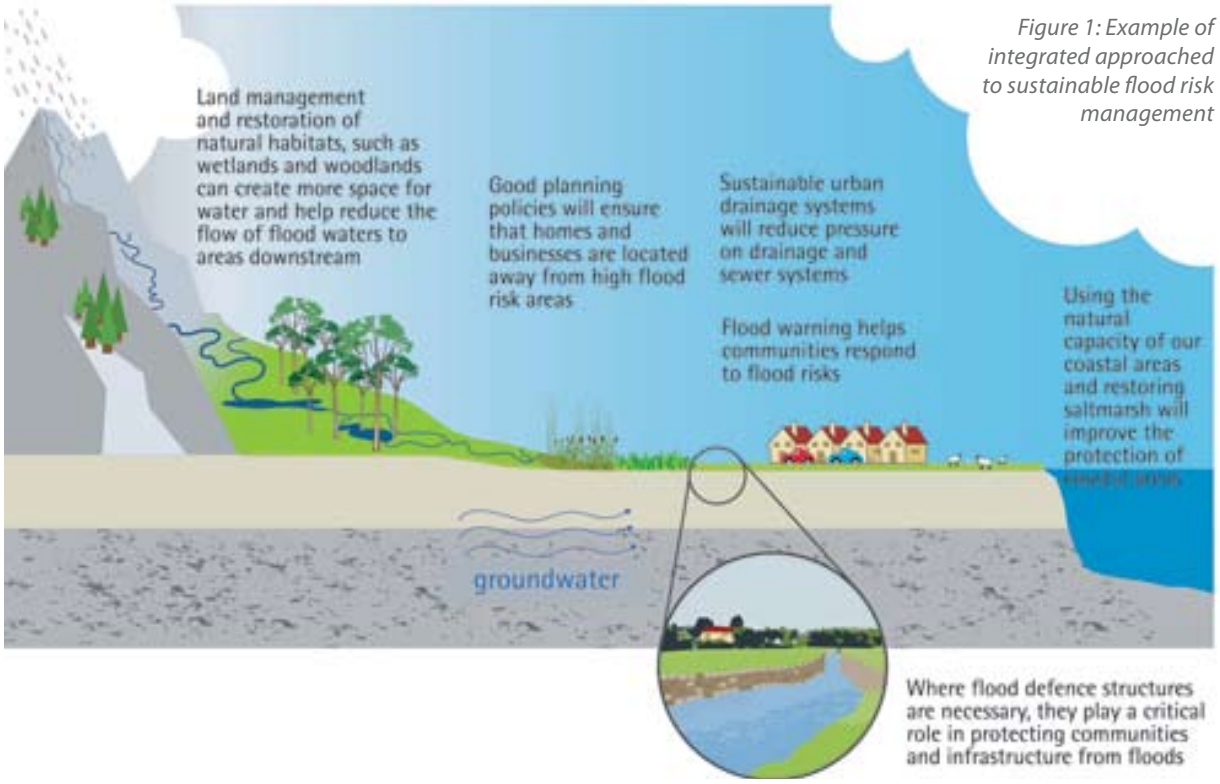

Figure 1: Example of integrated approached to sustainable flood risk management

2.3 The "source-pathway-receptor-impact" approach is a well-established framework in flood risk management. It provides a basis for understanding the causal links between the source of flooding, the route by which it is transmitted and the receptor which suffers impact:

Table1: Sources, pathways and receptors

Source (weather events)	Pathway (routes)	Receptor (those impacted)
Rainfall Wind Waves Sea levels Tidal surge Reservoir levels	Flood plain inundation Surcharged drainage systems Structural failure Groundwater Rivers Sewers	People Built environment Natural environment Infrastructure Economy

2.4 A good understanding of the sources and impacts of flooding, and the links between them, can help identify the right combination of measures to tackle particular flooding problems. For example, catchment and floodplain restoration should be considered to reduce or manage flood risk in both rural and urban areas. Where high rates of run-off in rural upland areas are contributing to flooding problems, measures to store or slow run-off can be considered, including re-vegetating hill slopes to increase the interception of rainfall and increase the roughness of the land surface, thereby slowing runoff. In urban areas, an understanding of sources and pathways of flooding can help identify appropriate measures and influence the layout and design of new developments. In some circumstances flood protection schemes or managed retreat from areas at significant risk may need to be considered.

