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EAST DUNBARTONSHIRE COUNCIL

DEVELOPMENT AND INFRASTRUCTURE

NEIGHBOURHOOD SERVICES

FLOOD RISK MANAGEMENT (SCOTLAND)

ACT 2009

**Implementation Plan for the delivery of
Surface Water Management Planning – Cycle 1
(2016 – 2022)**

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1.0 Purpose

The purpose of this implementation document is to clearly identify the process in which East Dunbartonshire Council (EDC) are to deliver the Surface Water Management Plans / Studies (SWMP) and meet its Statutory Obligations under the Flood Risk Management (Scotland) Act 2009 (FRM Act).

The location of the SWMP is based on SEPA's Flood Risk Management Strategies (FRM Strategies) that were published in Jan 2016. [The FRM Strategies](#) focused on:

- Assessment of flood risk and associated hazards from all sources;
- Identify where the highest flood risk is located (including where the highest risk of surface water flooding is);
- Set objectives (including where the surface water flood risk should be reduced);
- Identify measures to achieve these objectives; and
- Prioritise measures on a national level (any measure identified through surface water management plans that require funding through the FRM Strategy process will be included in the national prioritisation). However dependent on funding.

The National Flood Risk Assessment (NFRA) identified a total of 14 Local Plan Districts (LPD's). Within each LPD a number of catchments were identified where the potential impact of flooding warrants further assessment and an appraisal of flood risk management actions. These catchments are known as Potentially Vulnerable Areas (PVA's).

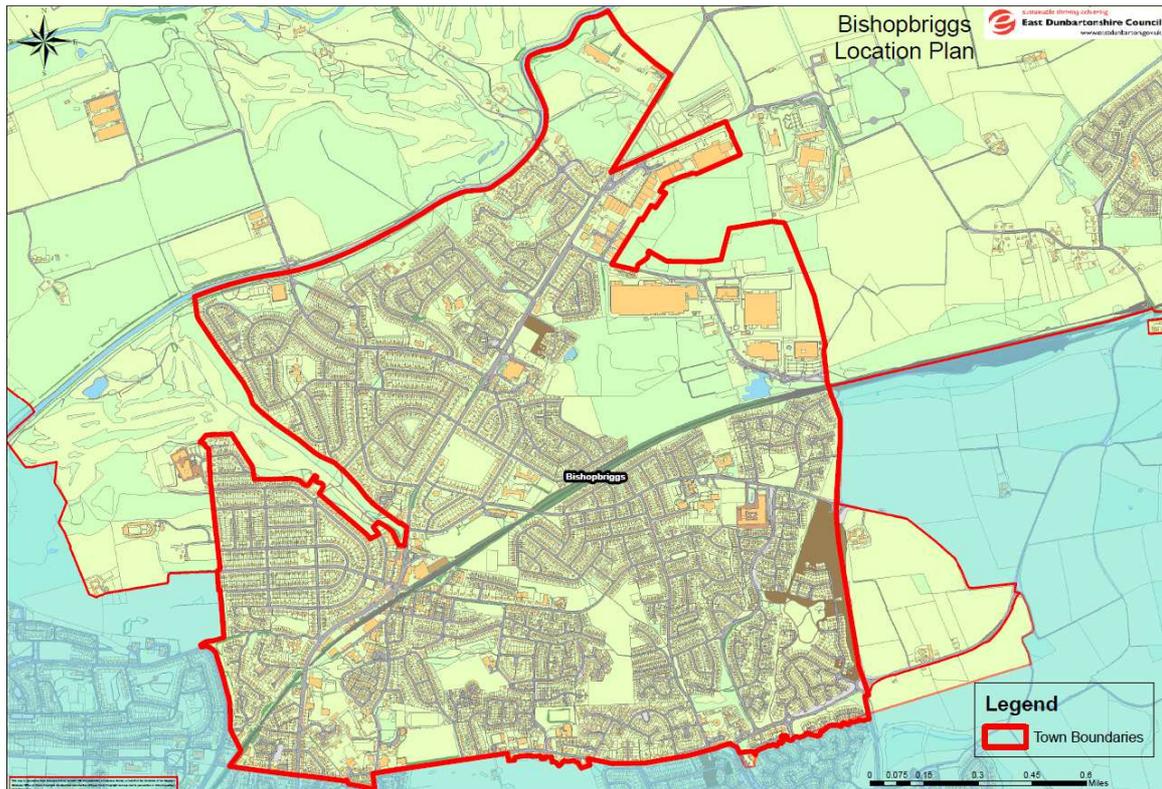
EDC will be developing SWMP's / Study on three areas within the first cycle of SWMP which are:

- Bishopbriggs Surface Water Plan/Study (ID Ref - 110850018);
- Milngavie Surface Water Plan/Study (ID Ref 110860018); and
- Bearsden Surface Water Plan/Study (ID Ref 110870018) and (ID Ref 110871018).

The extents of the 3 SWMP priority areas for EDC are shown in **Figures 1 to 3** on the following pages.

