

Flood Risk Management (Scotland) Act 2009

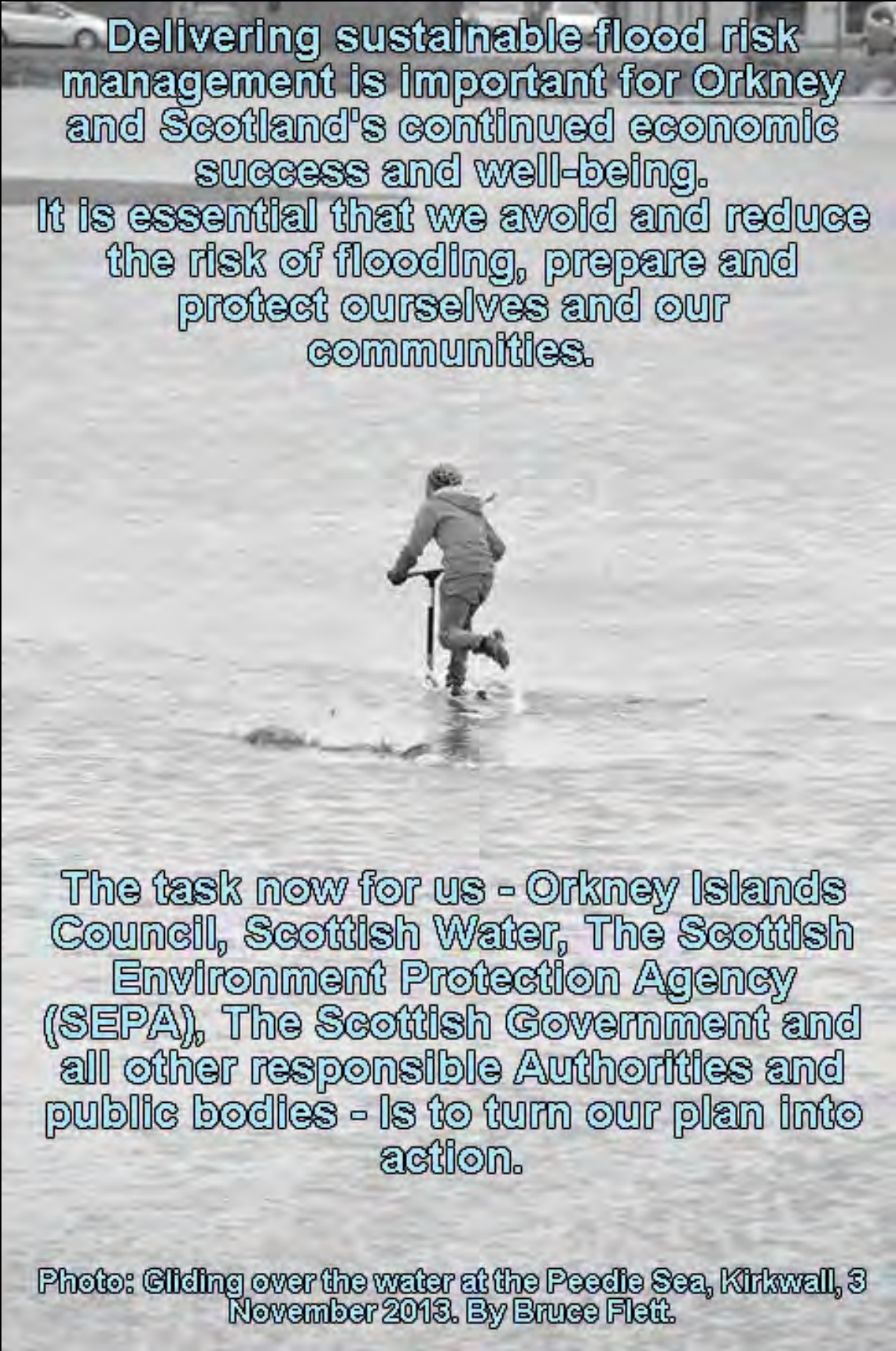
A Flood Risk Management Plan for Orkney



Published by Orkney Islands Council (2016)



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Water**
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Delivering sustainable flood risk management is important for Orkney and Scotland's continued economic success and well-being.

It is essential that we avoid and reduce the risk of flooding, prepare and protect ourselves and our communities.

The task now for us - Orkney Islands Council, Scottish Water, The Scottish Environment Protection Agency (SEPA), The Scottish Government and all other responsible Authorities and public bodies - is to turn our plan into action.

Photo: Gliding over the water at the Peedie Sea, Kirkwall, 3 November 2013. By Bruce Flett.

Contents

Chapter 1: Flood Risk Management in Orkney	10
1.1 What is a Local Flood Risk Management Plan?	10
1.2 How to read this plan	10
1.3 How we have developed the plan	11
1.4 Roles and responsibilities for flood risk management planning.....	14
1.5 Links with other plans, policies, strategies and legislative requirements.....	16
1.6 Next steps and monitoring progress.....	18
Chapter 2: Managing Flood Risk in Orkney	19
2.1 Understanding of flooding within Orkney.....	19
2.2 Summary of flood risk in Orkney	20
2.3 Objectives and actions for the entire Orkney Local Plan District.....	22
Chapter 3: Managing Flood Risk in Potentially Vulnerable Areas (PVAs)	29
3.1 An overview of the eight Potentially Vulnerable Areas in Orkney.....	29
3.2 Sanday (Strategy PVA (03/01) ‘Sanday’)	30
3.3 Stronsay (Strategy PVA (03/02) ‘Stronsay’)	39
3.4 Rendall and Evie (Strategy PVA (03/03) ‘Orkney Mainland North’).....	49
3.5 Stromness, Stenness and Sandwick (Strategy PVA (03/04) ‘Stromness’) ..	57
3.6 Kirkwall, Firth and East Mainland (Strategy PVA (03/05) ‘Kirkwall’	66
3.7 Hoy (Strategy PVA (03/06) ‘Hoy’).....	80
3.8 South Ronaldsay (Strategy PVA (03/07c) ‘South Ronaldsay’)	88
3.9 Westray (Strategy PVA (03/08c) ‘Westray’)	99
3.10 Other flood risk management activities in Orkney	109
Annexes.....	110
Annex 1: All actions, by date, to be implemented across the Orkney Local Plan District, 2016-2022	111
Annex 2: Supporting information	113

Annex 3: Consultation and engagement.	117
Annex 4: Schedule of clearance and repair.	134
Annex 5: Licensing acknowledgments.	135
Annex 6: What to do in the event of a flood – a contact sheet.	137

Foreword

The impacts of flooding experienced by individuals, communities and businesses can be devastating and long lasting. It is vital that we continue to reduce the risk of any such future events and improve our ability to manage and recover from any events which do occur. Life in Orkney has always been defined by the connections with the land and sea. Therefore, we have always been aware of the threat flooding from all sources pose to our islands and way of life.

The publication of this Plan is an important milestone in implementing the Flood Risk Management (Scotland) Act 2009, translating this legislation into actions to reduce the damage and distress caused by flooding and expanding on the Flood Risk Management Strategy for Orkney published by SEPA in December 2015. The development of this Local Flood Risk Management Plan for Orkney was led by Orkney Islands Council and is published by the Council on behalf of a partnership which also includes Scottish Water and SEPA.

Significant coordinated efforts involving the above noted organisations over several years have marked a significant step forward in the country's understanding and management of flood risk. Such processes have identified that approximately 680 residential properties and 460 non-residential properties are estimated to be at risk of flooding in Orkney from a variety of sources, the vast majority from coastal flooding, all amounting to potential cost of £4.2million in Annual Average Damages.

This Plan presents actions to avoid and reduce the risk of flooding, prepare and protect ourselves and our communities across the County with a focus on areas noted to be at particular risk, known nationally as "Potentially Vulnerable Areas". These actions, including details on who will take the lead role, how they will be funded and when they are programmed to be completed include the construction of new flood defences in Kirkwall Harbour; a new coastal flood warning scheme for the entire island group; six flood protection studies and a surface water management plan.

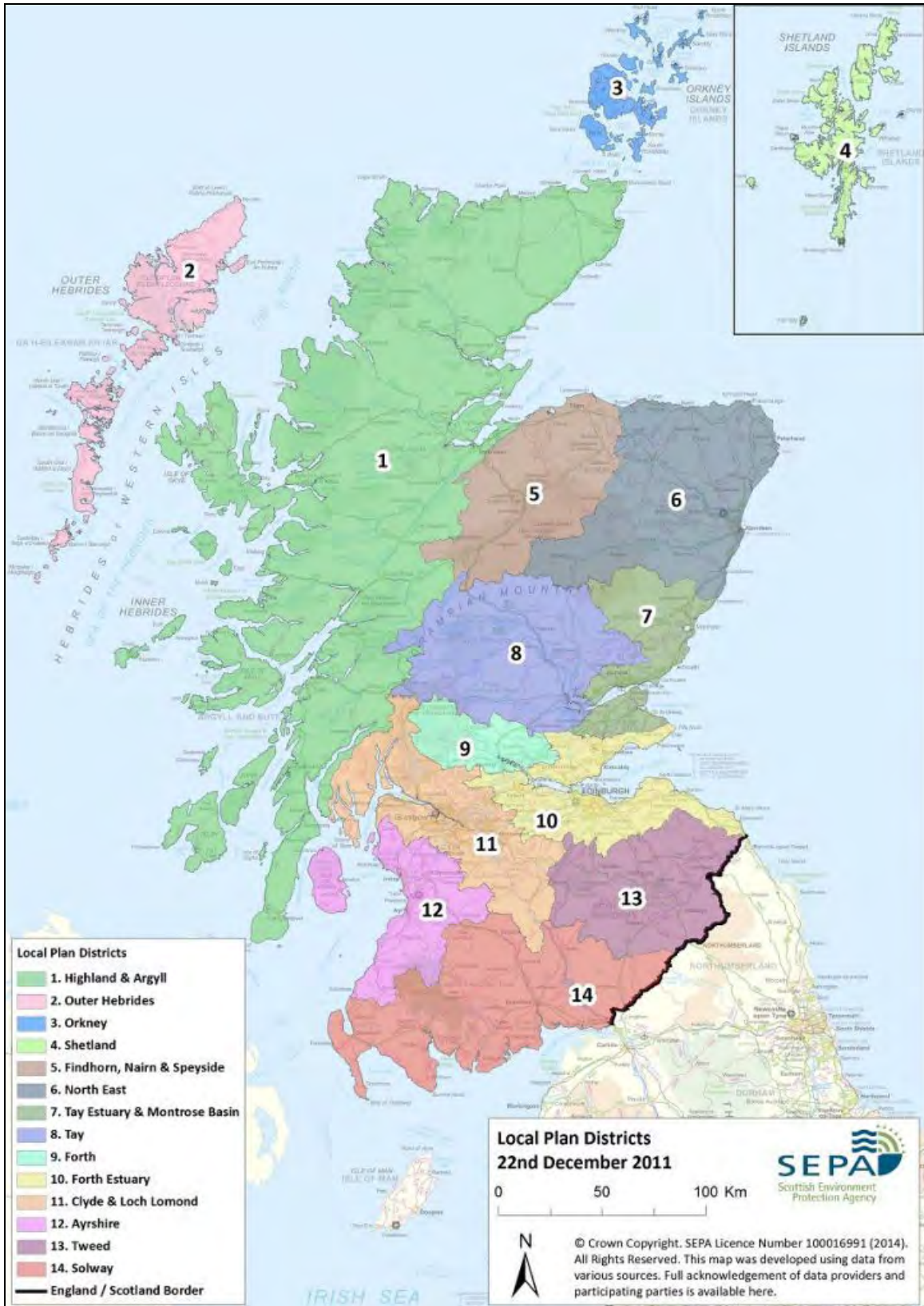
Individuals are the first line of defence against flooding and have responsibilities to protect themselves from flooding. Moreover, responsible authorities such as Orkney Islands Council, SEPA and Scottish Water all have flood risk management responsibilities and actions to be delivered over the first cycle of flood risk management plans in Scotland, 2016-2022.

This Plan therefore provides the blueprint upon which coordinated and collaborative efforts of public bodies, The Scottish Government and members of the public can be brought together to deliver sustainable outcomes. The delivery of the actions within the plan will also support the promotion of successful, thriving communities and mitigate risk from flood and coastal erosion – a priority of the Council.

I would like to thank all those who contributed to the development of this Plan which will help shape the way in which floods and their impacts are managed across Orkney.

Councillor James Stockan (Chair of Development and Infrastructure).





Map of the Local Plan Districts of Scotland. Figure reproduced from Flood Risk Management Strategy for Orkney, SEPA (December 2015).

Acronyms, abbreviations and glossary

AAD.	Annual Average Damages; Depending on its size or severity, each flood will cause a different amount of damage to a flood prone area and we can calculate the cost of this damage. Annual Average Damages for an area are the average costs per year that would occur from flooding over a very long period of time. Scottish figures have been calculated based on the method set out in the Flood Hazard Research Centre's Multi-Coloured Handbook (2010).
CAT 1 and 2 responders.	Category 1 and 2 responders are defined as part of the Civil Contingencies Act 2004 which seeks to minimise disruption in the event of an emergency. Category 1 responders are 'core' responders: local authorities, police, fire and rescue services, ambulance service, NHS health boards, SEPA and the Maritime and Coastguard Agency. Category 2 responders are key co-operating responders in support of Category 1 responders. These include gas and electricity companies, rail and air transport operators, harbour authorities, telecommunications providers, Scottish Water, the Health and Safety Executive and NHS National Services Scotland.
Coastal flooding.	Flooding that results from sea level rise or a combination of high tides and stormy conditions. The term coastal flooding is used under the Flood Risk Management (Scotland) Act 2009, but in some areas it is also referred to as tidal flooding and covers areas such as estuaries and river channels that are influenced by tidal flows.
Cultural Heritage Site.	Sites of particular cultural significance may be designated. The highest level of designation is a World Heritage Site. Historic Scotland maintains lists of buildings of special architectural or historic interest; these buildings are referred to as 'listed buildings'.
Flood Risk Management Strategy.	Sets out a long-term vision for the overall reduction of flood risk. They contain a summary of flood risk in each Local Plan District, together with information on catchment characteristics and a summary of objectives and actions for Potentially Vulnerable Areas.
HES.	Historic Environment Scotland is the new lead public body for the country's historic environment. It brings together Historic Scotland and the Royal Commission on the Ancient and Historic Monuments of Scotland.
HRA.	Habitats Regulations Appraisal; The Habitats Regulations require competent authorities to assess certain plans or projects which affect Natura sites . Any development proposal, which requires planning permission or other consent, is a 'project' which may require consideration under the Habitats Regulations.

LFRMP.	Local Flood Risk Management Plans; produced by lead local authorities, will take forward the objectives and actions set out in Flood Risk Management Strategies. They will provide detail on the funding, timeline of delivery, arrangements and co-ordination of actions at the local level during each six year FRM planning cycle.
LPD.	Local Plan District; Geographical areas for the purposes of flood risk management planning. There are 14 Local Plan Districts in Scotland.
OIC.	Orkney Islands Council; the local authority for the Orkney Islands and designated 'Lead Local Authority' for the Orkney Local Plan District.
PVA.	Potentially Vulnerable Area; Catchments identified as being at risk of flooding and where the impact of flooding is sufficient to justify further assessment and appraisal. There were 243 PVAs identified by SEPA in the National Flood Risk Assessment and these will be the focus of the first FRM planning cycle.
Q and S.	Q and S - Quality and Standards (Q and S) is the process, governing costs and outputs, through which the planning and delivery of improvements to the public drinking water and sewerage services in Scotland is carried out.
SEA.	Strategic Environmental Assessment; A process for the early identification and assessment of the likely significant environmental effects, positive and negative, of activities. Often considered before actions are approved or adopted.
SEPA.	Scottish Environment Protection Agency is Scotland's principal environmental regulator, protecting and improving Scotland's environment.
SNH.	Scottish Natural Heritage purpose is to promote, care for and improve our natural heritage; help people enjoy nature responsibly; enable greater understanding and awareness of nature; promoting the sustainable use of Scotland's natural heritage.
Special Area of Conservation (SAC).	Special Areas of Conservation are strictly protected sites designated under the European Habitats Directive. The Directive requires the establishment of a European network of protected areas which are internationally important for threatened habitats and species.
Special Protection Areas (SPA).	Special Protection Areas are strictly protected sites classified in accordance with the European Birds Directive. They are classified for rare and vulnerable birds (as listed in the Directive), and for regularly occurring migratory species.

SSSI.	Site of Special Scientific Interest; Sites of Special Scientific Interest are protected by law under the Nature Conservation (Scotland) Act 2004 to conserve their plants, animals and habitats, rocks and landforms.
SuDS.	Sustainable Drainage Systems; A set of techniques designed to slow the flow of water. They can contribute to reducing flood risk by absorbing some of the initial rainfall and then releasing it gradually, thereby reducing the flood peak and helping to mitigate downstream problems. SuDS encourage us to take account of quality, quantity and amenity / biodiversity
Surface water flooding.	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.
SWMP.	Surface Water Management Plan; A plan that takes an integrated approach to drainage accounting for all aspects of urban drainage systems and produces long term and sustainable actions. The aim is to ensure that during a flood the flows created can be managed in a way that will cause minimum harm to people, buildings, the environment and business.

Chapter 1: Flood Risk Management in Orkney

1.1 What is a Local Flood Risk Management Plan?

The Local Flood Risk Management Plan (the 'Plan') has been developed to detail the actions adopted to reduce the devastating and costly impact of flooding in Orkney. The Plan supplements the Orkney Flood Risk Management Strategy (the 'Strategy'), which coordinates the efforts of all organisations that tackle flooding, be it in our towns or rural areas and be it from rivers, the sea or from surface water. The Strategy identifies where the risk of flooding and benefits of investment are greatest: the Plan details the prioritised actions that will be delivered with this investment.

By publishing the Plan, individuals and communities have information to better manage their own responsibilities. Everyone can take action with the confidence of what others are doing and with the clear knowledge when they are doing it.

The Plan details how and when the actions to deliver the goals set in the Strategy are to be delivered in the first six-year planning cycle, from 2016 to 2022. The actions in this Plan are based on agreed objectives for tackling floods in highest risk areas. They rely on the best evidence available on the causes and consequences of flooding and make clear the practical ambition of responsible authorities, including Orkney Islands Council (OIC), Scottish Environment Protection Agency (SEPA) and Scottish Water.

It is through this risk-based and plan-led approach that flood management will improve for the individuals, communities and businesses at risk in Orkney.

The Plan is published by OIC and has been prepared and agreed in collaboration with Scottish Water, SEPA and other organisations with a responsibility or interest in managing flooding. The Plan is a requirement under the Flood Risk Management (Scotland) Act 2009 and fulfils requirements within the European Union's Floods Directive.

1.2 How to read this plan

The Plan has three sections:

Chapter 1 contains background information on the approach taken in Scotland to manage flooding. It explains the duties and aims of relevant organisations, including how they work together and how flood risk management planning is linked to other government policies and initiatives. Perhaps more importantly, this chapter details how flood risk management planning is to be delivered in Orkney through the Plan.

Chapters 2 and 3 are the most important sections for those individuals and communities seeking to understand flood risk and its management closer to home. For priority communities, identified as Potentially Vulnerable Areas, there is a short description of the causes and consequences of flooding. The agreed goals or objectives are clearly set out and, most importantly, the actions that will deliver

progress against these goals over the first six-year planning cycle from 2016 and 2022 are described, including when they will be implemented, which organisation is responsible, and how they are to be funded.