3 Delivering sustainable flood risk management

3.1 Scottish Government guidance on Delivering Sustainable Flood Risk Management promotes a more sustainable approach to flood risk management and provides specific guidance on understanding flood risk, understanding catchments, integrated flood risk management and integrated drainage. In promoting a sustainable approach to flood risk management, five overarching outcomes for Scotland are identified:

- a reduction in the number of people, homes and property at risk of flooding as a result of public funds being invested in actions that protect the most vulnerable and those areas at greatest risk of flooding.
- rural and urban landscapes with space to store water and slow down the progress of floods.
- providing integrated drainage that decreases burdens on our sewer systems while also delivering reduced flood risk and an improved water environment.
- a well informed public that understand flood risk and adopts actions to protect themselves, their property or their businesses.
- undertaking flood management actions that will stand the test of time and be adaptable to future changes in the climate.

3.2 Delivering Sustainable Flood Risk Management highlights that the planning system is one of the most powerful tools to manage flood risk. West Lothian Council fully endorses this approach. Where possible, the guidance advocates the avoidance approach to flood risk and seeks a move away from the build-and-protect approach to development in flood risk areas. It identifies local and strategic development plans (SDP) as being a key part of the integrated approach to land and water management through local flood risk management plans. The planning system therefore has a key role to play in delivering these outcomes through development plan spatial strategies, land use allocations, policies, supplementary guidance and development management decisions. These are based on robust and reliable information on the causes and consequences of flooding so that informed decisions can be made.

3.3 Local development plans can also be used to identify where the promotion of managed coastal realignment or other measures could contribute to a more sustainable approach to flood management. This encompasses the catchment approach to flood risk management by using land use planning to manage flood risk in rural and urban areas. The West Lothian LDP seeks to achieve these aims.

3.4 With regards to surface water drainage, the guidance seeks an integrated approach to drainage that reduces flood risk and burdens on sewer systems and supports/promotes improvements to the water environment.

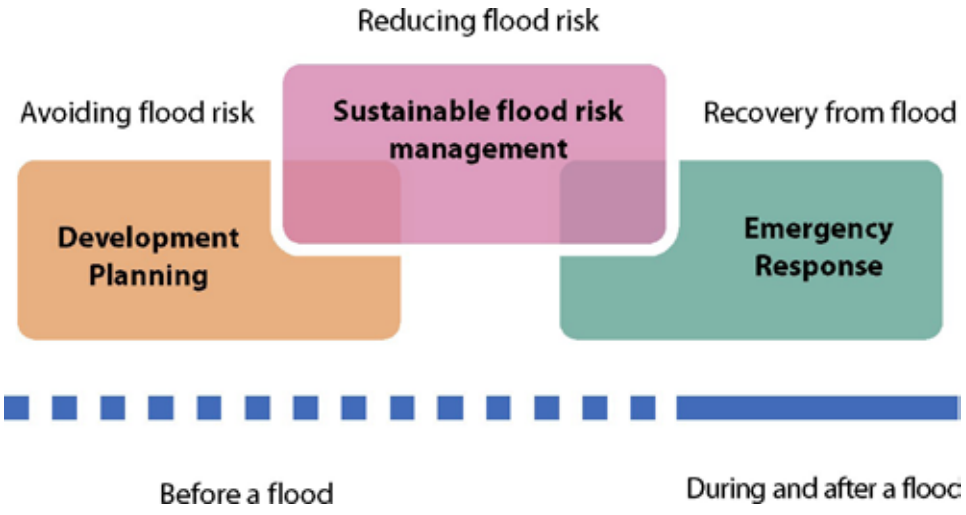

Figure 2: The three elements of flood risk management

4 Flood Risk Management (Scotland) Act 2009

4.1 The Flood Risk Management (Scotland) Act 2009 sets in place a statutory framework for delivering a plan-led, catchment-wide, sustainable and risk-based approach to managing flood risk. This includes the preparation of assessments of the likelihood of flooding, and the impacts of flooding and catchment focused plans to address these impacts. By 2016 Flood Risk Management Strategies and Local Flood Risk Management Plans will be in place across Scotland. These will require to be taken into account when subsequent development plans are prepared. To provide a baseline to inform the West Lothian LDP, the council has prepared this SFRA to ensure that new development will be free from significant flood risk and will not increase the risk of flooding elsewhere. This assessment took place at the MIR stage.