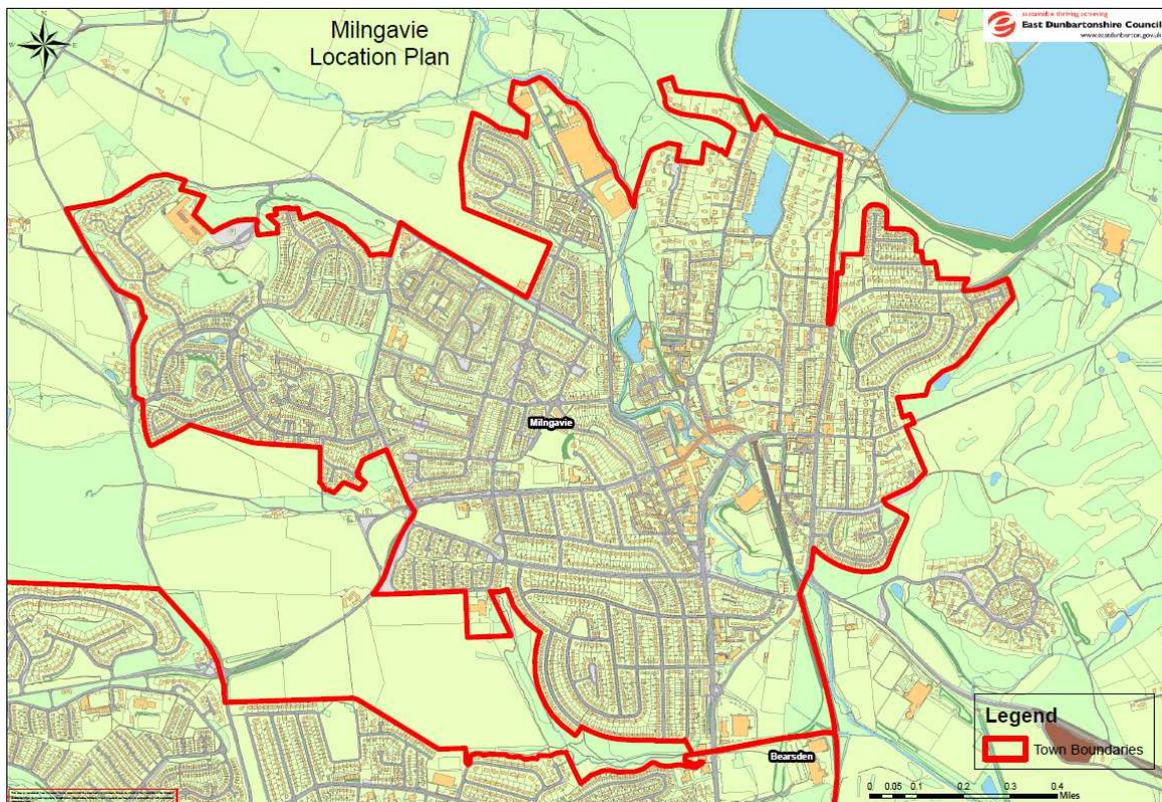
These SWMP studies are to be prioritised and be completed within the first cycle of the FRM Act being from 2016 to 2022. EDC forms part of the Clyde and Loch Lomond Plan District Group and its actions and objectives will be part of this Local Flood Risk Management Plan (LFRMP).

Figure 1 – Bishopbriggs



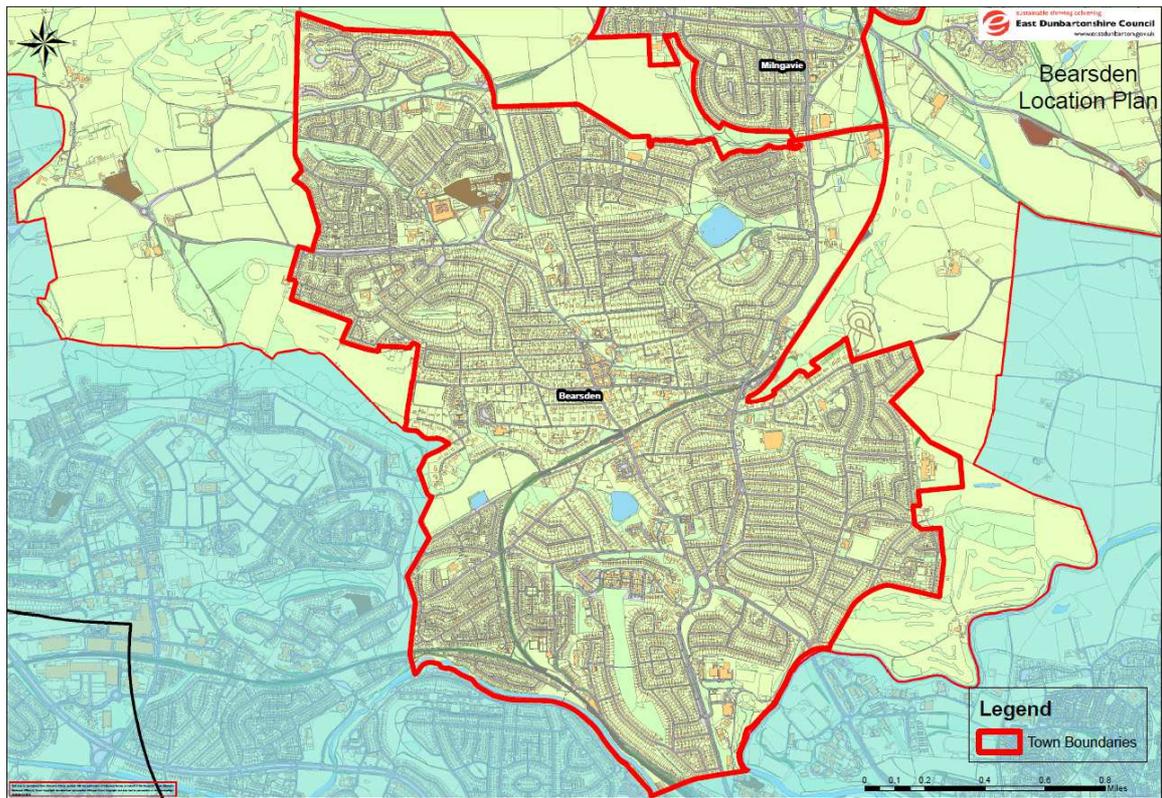
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Figure 2 – Milngavie