Annexes to the Plan provide supporting documents and references, and present more detailed information in various formats.

The Plan should be read alongside the Strategy for the Orkney Local Plan District. The Strategy has been developed in parallel and provides additional background information and national context. The publication date of the Strategy was December 2015. Both the Plan and the Strategy will be updated every six years – see chapter 1.6 of this Plan.

1.3 How we have developed the plan

Coordination, collaboration and partnership working

Many organisations and individuals are involved in helping to improve flood management in Scotland. A piecemeal approach to tackle flooding does not work. Flooding is too complex, and the causes and impacts too complicated for any single organisation to address alone. Flooding cuts across the responsibilities of organisations such as SEPA, Scottish Water and emergency responders. Flood management requires the coordination set out in this Plan (and parallel Strategy) to be successful. A willingness to collaborate by those responsible for flood management is essential.

The Plan has been developed in partnership. Those organisations responsible are working more closely together than ever before. In local partnerships, here and throughout Scotland, SEPA has provided the technical analysis and ensured a consistent national approach is taken. It has provided the evidence upon which to make sensible, informed decisions. Orkney Islands Council and Scottish Water have made sure that local knowledge and expertise has informed the decision-making process.

Individuals are the first line of defence against flooding and have responsibilities to protect themselves and their property from flooding. Being prepared by knowing what to do and who to contact if flooding happens can help you reduce the damage and disruption flooding can have on your life. An information sheet is included within Appendix 6 to this Plan which includes contact details for Responsible Authorities who may be able to help you before, during and after flood events.

However, the responsibility for planning flood risk management falls in the main to SEPA, Orkney Islands Council and Scottish Water.

Consultation, engagement and advice

Orkney Islands Council and SEPA have been keen to hear from the people and communities that live under the threat of flooding, to ensure that technical analysis of the risks is accurate and that efforts to manage flooding are targeted to where most can be achieved. Two statutory public consultations were held during the development of the Strategies and Plans. The first, by SEPA, was on the general

approach to flood risk management planning and the identification of priority areas (2011); the second, held jointly with SEPA and all local authorities including Orkney Islands Council, was on the understanding of flooding in these priority areas and on the objectives and actions to manage flooding (2015). The views and representations of the respondents to the second consultation were taken account of in developing and finalising the Plan.

Further advice has been sought from relevant organisations at key stages. The Strategies and Plan have benefitted from input from Local Advisory Groups, providing important area-based knowledge on both the causes and consequences of flooding and on the appropriate actions for future management. Advice was also taken from a National Flood Management Advisory Group consisting of over 50 member organisations, reflecting the national importance and impact of flooding on our communities, economy, environment and cultural heritage.

Some of the work carried out has been complex and technical in nature for which professional advice was sought from across Scotland and beyond. Working together, SEPA, The Scottish Government, local authorities, Scottish Water, Forestry Commission Scotland, the National Park Authorities and other key interested organisations have assisted each other and developed industry best practice guidance for flood risk management planning.

Identification of objectives, appraisal and prioritisation of actions

The identification of objectives and appraisal of actions to reduce flood risk has been led by SEPA with significant local input from OIC and Scottish Water. The setting of objectives and selecting the most sustainable actions to reduce flood risk in each Local Plan District (LPD), including Orkney, will provide the long-term vision for Flood Risk Management in Scotland. Objectives set focus on the main sources and impacts of flooding identified for each Potentially Vulnerable Area (PVA) in Orkney. A wide range of actions were appraised, including flood protection works and schemes, flood protection studies, flood warning schemes, surface water management plans, and awareness raising activities amongst others.

To prioritise future actions across Scotland as required in flood risk management planning, SEPA separated the technical, risk-based assessment of priorities from aspects of local, practical deliverability. In this way the data on the costs and impacts of actions is used alongside information from delivery and funding bodies to jointly agree priorities and identify indicative delivery dates for actions. A National Prioritisation Advisory Group was established to provide guidance to SEPA on the priority of flood risk management actions, having considered both the technical ranking prepared by SEPA and issues of local priority. This group was made up of representatives from SEPA, local authorities, Scottish Water, Convention of Scottish Local Authorities (CoSLA) and the Scottish Government.

The Strategy provides the list of prioritised actions for the first six-year flood risk management planning cycle, 2016 to 2022. The Plan identifies who will be responsible for the action, a timetable of when it will be undertaken and the funding arrangements which is described in greater detail within Chapter 3.

The lists of prioritised actions to meet agreed goals and objectives in the first six-year cycle considered what would be achievable assuming a similar level of funding for flood risk management activities from The Scottish Government. However, given the timing of spending reviews and annualised financial settlements for local government, the actual ability to deliver all the actions set in the Strategies in December 2015 and detailed in this Plan will be dependent on the availability of the necessary funding in each year of the six year Plan.

Strategic Environmental Assessment

All Scottish public bodies and a few private companies operating in a 'public character' (e.g. utility companies) within Scotland are required by the Environmental Assessment (Scotland) Act 2005 to assess, consult and monitor the likely impacts of their plans, programmes and strategies on the environment. This process is known as Strategic Environmental Assessment (SEA).

SEA was undertaken by the Scottish Environment Protection Agency alongside preparation of the national Flood Risk Management Strategies and the findings are reported in a Post Adoption Statement which may be accessed from the [SEPA website](#)

The Orkney Flood Risk Management Plan falls under the scope of Section 5(3) of the Act and, accordingly, Orkney Islands Council has prepared a screening report which summarises the likely environmental effects of the Plan. Following consultation on the report with the statutory authorities SEPA, Scottish Natural Heritage (SNH) and Historic Environment Scotland (HES), the Council has determined that implementation of the actions set out in the Plan is unlikely to result in significant environmental effects beyond those already identified and addressed through SEA of the national Strategies; therefore no further environmental assessment of the Plan is required.

The above screening determination has been published on [Orkney Islands Council website](#), along with a Statement of Reasons which describes how the Council has taken account of the environmental assessment and the consultation responses.

A copy of the Screening Report, Screening Determination and Statement of Reasons are included as Appendix 3 to this plan.

Habitats Regulations Appraisal

The Conservation (Natural Habitats, and c.) Regulations 1994 require that certain plans which are likely to have a significant effect on a Natura 2000 site must be subject to an 'appropriate assessment' by the plan-making authority. The process for determining whether an appropriate assessment is required, together with the appropriate assessment itself - where necessary - is known as 'Habitats Regulations Appraisal' (HRA). Natura 2000 is the Europe-wide network of protected sites (Special Protected Areas and Special Areas of Conservation) developed under the European Commission Habitats Directive (Directive 92/43/EEC) and the Birds Directive (79/409/EEC).

In consultation with SNH, SEPA undertook HRA alongside preparation of the national Flood Risk Management Strategies, to assess how their implementation would affect European sites. The conclusion reached during this process was that none of the actions proposed in the Orkney Strategy would lead to a likelihood of significant effect on any European site.

No further actions have been included in the Orkney Flood Risk Management Plan in addition to those that are included in the Strategy; therefore, following consultation with Scottish Natural Heritage, Orkney Islands Council has adopted the findings of the HRA that was undertaken of the Orkney Strategy.

A Habitats Regulations Appraisal Record has been published on the Council's website, which summarises the HRA findings in relation to the actions that are set out in Orkney Flood Risk Management Strategy and Plan, a summary of this appraisal is included within Appendix 3 to this plan.

1.4 Roles and responsibilities for flood risk management planning

Individuals are the first line of defence against flooding. However, public bodies have responsibilities too and are working together to reduce the impacts of flooding in Scotland. Responsibility for flood risk management planning falls in the main to SEPA, local authorities and Scottish Water. However, individuals have a personal responsibility to protect themselves and their property.

Some of the key roles are outlined below and more information is available from the SEPA website.

Your responsibilities

Organisations and individuals have responsibilities to protect themselves from flooding. Being prepared by knowing what to do and who to contact if flooding happens can help you reduce the damage and disruption flooding can have on your life.

The first step to being prepared is signing up to [SEPA floodline](#) so you can receive messages to let you know where and when flooding is likely to happen. Other useful tools and advice on how to be prepared are available on the [Floodline](#) website including a quick guide to who to contact in the event of a flood. You can also check how your area could be affected by flooding by looking at [SEPA flood maps](#).

The Scottish Flood Forum is a Charitable Organisation funded by the Scottish Government that provides support for and represents those who are affected by or are at risk of flooding. The Forum offers advice, information, awareness, education and training to help reduce the risk of flooding and particularly to support the recovery process following a flood incident. More details can be found by visiting their website at [Scottish Flood Forum](#).

Orkney Islands Council is responsible for the production of the Local Flood Risk Management Plan and the implementation of flood protection actions for which they have a lead role, as agreed within the Flood Risk Management Strategy, including

new schemes or works and the requirement for the clearance and repair of watercourses. You can help your local authority to manage flooding by letting them know if debris is blocking watercourses or if flood defences are tampered with.

OIC currently monitor the coastal flood risk to our communities on a daily basis, issuing alerts and implementing procedures to manage any identified risk. OIC also carry out cyclical maintenance and inspection of culverted watercourses and outfalls throughout the year to try and reduce the risk of flooding from such sources.

During periods where an alert for flooding has been issued OIC work closely with other emergency services and responsible authorities to ensure that suitable emergency plans and responses are put in place. During severe flooding, Orkney Islands Council will work with the emergency services and coordinate shelter for people evacuated from their homes.

SEPA is Scotland's national flood forecasting, flood warning and strategic flood risk management authority. SEPA has a statutory duty to produce Scotland's Flood Risk Management Strategies. They work closely with other organisations responsible for managing flood risk through a network of partnerships and stakeholder groups to ensure that a nationally consistent approach to flood risk management is adopted.

SEPA also has a responsibility to identify where in Scotland there is the potential for natural flood management techniques to be introduced. Natural flood management is the use of the natural features of the land to store and slow down the flow of water.

In running Floodline, SEPA provide live flooding information and advice on how to prepare for or cope with the impacts of flooding 24 hours a day, seven days a week. To help SEPA forecast for flooding they work closely with the [Met Office](#).

To raise awareness of flooding at a national level SEPA runs education initiatives, community engagement programmes and an annual campaign to promote the useful advice and information available through Floodline. SEPA works in partnership with local authorities, Neighbourhood Watch Scotland, Ready Scotland and others to share resources and help to promote preparedness and understanding of how flood risk is managed.

Scottish Water is a responsible authority for flood risk management and is working closely with SEPA, local authorities and others to coordinate plans to manage flood risk.

Scottish Water has the public drainage duty and is responsible for foul drainage and the drainage of rainwater run-off from roofs and any paved ground surface from the boundary of properties. Additionally, Scottish Water helps to protect homes from flooding caused by sewers either overflowing or becoming blocked. Scottish Water is not responsible for private pipework or guttering within the property boundary.

Other organisations

The Scottish Government oversees the implementation of the Flood Risk Management (Scotland) Act 2009 which requires the production of Flood Risk Management Strategies and Local Flood Risk Management Plans. Scottish Ministers

are responsible for setting the policy framework for how organisations collectively manage flooding in Scotland. Scottish Government has also approved the Flood Risk Management Strategy for Orkney, published in December 2015.

Scottish Natural Heritage has provided general and local advice in the development of the Flood Risk Management Strategy and Local Flood Risk Management Plan for Orkney. Flooding is seen as natural process that can maintain the features of interest at many designated sites, so Scottish Natural Heritage helps to ensure that any changes to patterns of flooding do not adversely affect the environment. Scottish Natural Heritage also provides advice on the impact of Flood Protection Schemes and other land use development on designated sites and species.

The Scottish Flood Forum is a Scottish charitable organisation that provides support for those who are affected by, or are at risk of, flooding. It provides flood advice, information, awareness, education and training to individuals and communities to help reduce the risk of flooding; in partnership with the local authority, provides support during the recovery process following a flood incident and aims to support the development of resilient communities.

Forestry Commission Scotland was designated in 2012 as a responsible authority for flood risk management planning purposes and has engaged in the development of the Flood Risk Management Strategies through national and local advisory groups. This reflects the widely held view that forestry can play a significant role in managing flooding.

Utility companies have undertaken site specific flood risk studies for their primary assets and have management plans in place to mitigate the effects of flooding to their assets and also minimise the impacts on customers.

The Met Office provides a wide range of forecasts and weather warnings. SEPA and the Met Office work together through the [Scottish Flood Forecasting Service](#).

The emergency services provide emergency relief when flooding occurs and can coordinate evacuations. You should call the emergency services on 999 if you are concerned about your safety or the safety of others and act immediately on any advice provided.

Historic Environment Scotland considers flooding as part of their regular site assessments. As such, flooding is considered as one of the many factors which inform the development and delivery of its management and maintenance programmes.

1.5 Links with other plans, policies, strategies and legislative requirements

The Plan does not stand in isolation. As far as is practicable, an integrated approach to land and water management has been pursued. When developing the Strategy and Plan, early links were made with other relevant aspects of water and land management including local development plans, river basin management plans and emergency plans. In turn, the responsible authorities will work proactively to ensure

the findings from these Flood Risk Management Plans and Strategies will influence other planning initiatives in an interactive and iterative cycle. Making these links has helped identify opportunities to deliver multiple benefits from flood risk management goals, objectives and actions.

Local Development Plan

Orkney Islands Council, as the Planning Authority leads on the production of a Local Development Plan for their area under the Planning (Scotland) Act 2006. This document looks at the land use allocations and policies for a 5 year period and is drafted with assistance from a number of statutory agencies including SEPA and Scottish Water. A Local Development Plan is required to be in line with National Planning Framework 3 (NPF3) and Scottish Planning Policy (SPP). Both these national planning documents supports sustainable flood risk management with SPP setting out a precautionary approach to flood risk, flood avoidance, flood reduction and a requirement for sustainable drainage systems. More information on the current Local Development Plan can be found by visiting [Orkney Islands Council website](#).

Surface Water Management Planning

Surface water flooding is experienced in all areas and therefore there is a need to manage this risk. Surface water flooding is a key component of the flood risk assessment that has led to the development of this Plan. However, the management of the risk will not always require a Surface Water Management Plan or specific study or other action as described in Chapter 3 of this Plan. Responsible authorities in each LPD may therefore undertake broader surface water management planning over the period of the first cycle of the Plan. Such additional surface water management planning is described in Chapter 3.10 of the Plan 'Other flood risk activities by local authorities in Orkney.'

River basin management planning

Reducing flood risk in Scotland through the development of Flood Risk Management Strategies has provided an opportunity to connect with plans to improve the quality of Scotland's water environment at the same time. For example, coordination between river basin management and flood risk management can reduce flood risk, whilst improving water quality and biodiversity.

SEPA is leading the delivery of River Basin Management Plans and Flood Risk Management Strategies, and Orkney Islands Council for the Local Flood Risk Management Plan, and we have worked to ensure that there is integration and coordination between them. This coordination, particularly in regard to consultation and engagement, will be important for stakeholders many of whom have an interest in the objectives of both Plans and Strategies.

Scottish Water Business Plan 2015-2021

Scottish Water's investment programme is set out in their Business Plan 2015-2021, which can be found on the [Scottish Water website](#).

Scottish Water's customers have told them that reducing internal property flooding from sewers is a high priority and this is reflected in Scottish Water's Business Plan

commitments for the period 2015-2021. Addressing sewer flooding is of the highest importance to Scottish Water, as highlighted by our customers who have helped shape the investment plans for 2015-2021.

In recognition of this high priority, within the period 2015-2021, Scottish Water will invest circa £115m to improve the hydraulic capability of the sewer network so that they can remove all customers from the high risk internal sewer flooding register (greater than 10% chance per annum) as quickly as possible, typically within four years of the problem being confirmed. Scottish Water has made a commitment to those customers on the register on 31 March 2015 that they will no longer be on the register by 31 March 2021.

Scottish Water's customers have also highlighted external flooding is an important issue. As a result, within the period 2015-2021, they are investing c£40m to develop and to begin to implement solutions to reduce the flood risk for 400 high priority external sewer flooding areas suffering from frequent repeat flooding events.

As a responsible authority under the Flood Risk Management (Scotland) Act 2009, Scottish Water is also working collaboratively with third parties such as SEPA and Local Authorities through the Flood Risk Management Planning process, which will assess the risk of flooding into the future.

As part of that work, Scottish Water has allocated investment to undertake further modelling and assessment in sewer catchments within PVA's to improve knowledge and understanding of flood risk from the sewers in these areas, as required under Section 16 of the Flood Risk Management (Scotland) Act 2009. Scottish Water is also working in partnership with SEPA and Local Authorities, to lead on the production of Integrated Catchment Studies across key catchments. Work carried out under these Flood Risk Management (Scotland) Act 2009 duties will continue to inform future investment requirements for Scottish Water.

1.6 Next steps and monitoring progress

The Plan runs for six years from June 2016. Over this period the Orkney LPD partnership will continue to meet periodically to monitor progress towards implementing the actions detailed in Chapter 3 and Annex 1 of the Plan.

Between years 2 and 3 of the cycle of this Plan (i.e. before June 2019), Orkney Islands Council will complete a review of progress made on each action within the Plan and publish a report on the conclusions of said review.

Between years 5 and 6 of the cycle of this Plan (i.e. before June 2022), Orkney Islands Council will publish a report on the Plan containing an assessment of the progress made towards implementing the current actions, a summary of the current actions which were not implemented, with reasons for their non-implementation, and a description of any other actions implemented since the plan was finalised which the lead authority considers have contributed to the achievement of the objectives summarised in the Plan.

Orkney Islands Council will make these reports available for public inspection.

Chapter 2: Managing Flood Risk in Orkney

2.1 Understanding of flooding within Orkney

This chapter presents an overview of the flood risk faced across Orkney. The agreed objectives set for the entire county are clearly set out and most importantly the actions that will deliver these objectives are also described.

A summary of facts and figures on the characteristics, impacts and sources of flooding are provided together with the Annual Average Damages attributable to such sources if significant flooding were to occur. A series of maps and tables displays such information in a visual format which demonstrates the dispersed nature of flood risk in Orkney and the logistical difficulties faced in dealing with such risks, but at the same time highlights areas that are particularly vulnerable.

Broad objectives identifying the shared aims for managing flooding across the island group are provided within section 2.3. Actions describe where and how flood risk will be managed and how these objectives may be met. As detailed within Chapter 1, achieving these objectives and implementing such actions requires a coordinated approach and individuals as well as businesses and responsible authorities working together and understanding some of the unique mechanisms for flooding faced in the wider community.

Chapter 3 provides greater detail of actions within PVAs describing how and when selected actions chosen to meet objectives will be implemented. There are eight PVAs within Orkney; planned actions to manage flooding that have been prioritised for delivery between 2016 and 2022 across the whole of Orkney and in each PVA are detailed.



A flood in Albert Street, Kirkwall, 24 September 1909. Photograph courtesy of Orkney Library and Archive.

2.2 Summary of flood risk in Orkney

The Orkney Islands covers an area of approximately 1,000km² and has a coastline with a length of approximately 860km. There are eight PVAs in Orkney, details of which are included within Chapter 3.

There are approximately 680 residential properties (7% of all residential properties in the Islands) and 460 non-residential properties (17% of all non-residential properties) at risk of flooding across Orkney. Of these properties deemed to be at risk of flooding it is estimated that 82% of these are located within the identified PVAs. The Annual Average Damages (AAD) from flooding (see glossary) are approximately £4.2 million, with an estimated 92% of the AAD within Orkney accounted for in the eight PVAs.