4.2 In December 2011, SEPA published the National Flood Risk Assessment, which highlighted that 1 in 22 of all residential properties and 1 in 13 of non-residential properties are at risk of flood from rivers, the sea or surface water in urban areas. This, along with emerging information about sewer flooding and groundwater flooding, requires to be taken into account by planning authorities when development plans are prepared.

4.3 The West Lothian SFRA provides a strategic overview of flood risk in West Lothian and supports the identification of the area's most suitable for development in relation to avoiding potential flooding and general areas that should be safeguarded for sustainable flood management.

5 Scottish Planning Policy

5.1 Scottish Planning Policy 2014, SPP (2014) suggests that land allocated for development should, in the first instance, be located in areas with the lowest risk of flooding and lastly in areas of highest risk. SPP2014 contains a 'Risk Framework' which shows the return period and probability associated with river and coastal flooding as shown in Table 2 below:

Table 2: Risk framework

Little or no risk
Annual probability of watercourse, tidal or coastal flooding is less than 0.1% (1:1000)
No constraints due to watercourse, tidal or coastal flooding.
Low to medium risk area
Annual probability of watercourse, tidal or coastal flooding in the range 0.1% - 0.5% (1:1000 – 1:200)
These areas will be suitable for most development. A flood risk assessment may be required at the upper end of the probability range (i.e. close to 0.5%) or where the nature of the development or local circumstances indicates heightened risk. Resilient materials and construction may be required depending on the flood risk assessment. Subject to operational requirements, including response times, these areas are generally not suitable for essential civil infrastructure such as hospitals, fire stations, emergency depots etc. Where such infrastructure must be located in these areas or is being substantially extended it should be capable of remaining operational and safely accessible during extreme flooding events.

Medium to high risk
Annual probability of watercourse, tidal or coastal flooding greater than 0.5% (1:200)
Generally not suitable for essential civil infrastructure such as hospitals, fire stations, emergency depots etc., schools, care homes, ground-based electrical and telecommunications equipment unless subject to an appropriate long term flood risk management strategy. The policy for development on functional flood plains applies. Land rising might be acceptable subject to the provision of appropriate compensation storage in an appropriate location.
If built development is permitted, appropriate measures to manage flood risk will be required and the loss of flood storage capacity mitigated to produce a neutral or better outcome.
Within built-up areas, medium to high-risk areas may be suitable for residential, institutional, commercial and industrial development provided flood prevention measures to the appropriate standard already exist, are under construction or are planned as part of a long term development strategy. In allocating sites, preference should be given to those areas already defended to required standards. Resilient materials and construction should be used where appropriate.
In undeveloped and sparsely developed areas, medium to high risk areas are generally not suitable for additional development. Exceptions may arise if a location is essential for operational reasons, e.g. for navigation and water based recreation uses, agriculture, transport or some utilities infrastructure and an alternative lower risk location is not achievable. Such infrastructure should be designed and constructed to remain operational during floods. These areas may also be suitable for some recreation, sport, amenity and nature conservation uses provided adequate evacuation procedures are in place. Job-related accommodation (e.g. caretakers and operational staff) may be acceptable. New caravan and camping sites should not be located in these areas. If built development is permitted, measures to manage flood risk are likely to be required and the loss of flood storage capacity minimised. Resilient materials and construction should be used where appropriate.

Source: SPP 2013

5.2 In allocating development sites the LDP seeks to ensure there is minimal damage from the risks of flooding. Development of sites on flood plains is normally resisted and development of other low-lying land adjacent to rivers and watercourses will not normally be supported. Where the allocation of a site for development would create an unmanageable risk of flooding elsewhere, or could negatively impact on the water environment, development is not be supported. The council is following guidance in SPP2014 paragraphs 260-263 in producing the development plan and Development Management will be required to accord to paragraphs 264 – 268 inclusive. The principles established in paragraphs 254 – 259 regarding flooding are also being followed.