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Figure 3 – Bearsden



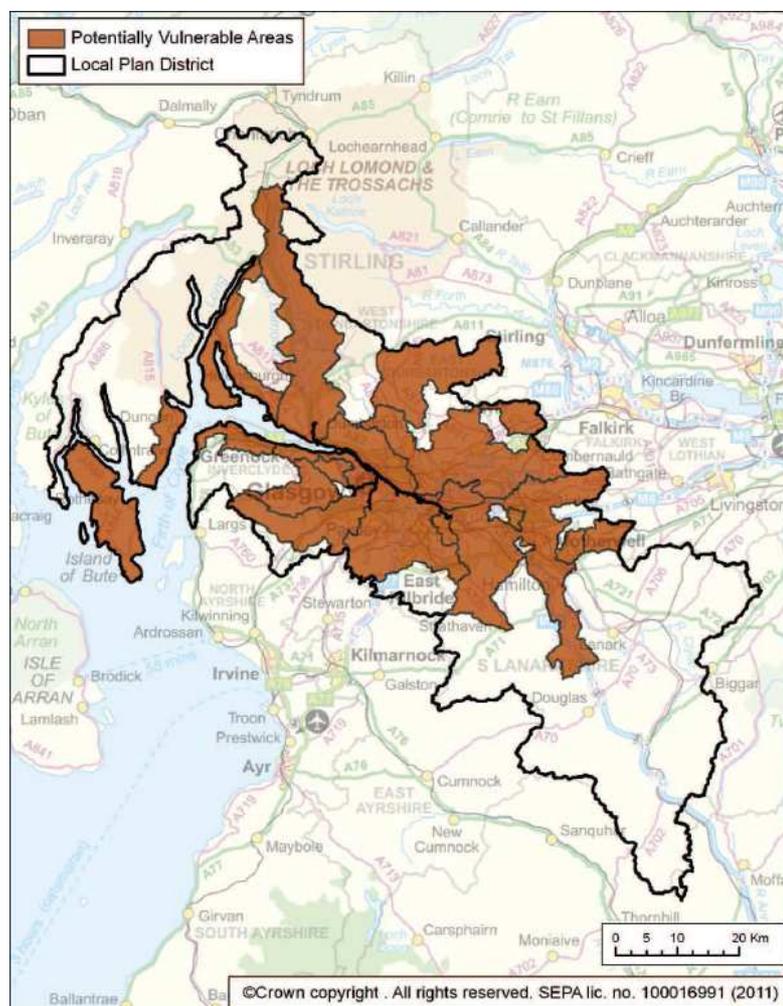
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2.0 Background

The NFRA was published by SEPA and supported by the Scottish Government on December 2011. This has shown that today, around 125,000 properties are at risk of flooding in Scotland. This represents 1 in 22 residential properties and 1 in 13 businesses. The average annual cost of flood related damages is estimated to be between £720 and £850 million.

Based on SEPA's FRM Strategies there are a total of 14 LPD's in Scotland. EDC falls within LPD 11 – Clyde and Lomond. This LPD extends from Loch Lomond in the north to Leadhills in the south and incorporates a section of the Loch Lomond and the Trossachs National Park. It comprises an area of approximately 4,840km². Please see **Figure 6** below for plan.

Figure 6



*Taken from SEPA's "Local Plan Districts and Potentially Vulnerable Areas - Flood Risk Management (Scotland) Act 2009 – 11. Clyde and Loch Lomond"

It has been estimated that approximately 35,710 residential properties and 2,810 non-residential properties are at risk of flooding, this compares to approximately 1 in 24 of all residential properties

and 1 in 17 of all non-residential properties within the LPD. The estimated weighted annual average damages within LPD 11 are between £218.3 and £244.8 million.

LPD 11 consists of 20 PVA's which are shared across 14 Local Authorities. Of these 20 PVA's EDC falls within 2 PVA areas known as 11/04 and 11/05. The 3 SWMP areas contained within these PVA reference areas share a boundary with other local authorities which are shown in **Table 1 below**.