The main source of flooding is from coastal flooding which accounts for approximately 94% of the AAD (Figure 1). AAD caused by coastal floods are £3.9 million, with those caused by river and surface water floods being approximately £150,000 and £170,000 respectively.

Figure 1: Annual Average Damages by flood source.

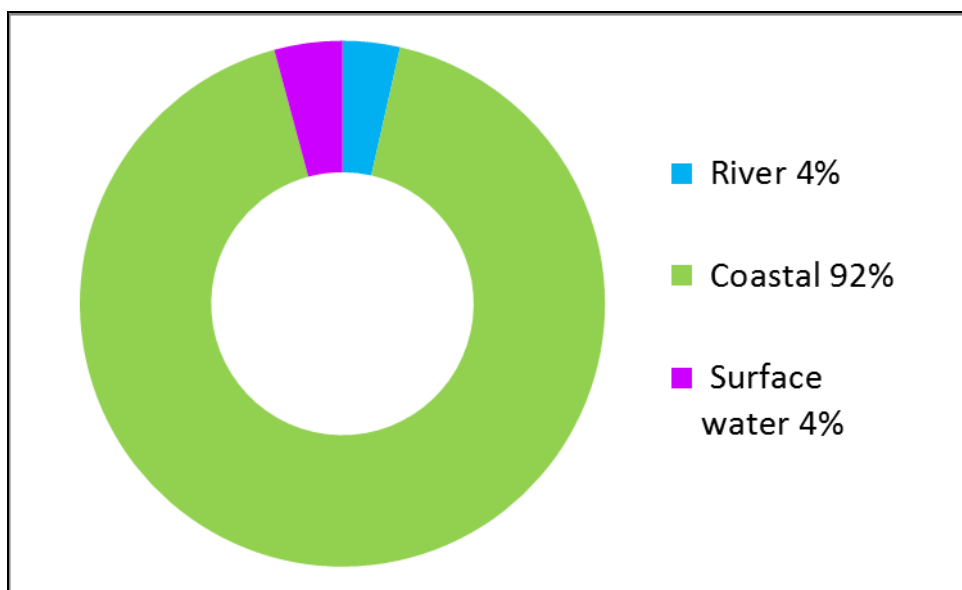


Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Table 1 shows the number of properties at risk and the AAD caused by flooding in the PVAs within Orkney. This includes damages to residential properties, non-residential properties, transport and agriculture. Please note that economic damages to airports are not included as information on damages at this scale is not available.

Table 1: PVAs at risk of flooding

Location.	Residential and non-residential properties at risk of flooding.	Annual Average Damages.
Kirkwall.	750.	£2,100,000
Sanday.	80.	£740,000
Stromness.	70.	£140,000
Stronsay.	50.	£250,000
Westray.	60.	£90,000
South Ronaldsay.	50.	£85,000

Table reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Background information on the Orkney Local Plan District

The population of the Orkney Islands is approximately 21,500. There are around 70 islands, of which 20 are inhabited. The largest settlement with a population of around 8,500 is Kirkwall.

Approximately 3% of the area of Orkney is classified as urban. The main land cover across the islands is improved grassland covering 36% of the area and rough grassland covering 28% of the area. Heather grassland is also fairly common covering 14% of the area.

The table below summarises the actions to manage flood risk in the Potentially Vulnerable Areas within Orkney. Further detail is provided within Chapter 3 for each Potentially Vulnerable Area.

PVA	Flood protection scheme/ works	New flood warning	Flood protection study	Surface water plan/study	Strategic mapping and modelling	Flood forecasting	Self help	Awareness raising	Maintenance	Emergency plans/ response	Planning policies
Sanday 03/01		✓			✓	✓	✓	✓	✓	✓	✓
Stronsay 03/02		✓	✓			✓	✓	✓	✓	✓	✓
Evie and Rendall 03/03		✓			✓	✓	✓	✓	✓	✓	✓
Stromness, Stenness and Sandwick 03/04		✓			✓	✓	✓	✓	✓	✓	✓
Kirkwall, Firth and East Mainland 03/05	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hoy and South Walls 03/06		✓	✓			✓	✓	✓	✓	✓	✓
South Ronaldsay 03/07c		✓	✓			✓	✓	✓	✓	✓	✓
Westray 03/08c		✓	✓			✓	✓	✓	✓	✓	✓

Table reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015)

2.3 Objectives and actions for the entire Orkney Local Plan District

Objectives and actions have been set by SEPA and agreed by flood risk management responsible authorities following consultation. The objectives are the shared aims for managing flooding. Actions describe where and how flood risk will be managed.

These objectives and associated actions apply across the entire Orkney Islands group, including the PVAs. There are more specific actions that apply within PVAs, in addition to those listed below. Further detail can be found in the relevant PVA within Chapter 3.

Target area	Objective(s)	ID	Indicators
Applies across Orkney.	Avoid an overall increase in flood risk.	300001	<ul style="list-style-type: none"> • 680 residential properties. • 460 non-residential properties . • 1,500 people.
Applies across Orkney.	Reduce overall flood risk.	300002.	<ul style="list-style-type: none"> • 680 residential properties. • 460 non-residential properties . • 1,500 people.
Applies across Orkney.	Organisations such as utility companies and Historic Environment Scotland actively maintain and manage their own assets, including the risk of flooding. These actions are not detailed further in this plan.		

The following actions have been selected to be applied across Orkney in order to help achieve the above noted objectives.

Action (ID):	Maintenance (3000020007)		
Objective (ID):	Reduce overall flood risk (3000002).		
Delivery lead:	Orkney Islands Council, asset/land managers.		
Status:	Existing.	Delivery:	On-going.
Description:	<p>Orkney Islands Council (OIC) must from time to time (or as directed by Scottish Ministers) assess relevant bodies of water including watercourses within its area, for the purpose of ascertaining whether the condition of any such body of water gives rise to a risk of flooding of land within its area. Where such a risk is identified and where OIC considers that clearance and repair works will substantially reduce that risk, such operations will be added to a schedule of clearance and repair works which will be available for public inspection. OIC also undertake inspection and repair operations on the OIC owned surface water drainage networks.</p> <p>Scottish Water undertakes risk based inspection, maintenance and repair on the public sewer network.</p> <p>Asset owners and riparian landowners are responsible for the maintenance and management of their own assets including those which help to reduce flood risk.</p>		
Coordination arrangement:	<p>Orkney Islands Council will co-ordinate with landowners and other Responsible Authorities where a risk is identified and carry out works.</p> <p>Scottish Water will keep responsible authorities informed of large scale capital maintenance work to identify opportunities for co-ordination.</p>		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		



Maintenance of the surface water drainage network and clearance of culverts are duties undertaken by Orkney Islands Council throughout the year.

Action (ID):	Emergency Plan/Response (3000020014)		
Objective (ID):	Reduce overall flood risk (3000002).		
Delivery lead:	Category 1 and 2 responders .		
Status:	Existing.	Delivery:	On-going.
Description:	<p>Providing an emergency response to flooding is the responsibility of many organisations, including local authorities, the emergency services and SEPA. Effective management of an emergency response relies on emergency plans that are prepared under the Civil Contingencies Act 2004 by Category 1 and 2 Responders. The emergency response by these organisations is co-ordinated through regional and local resilience partnerships. This response may be supported by the work of voluntary organisations.</p> <p>Orkney Islands Council monitors the flood risk daily by comparing forecast tide and surge levels with land levels. This enables advanced warning of coastal flood events to be provided.</p>		
Coordination arrangement:	<p>In response to any flood activity arising in Orkney, Orkney Local Emergency Co-ordinating Group (OLECG) would form as a multi-agency Emergency Liaison Group sitting as part of the response arrangements within the Highlands and Islands Local Resilience Partnership. Comprising of all Category 1 and Category 2 responders within the Civil Contingencies Act 2004, the Group would ensure the objectives within the strategic response were considered and met.</p>		
Funding arrangement:	<p>Multiple agencies and funding arrangements are contributing to this work.</p> <p>The Bellwin Scheme is activated at the discretion of Scottish Government to offset expenditure arising out of an emergency.</p>		



Action (ID):	Planning Policies (30000100001)		
Objective (ID):	Avoid an overall increase in flood risk (300001) Reduce overall flood risk (300002)		
Delivery lead:	Orkney Islands Council - Planning Authority		
Status:	Existing	Delivery:	On-going
Description:	<p>Scottish Planning Policy and accompanying Planning Advice Notes set out Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. In terms of flood risk management, the policy supports a catchment-scale approach to sustainable flood risk management and aims to build the resilience of our cities and towns, encourage sustainable land management in our rural areas, and to address the long-term vulnerability of parts of our coasts and islands. Under this approach, the Flood Risk Framework of SPP should be adhered to. For further information on the application of national planning policies please see the Scottish Government Scottish Planning Policy document and specifically sections 254 through to 268.</p> <p>SEPA has a statutory role in relation to the provision of flood risk advice to planning authorities. This role is expressed in Section 72 of the FRM Act, 2009. SEPA also has a duty to co-operate with planning authorities in the preparation of development plans. When consulted in relation to planning applications for development or site allocations in development plans, and where the planning authority considers there may be a risk of flooding, SEPA will provide advice. The advice provided by SEPA will be with respect to the risk of flooding and on the basis of the relevant information it holds which is suitable for planning purposes. It will also be in line with the principles and duties set out in the FRM Act. Further information about how SEPA engages in the planning system, including guidance on flood risk and planning is available on SEPA.</p> <p>Scottish Water is a statutory consultee within the planning legislation and is required to comment on all outline or full planning applications which are referred by a local authority.</p>		
Coordination arrangement:	<p>Orkney Islands Council (OIC) will work directly with their planners to ensure that appropriate policies and measures are put in place to ensure that the council Planning Policy takes account of the objective to avoid increasing flood risk and to reduce flood risk.</p> <p>OIC, as the planning authority will ensure that appropriate policies through the Local Development Plan and associated guidance are in place to take account of the objective to reduce flood risk.</p> <p>SEPA's land use planning activities will be co-ordinated with the activities of other responsible authorities as required.</p>		
Funding arrangement:	<p>SEPA's land use planning activities are funded by Scottish Government through SEPA's grant in aid settlement.</p> <p>OIC funding will come from revenue and capital budgets.</p>		

Action (ID):	Awareness Raising (3000020013)		
Objective (ID):	Reduce overall flood risk (3000002).		
Delivery lead:	Responsible Authorities		
Status:	Existing.	Delivery:	On-going.
Description:	<p>From 2016 SEPA will engage with the community through local participation in national initiatives, including partnership working with Neighbourhood Watch Scotland. In addition, SEPA will engage with local authorities and community resilience groups where possible.</p> <p>Where a new flood protection scheme is to be created, SEPA will support the local authority's communications and engagement activities with media activity, local public awareness events and education engagement with schools. SEPA will also deliver joint communications with local authorities for Floodline customers in any newly protected flood warning area.</p> <p>Scottish Water will support SEPA and responsible authorities with their awareness raising activities as required and provide targeted flooding communications for Scottish Water specific activities. Scottish Water will raise awareness by producing and supplying targeted information to the public on large capital projects and detailed local studies.</p> <p>More general information and flooding guidance will be available on the website at: Scottish Water flooding information page.</p> <p>Orkney Islands Council (OIC) aim to deliver clear and effective communication to the local community during the implementation of flood protection works, hosting public engagement events to encourage local input and feedback wherever possible. OIC will also include effective communication on flood risk within existing and new initiatives involving Education Scotland and resilience teams.</p>		
Coordination arrangement:	<p>Across Scotland, SEPA will create and share communication and education resources with other responsible authorities. These resources will include awareness campaigns, media and marketing activity and promotion of SEPA's flood forecasting and warning services (Floodline). Where they exist, SEPA will engage with community resilience groups and community safety partnerships.</p> <p>To support the delivery of the new SEPA flood warning scheme, SEPA will carry out a local launch event and engage directly with residents in the area. This will be supported by local and national media communications. SEPA will also support and participate in local public awareness events, in partnership with the local authority, community council or other local representative organisations, including schools. SEPA's awareness raising activities will be co-ordinated with activities of other responsible authorities as required.</p>		

	<p>Orkney Islands Council (OIC) will work with local communities to raise awareness and assist SEPA in relation to the new flood warning system. OIC will work with any community flood action groups to develop emergency plans/response. Within OIC, various departments will coordinate efforts to deliver educational awareness raising activities within schools.</p> <p>Scottish Water will keep responsible authorities informed of its awareness raising activities through the Local Plan District partnerships.</p>
Funding arrangement:	<p>SEPA's awareness raising activities are funded by Scottish Government through SEPA's grant in aid settlement.</p> <p>OIC funding will come from revenue and capital budgets.</p>

Action (ID):	Self Help (3000020011)		
Objective (ID):	Reduce overall flood risk (3000002)		
Delivery lead:	Individuals.		
Status:	Existing.	Delivery:	On-going.
Description:	<p>Everyone is responsible for protecting themselves and their property from flooding. Property and business owners can take simple steps to reduce damage and disruption to their homes and businesses should a flood happen.</p> <p>This includes preparing a flood plan and flood kit, installing property level protection, signing up to Floodline and Resilient Communities initiatives, and ensuring that properties and businesses are insured against flood damage.</p>		
Coordination arrangement:	<p>Responsible authorities will offer advice and information on the actions available to individuals and property owners. This will be done through Awareness Raising activities and in response to individual requests, see section 1.4 of the Plan for more information.</p>		
Funding arrangement:	<p>Individuals are responsible for the protection of their properties. Responsible authorities will advise on any external funding available to individuals through awareness raising activities.</p>		

Action (ID):	Flood Forecasting (3000020009)		
Objective (ID):	Reduce overall flood risk (300002)		
Delivery lead:	SEPA		
Status:	Existing	Delivery:	Ongoing
Description:	<p>The Scottish Flood Forecasting Service is a joint initiative between SEPA and the Met Office that produces daily, national flood guidance statements which are issued to Category 1 and 2 Responders.</p> <p>The flood guidance statements provide an assessment of the risk of flooding for a five day period allowing responders time to put preparations in place to reduce the impact of flooding. The service also provides information which allows SEPA to issue flood warnings, giving people a better chance of reducing the impact of flooding on their home or business.</p> <p>For more information please visit SEPA's website.</p>		
Coordination arrangement:	<p>SEPA / Met Office joint initiative.</p> <p>Hydrological information is provided by SEPA and meteorological information is provided by the Met Office. SEPA uses the information to predict the likelihood and timing of river, coastal and surface water flooding.</p>		
Funding arrangement:	<p>SEPA's flood forecasting service is funded through Scottish Government's grant in aid allocation.</p> <p>The Met Office receives funding from the UK Government.</p>		

Chapter 3: Managing Flood Risk in Potentially Vulnerable Areas (PVAs)

3.1 An overview of the eight Potentially Vulnerable Areas in Orkney

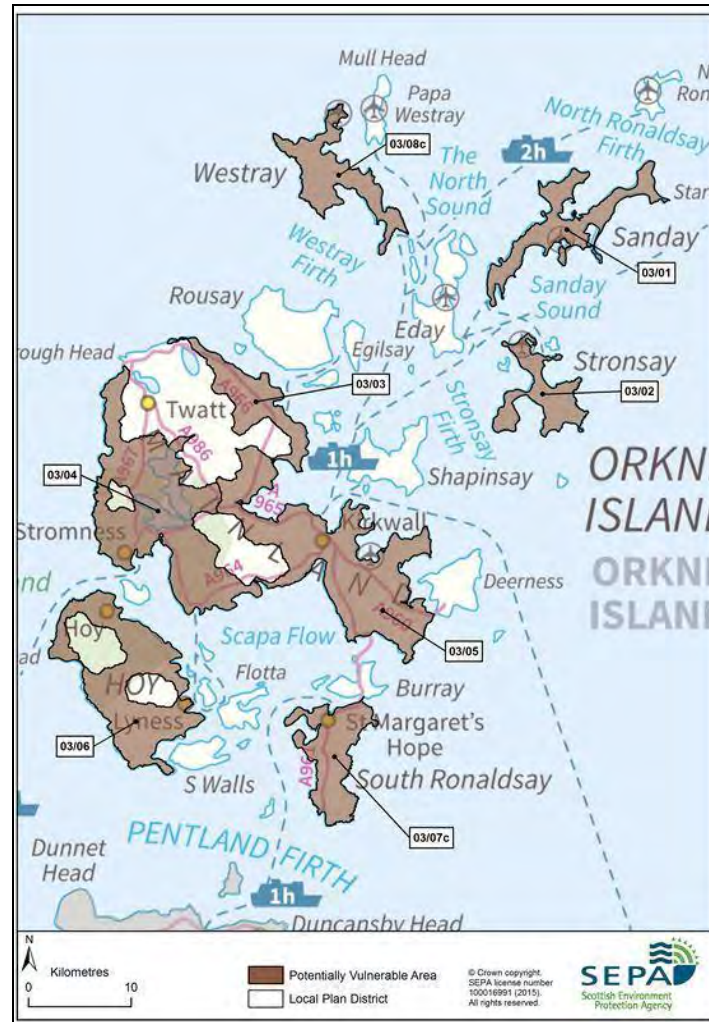


Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

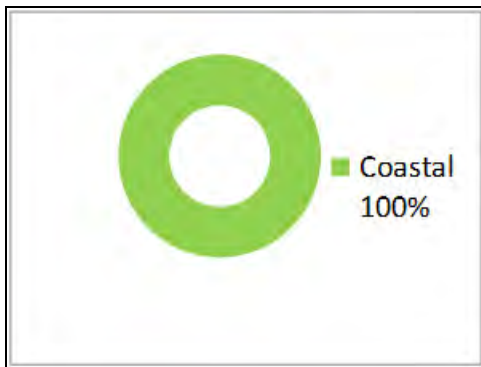
There are 8 PVAs across Orkney, identified in the map above. The PVAs represent 558 of the 680 residential properties at flood risk in Orkney, and 378 of the 460 non-residential properties at flood risk. An estimated 92% of the Annual Average Damages across Orkney are contained within the eight PVAs, a value of £3.8million. The following sections detail objectives and selected actions to manage the flood risk within each PVA. Each action identifies who will be responsible for the delivery and implementation of the actions, along with a timetable of when the actions will be undertaken and the funding arrangements. A combined summary of all actions to be implemented across Orkney in the first cycle of the Plan, 2016-2022, included as Annex 1.

3.2 Sanday (Strategy PVA (03/01) 'Sanday')

Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Sanday coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- 60 residential properties.
 - 20 non-residential properties.
 - £740,000 Annual Average Damages.
- (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
Strategic mapping and modelling.					
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Flooding Impacts

Background



This Potentially Vulnerable Area covers the island of Sanday (shown left). It has an area of approximately 50km² and includes all the settlements on the island, the road network and the airport.

There are approximately 60 residential and 20 non-residential properties at risk of flooding.

The Annual Average Damages are estimated to be £740,000 with all of these attributed to coastal flooding.

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Coastal flood risk affects extensive parts of the island, including the main settlements. There is the potential for the island to be split into two or more smaller islands during coastal floods.

The risk of flooding to people and property, as well as to community facilities, utilities, transport network, designated sites and agricultural land is summarised in Table 1.