6 West Lothian flood risk and drainage supplementry planning guidance

6.1 In April 2008, the council approved SPG for developers to minimise flood risk both to their own sites and from other sites.

6.2 The council is likely to revise and update this SPG before the publication of the proposed plan stage of the LDP. Progress on this maybe dependent upon the publication of an updated Planning Advice Note (PAN) on Flooding by Scottish Government, which will supersede the current PAN 79 'Water and Drainage', PAN 61 Planning and Sustainable Urban Drainage Systems and PAN 69 Planning and Building Standards Advice on Flooding. It is hoped that the updated PAN will be published in early course.

7 Climate change impacts on flood risk

7.1 It is expected that flooding will become a greater problem in the future due to the impact of climate change. SEPA indicate a moderate predicted increase in rainfall with proportionate increase in flooding and consider that there are no significant risks to properties in West Lothian from the tidal surge in the Forth estuary.

7.2 However, SEPA does update its flood hazard maps in terms of 1:200 flood risks and the council assesses sites against this information. A new suite of maps was available from the end of December 2014 as part of SEPA's obligations under the Flood Risk Management (Scotland) Act 2009.

7.3 The Scottish Government's understanding of the future impacts of climate change upon economic performance, our natural environment, communities and individuals is developing. The UK 2012 Climate Change Risk Assessment for Scotland highlights that the main impacts of climate change are likely to result in:

- higher temperatures in summer and winter;
- increased winter rainfall, but a decrease in summer rainfall;
- more heavy rainfall days (extreme events) in summer and winter; and
- a rise in relative sea level.

(Based on UKCP09, using central estimates for the medium emissions scenario).

7.4 There are predictions for regional variations:

- by 2080 rainfall events will, on average, be unaffected in north-west Scotland, 25-75% more intense in east Scotland, up to 100% more intense in west Scotland and more than 150% more intense in parts of south-west Scotland.
- unlike changes in average temperature and rainfall, changes in rainfall intensity will be more dramatic in Scotland, increasing the likelihood of flash flooding of Scottish rivers.

Source: SNIFFER

7.5 In relation to flood risk and the water environment, climate change implications include:

- increases in flooding and an increase in the number of people at risk of flooding.
- an increase in coastal flooding resulting in changes to coastal evolution affecting people, property, infrastructure, landforms, habitats and species.
- increased flooding events from drainage systems being unable to cope with sudden and intense rainfall.
- increased erosion of river banks due to more intense flooding events.
- increased threats to the stability of estuary shores and lower lying intertidal zones from sea level rise and coastal flooding.
- greater impacts on water quality as potential pollutants are transported into watercourses from flood events. This may impact on Water Framework Directive targets for water quality.
- reduction in river flows and water availability during the summer, affecting water supplies and the natural environment.
- drier summers could impact upon water quality and quantity issues as pollutants may not be adequately diluted. There may be higher demand for water supplies in some areas.
- greater chance of odour and bacteria issues at waste water treatment and water treatment plants due to drier summers.

8 Climate change adaptation

8.1 Climate change adaptation requires us to take account of the consequences of climate change by altering our plans and designs to lower the risks and lessen the impacts. Flood risk adaptation can include measures such as altering the location and design of new development and introducing flood protection measures. The Adaptation Sub-Committee of the Scottish Government has identified five priority themes for early adaptation action which will inform the Scottish Climate Change Adaptation Programme. Three of these relate to the planning system:

- Land use planning – determining where new housing and commercial premises should be located and overall urban form, including urban greenspace, so that places and their communities are resilient to a changing climate;
- Designing and renovating buildings – how new housing, commercial and public sector buildings are planned and built, and the methods and materials used to renovate the existing building stock, so that the health and well-being of their occupants is maintained; and
- Providing national infrastructure – how critical infrastructure in the energy, transport, communication (ICT) and water sectors are designed and where they are located, so that they are able to continue to deliver services critical to the well-being and the prosperity of communities and business.