Table 1

PVA Reference	Town	Shared Boundary – Local Authority
11/04 and 11/05	Bearsden	Glasgow City Council / West Dunbartonshire Council
11/04	Bishopbriggs	Glasgow City Council / North Lanarkshire Council
11/04	Milngavie	West Dunbartonshire Council / Stirling Council

EDC forms one of 6 Local Authorities who have jurisdiction in PVA 11/04. SEPA's FRM Strategy has identified that 50% of the flooding source originates from watercourses and 50% from surface water. It is estimated that within PVA 11/04 there are approximately 2,300 residential properties and 1,100 non residential properties that are at risk of flooding. This equates to an average of £4.6Million of annual damages.

In PVA 11/05 EDC forms one of 4 Local Authorities. SEPA's FRM Strategy has identified that 23% of the flooding source originates from watercourses; 39% from coastal and 38% from surface water. It is estimated that within PVA 11/05 there are approximately 4,900 residential properties and 700 non residential properties that are at risk of flooding. This equates to an average of £8.1 Million of annual damages.

The FRM strategies have set out objectives which aim to manage local flood risk within these PVA areas. The objectives have been grouped in three main ways:

- Reducing flood risk;
- Avoiding increasing flood risk; and
- Accepting risk by maintaining current management levels.

These actions and objectives have both been agreed by SEPA and the flood risk management authorities. **Table 2** and **3** on the following page summarises the actions which have been selected to manage flood risk in PVA area 11/04 and 11/05.

Table 2

Summary of actions to manage flooding

The actions below have been selected to manage flood risk.

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

Actions

*Taken from SEPA's FRM Strategy for Kilsyth to Bearsden – north of Glasgow City (Potentially Vulnerable Area 11/04) "PVA"

Table 3

Summary of actions to manage flooding

The actions below have been selected to manage flood risk.

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

Actions

Taken from SEPA's FRM Strategy for Kilsyth to Bearsden – north of Glasgow City (Potentially Vulnerable Area 11/04) "PVA"

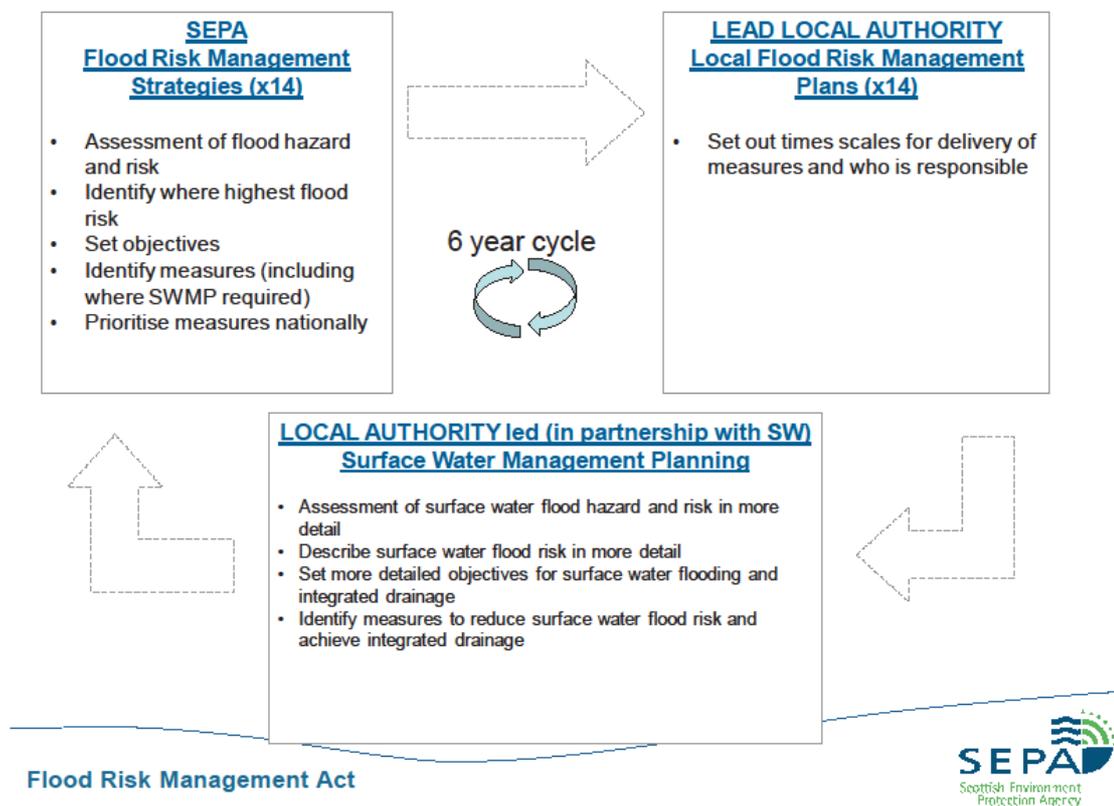
Under the FRM Act, EDC have a number of responsibilities that they require to be actively achieving. One such responsibility is the reduction of the overall risk of flooding. When addressing the risk the social, environment and economic impacts have to be considered. Part of this process is the production of the SWMP and the LFRMP. EDC has a responsibility in the promotion of sustainable flood management and also in raising awareness to flood risk. As such the measures identified within the SWMP(s) should be sustainable, cost effective and also consider the impacts to the general public during and after implementation.