Roads affected by flooding include the B9068, B9069 and B9070. Flooding of roads affects commuting to the mainland and disrupts access to farmland, amenities and the emergency services. The air ambulance relies on access to the air strip, which is at risk of being cut off when the road is flooded.

Eight designated cultural heritage sites, including scheduled monuments, are at risk of flooding. Significant areas of agricultural land and environmental importance are also at risk. The sites include East Sanday Coast Special Protection Area and Central and Northwall Sites of Special Scientific Interest (SSSI). Any flood defence scheme will need to ensure particular care and consideration is applied to these sites

The damages associated with floods of different likelihood are shown in Figure 1. Residential properties and roads experience the greatest economic impact. Note that cultural heritage and environmental sites are not included in the estimation of the economic impact of flooding due to the difficulty in placing an economic value on these impacts.

History of flooding

Anecdotal reports of flooding in Sanday have been noted at regular intervals in the last 100 years, often closely linked to other factors such as coastal erosion, which is very pertinent to the island given its topography and geology.

More recently, floods have been recorded affecting different areas of the island. In January 2005 a coastal storm destroyed a section of road and seawall at Cleat / Klondyke, damaged the sea wall at Tofts and a section of defences to the north of Kettletoft Bay increasing the vulnerability of the road to future events.

In August 2007, roads and fields flooded due to a burn being unable to cope with runoff from surrounding land. In January 2013 sea defences along the B9069 were breached at Isegarth causing flooding to the road.

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 260).	30	60	70
Non-residential properties (total of 70).	20	20	20
People .	70	130	160
Community facilities.	0	0	0
Utilities assets.	0	0	0
Transport links (excluding minor roads).	Roads at 40 locations.	Roads at 50 locations.	Roads at 50 locations.
Environmental designated areas (km ²).	7	7	8
Designated cultural heritage sites.	8	8	8
Agricultural land (km ²).	11	13	14

Table reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Figure 1: Damages by flood likelihood

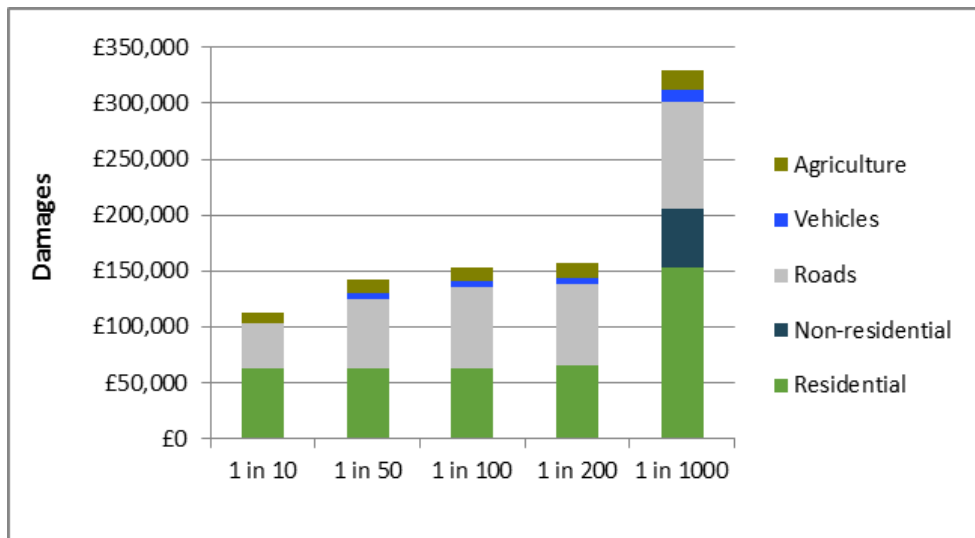
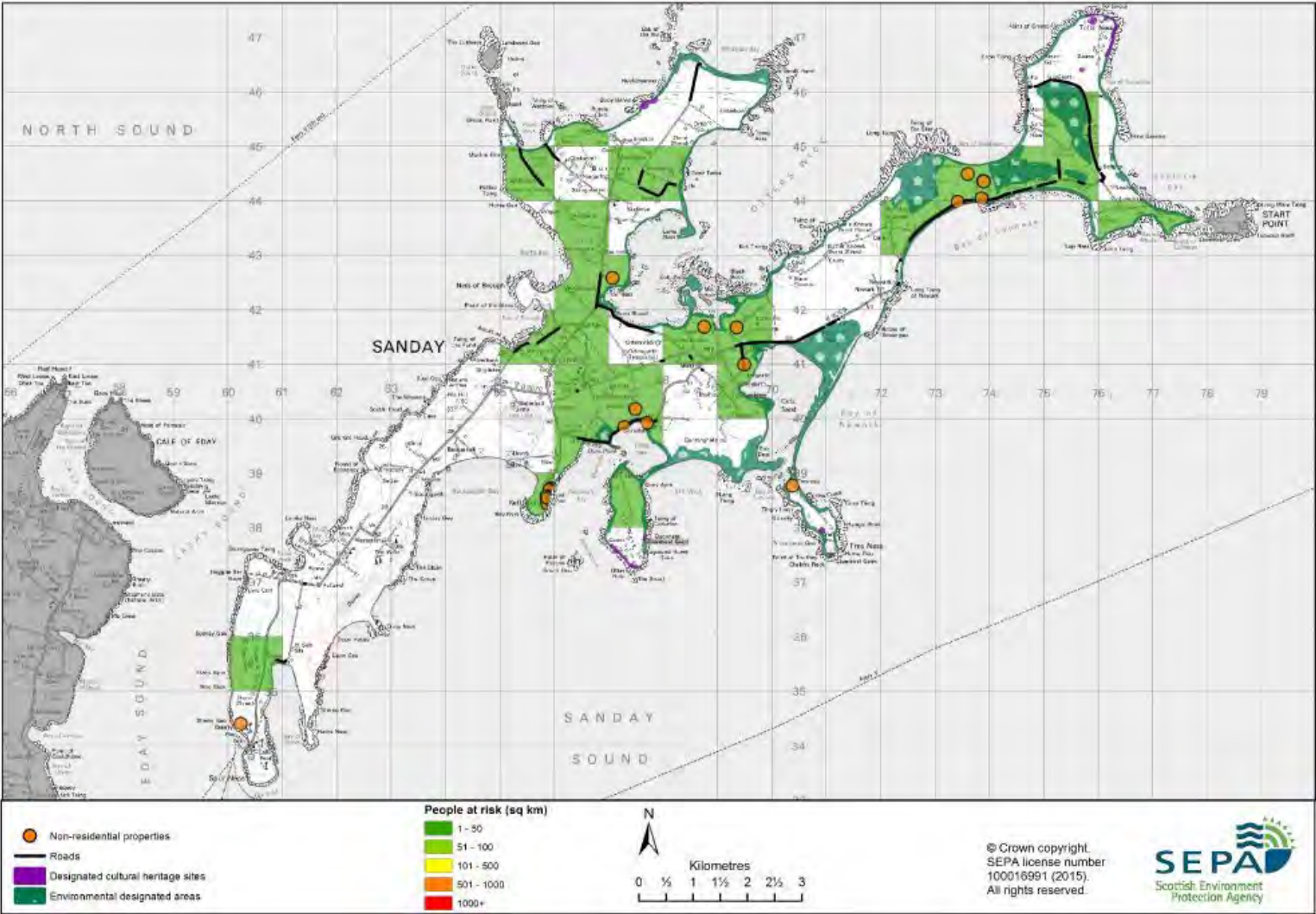


Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).



Objectives to manage flooding in Sanday

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for Sanday.

Reduce flood risk in Sanday from Coastal Flooding

- 110 people.
- £350,000 Annual Average Damages from residential properties.
- £110,000 Annual Average Damages from non-residential properties.
- B9069 (Newark to Northwall and Little Isegarth to Silverhall).



Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	60 residential properties. £740,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	60 residential properties. £740,000 Annual Average Damages.



Road network on Sanday affected by coastal flooding December 2013. Photograph courtesy Diane Grieve.

Actions to manage flooding in Sanday

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for Sanday.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
Strategic mapping and modelling.					
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	SEPA will work with partners to ensure that any new information about flood risk, including improved strategic mapping and modelling, is considered when informing reviews of the flood warning system.		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		

Action (ID):	Strategic Mapping and Modelling (3001010016).		
Objective (ID):	Reduce risk in Sanday from coastal flooding (300101).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2016-2019.
Description:	SEPA will be seeking to develop the flood hazard mapping on Sanday to improve understanding of the coastal flood risk. The extent and timing of the completed improvements will be dependent on detailed scoping and data availability.		
Coordination arrangement:	SEPA will work with Orkney Islands Council to ensure any relevant information is considered. A new flood warning scheme is under consideration for Orkney. SEPA will ensure that any new information about flood risk resulting from the proposed flood warning developments is considered in SEPA's strategic mapping and modelling developments where appropriate and relevant.		
Funding arrangement:	SEPA's strategic mapping and modelling activities are funded by Scottish Government through SEPA's grant in aid settlement.		

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.



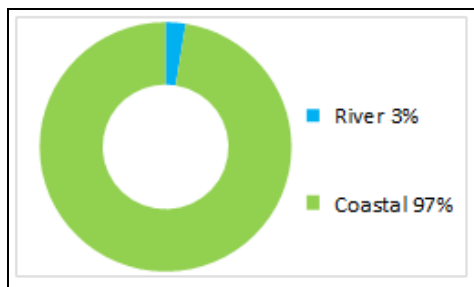
Sanday from the air, highlighting relationship with the sea. Photograph courtesy of Mark Crook.

3.3 Stronsay (Strategy PVA (03/02) 'Stronsay')

Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Stronsay coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- 40 residential properties.
- 10 non-residential properties.
- £250,000 Annual Average Damages.. (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
	Flood protection study.				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Flooding Impacts

Background



This Potentially Vulnerable Area covers the island of Stronsay (shown left). It is approximately 34km².

There are approximately 40 residential and 10 non-residential properties at risk of flooding.

The Annual Average Damages are estimated to be £250,000 with the majority caused by coastal flooding.

Figures reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Coastal flood risk is mainly focused around Whitehall in the north. Further areas of risk including low-lying land around Bay of Houseby and Holland in the south and to the west of Loch Rothiesholm where there is a risk to the area of Rothiesholm being cut off from the rest of the island.

The risk of flooding to people and property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1. Roads potentially affected by flooding include the B9060 and B9061 and the access road to the ferry terminal. Six designated cultural heritage sites, including scheduled monuments, are also at risk.

The risk of flooding to utilities in Table 1 does not include Scottish Water data. Scottish Water undertook a national assessment of above ground assets at medium likelihood of flooding (including water treatment works, wastewater treatment works, and pumping stations). Within this Potentially Vulnerable Area there is one asset identified as being at risk of flooding.

The damages associated with floods of different likelihood are shown in Figure 1. For this Potentially Vulnerable Area the highest damages are to residential properties followed by damages to roads. Note that cultural heritage and environmental sites are not included in the estimation of the economic impact of flooding due to the difficulty in placing an economic value on these impacts.

History of flooding

There is a recorded history of regular coastal flooding on Stronsay, particularly in Whitehall and Mill Bay, where the issue is exacerbated by wave action, the inability

of outfalls to discharge freely due to high tide levels and the overtopping of existing coastal defences.

The most notable flood was the 1953 North Sea flood, which inundated seafront houses, damaged property and affected roads. More recent recorded floods include January 2005, when a winter storm caused damage and disruption across the island, including coastal flooding in Whitehall. Similar floods were recorded in November 2011 and December 2013 which flooded roads and property.

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 180).	30	40	50
Non-residential properties (total of 40).	<10	10	10
People .	60	80	100
Community facilities.	0	0	0
Utilities assets.	0	0	0
Transport links (excluding minor roads).	Roads at 20 locations.	Roads at 20 locations.	Roads at 20 locations.
Environmental designated areas (km ²).	0	0	0
Designated cultural heritage sites.	5	6	6
Agricultural land (km ²).	1	2	2

Table reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Figure 1: Damages by flood likelihood

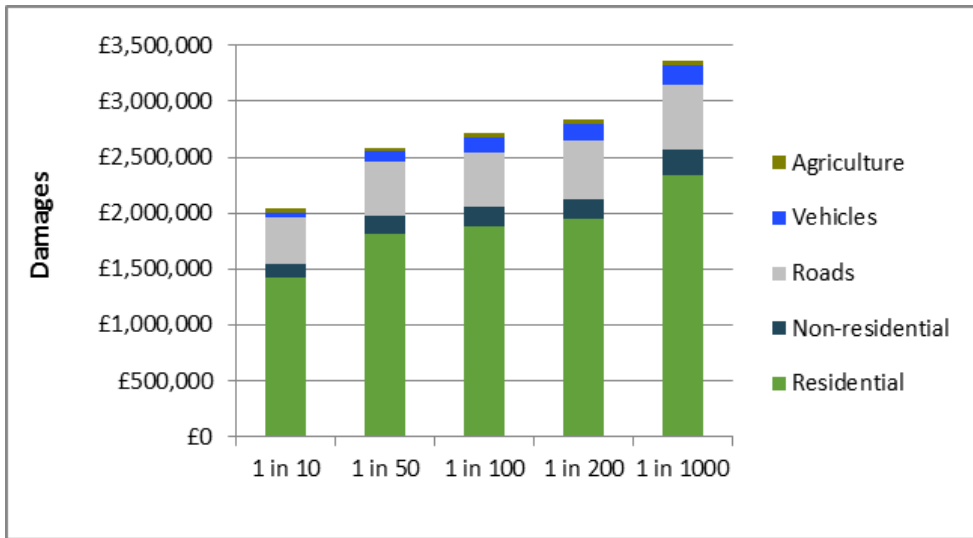
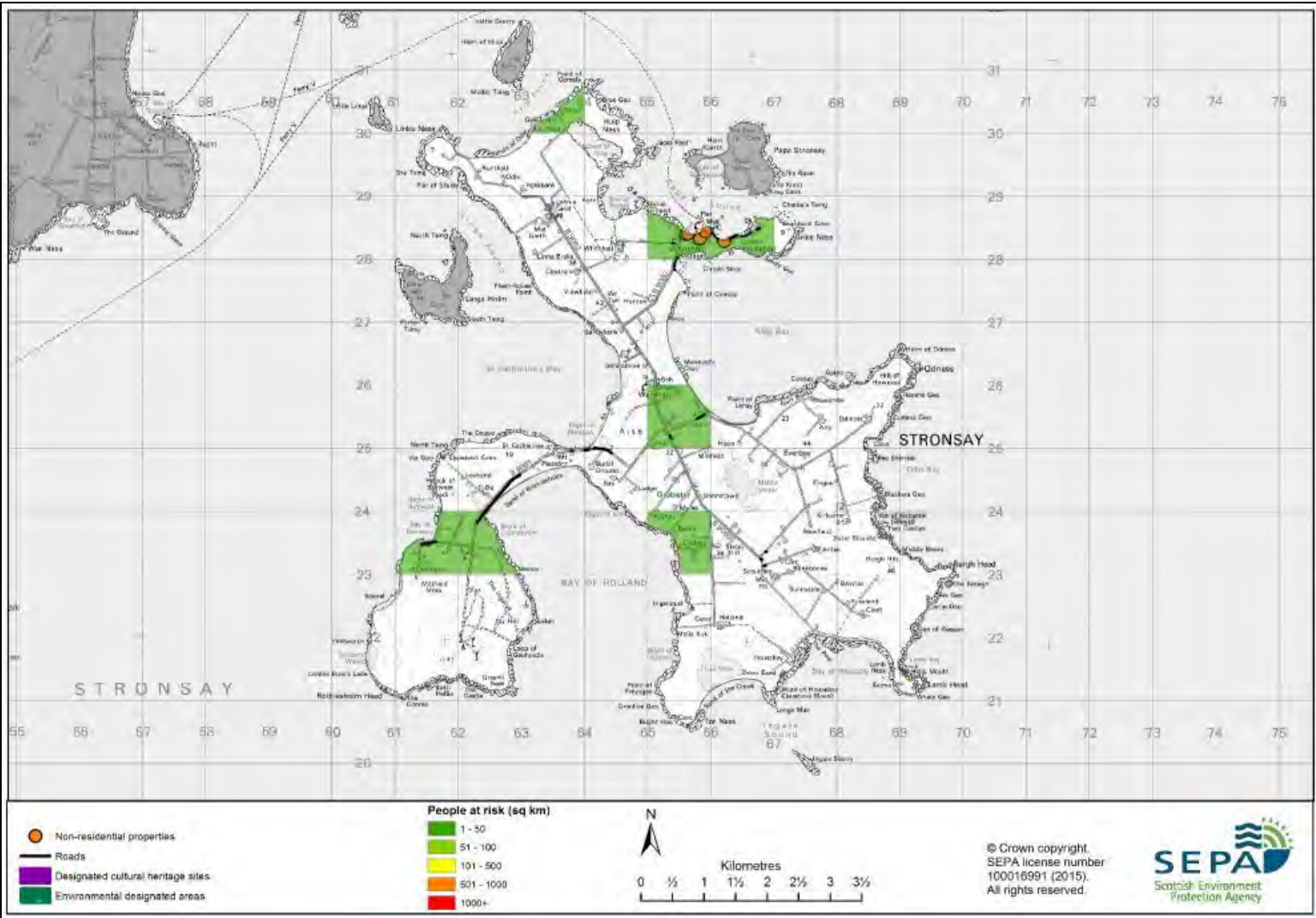


Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015)



Coastal flood, Whitehall, Stronsay, circa 1990. Photograph courtesy Orkney Library and Archive.

Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).



Objectives to manage flooding in Stronsay

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for Stronsay.

Reduce flood risk in Whitehall from Coastal Flooding (Objective ID. 300201)

- 50 people.
- £120,000 Annual Average Damages from residential properties.
- £11,000 Annual Average Damages from non-residential properties.
- B9060 through Whitehall.



Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	60 residential properties. £740,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	40 residential properties. £250,000 Annual Average Damages.

Actions to manage flooding in Stronsay

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for Stronsay.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
	Flood protection study.				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	A flood protection study is proposed for Whitehall and SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered when informing reviews of the flood warning system.		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		

Action (ID):	Flood Protection Study (3002010005)		
Objective (ID):	Reduce flood risk in Whitehall from coastal flooding (300201).		
Delivery lead:	Orkney Islands Council.		
Status:	Not started.	Delivery:	2017-2018.
Description:	A flood protection study is required to consider flood protection works for Whitehall. The study should primarily focus on coastal management actions, direct defences and property level protection, but other actions may also be considered in order to develop the most sustainable range of options. The investigation will assess the impact from wave overtopping to confirm the existing risk and define the height and extent of flood protection works required.		
Potential Impacts:			
Economic impact:	The study could benefit 26 residential and seven non-residential properties at risk of flooding in this location, with potential damages avoided of up to £4.9 million.		
Social impact:	The development of flood protection works following the study would potentially reduce risk to 57 people. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. The B9060 would have reduced flood risk, therefore improving access across the town. Negative impacts through disturbance to the local community during the construction phase should be considered.		
Environmental impact:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Opportunities to mitigate any environmental impacts may include design and timing of works. There is potential for positive impacts such as improving the aesthetics of the frontage if required, as well as negative impacts such as impacting on coastal habitats. There are no designated sites close to Whitehall.		
Coordination arrangement:	Orkney Islands Council will work with SEPA and the local community on Stronsay in order to obtain the appropriate level of information in order to ensure the flood protection study meets the stated objective. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered in developing the new flood warning system.		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.