Source: 'How well is Scotland preparing for climate change?' November 2011

8.2 The Scottish Government has produced climate change Sector Action Plans to provide guidance on adapting to climate change. Of particular importance to flood risk, the water environment and water supply are the action plans on:

- Spatial Planning and Land Use
- Built Environment
- Water

8.3 It should be noted that where existing buildings are renovated, the health and wellbeing of its potential occupants requires to remain maintained in terms of not being susceptible to flood risk, but where there is a possible risk this should be mitigated. It should be noted that SEPA may be unlikely to support an increase in the sensitivity of use e.g. commercial to residential to existing buildings or brownfield sites that are known to be at risk from flooding.

9 SEPA potentially vulnerable area (PVA)

9.1 The council is aware of the issues of PVAs and considers the issue of flood risk within these when allocating sites in the development plan or considering planning applications. SEPA has incorporated information and responses from the consultation into the National Flood Risk Assessment and has reviewed PVAs and Local Plan Districts. . West Lothian has five such PVAs within Local Plan District 10 – The Forth Estuary. These areas include:

- the Forth Estuary (South) Coastal (three different defined areas);
- the River Avon; and
- the River Almond

9.2 Helpful datasheets have been provided which include high level information in each geographical area on:

- summary of main impacts from the river in question;
- estimated weighted annual average damages;
- known sources of flooding;
- groundwater flooding;
- impact of climate change;
- proportion of property type within the PVA;
- lists of any settlements at risk from flooding;
- total area and a breakdown of land area in terms of agriculture, forestry and urban;
- confirmation of any existing flood defences; and
- catchment hydrology and morphology.

9.3 Further information can be found on PVAs at the following link on the SEPA website.

10 Other flooding issues

10.1 As well as having numerous rivers, burns and bodies of water within West Lothian, there is also potential flood risk in certain areas through the flooding of abandoned underground mine workings. This has been an emerging issue that the council has become aware of and will monitor and assess in liaison with the Coal Authority when considering allocations in the LDP and assessing planning applications.

10.2 Plans have recently been prepared by SEPA which show Potentially Vulnerable Areas, deemed by modelling to be at an enhanced risk of flooding from one or more sources. The PVA plans show specific areas deemed, by modelling, to be at risk of flooding. The plans will be used to develop Local Flood Risk Management Plans as well as influencing decisions on planning applications. Where development may potentially afford the opportunity to reduce existing flood risk or improve the water environment, the council, as Planning Authority, may require developers to provide or enhance infrastructure or flood routes or restore riparian environment as part of the development planning process. Doing so helps fulfil legal obligations placed on the council, as a Responsible Authority under the Flood Risk Management (Scotland) Act 2009.

10.3 Where there are particular issues of impaired water quality in or otherwise affecting a receiving water body, the council as Planning Authority may require developers to provide or enhance infrastructure or install additional measures on or off site or to provide land for the provision of retrofit measures to lessen the impact of development or previous unsustainable development on the receptor. This helps fulfil legal requirements on the council to have regard to the requirements of the European Water Framework Directive 2008 in the discharge of its statutory functions.

11 Historical flooding in West Lothian

11.1 The council maintains a record of significant flood events in West Lothian. This can help to provide information on where there is an existing flood risk and highlight where action may be needed to reduce the frequency and extent of the impact of such events.

11.2 The types of work the council has been involved in during recent years to alleviate flood risk and improve water quality are shown in the Table 3.

Table 3: West Lothian Council Flood Risk Allevation and Water Quality Improvement Projects