3.0 Introduction

The FRM Act establishes a flood risk management planning process for the assessment and sustainable management of flood risks. The aim of the process is to reduce the impacts of flooding from all sources. It states in the ministerial guidance on Delivering Sustainable Flood Risk Management in Scotland that flooding due to surface water will be addressed through SWMP.

Although the plans themselves are not a legal requirement, it is considered the most efficient means to identify the most sustainable measure to manage urban drainage and the risk of surface water flooding. It is expected that each Local Authority (LA) will take the lead in the preparation of these plans. The SWMP process is cyclic and will be repeated every 6 years. Please see **Figure 4** for the cycle process.

Figure 4



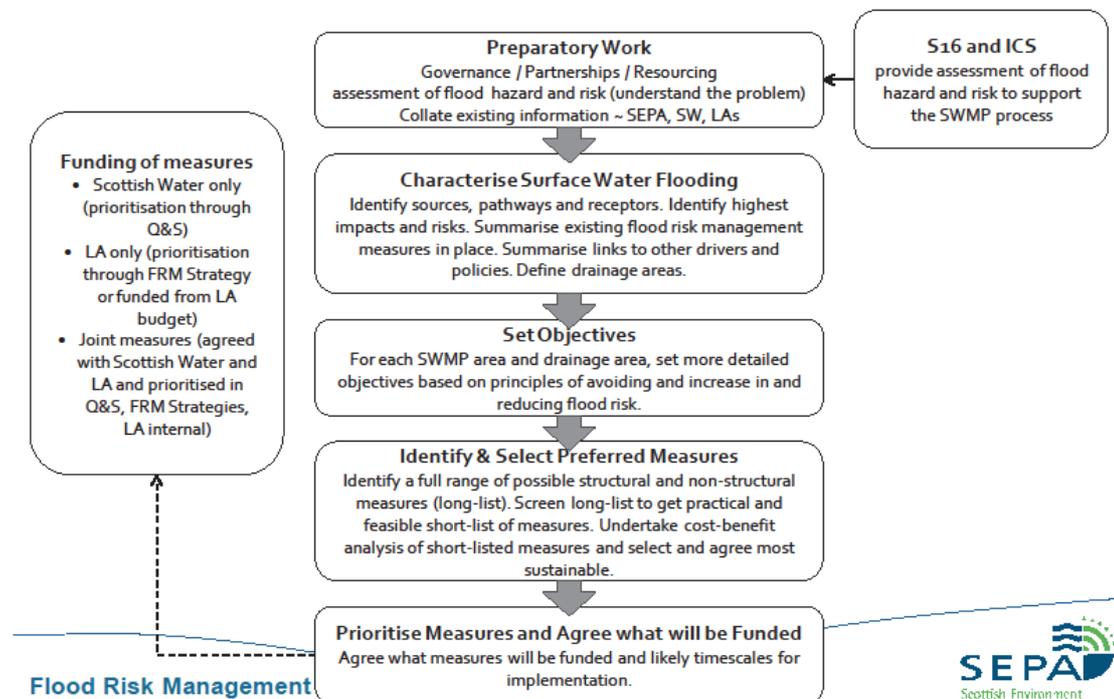
*Taken from SEPA's "Surface Water Management Planning Forth Estuary LPD Presentation"

The Lead Local Authority (LLA) will be responsible for the implementation of the Local Flood Risk Management Plans (LFRMPs). These plans will summarise the findings of the SWMP's. SWMP's and LFRMP's are led by the LA but will be developed through collaborative partnerships between the LA, SEPA and Scottish Water (SW), within the partnership.

There are various stages in the implementation of the SWMP's; these are shown in **Figure 5** below:

Figure 5

Implementing surface water management plans



*Taken from SEPA's "Surface Water Management Planning Forth Estuary LPD Presentation" Each SWMP will focus on:

- Setting up SWMP partnership(s);
- Define the geographical area of the SWMP(s);
- Decide on appropriate levels of detail for the SWMP(s);
- Characterise the main flooding issues;
- Decide if further assessment is required;
- Identify and prioritise drainage areas for further investigation;
- Set initial objectives to tackle the various flooding issues;
- Identify a "long list" of potential measures;
- Review the potential measures and identify a short list of "potential measures";
- Undertake a high level cost benefit analysis of the measures;
- Prioritisation of the selected measures and agree with the funding bodies;
- Provide information to the LA for inclusion in the LFRMP; and
- Identify and implementation plan for the selected actions;

4.0 EDC SWMP(s) Implementation Plan

EDC purpose to appoint an independent Consultant to undertake the SWMP highlighted in Section 1.0. The SWMP will summarise any technical recommendations which will address surface water flooding and help identify and bring together all sources of existing flooding information. Any potential gaps identified will require to be addressed in order to enhance future versions of SWMP(s). The SWMP(s) will focus on the areas which are deemed to be a high flood risk by SEPA in the NFRA and FRM Strategies within the LFRMP.