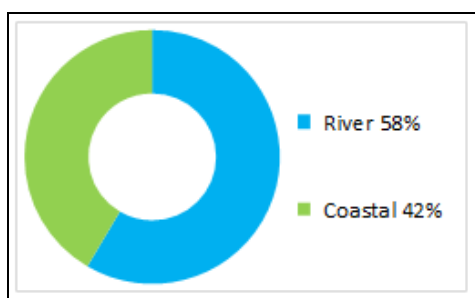


Whitehall village during a storm event. Photograph courtesy of Kirst Teale.

3.4 Rendall and Evie (Strategy PVA (03/03) ‘Orkney Mainland North’) Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Orkney coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- <10 residential properties.
- <10 non-residential properties.
- £14,000 Annual Average Damages.. (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

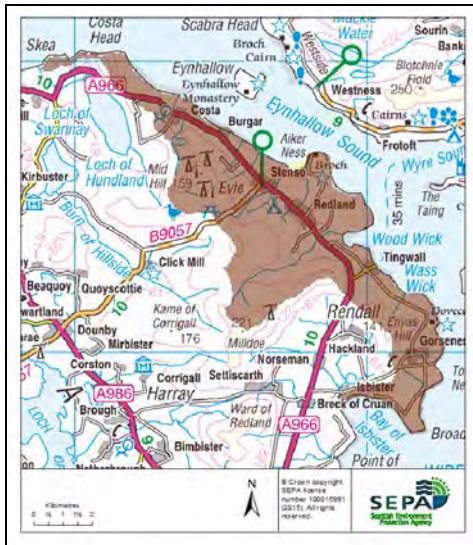
Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
	Strategic Mapping and Modelling.				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Flooding Impacts

Background



This Potentially Vulnerable Area includes the parishes of Rendall and Evie within the West Mainland of Orkney (shown left). It is approximately 41km² in area and includes Costa, Evie Village, Tingwall, Woodwick, Broch of Gurness and Eynhallow Sound.

The area extends along the coastline from the Bay of Isbister in the south east to Skea on the north coast. Peerie Water and several burns and lochs are within the area, including the Burn of Woodwick.

Figures reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

There are no significant areas of coastal flood risk, but there are small areas of river flood risk around Isbister and Woodwick.

The risk of flooding to people and property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1.

Roads potentially affected by flooding include the A966. There are 10 designated cultural heritage sites, including scheduled monuments, and small areas of environmental importance at risk of flooding. The sites include Orkney Mainland Moors and West Mainland Moors Special Protection Areas and Sites of Special Scientific Interest.

The damages associated with floods of different likelihood are shown in Figure 1. For this Potentially Vulnerable Area the highest damages are to residential properties followed by damages to roads. Note that cultural heritage and environmental sites are not included in the estimation of the economic impact of flooding due to the difficulty in placing an economic value on these impacts.

The location of the impacts of flooding is shown in Figure 2.

History of flooding

There have been no recorded incidents of properties being flooded in this Potentially Vulnerable Area. Recorded floods have been minor, for example in September 2007, agricultural and roadside drainage systems were overwhelmed resulting in ponding of excess surface water on the A966 in Evie.

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 250).	<10	<10	<10
Non-residential properties (total of 70).	<10	<10	<10
People .	<10	<10	10
Community facilities.	0	0	0
Utilities assets.	0	0	0
Transport links (excluding minor roads).	Roads at <10 locations.	Roads at <10 locations.	Roads at <10 locations.
Environmental designated areas (km ²).	<0.1	<0.1	<0.1
Designated cultural heritage sites.	9	10	10
Agricultural land (km ²).	0.5	0.7	0.8

Figure 1: Damages by flood likelihood

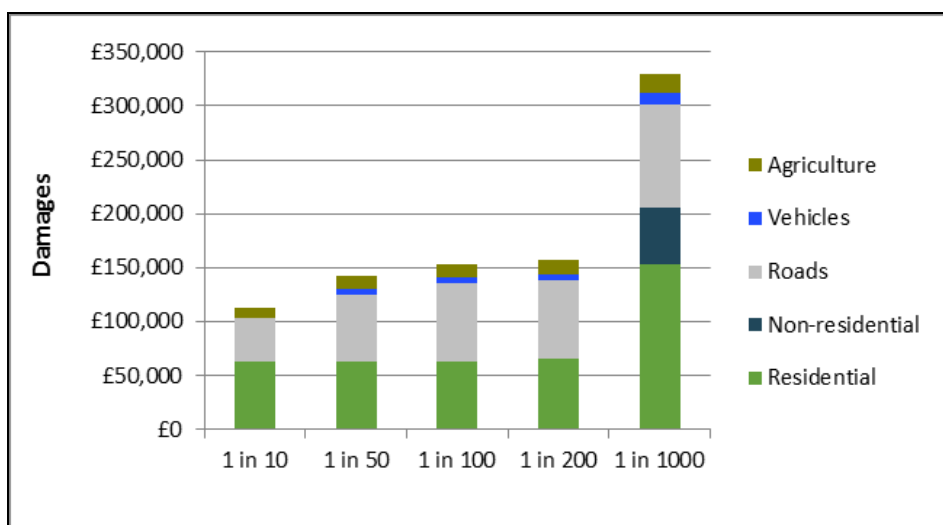
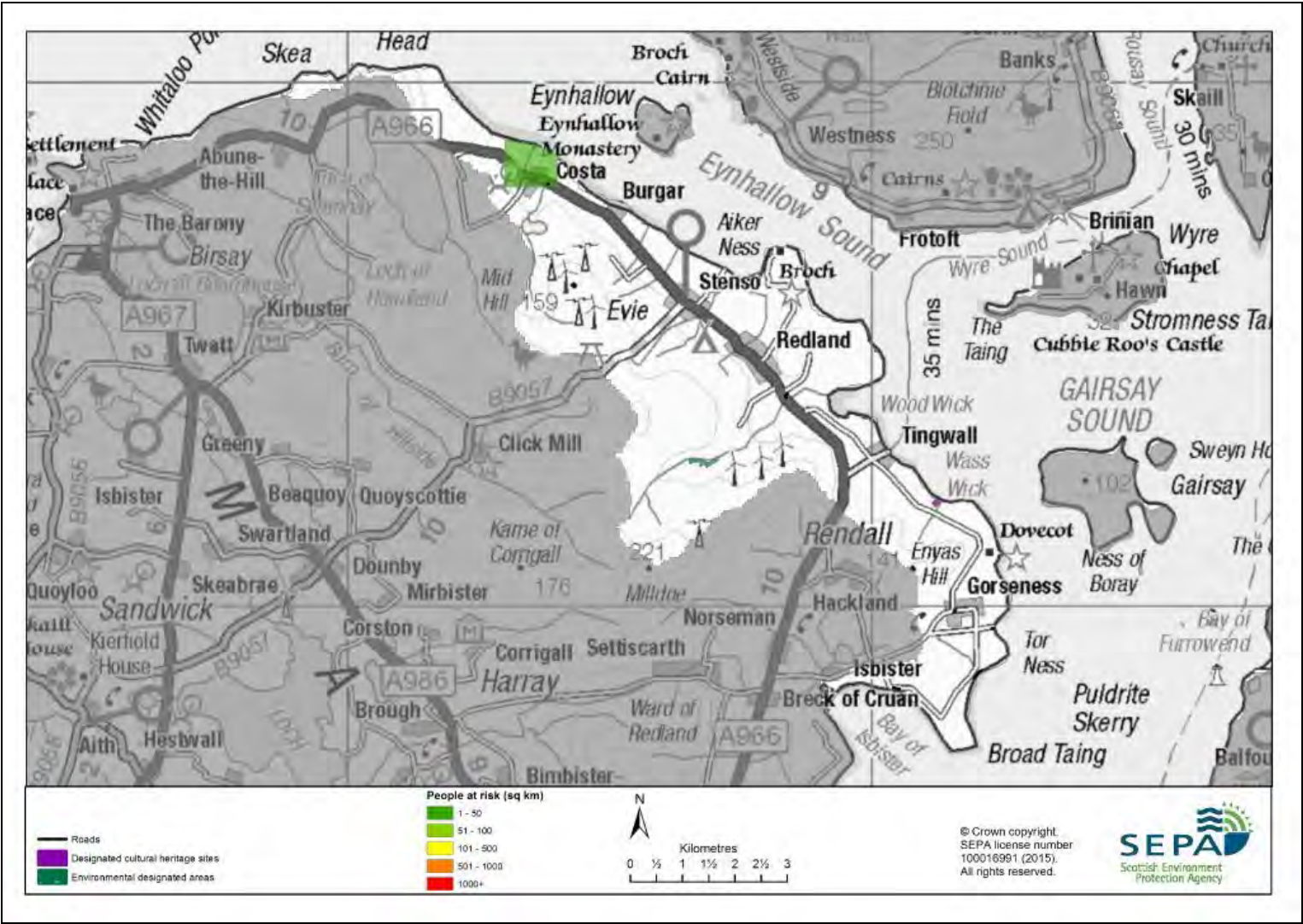


Table and Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).



Objectives to manage flooding in Rendall and Evie

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for this Potentially Vulnerable Area.

Please note this PVA is referred to within the SEPA Flood Risk Management Strategy for Orkney as 'Orkney Mainland North.

Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	<10 residential properties. £14,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	<10 residential properties. £14,000 Annual Average Damages.



Flooding to the road network in Evie, October 2013.

Actions to manage flooding in Rendall and Evie

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for this PVA.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
	Strategic Mapping and Modelling (SEPA).				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	SEPA will work with partners to ensure that any new information about flood risk, including improved strategic mapping and modelling, is considered when informing reviews of the flood warning system.		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		

Action (ID):	Strategic Mapping and Modelling (3001010016)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2016-2019.
Description:	<p>SEPA will be seeking to incorporate additional surface water hazard mapping information into the flood maps to improve understanding of flood risk. Approximately 200km² of improved data is currently available within this Local Plan District.</p> <p>SEPA will be seeking to develop the flood hazard mapping in this PVA to improve understanding of the coastal flood risk. The extent and timing of the completed improvements will be dependent on detailed scoping and data availability.</p>		
Coordination arrangement:	<p>SEPA will work with Orkney Islands Council to ensure any relevant information is considered.</p> <p>A new flood warning scheme is under consideration for Orkney. SEPA will ensure that any new information about flood risk resulting from the proposed flood warning developments is considered in SEPA's strategic mapping and modelling developments where appropriate and relevant.</p>		
Funding arrangement:	SEPA's strategic mapping and modelling activities are funded by Scottish Government through SEPA's grant in aid settlement.		

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

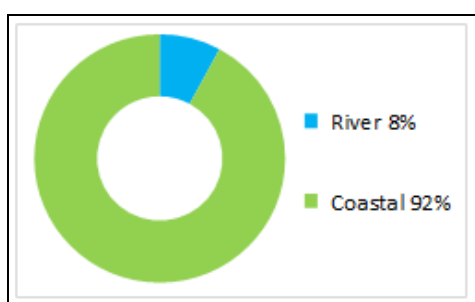
Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.

3.5 Stromness, Stenness and Sandwick (Strategy PVA (03/04) 'Stromness')

Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Loch of Stenness, Orkney Coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- 90 residential properties.
- 40 non-residential properties.
- £220,000 Annual Average Damages.. (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
Strategic Mapping and Modelling (SEPA)					
	New flood warning.				
	Strategic Mapping and Modelling Scottish Water).				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Flooding Impacts

Background



This Potentially Vulnerable Area is located on the south-west coast of Orkney Mainland (shown left). It is approximately 148km².

The area includes Stromness, the Parishes of Stenness and Sandwick and Orphir Village.

The area extends from Birsay Bay in the north to Waulkmill Bay in the south and includes the Bay of Skail. It also includes the Loch of Stenness, Loch of Harray, Loch of Skail, and numerous smaller lochs and burns.

Figures reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Coastal flood risk affects parts of Stromness however many of the properties within the harbour area of Stromness have their floor levels raised on piers. Parts of Stenness village may also be at coastal flood risk.

The risk of flooding to people and property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1. The risk of flooding to utilities in Table 1 does not include Scottish Water data. Scottish Water undertook a national assessment of above ground assets at medium likelihood of flooding (including water treatment works, wastewater treatment works, and pumping stations). Within this Potentially Vulnerable Area there are four assets identified as being at risk of flooding.

Roads potentially affected by flooding include the A964, A965, A967, A986, B9056, B9055 and the B9057. There are a large number of cultural heritage sites at risk of flooding including The Heart of Neolithic Orkney World Heritage Site which is a major and vital driver of the Orkney economy, and also the conservation areas of Stromness and Brodgar / Stenness. Large areas of environmental importance and agricultural land are also at risk of flooding.

The damages associated with floods of different likelihood are shown in Figure 1. The highest damages are to residential properties, followed by damages to roads. Note that cultural heritage and environmental sites are not included in the estimation of the economic impact of flooding due to the difficulty in placing an economic value on these impacts.

History of flooding

Floods within this Potentially Vulnerable Area have been recorded at regular intervals over the last 100 years, particularly in the town of Stromness, which is the

second largest settlement in the Orkney Local Plan District and a vital ferry connection to the Scottish mainland.

The earliest recorded flood for Stromness was in 1909, when a river flood caused considerable damage to roads, crops and infrastructure. Other floods from rivers were recorded in 2004 when the May Burn flooded after heavy rain, inundating properties in Stromness town centre. In October 2006, extremely heavy rainfall resulted in the Mill Burn bursting its banks and drainage systems being overwhelmed causing flooding to roads, property and agricultural land.

Coastal flooding has been a consistent threat to Stromness due to its proximity to the sea. The 1953 North Sea flood resulted in flooding to the golf course and debris being washed-up along the coastline. More recently in January 2005, there was coastal flooding which affected properties in the town centre and along the sea front. Several minor coastal flood events have been noted in Stromness since 2005 causing flooding to roads and properties.

Further information on flood hazard and risk: Statistics for the number of properties and number of people at risk have been updated based on evidence provided by Orkney Islands Council. There is however no suitable information available to update the estimated economic damages at this stage.



Flooding in Stromness, date unknown, circa 1909.

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 1,900).	20	90	110
Non-residential properties (total of 460).	10	40	50
People .	40	190	230
Community facilities.	0	0	0
Utilities assets.	0	0	0
Transport links (excluding minor roads).	Roads at 50 locations.	Roads at 80 locations.	Roads at 90 locations.
Environmental designated areas (km ²).	52	52	52
Designated cultural heritage sites.	36	44	45
Agricultural land (km ²).	3	4	5

Figure 1: Damages by flood likelihood

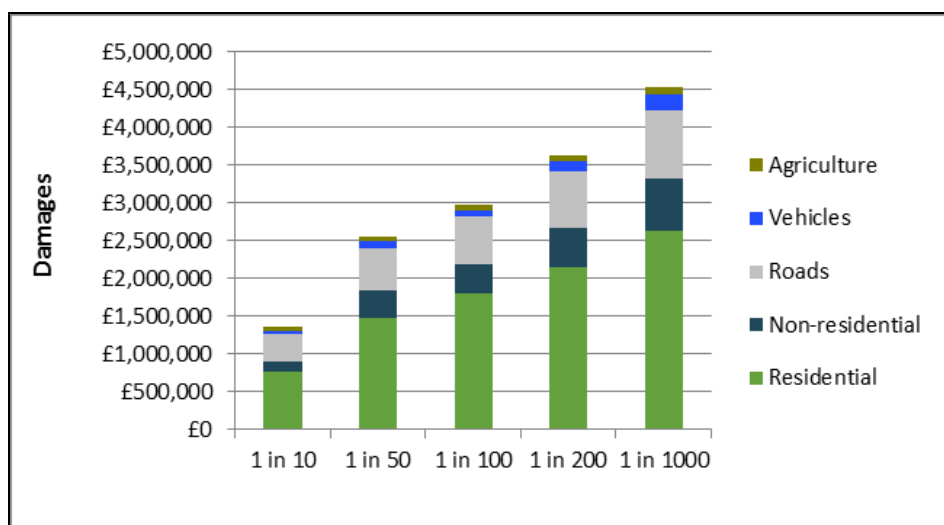
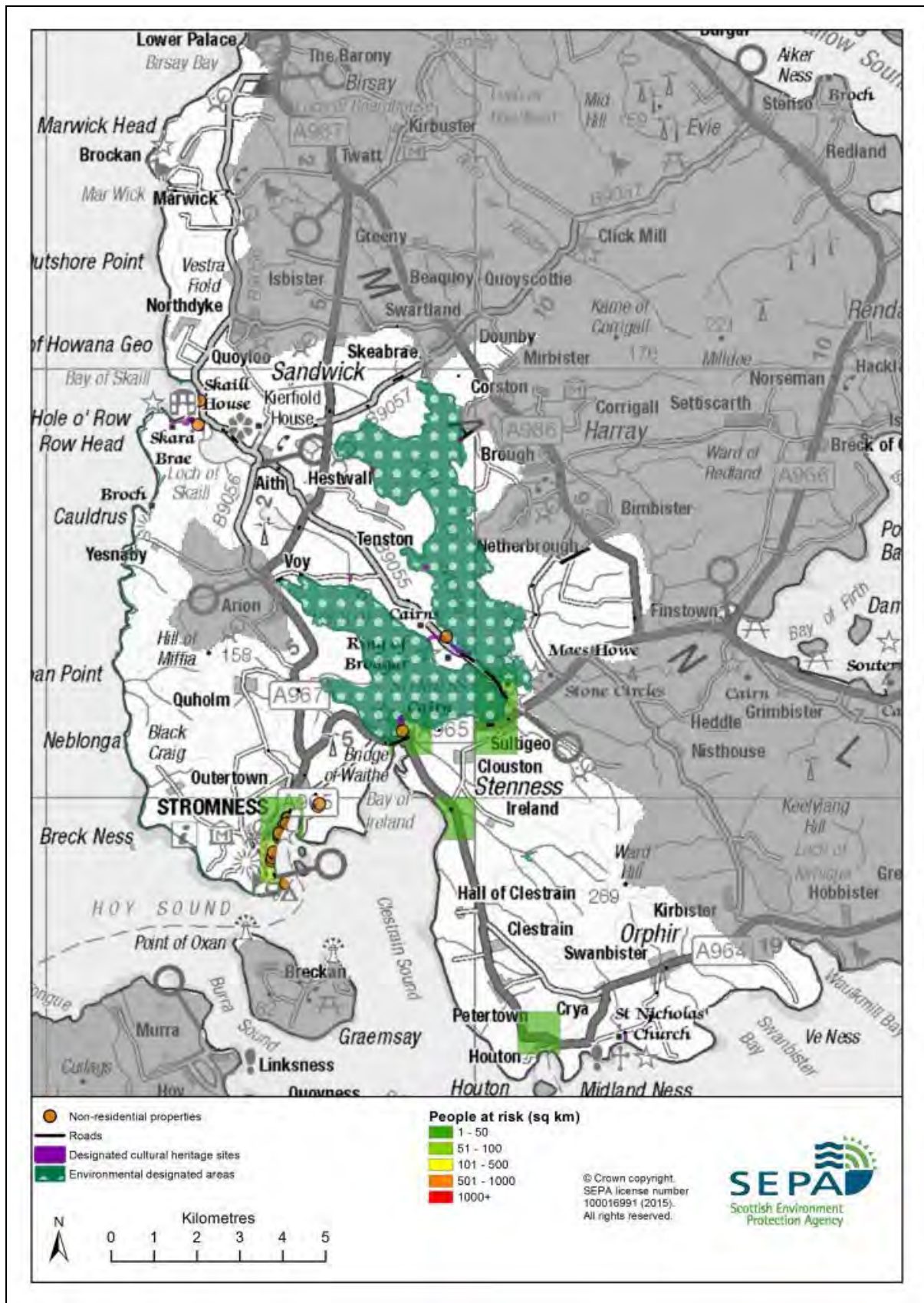


Table and Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

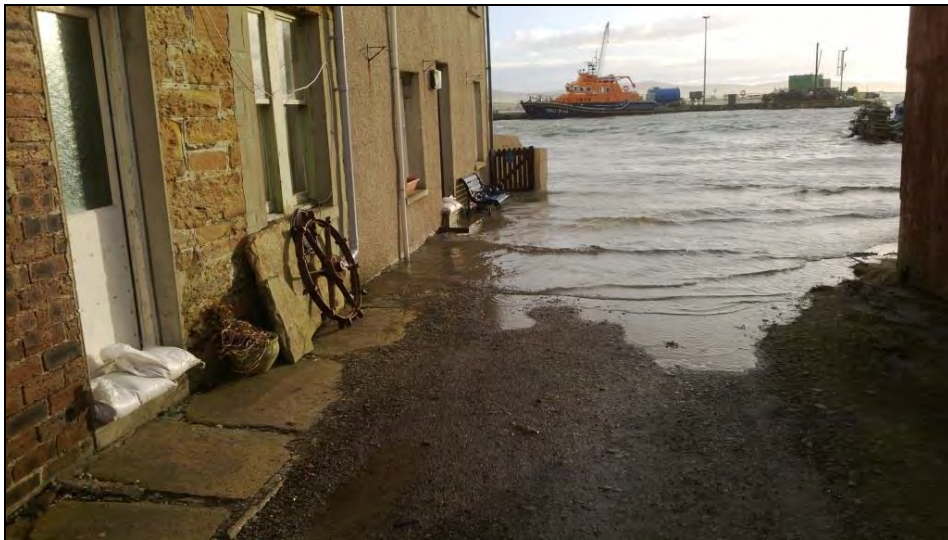
Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015)



Objectives to manage flooding in Stromness, Stenness and Sandwick

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for this Potentially Vulnerable Area.

Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	90 residential properties. £220,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	90 residential properties. £220,000 Annual Average Damages.



Coastal flooding, Victoria Street, Stromness, 2 February 2014.

Actions to manage flooding in Stromness, Stenness and Sandwick

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for this PVA.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
Strategic Mapping and Modelling (SEPA)					
	New flood warning.				
	Strategic Mapping and Modelling (Scottish Water).				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	SEPA will work with partners to ensure that any new information about flood risk, including improved strategic mapping and modelling, is considered when informing reviews of the flood warning system.		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		

Action (ID):	Strategic Mapping and Modelling (3001010016)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2016-2019.
Description:	<p>SEPA will be seeking to incorporate additional surface water hazard mapping information into the flood maps to improve understanding of flood risk. Approximately 200km² of improved data is currently available within this Local Plan District.</p> <p>SEPA will be seeking to develop the flood hazard mapping in this PVA to improve understanding of the coastal flood risk. The extent and timing of the completed improvements will be dependent on detailed scoping and data availability.</p>		
Coordination arrangement:	<p>A new flood warning scheme is under consideration for Orkney. SEPA will ensure that any new information about flood risk resulting from the proposed flood warning developments is considered in SEPA's strategic mapping and modelling developments where appropriate and relevant.</p>		
Funding arrangement:	<p>SEPA's strategic mapping and modelling activities are funded by Scottish Government through SEPA's grant in aid settlement.</p>		

Action (ID):	Strategic Mapping and Modelling (3001010019)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Scottish Water.		
Status:	Not started.	Delivery:	2017-2019.
Description:	<p>Scottish Water will undertake further investigation and modelling in the Stromness sewer catchment to improve knowledge and understanding of flood risk in this area as required under Section 16 of the Flood Risk Management (Scotland) Act 2009.</p>		
Coordination arrangement:	<p>Scottish Water will work with Responsible Authorities to incorporate relevant information into these studies by keeping them informed of their progress. Scottish Water will provide the outputs of the Section 16 assessment to Responsible Authorities to inform surface water management plans and to SEPA for use in flood hazard and risk maps.</p>		
Funding arrangement:	<p>Scottish Water funding is committed in its capital programme through Q and S 4a (2015-2021) which is approved by its regulators and customers.</p>		

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

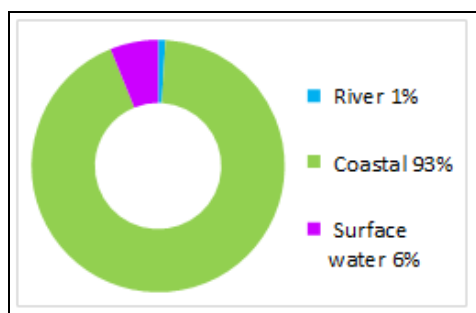
Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.

3.6 Kirkwall, Firth and East Mainland (Strategy PVA (03/05) 'Kirkwall' Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Orkney Coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- 490 residential properties.
- 460 non-residential properties.
- £2,500,000 Annual Average Damages.. (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

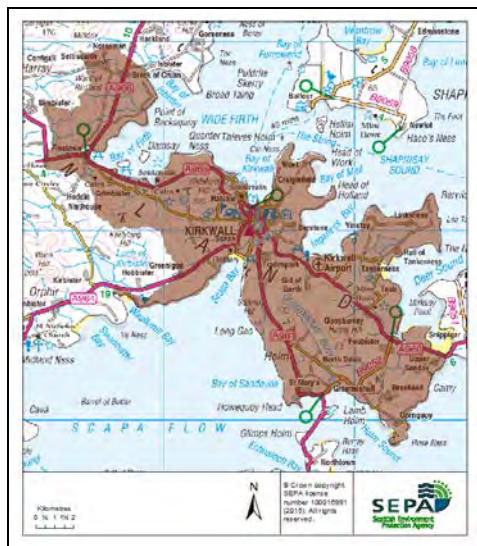
Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
Flood Protection Scheme.	New flood warning.	Flood Protection Study.			
Strategic Mapping and Modelling (SEPA).					
Surface Water Management Plan.					
	Strategic Mapping and Modelling (Scottish Water).				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Flooding Impacts

Background



This Potentially Vulnerable Area covers the majority of the East Mainland of Orkney (shown left). It is approximately 150km².

The area includes the town of Kirkwall and parishes such as St Ola, Firth, St. Andrews and Holm as well as areas of Orphir and the Norseman Village.

The Annual Average Damages are estimated to be £2.5 million with the majority of these attributed to coastal flooding.

Figures reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Coastal flood risk is mainly focused on the town of Kirkwall with a significant part of the town to the south of the harbour located in the coastal floodplain. Part of this area of the town is also subject to surface water flooding and there is a known interaction between coastal and surface water flooding during periods of intense rainfall and high sea levels.

The risk of flooding to people and property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1. The risk of flooding to utilities in Table 1 does not include Scottish Water data. Scottish Water undertook a national assessment of above ground assets at medium likelihood of flooding (including water treatment works, wastewater treatment works, and pumping stations). Within this Potentially Vulnerable Area there are two assets identified as being at risk of flooding.

Three schools in Kirkwall are identified as being at risk of flooding, along with three buildings housing emergency services. Roads affected by flooding include the A960, A961, A963, A964, A965, A966, B9053, B9054 and B9148. There are 13 designated cultural heritage sites and small areas of environmental importance also at risk.

The damages associated with floods of different likelihood are shown in Figure 1. Note that cultural heritage and environmental sites are not included in the estimation of the economic impact of flooding due to the difficulty in placing an economic value on these impacts.

History of flooding

There have been many anecdotal reports and recorded floods documented within this Potentially Vulnerable Area over the last 130 years. Flooding has come from

burns, surface water or coastal sources and often as a result of complex combinations, particularly where flows from outfalls are restricted by high sea levels.

Significant coastal floods recorded within the Potentially Vulnerable Area include the 1953 North Sea Flood which caused damage to civil infrastructure, properties, businesses and shipping. Significant works on the Harbour area and sewer networks were completed in the early 1990s which altered the sources and hydraulics of historical flooding which reduced the regularity of flooding in the town.

More recently recorded coastal floods were in January 2005 when properties and large sections of roads within low lying coastal areas in Kirkwall, St Mary's and Finstown were flooded. The 2005 flood saw the harbour defences at Kirkwall being breached with minor overtopping, the pier at St Mary's being completely submerged and the A961 through the village also flooded. Significant surface water and river floods have been consistently recorded in Kirkwall and still occur occasionally despite improvements to the storm water drainage network. These instances are often linked to tidal influences on outfalls.

In October 2006, heavy rainfall resulted in flooding at Maitland's Burn in Finstown, whilst in Kirkwall the Peedie Sea, Muddisdale Burn, Crantit Burn, Burn of Wideford, and Papdale Burn were all affected. During this flood the volume of surface water entering the drainage system and water from overflowing watercourses resulted in the capacity of the drainage system being exceeded. Properties affected included three schools, a museum, four social clubs, a church, an art gallery and a water treatment works. Roads and agricultural land were also affected.

Less significant surface water floods also occurred across the area in August 2007, September 2007, January 2008, December 2012, October 2013 and November 2013 with the greatest impacts in Kirkwall

Further information on flood hazard and risk: Orkney Islands Council consider that surface water flood risk is underestimated for Kirkwall. However whilst there are good records of the extent of actual flooding there is no accurate record of the properties that have suffered from internal flooding.

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 5,000).	30	490	540
Non-residential properties (total of 1,200).	90	460	520
People .	60	1,100	1,200
Community facilities.	0	<10 includes: educational buildings and emergency services.	<10 includes: educational buildings and emergency services.
Utilities assets.	<10	20	20
Transport links (excluding minor roads).	Roads at 180 locations.	Roads at 280 locations.	Roads at 280 locations.
Environmental designated areas (km ²).	<0.1	<0.1	<0.1
Designated cultural heritage sites.	11	13	15
Agricultural land (km ²).	2	3	4

Figure 1: Damages by flood likelihood

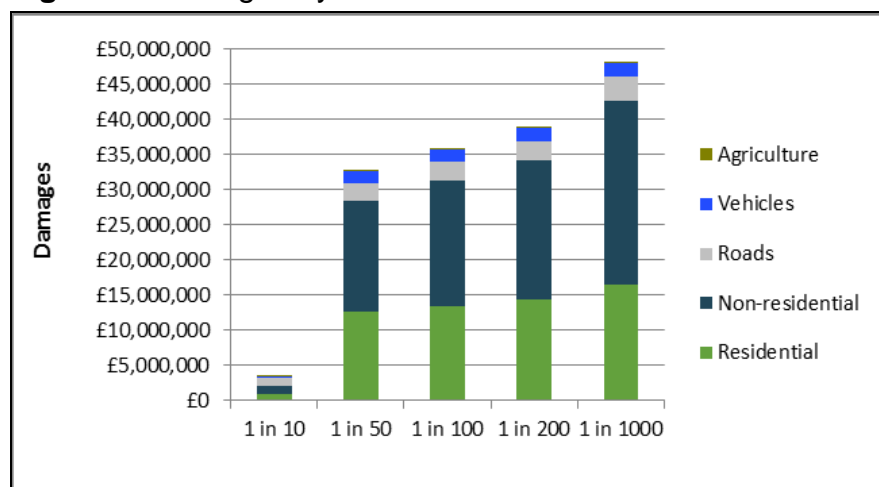
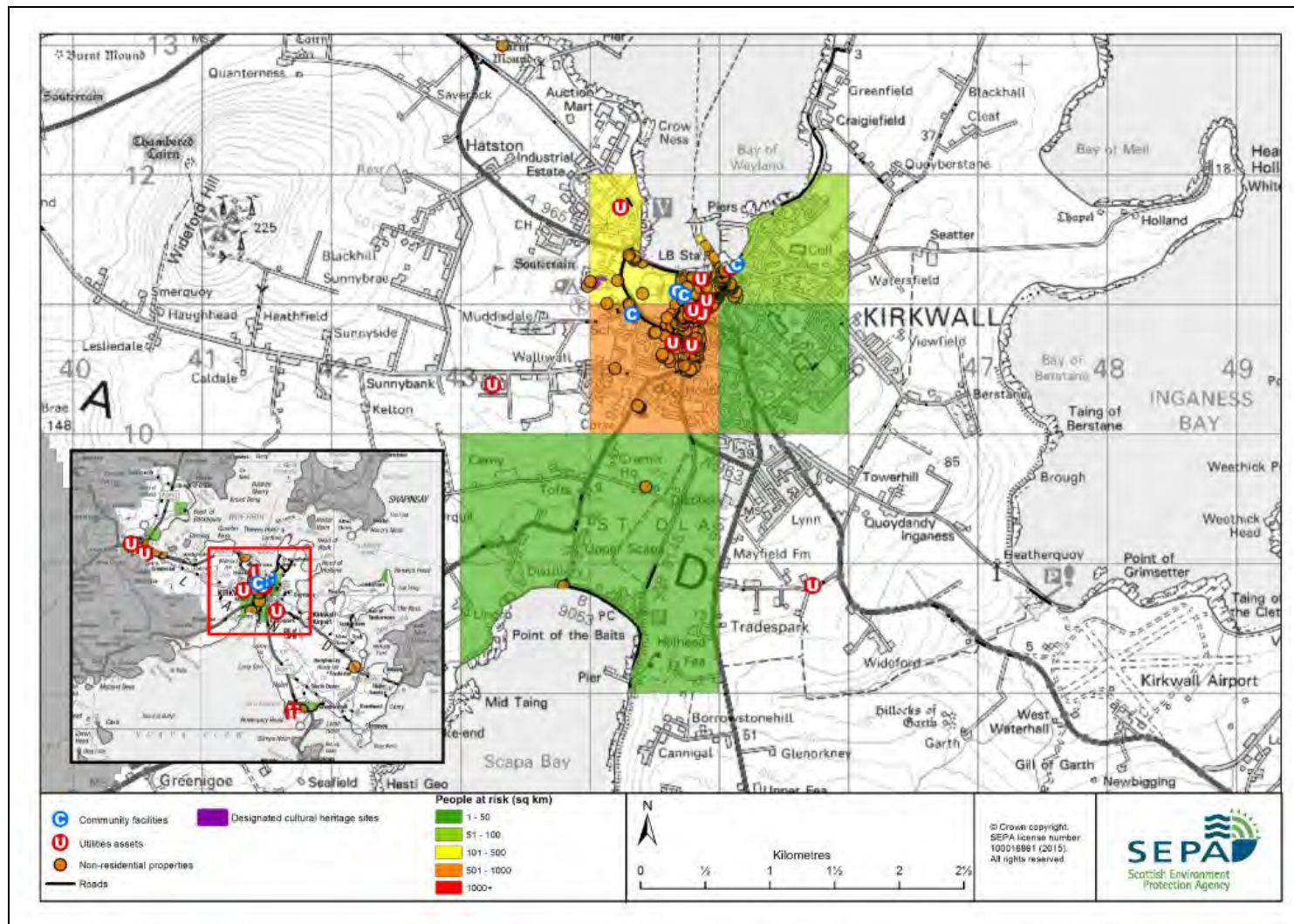


Table and Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015)

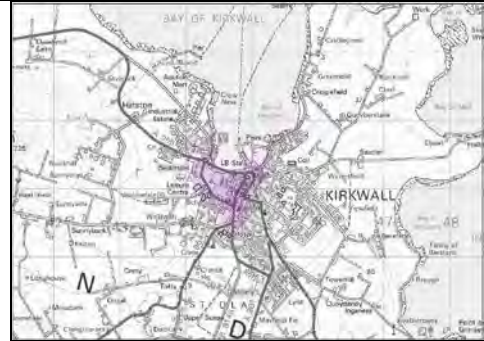


Objectives to manage flooding in Kirkwall, Firth and East Mainland

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for this Potentially Vulnerable Area.

Reduce flood risk in Kirkwall from Coastal Flooding (Objective ID. 300501)

- 900 people.
- £810,000 Annual Average Damages from residential properties.
- £960,000 Annual Average Damages from non-residential properties.
- A965 Ayre Road
- A963 through Kirkwall.



Reduce flood risk in St Marys from Coastal Flooding (Objective ID. 300502)

- 200 people.
- £16,000 Annual Average Damages from residential properties.
- £4,900 Annual Average Damages from non-residential properties.
- A9651 through St Marys



Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	90 residential properties. £220,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	90 residential properties. £220,000 Annual Average Damages.

Actions to manage flooding in Kirkwall, Firth and East Mainland

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for this PVA.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
Flood Protection Scheme	New flood warning.	Flood Protection Study			
Strategic Mapping and Modelling (SEPA)					
Surface Water Management Plan					
	Strategic Mapping and Modelling (Scottish Water).				
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					



Peedie Sea and Pickaquoy, Kirkwall, 26 October 2006. Photograph courtesy of Lizzy Walls.

Action (ID):	Flood Protection Scheme/Works (3005010006)		
Objective (ID):	Reduce flood risk in Kirkwall from coastal flooding (300501).		
Delivery lead:	Orkney Islands Council.		
Status:	Under Development.	Delivery:	2016-2017.
Description:	A flood protection scheme is under development for the perimeter of the harbour in Kirkwall. The scheme will complement existing defences to reduce the flood risk in Kirkwall. The scheme includes the construction of direct defences including walls, gates and associated street works and is being designed to a 1 in 200 year standard of protection including an allowance for climate change and wave action.		
Potential Impacts:			
Economic impact:	The flood protection scheme could reduce flood risk to 383 residential properties and 158 non-residential properties. Damages avoided of £15.1 million could be achieved. The benefit-cost ratio of the proposed works is 8.03.		
Social impact:	The flood protection scheme could reduce flood risk for an estimated 842 people. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. The social vulnerability is higher than average with a high percentage of the residential properties in the area currently at flood risk. Roads (A960/A965), two emergency services, a school, two telecommunication and five energy/electricity production sites would also potentially benefit from the scheme.		
Environmental impact:	Flood protection works can have both positive and negative impacts on the ecological quality of the environment depending on how they are designed. One scheduled monument would potentially benefit from the flood protection works. The design includes the use of local natural stone and maintains where possible views over the harbour front from a variety of vantage points, minimising the visual impact of completed works.		
Coordination arrangement:	<p>OIC will work with all responsible authorities and utility companies to ensure that changes to utilities, hydrology and flood risk as a result of the proposed flood protection scheme are fully considered and managed.</p> <p>OIC will work with SEPA to ensure the flood protection scheme is considered in the strategic flood risk and hazard maps and for the proposed flood warning scheme.</p>		
Funding arrangement:	80% of costs will be met by Scottish Government Flood Scheme Grant. 20% of costs will be covered by OIC funds from revenue and capital budgets.		