Commissioning a further study of the hydrology at East Burnside, Broxburn following the post-flood review and installation of debris traps across the burn.
Commissioning the design of a replacement bridge where Newhouses Road crosses the Brox Burn at East Burnside.
Working with members of the Dedridge Environment & Ecology Project (DEEP) and contributing to proposals to restore the ponds at Dedridge.
Building a new headwall and trash screen and upgrading the culverted watercourse leading from Bughtknowes Farm, Bathgate beneath Torphichen Road to Balbardie Park to reduce the risk of flooding to Torphichen Road.
Working with householders and replacing the trash screen located at The Glen, Bathgate with a new one to reduce the risk of flooding and enhance the safety of those inspecting and cleaning the structure.
Putting in place further measures in Fauldhouse to intercept and temporarily store surface water, storing it temporarily before releasing it at a more controlled rate into the receiving drainage systems and watercourses.
Investment in maintenance and works in the interests of safety at both Beecraigs and Eliburn Reservoirs.
Commissioning a study into flooding, seriously impaired drainage, damp and condensation affecting social housing at Mayfield, Armadale.
Undertaking further site work to reduce the incidence of flooding to properties at Bowyett, Torphichen.
Investing in two high-volume pumps to improve the support that the council can give to its customers affected by flooding, reduce the time that public roads are closed due to flooding and enabling the council to respond more quickly to pollution incidents.
Working with a house builder to help resolve flooding caused by an accumulation of surface water at Nelson Park, Armadale which was adversely affecting the nearby filling station premises.

Source: West Lothian Council Flood Prevention team

The measures which in the last few years the council has undertaken to prevent or mitigate the flooding of land in the council area are set out in Table 4.

Table 4: Flood Prevention /Mitigation Measures undertaken by West Lothian Council

Continuing to inspect watercourses, including culverted watercourses, headwalls and trash screens and carry out maintenance to reduce the risk of flooding.
Constructing a floodwall and spillway at the lower end of the small pond at the Lanthorn Community Centre, Dedridge.
Carrying out essential repairs and upgrading to the Boghead Burn Flood Alleviation Scheme in Bathgate.
Taking forward recommendations arising from the study into flooding, seriously impaired drainage, damp and condensation affecting social housing in Mayfield, Armadale.
Working with adjacent landowners to realign boundaries and reform the ditch network to the rear of Ennis Park, Polbeth to reduce the risk of flooding and seriously impaired drainage.
Constructing an outfall to enable an effective drainage system to be installed at Bellsquarry Playing Field leading to the Dedridge Burn beneath the old Calder Road.
Acquiring a number of steel containers in which to store sandbags to speed up mobilisation before and during flood events and help protect sandbag stocks from theft and vandalism.
Contributing to a project to restore the large ponds at Dedridge, take the burn off-line and create a new smaller pond and wetland to improve the landscape and habitat value of the area.
Carrying out essential repairs to the headwall of the Dedridge Burn at Burnvale Place, Almondvale, Livingston in the interests of safety.
Commissioning a study into flooding, seriously impaired drainage, condensation and damp affecting properties at Parkhead, East Calder.
Working together with SEPA, Scottish Water and other local authorities to develop Local Flood Risk Management Plans under the Flood Risk Management (Scotland) Act 2009.
Working with landowners to install new drainage schemes to reduce the risk of flooding and seriously impaired drainage at both Park View and Church Place, Fauldhouse.
Carrying out work to protect social housing stock from flooding at North Reeves Place, Whitburn.
Working cooperatively with other stakeholders to help reduce the risk of flooding to the Edinburgh to Bathgate railway at Tailend Moss Local Nature Reserve, Bathgate to prevent delays and cancellations to this vital public transport link.
Investigating the cause of flooding affecting the Fauldhouse Partnership Centre and put in place measures to help lessen the risk.
Working with our partners to rationalise the number council-owned structures on the River Almond whilst improving the accessibility of the upper reaches of the river to migrating fish.

Source: West Lothian Council Flood Prevention team July 2015

Glossary of tems

Climate change
Both natural and human actions causing long term variations in global temperature and weather patterns.
Culvert
A channel or pipe that carries water below the level of the ground.
Drainage assessment
This is a site specific assessment that addresses foul and surface water drainage, and should consider flood risk where appropriate relative to ma site and normally accompanies a planning application where drainage is seen as an issue.
European Water Framework Directives 2000 & 2008
This establishes a legal framework for the protection, improvement and sustainable use of all water bodies in the environment across Europe. That is, all rivers, canals, lochs, estuaries, wetlands and coastal waters as well as water under the ground. The main environmental objectives are to protect and improve Scotland's water environment. This will include preventing deterioration of aquatic ecosystems and, where possible, restoring surface waters and groundwater damaged by pollution, water abstraction, dams and engineering activities to 'good status' by 2015.
FRM Act
This is the short reference for the Flood Risk Management (Scotland) Act 2009.
Floodplain
An area of land which borders a watercourse, estuary or sea which covers with water in times of flood.
Flood defence
Infrastructure used to protect an area against floods as floodwalls and embankments; they are designed to be of a specific standard of protection (design standard)
Flood map
A map that delineates the areas that have been predicted to be at risk of being flooded during an event of specified probability.