EDC's SWMP(s) will examine the following:

- The various forms of flooding and their mechanisms;
- Risks from surface water flooding;
- Possible opportunities to daylight any culverted watercourses;
- Gaps within the flooding data and identify any works, studies and modelling that is required to fill the gaps;
- Improved information sharing between various shareholders to assist with the improved management of existing drainage assets; and
- Identify an initial action plan which highlights possible solutions and also define a scope for potential future works.

In order for the SWMP to successfully address the above there will be a number of phases in which each SWMP shall progress:

- Phase 1 – Introduction / Background;
- Phase 2 – Preparation;
- Phase 3 – Catchment Characterisation;
- Phase 4 – Objective Setting;
- Phase 5 – Selection and Appraisal of Measures;
- Phase 6 – Public Consultation and Engagement;
- Phase 7 – Prioritisation and Funding of Selected Actions; and
- Phase 8 – Cost Benefit Analysis of Selected Actions.

Phases 1 - 8 are further discussed in Section 5 below.

5.0 Scope of Works

The scope of the SWMP is outlined in the following section. In general EDC requires that the sources, paths and receptors of flood water be examined. The Consultant is required to undertake a study on the development of long term, sustainable and achievable measures which can be implemented to manage the flood risk, and reduce the impact on the public, environment and the economy.

At each stage of the SWMP the level of information provided should be risk based and proportionate to the level of surface water flood risk, the complexity of the surface water flooding mechanisms and the information that is available.

The SWMPs should be consistent with the following key references:

- Scottish Government (2011) Delivering Sustainable Flood Risk Management <http://www.gov.scot/Topics/Environment/Water/Flooding/FRMAct/guidance>
- Scottish Government (2013) Surface Water Management Planning Guidance including Benefit Cost Analysis of options to manage surface water flooding (2014) <http://www.gov.scot/Topics/Environment/Water/Flooding/FRMAct/guidance>
- SEPA Flood Risk Management Strategies <http://apps.sepa.org.uk/FRMStrategies/>

A key component of the SWMP is to manage the run-off at source before it enters the local network systems or watercourses. The Consultant should look to provide:

- Effective interception at source;
- Adequate storage for attenuating prior to releasing direct during high intensity events;
- Possible creation of flood flow routes to help direct any run-off away from any potential receptor;
- Day-light any culverted watercourse to help increase capacity;
- Potential use of any “green infrastructure” for the implementation of wetlands, basins; and
- SuDS and Retrofitting and greening areas.

The SWMP should not only consider mitigation and reduction of flooding impacts but also look to enhance benefits to the local community such as improving the water quality, enhancing biodiversity and improving the landscape or amenity value of open or derelict spaces.

5.1 Preparation

It is essential that there is an understanding of the existing conditions for each priority area. The first stage in the development of a SWMP is the preparatory work which will enable the collation of all existing information relating to the priority area. EDC will require the Consultant to undertake this task to ensure that all current information is collated and reviewed for the SWMP areas. This will involve:

- Set up governance for the SWMP Partnerships;
- Collate all existing information on surface water flooding
- Engage with Scottish Water on Q&S 5 investment;
- Define geographical areas in more detail; and
- Scope level of detail required for each priority area.

Existing information shall not only be limited to the SEPA pluvial hazard and risk mapping but through the various partnership may include but not limited to:

- Existing flood protection measures to manage flood risk;
- Reports on historical flood events;
- Culvert surveys;
- Scottish Water maintenance regimes;
- Local Authority maintenance regimes;
- Watercourse mapping including all small water bodies;
- River modelling; and
- Lidar /survey information.

Upon appointment the Consultant shall generate a project data register which shall be kept up to date and formally record the information that is available for the SWMP. The information in the register should include:

- What data is available;
- Ownership of the data;
- Format of the data / information;
- Quality of the data;
- Limitations on the use of the data; and
- Updating of revisions.

EDC will make all exiting information available to the Consultant with regards to existing flood protection measures, surveys and known historic flood event information as noted above.

5.2 Catchment Characterisation

This stage requires analysis and interpretation of existing data to come to an understanding of the surface water problem. The information should be presented in a clear and concise manner and should also include maps and figures where appropriate to aid interpretation. The characterisation should include, but not be limited to:

- Geographic description of each SWMP area including natural drainage characteristics and artificial drainage systems;
- Identify existing actions/works that are being undertaken for the reduction of flood risk;
- Identify any future/planned works in the area;
- Describe the flooding mechanisms and adverse impacts of flooding (i.e. sources, pathways and receptors of flooding) including a description of the highest risk areas (hot spots);
- Assessment of current and future flood risk and of past events;
- Identify and prioritise areas that further studies, surveys and modelling are required; and
- Identify the level of detail the SWMP that is required.

The characterisation exercise will enable the Consultant to determine the quality of the data available and determine if any further studies which are required to fill gaps which may enhance the quality of the existing information.

SEPA's FRM strategies provide an indication of the level of risk of surface water flooding in an area. The addition of other information and local knowledge should give an indication of the complexity of the flooding mechanisms within a given area. Upon review of the information, the Consultant in discussion with the SWMP partnership shall determine the level of detail that is likely to be required for the SWMP.