Action (ID):	Flood Protection Study (3005020005)		
Objective (ID):	Reduce flood risk in St Marys from coastal flooding (300502).		
Delivery lead:	Orkney Islands Council.		
Status:	Not started.	Delivery:	2018-2019.
Description:	A flood protection study is required to consider flood protection works for St Mary's. The study should primarily focus on coastal management actions, direct defences and property level protection, but other actions may also be considered in order to develop the most sustainable range of options. As localised defences may only be required the investigation should define the height and extent of the works.		
Potential Impacts:			
Economic impact:	The study could benefit seven residential and five non-residential properties at risk of flooding in this location, with potential damages avoided of up to £1.1 million		
Social impact:	The development of flood protection works following the study would potentially reduce risk to 15 people. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. The flood works would also potentially reduce risk to the B9052 road, which connects Mainland Orkney with South Ronaldsay, therefore access around the islands would be improved. Negative impacts through disturbance to the local community during the construction phase should be considered.		
Environmental impact:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Opportunities to mitigate any environmental impacts may include design and timing of works. The scheduled monument would benefit from a reduction in flood risk.		
Coordination arrangement:	Orkney Islands Council will work with SEPA and the local community in St Mary's in order to obtain the appropriate level of information in order to ensure the flood protection study meets the stated objective. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered in developing the new flood warning system.		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		

Action (ID):	Surface Water Plan/Study (3005060018).		
Objective (ID):	Reduce risk from surface water flooding in Kirkwall (300506).		
Delivery lead:	Orkney Islands Council.		
Status:	Not started.	Delivery:	2016-2018.
Description:	<p>Kirkwall will be covered by a surface water management plan (SWMP) or plans that set objectives for the management of surface water flood risk and identify the most sustainable actions to achieve the objectives. Scottish Water will provide local knowledge and understanding of the sewer network. This includes Scottish Water data (as applicable) and, where available, outputs of drainage assessments, to assist with the surface water management planning process.</p> <p>Actions identified within the plan will be implemented following publication of the SWMP for Kirkwall. However, where opportunity arises, actions identified to meet the objectives as part of the study will be implemented as and when required, including prior to publication of the SWMP.</p>		
Coordination arrangement:	<p>Orkney Islands Council will lead on the development of surface water management plans in partnership with Scottish Water and SEPA and other relevant authorities where required. This will include working to share the appropriate level of information, coordinating survey work to minimise disruption all in order to implement sustainable actions to ensure the SWMP meets the stated objective.</p> <p>Scottish Water will work with OIC and support surface water management planning through ensuring that best available knowledge and data is used to input into the surface water management plans. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered in developing the new flood warning system.</p>		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	<p>A flood protection scheme is proposed for Kirkwall. SEPA will work with the local authority to ensure that changes to hydrology and flood risk as a result of the proposed flood protection scheme are fully considered when developing the new flood warning system.</p> <p>A flood protection study is proposed for St Marys. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered when informing reviews of the flood warning system.</p>		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		



High tide at Kirkwall Harbour, 12 January 2005.

Action (ID):	Strategic Mapping and Modelling (30020010)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2016-2019.
Description:	SEPA will be seeking to develop the flood hazard mapping in the Orkney Mainland area to improve understanding of the coastal flood risk. The extent and timing of the completed improvements will be dependent on detailed scoping and data availability. Where this work coincides with local authority studies, SEPA will work collaboratively to ensure consistent modelling approaches are applied.		
Coordination arrangement:	<p>A flood protection scheme is planned for Kirkwall. SEPA will work with the local authority to ensure that strategic mapping and modelling developments reflect the changes in flood risk resulting from new flood protection scheme where appropriate and relevant.</p> <p>A flood protection study is planned for St Marys and Kirkwall. SEPA will work with the local authority to ensure that strategic mapping and modelling developments reflect the changes in flood risk resulting from the flood protection studies where appropriate and relevant.</p> <p>A new flood warning scheme is under consideration for Orkney. SEPA will ensure that any new information about flood risk resulting from the proposed flood warning developments is considered in SEPA's strategic mapping and modelling developments where appropriate and relevant.</p>		
Funding arrangement:	SEPA's strategic mapping and modelling activities are funded by Scottish Government through SEPA's grant in aid settlement.		

Action (ID):	Strategic Mapping and Modelling (3000020019)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Scottish Water.		
Status:	Not started.	Delivery:	2017-2019.
Description:	Scottish Water will undertake further investigation and modelling in the Kirkwall sewer catchment to improve knowledge and understanding of flood risk in this area as required under Section 16 of the Flood Risk Management (Scotland) Act 2009.		
Coordination arrangement:	Scottish Water will work with Responsible Authorities to incorporate relevant information into these studies by keeping them informed of their progress. Scottish Water will provide the outputs of the Section 16 assessment to Responsible Authorities to inform surface water management plans and to SEPA for use in flood hazard and risk maps.		
Funding arrangement:	Scottish Water funding is committed in its capital programme through Q and S 4a (2015-2021) which is approved by its regulators and customers.		



St Mary's village, Holm. 12 January 2005. Photograph courtesy of Hazel Berston.

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

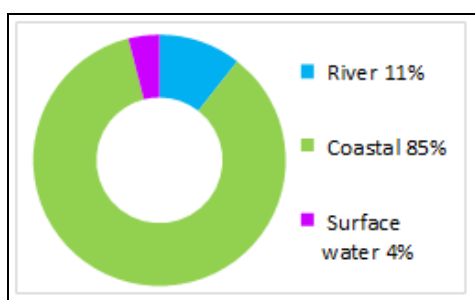
Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.

3.7 Hoy (Strategy PVA (03/06) 'Hoy')

Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Hoy coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- <10 residential properties.
 - <10 non-residential properties.
 - £28,000 Annual Average Damages.
- (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
				Flood protection study.	
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 180).	<10	<10	<10
Non-residential properties (total of 40).	<10	<10	<10
People.	<10	<10	<10
Community facilities.	0	0	0
Utilities assets.	0	0	0
Transport links (excluding minor roads).	Roads at 10 locations.	Roads at 20 locations.	Roads at 20 locations.
Environmental designated areas (km ²).	3	3	3
Designated cultural heritage sites.	4	4	4
Agricultural land (km ²).	0.8	0.9	1

Figure 1: Damages by flood likelihood

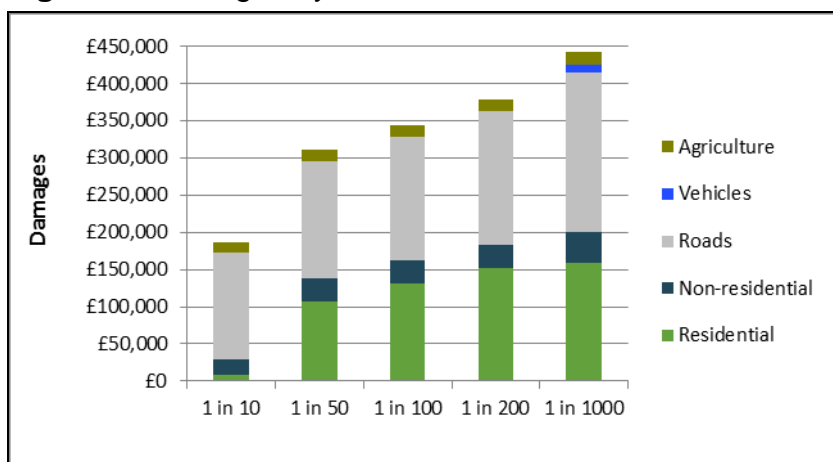
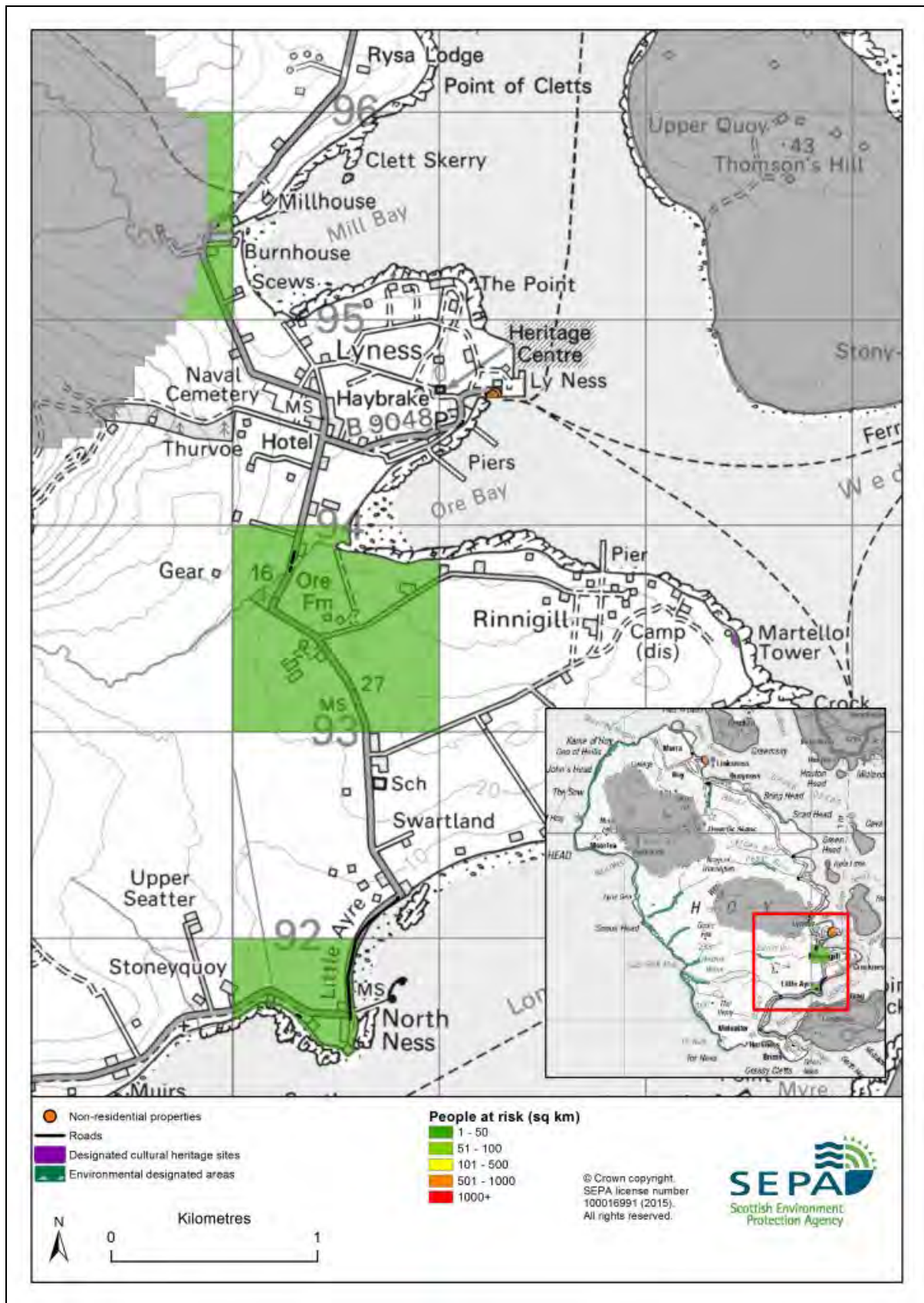


Table and Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015)

Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

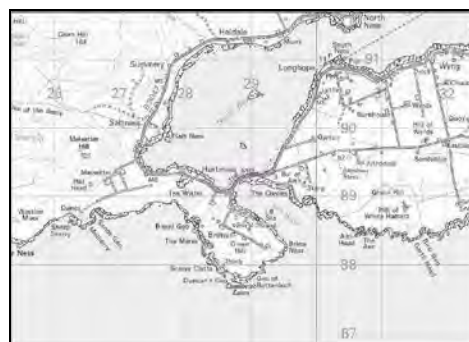


Objectives to manage flooding in Hoy

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for this Potentially Vulnerable Area.

Reduce disruption to roads from coastal flooding with particular reference to the causeway linking Hoy to South Walls (Objective ID. 300601)

- B9047 The Ayre



Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	<10 residential properties. £28,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	<10 residential properties. £28,000 Annual Average Damages.

Actions to manage flooding in Hoy

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for this Potentially Vulnerable Area.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
				Flood protection study.	
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	A flood protection study is proposed for the Longhope Ayre, SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered when informing reviews of the flood warning system.		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		

Action (ID):	Flood Protection Study (3006010005)		
Objective (ID):	Reduce disruption to roads from coastal flooding with particular reference to the causeway linking Hoy to South Walls. (300601).		
Delivery lead:	Orkney Islands Council.		
Status:	Not started.	Delivery:	2020-2021.
Description:	A flood protection study for the causeway is required to investigate the most suitable action for long term maintenance of the road. The study should primarily focus on coastal management actions to strengthen the existing road or actions to raise the height of the existing road, but other actions may also be considered in order to develop the most sustainable range of actions.		
Potential Impacts:			
Economic impact:	Reducing the flood impacts to the road (B9047) for high likelihood floods would result in potential damages avoided of up to £1,000. Although the quantified flood damages are small, there are wider benefits which should be investigated in the study.		
Social impact:	The recommended actions from the proposed flood protection study would result in improved access between the islands of Hoy and South Walls during high likelihood floods and reduce to the risk to life. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. Negative impacts through disturbance to the local community during the construction phase should be considered.		
Environmental impact:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Opportunities to mitigate any environmental impacts may include design and timing of works. There may be impacts on coastal habitats through any potential increased disruption of natural processes, coastal squeeze and possible increase to coastal erosion risk.		
Coordination arrangement:	Orkney Islands Council will work with SEPA and the local community on Hoy and South Walls in order to obtain the appropriate level of information in order to ensure the flood protection study meets the stated objective. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered in developing the new flood warning system.		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

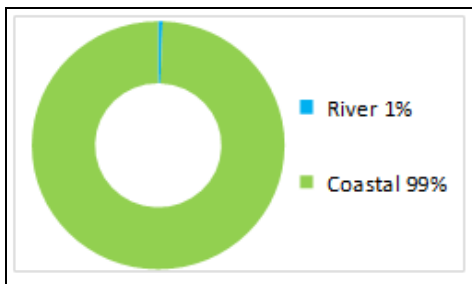
Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.

3.8 South Ronaldsay (Strategy PVA (03/07c) 'South Ronaldsay') Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Orkney coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- 50 residential properties.
 - <10 non-residential properties.
 - £85,000 Annual Average Damages.
- (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
Flood Protection Study (SMH)	New flood warning.				
Flood Protection Study (Barrier number 2)					
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Flooding Impacts

Background



This candidate Potentially Vulnerable Area comprises the island of South Ronaldsay (shown left). It is approximately 50km². South Ronaldsay is connected to Burray and the Orkney mainland by the A961, which crosses the causeways at the Churchill barriers.

The main centre of population is St Margaret's Hope. There is a vital ferry connection from St Margaret's Hope to the Scottish mainland.

Figures reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Coastal flood risk in this area is focused around St Margaret's Hope and on the A961 which connects Burray and South Ronaldsay to the mainland. Wave overtopping is the major contributing factor to flooding in these two locations.

The risk of flooding to people and property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1.

Roads at risk of flooding are concentrated on the northern coast and in St Margaret's Hope including the access to Hope Primary School. St. Margaret's Hope is a major ferry connection to the Scottish mainland and the access road to the port is at risk of flooding. The ferry port at Burwick provides a foot passenger ferry to John O'Groats and the road leading to it is also at risk. The A961 Churchill Barriers are at risk of disruption due to wave overtopping with several road closures occurring each year.

The damages associated with floods of different likelihood are shown in Figure 1. For this Potentially Vulnerable Area the highest damages are to residential properties followed by damages to roads and non-residential properties. Note that cultural heritage and environmental sites are not included in the estimation of the economic impact of flooding due to the difficulty in placing an economic value on these impacts.

History of flooding

There is a long history of flooding in St Margaret's Hope, with records of floods in 1914, 1953, during the 1980s and 1990s, in January 2005 and more recently December 2013. The centre of the village is known to be at risk of coastal flooding, which is exacerbated by wave overtopping.

Between 1997 and 2009 the Cromarty Square area and coastal roads in St Margaret's Hope were occasionally affected by flooding due to high tides, heavy rainfall and blocked culverts. In 2009 a new access road into the village was built, the culvert upgraded and a regular inspection maintenance programme for the culvert was initiated, leaving the major threat to the village from coastal flooding.

A recorded coastal flood in January 2005 resulted in approximately 20 properties within the St Margaret's Hope Conservation Area being flooded together with many properties in the wider area of the village. This flood also closed off the access road to the ferry terminal.

The closure of the A961 causeway along the Churchill Barriers (in particular Barrier No.2) from wave action and overtopping is a major issue to those residents and businesses on South Ronaldsay and Burray. These conditions result in several road closures every year.

Further information on flood hazard and risk: The national flood maps do not take account of wave overtopping and as a result the damages attributed to this candidate Potentially Vulnerable Area are considered to be significantly underestimated. The number of properties and people at risk has been updated based on evidence provided by Orkney Islands Council. There is however no suitable information available to update the estimated economic damages at this stage



Coastal flooding, Cromarty Square, St Margarets Hope, 14 February 1914.

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 180).	20	50	70
Non-residential properties (total of 40).	<10	<10	10
People.	30	110	150
Community facilities.	0	0	0
Utilities assets.	0	0	0
Transport links (excluding minor roads).	Roads at 20 locations.	Roads at 20 locations.	Roads at 30 locations.
Environmental designated areas (km ²).	<0.1	<0.1	<0.1
Designated cultural heritage sites.	0	0	0
Agricultural land (km ²).	0.1	0.2	0.2

Figure 1: Damages by flood likelihood.