Flood risk
The combination of the probability of a flood and of the potential adverse consequences associated with a flood for communities, the environment, cultural heritage and economic activity.
Flood Risk Management Strategy
Sets out a long-term vision for the overall reduction of flood risk. They will contain a summary of flood risk in each local plan district, together with information on catchment characteristics and a summary of objectives and measures for Potentially Vulnerable Areas. Taken together, the Strategies will satisfy the requirement for National Flood Risk Management Plans, set out in Section 27 of the FRM Act.
Flood storage
A temporary area that stores excess runoff or river flow, often ponds or reservoirs.
Fluvial flooding
Flooding by a river or other watercourse.
Functional floodplain
This comprises land where water has to flow or be stored in times of flood. SFRAs should identify the functional floodplain, i.e. land which would flood with an annual probability of 1 in 200 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood.
Groundwater
Water that is in the ground, this is usually referring to water in the saturated zone below the water table.
Inundation
Flooding.
Local Flood Risk Management Plans
They will contain details on the funding, timing and responsibility for actions to reduce flood risk. They will set out how the Flood risk Management Strategies will be implemented in each Local Plan District and any other locally relevant information. They satisfy the requirements set out in Section 34 of the Flood Act.
Local Plan District (LDP)
Geographical areas for which local flood risk management plans will be produced.
Mitigation measure
An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.

National Flood Risk Assessment
A national assessment of the impacts of flooding on communities, the economy and the environment. Taking into account catchment characteristics, climate change and long term developments.
Natural flood management
A set of flood management techniques that aim to work with natural processes (or nature) to manage flood risk.
1: 200 year flood
A flood that has a probability of being exceeded once every 200 years. Also expressed as a flood, which has a 0.5% probability of being exceeded in the space of one year.
Planning Advice Note (PAN)
Advice published by The Scottish Government in the form of a policy document that includes best practice and other relevant information.
Pluvial
Relating to or caused by rainfall.
Potentially Vulnerable Areas (PVAs)
Catchment units in which the National Flood Risk Assessment has identified significant impacts from flooding either now, or in the future as a result of climate change. They will be used as the basis for producing Flood Risk Management Strategies.
River Basin Management Plan (RBMP)
Most of Scotland is within the Scotland river basin district, which is covered by the *Scotland river basin management plan* (the Scotland RBMP). Following its approval by the Scottish Ministers, SEPA adopted and published the Scotland RBMP on 22 December 2009.
Risk
The probability or likelihood of an event occurring.
River catchments
Upstream areas of land which drain into a river.
Scottish Planning Policy
This document, published by the Scottish Government in 2010, is the statement of the Scottish Government's policy on nationally important land use planning matters.

Sewer flooding
Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
Strategic Flood Risk Assessment (SFRA)
A Strategic Flood Risk Assessment (SFRA) is developed to inform and guide the location for new development and minimise the risk of flooding. In summary, the primary aim of Strategic Flood Risk Management is to avoid locating new development in areas of flood risk.
Tributary
A small stream or body of water that flows into a larger body of water.
Water Environment and Water Services (WEWS) Act
This is the Water Environment and Water Services (Scotland) Act (WEWS) 2003. This transposes the EU Water Framework Directive 2003 into Scots Law.
1: 100 Year event
Event that on average will occur once every 100 years. Also expressed as an event, which has a 1% probability of occurring in any one year.
1: 200 Year event
Event that on average will occur once every 200 years. Also expressed as an event, which has a 0.5% probability of occurring in any one year.
1: 1000 Year event
Event that on average will occur once every 1000 years. Also expressed as an event, which has a 0.3% probability of occurring in any one year.