The Consultant at this stage should begin verifying the flood hazard data; this will determine if the SEPA regional pluvial mapping and associated impacts of flooding is an appropriate basis for the SWMP. This should also determine if there are any gaps in the data and if there is any further modelling or assessment is required prior to the identification of measures. The Consultant shall determine if there is further modelling and risk assessment required.

As part of the characterisation, the Consultant shall undertake an assessment of flood risk. The purpose of this is to provide an explanation of the probability and impacts of surface water flooding across the entire SWMP area or focussed on one or more flooding hot spots or drainage areas. The Consultant shall undertake the following tasks in assessing flood risk:

- Verify the flood hazard information. If the Consultant finds that the information / modelling is not robust, then further modelling will be required to generate a robust model;
- Determine the impacts of flooding; and

- Identify and prioritise drainage areas and actions.

The purpose of identifying and prioritising areas within the SWMP is to provide focus when undertaking the options appraisal stage. Some measures may apply across the entire SWMP area and some will be more focussed on one or more drainage areas. The number of drainage areas that should be considered will vary dependent on the level of flood risk in the given areas.

5.3 Objective Setting

For the SWMP's to address surface water flooding a clear statement of the problems that are to be addressed is required. As such, there must be clear objectives agreed and in place which will help in the measures against flooding and its impacts. This will be defined in the characterisation section of the plan. There a number of stages in the setting of the objectives of the SWMP. The first process is to produce a high level objective list which will be based on the principles of avoid, protect and prepare (these have been set in the FRM Strategies).

The FRM Strategy has set the following high level objective for all SWMP areas

“Avoid an overall increase in flood risk including surface water flood risk”.

This has been set for the LPD and includes all areas in EDC including the SWMP areas. Reduce objectives have also been set for the SWMP areas, these include:

- Reduce surface water flood risk in Bearsden (cycle 1);
- Reduce surface water flood risk in Bishopbriggs (cycle 1);
- Reduce surface water flood risk in Milngavie (cycle 1); and

The SWMP partnership should then set more detailed objectives. This should be undertaken in two stages. The first stage should take the initial objectives set out in the FRM Strategies and update them based on the flood risk assessment that will be carried out in the characterisation stage. The second stage will then take the updated objectives and finalise the list once the appraisal measures have been reviewed, appraised, selected and prioritised for funding and delivery. This final list will be the SMART objectives. The guidance for Surface Water Management Planning provides the following principals in setting the detailed objectives in the SWMP, these are:

- Main impacts and sources of flooding should be referenced;
- Where appropriate, specific return periods should be used. The return periods can be used to define the “avoid” objectives;
- Baseline levels of flood risk should be included within the objectives to enable tracking of progress;
- Objectives should focus on the flood risk reduction; and
- Objectives should not set limits on the degree of flood risk avoidance or reduction.

The objectives should focus on the highest risk of flooding and should also consider the different geographical scales e.g. they should consider areas such as hot spots or high risk receptors such as hospitals or main communication links. As part of this process objectives (including hot spots) may be prioritised to help inform the appraisal of the measures.

The objectives that have been set should be revisited once the measures have been selected and the process of prioritising and funding the implementation measures has been completed.

5.4 Selection and Appraisal of Measures

EDC have the responsibility to ensure that the most sustainable measures to manage flood risk and achieve the objectives have been identified and these are implemented. The SWMP enables the LA to implement an effective appraisal method. Measures should be appraised using the following Scottish Government appraisal guidance:

- Delivering Sustainable Flood Risk Management;
- Sustainable Flood Risk Management – Principles of appraisal: a policy statement;
- Flood Protection Schemes – Guidance for Local Authorities Chapter 5 Project Appraisal; and
- Scottish Government (2013) Surface Water Management Planning Guidance including Benefit Cost Analysis of options to manage surface water flooding (2014) <http://www.gov.scot/Topics/Environment/Water/Flooding/FRMAct/guidance>

The appraisal method should also follow a risk based approach and can be carried out in different levels, from strategic to detail. The level of appraisal will be dependent on the measures proposed and the amount and quality of data available.

The level of appraisal is directly linked to the risk assessment carried out in the characterisation stage of the SWMP. The Consultant at this stage shall produce a long list of possible measures that cover all the objectives that cover the full SWMP areas. However prioritisation should be given to areas which the flood risk assessments have identified as priority.

The benefits and costs for all 'do something' options should be compared with those for the 'do nothing' options. This will provide baseline to compare the various options.

The SWMP will initially identify a "long list" of potential measures to meet the objectives; these can be either structural or non-structural to achieve the set objectives in the most sustainable way. The SWMP should identify all measures that address surface water flooding from strategic types for example land use planning policy or a flood alleviation scheme. At this stage the generation of the list of measures should not be restricted by concerns over funding or the delivery method for

implementation. The aim of producing the long list is to identify the most sustainable methods to manage the surface water flood risks.

Once the “long list” has been generated, a screening process should be undertaken to identify those that may pose a problem for technical, financial or legal reasons. The screening process should be based upon expert judgement by all of the partnerships.

This stage removes any measures that are not possible at an early stage in the process. The removal of any unrealistic measures is based on expert judgment. This process should be transparent and all those in a SWMP partnership should be involved in this process.

Should an issue arise with regards to uncertainty over the feasibility of a measure, this should be left in the list for a more detailed review.

This screening process will produce a short list of potential measures which will undergo a more detailed appraisal. The Consultant at this stage should carry out an appraisal on the short list. The appraisal should include the flood risk benefits of the measures as well as the wider impacts of the measures. This should be prioritised where there have been areas identified at a greater flood risk and are known receptors of flooding. Other options for the full SWMP area should also be considered.

5.5 Public Consultation

To ensure that the local community and businesses are included in the proposals detailed in the SWMP, the process should allow for public engagement via public consultations. This ensures that not only engineering considerations have been included, but also the views of the people and businesses who will be directly affected by the measures/proposals.

5.6 Prioritisation and Funding of Selected Actions

The appraisal process will generate an agreed set of feasible and sustainable measures that manage the risk of surface water flooding.

Once this list has been generated, the SWMP partnerships should now determine who is responsible for implementing the most sustainable measures and how they will be funded. Any measures that would require funding through the FRM strategies (i.e. capital money from the Scottish Government via COSLA) will need to be included on the FRM Strategy prioritisation process. The SWMP partnerships will prioritise what measures can be implemented in the current FRM planning cycle. Below are the dates for the various cycles:

- 2016 to 2022 – Cycle 1 (Current Measures) – FRM Strategies published 2016;
- 2022 to 2027 – Cycle 2; and
- After 2027 – Cycle 3.

The various measures are prioritised on a number of scales ranging from the cost / impact information, indicative dates as to when the measures can be implemented and when funding is available to undertake the work. There are various avenues that can be explored for implementing the selected measures, these are:

- Scottish Government funding;
- Local Authority funding;
- Scottish Water funding; and
- Private funding (e.g. developers via planning process).

The Consultant shall undertake a review of the SMART objectives previously identified. These should be updated based on the information that has been generated through the appraisal process i.e. information on how effective the measures are in addressing and managing the flood risk as well as a high level time table for the implementation of the measures.

5.7 Cost Benefit Analysis of Selected Actions

A cost benefit analysis will required to be carried out to identify the most beneficial options that have been considered. This process will provide an agreed cost benefit analysis of the possible measures that could be implemented from the short list of actions selected. These cost benefits have to be agreed by all parties i.e. SEPA, SWMP partnerships and Scottish Water and dependant on funding.

6.0 Works Undertaken

EDC have been working towards the collation of information required for the production of the SWMP for these priority areas. Below is a detailed account of the work that has been undertaken to date:

Identified Stakeholders – EDC have been working closely with Scottish Water and SEPA to identify key areas for developing the first cycle of SWMP. This has involved reviewing information provided by SEPA on Local District Plans and Potentially Vulnerable Areas and chairing meetings with Scottish Water to ensure that EDC have received the most current information. EDC has identified that there is a need to consult other Stakeholders as part of the SWMP process.

Historic flooding information – EDC have identified all flood events over an approximate 10 - 20 year period. This information has been broken down into the various types of flooding and also the extent of the flooding i.e. was it internal or external flooding. This information has been created as point data for use within our GIS. This information will be cross checked against SEPA's pluvial and fluvial data and Scottish Water's historic flooding information provided. The following has been collated:

- **High Level Hot Spot Identification** – based on SEPA, Scottish Water and EDC' data sets, a high level review has identified a total of 42 potential hot spot locations that require further investigation (please note that this was very high level and based on areas where there was an clash overlap between the EDC historic events, SW predicted flooding and SEPA's flood extent. Consultant to review and verify hot spot locations), these are broken down into the three areas:
 - **Bearsden** – 29 hot spots identified;
 - **Bishopbriggs** – 14 hot spots identified;
 - **Milngavie** – 11 hotspots identified;
- **Scottish Water Section 16** – EDC have reviewed and incorporated the asset information from the Section 16 data set for each of the 3 areas identified for SWMP. This identifies the different apparatus and also the simulated flood levels within their network;
- **SEPA's Pluvial Data** – EDC have reviewed and incorporated SEPA's 1 in 200 year pluvial flood extents to assist in identifying hot spot locations (As part of the characterisation section of the SWMP, the Consultant shall review all information and determine the final hot spot locations. Consultant to verify based on SEPA's pluvial risk data (showing receptors impacted by flooding) as well as the hazard data (extent of depths etc.);
- **Initial meeting with Scottish Water** – EDC and SW discussed areas of known problems within SW's system and also areas of potential flooding based on a 1 in 30 year simulated

storm event. These areas were cross referenced with EDC known historic flooding data; and

- **EDC internal discussions** – EDC is reviewing and will continue to develop opportunities for the betterment of run-off from new/re-developed sites and also aim to improve capacity in the current network and minimise Pluvial and Fluvial flood risk. This may involve the Consultant to contact other departments of EDC to review the following opportunities:
 - Opportunities of day lighting culverted watercourses and creation of ponds / basins within open ground in ownership of EDC.
 - Any development within brown field sites will aim to provide betterment in the terms of discharge rates. Any surface water drainage will not be taken to the combined sewers; and
 - Review of future years resurfacing works to maximise potential for retrofitting SuDS features to the existing carriageway network.