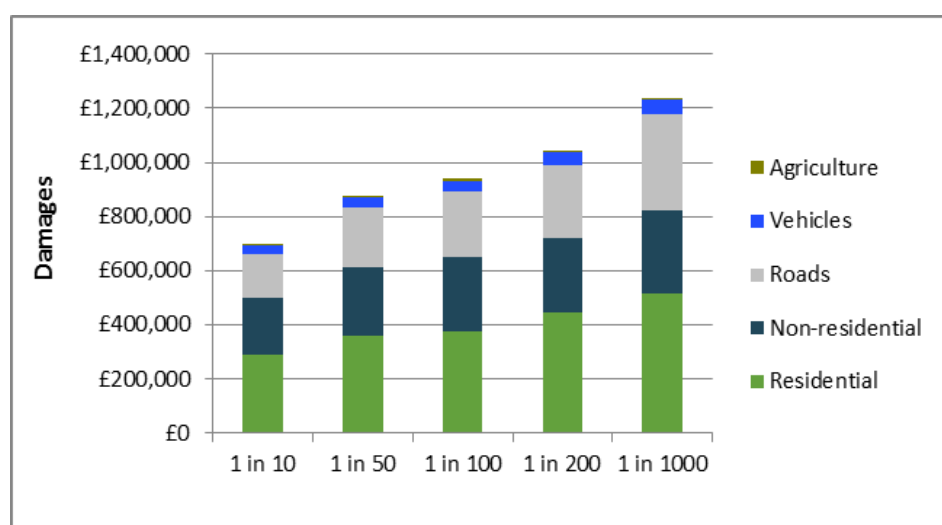


Table and Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

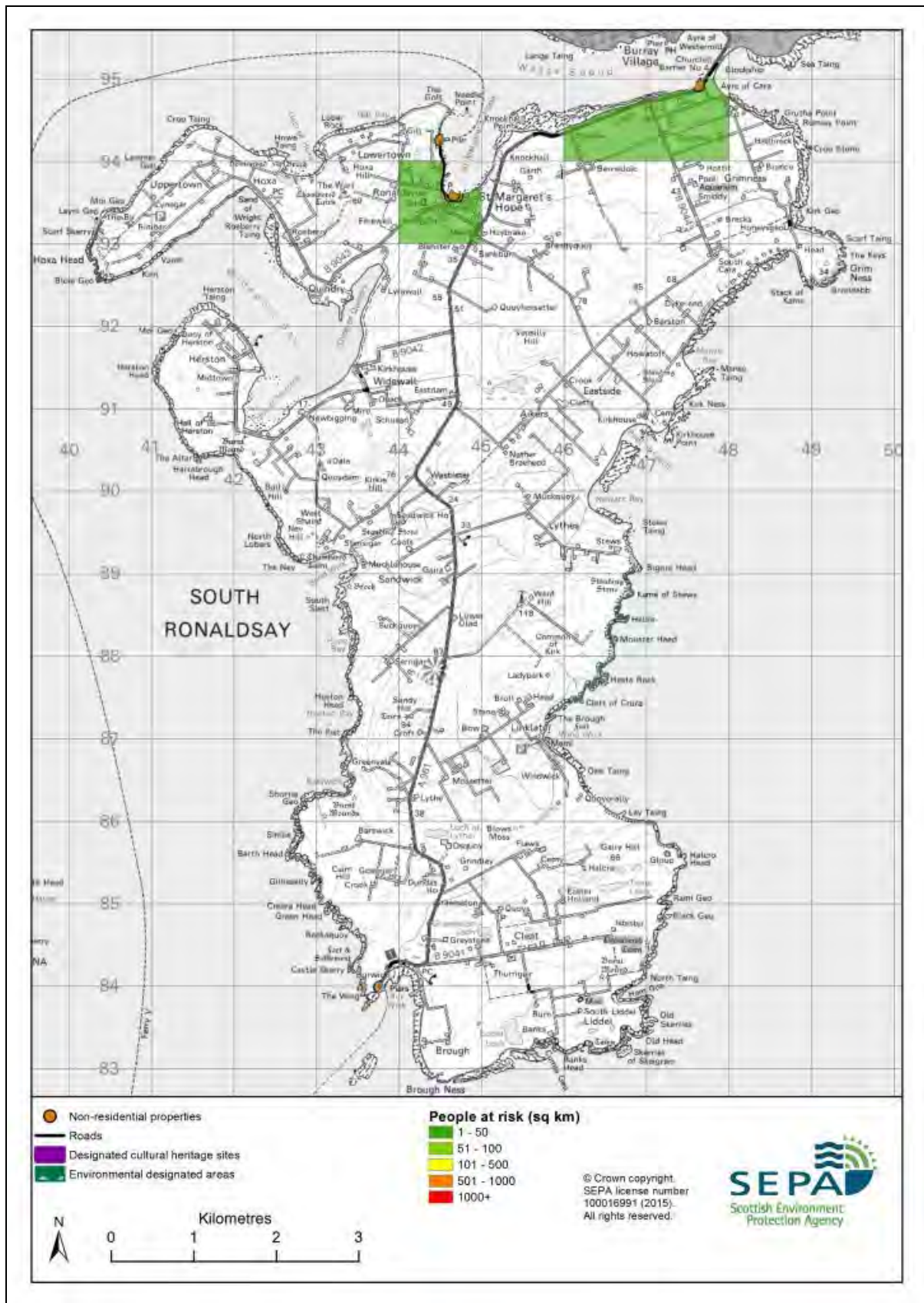


Coastal flooding and wave overtopping, Front Road, St Margarets Hope, 5 December 2013.



Deployment of mobile flood defence units. Front Road/Cromarty Square, St Margarets Hope, 5 December 2013.

Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).



Objectives to manage flooding in South Ronaldsay

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for this Potentially Vulnerable Area.

Reduce coastal flood risk in St Margaret's Hope, including the access road to the Hope school (Objective ID. 300701)

- 40 people.
- £98,000 Annual Average Damages from residential properties.
- Front Road, Back Road and Cromarty Square.



Figure reproduced from Orkney Flood Risk Management Strategy (SEPA December 2015).

Reduce coastal flood risk to Churchill Barrier number 2 (Objective ID. 300702)

- Churchill barrier number 2.



Figure reproduced from Orkney Flood Risk Management Strategy (SEPA December 2015).

Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	50 residential properties. £85,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	50 residential properties. £85,000 Annual Average Damages.

Actions to manage flooding in South Ronaldsay

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for this Potentially Vulnerable Area.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
Flood Protection Study (SMH).	New flood warning				
Flood Protection Study (Barrier number 2)					
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	Two flood protection studies are proposed in this PVA. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection studies are considered when developing and informing reviews of the flood warning system.		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		

Action (ID):	Flood Protection Study (3007010005)		
Objective (ID):	Reduce coastal flood risk in St Margarets Hope (300701).		
Delivery lead:	Orkney Islands Council.		
Status:	Preliminary investigations.	Delivery:	2016-2017.
Description:	A flood protection study is required to consider flood protection works for St Margaret's Hope. The study should primarily focus on coastal management actions, direct defences and property level protection, but other actions may also be considered in order to develop the most sustainable range of options. The investigation will assess the impact from wave overtopping to confirm the existing risk and define the height and extent of flood protection works required.		
Potential Impacts:			
Economic impact:	The study could benefit 50 residential and 10 non-residential properties at risk of flooding in this location, with potential damages avoided of up to £2.9 million.		
Social impact:	The development of flood protection works following the proposed study would potentially reduce risk to 110 people. The action could also reduce the impact of flooding on access to Hope school. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. Negative impacts through disturbance to the local community during the construction phase should be considered.		
Environmental impact:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Opportunities to mitigate any environmental impacts may include design and timing of works. There may be impacts on coastal habitats through any potential increased disruption of natural processes, coastal squeeze and possible increase to coastal erosion risk. The study should also minimise the visual impacts of the actions for the local community.		
Coordination arrangement:	Orkney Islands Council will work with SEPA and the local community in St Margaret's Hope in order to obtain the appropriate level of information in order to ensure the flood protection study meets the stated objective. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered in developing the new flood warning system.		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		

Action (ID):	Flood Protection Study (3007010005)		
Objective (ID):	Reduce coastal flood risk to Churchill Barrier number 2 (300702).		
Delivery lead:	Orkney Islands Council.		
Status:	On-going.	Delivery:	2016-2022.
Description:	A flood protection study is progressing to reduce flooding to Churchill Barrier number 2 from high likelihood floods. The study is primarily focusing on coastal management actions and natural flood management through wave attenuation to minimise the impact of waves, but other actions may also be considered in order to develop the most sustainable range of options.		
Potential Impacts:			
Economic impact:	Reducing the impacts of flooding for Churchill Barrier number 2 during high likelihood floods would result in damages avoided of £37,000 due to reduced flood damages to the road. There are wider benefits that have not yet been quantified and should be considered within the on-going study.		
Social impact:	The recommended actions from the on-going flood protection study would improve access from South Ronaldsay to Mainland Orkney and reduce risk to life from using the access road in stormy weather. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. Natural flood management actions can restore and enhance natural environments and create opportunities for recreation and tourism. Negative impacts through disturbance to the local community during the construction phase should be considered.		
Environmental impact:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Natural flood management actions can have a positive impact by restoring and enhancing natural habitats. Opportunities to mitigate any environmental impacts may include design and timing of works. The on-going study should consider the effects on coastal habitats through any potential increased disruption of natural processes, coastal squeeze and possible increase to coastal erosion risk.		
Coordination arrangement:	Orkney Islands Council will work with SEPA; refer to existing knowledge relating to Barrier No.2 and the local community in order to obtain the appropriate level of information in order to ensure the flood protection study meets the stated objective. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered in developing the new system.		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

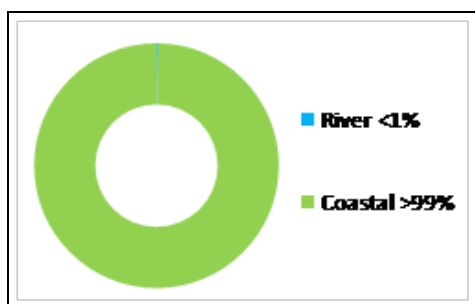
Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.

3.9 Westray (Strategy PVA (03/08c) 'Westray')

Flood risk, objectives and actions.

Local Plan District	Local authority	Main catchment
Orkney.	Orkney Islands Council.	Orkney coastal.

Summary of Flooding Impacts (Flooding Impacts)



At risk of flooding:

- 40 residential properties.
 - 20 non-residential properties.
 - £90,000 Annual Average Damages.
- (Damages by flood source shown left).

Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Summary of objectives to manage flooding (Objectives)

Objectives have been set by SEPA and agreed with flood risk management authorities. These are the aims for managing local flood risk. The objectives have been grouped in three main ways: by reducing risk, avoiding increasing risk or accepting risk by maintaining current levels of management.

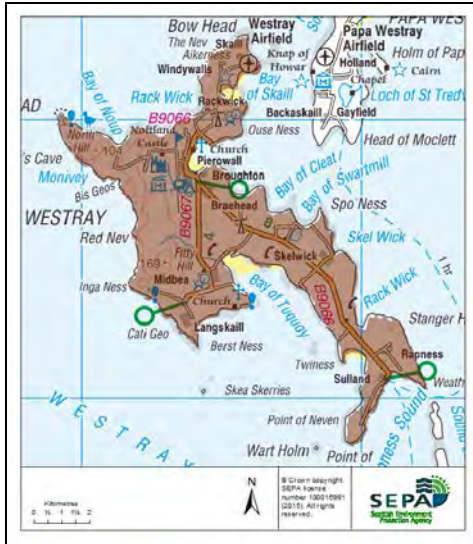
Many organisations, such as utility companies, actively maintain and manage their own assets including their risk from flooding. Where known, these actions are described here. Scottish Natural Heritage and Historic Environment Scotland work with site owners to manage flooding where appropriate at designated environmental and/or cultural heritage sites. These actions are not detailed further in this Plan.

Summary of actions and delivery period to manage flooding (Actions)

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
			Flood protection study.		
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Flooding Impacts

Background



This candidate Potentially Vulnerable Area covers the island of Westray (shown left). It is approximately 47km². Westray is the most densely populated of all the outlying Northern Isles in Orkney and is connected to the mainland by local air and ferry services.

Pierowall is the hub of the island, with a vibrant community comprising several businesses, community facilities and homes. The village has a history of flooding due to the combined effects of high sea levels and wave action.

Figures reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

Coastal flood risk in this area is focused around Pierowall and on the access routes to and from the town and the airport.

The risk of flooding to people and property, as well as to community facilities, utilities, the transport network, designated sites and agricultural land is summarised in Table 1.

A number of roads are at risk of flooding, particularly at Pierowall, Skelwick and at the Bay of Tuquoy. The major access roads to the ferry port and airport are affected by flooding and there are no alternative access routes.

Four designated cultural heritage sites and a small area of the West Westray Special Protection Area and Site of Special Scientific Interest are also at risk effects of high sea levels and wave action.

The damages associated with floods of different likelihood are shown in Figure 1. Roads and residential properties experience the greatest economic impact. Note that cultural heritage and environmental sites are not included in the estimation of the economic impact of flooding due to the difficulty in placing an economic value on these impacts.

The location of the impacts of flooding is shown in Figure 2.

History of flooding

Westray has a history of coastal and surface water flooding. Between 1997 and 2009 Pierowall was affected by several coastal floods, as well as flooding due to seaweed blocking culverts and causing surface water to back up. In particular, flooding of the B9066, the major road across the island, affected the majority of residents.

During January 2005, Pierowall was subject to high tides and as a result flooding affected areas of the village. The worst affected area was in the vicinity of Ulva Cottage, where the sea flooded up through the burn and inundated low lying land. The coastal embankments were close to being exceeded at this time.

Further information on flood hazard and risk: The national flood maps do not take account of wave overtopping and as a result the damages attributed to this candidate Potentially Vulnerable Area are considered to be significantly underestimated. The number of properties and people at risk has been updated based on evidence provided by Orkney Islands Council. There is however no suitable information available to update the estimated economic damages at this stage.



Photo. Gill Pier, Pierowall, Westray during a storm event, 5 December 2013. Photograph courtesy of Teenie Harcus.

Table 1: Summary of flooding impacts.

Receptors.	1 in 10 High likelihood.	1 in 200 Medium likelihood.	1 in 1000 Low likelihood.
Residential properties (total of 180).	10	40	40
Non-residential properties (total of 40).	<10	20	20
People.	10	80	80
Community facilities.	0	0	0
Utilities assets.	0	0	0
Transport links (excluding minor roads).	Roads at 20 locations.	Roads at 30 locations.	Roads at 30 locations.
Environmental designated areas (km ²).	0	<0.1	<0.1
Designated cultural heritage sites.	4	4	5
Agricultural land (km ²).	<0.1	0.5	0.6

Figure 1: Damages by flood likelihood

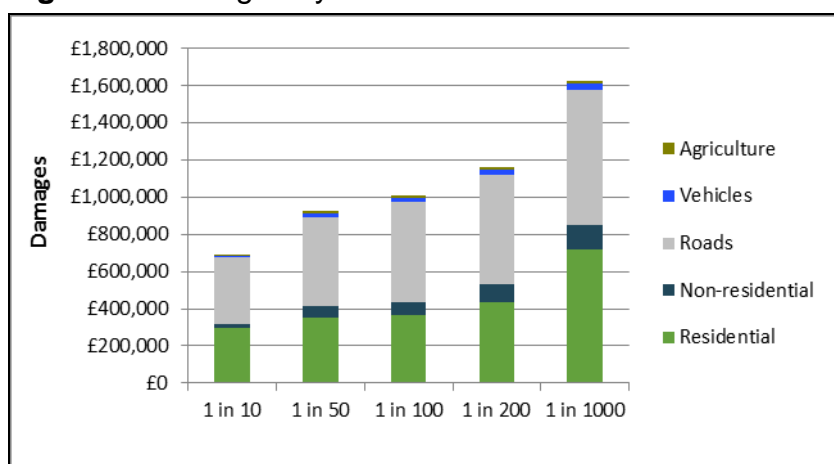
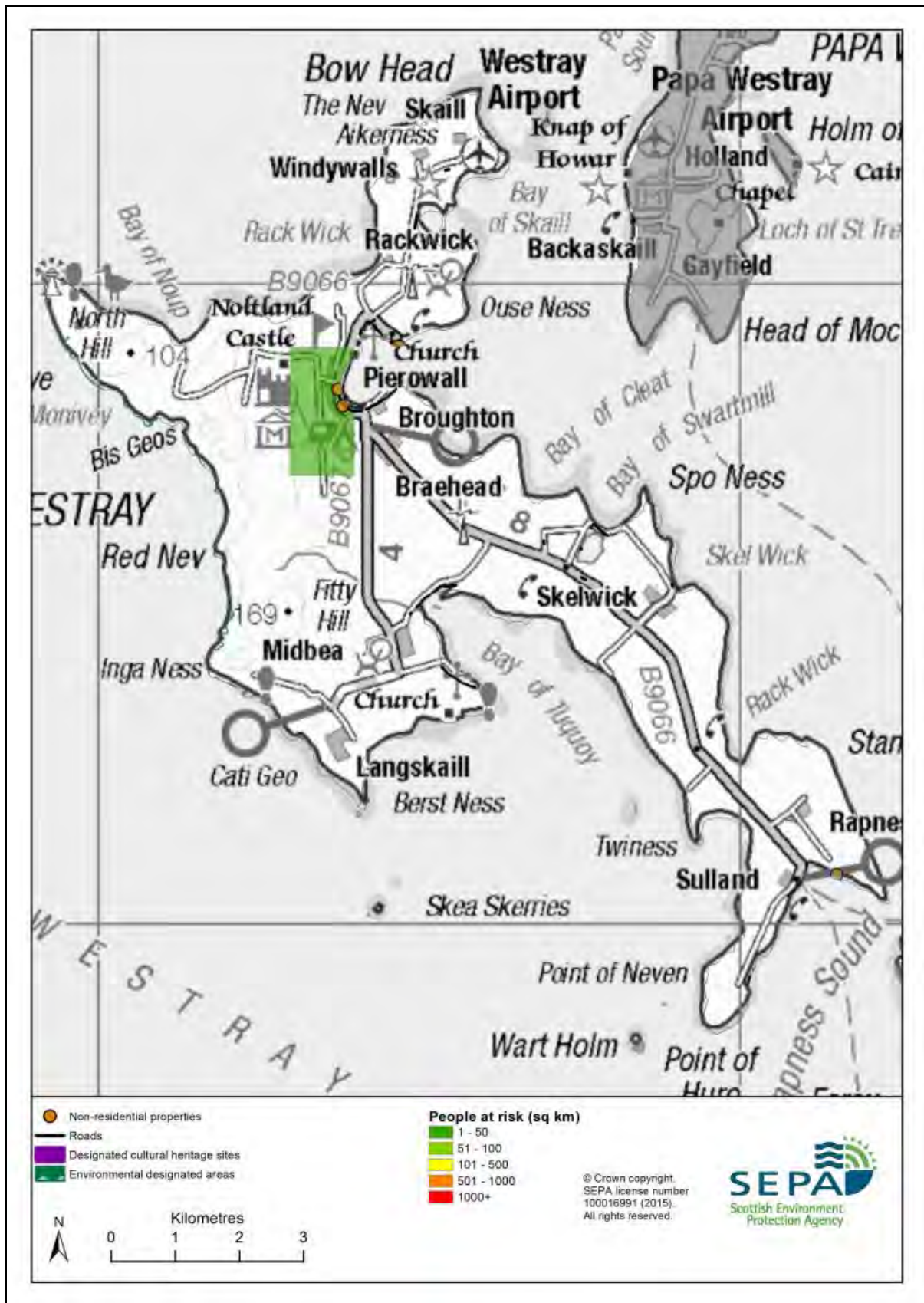


Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015)

Figure 2: Impacts of flooding. Figure reproduced from Orkney Flood Risk Management Strategy, SEPA (December 2015).

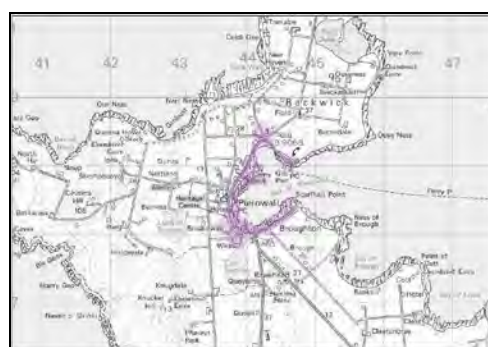


Objectives to manage flooding in Westray

Objectives provide a common goal and shared ambition for managing floods. These objectives have been set by SEPA and agreed with flood risk management authorities following consultation. They were identified through an assessment of the underlying evidence of the causes and impacts of flooding. Target areas have been set to focus actions; they do not necessarily correspond to areas at risk in SEPA's flood map. The objectives below have been set for this Potentially Vulnerable Area.

Reduce flood risk in Pierowall from Coastal Flooding (Objective ID. 300801)

- 90 people.
- £49,000 Annual Average Damages from residential properties.
- B9066 Gill to Scarfhall Point.



Objective target area.	Objective(s).	Objective ID.	Indicators.
Applies across Orkney.	Avoid an overall increase in flood risk.	300001.	40 residential properties. £90,000 Annual Average Damages.
	Reduce overall flood risk.	300002.	40 residential properties. £90,000 Annual Average Damages.



Coastal flooding, Pierowall. 12 January 2005. Photograph courtesy of Danny Harcus.



Coastal flooding, Pierowall, 12 January 2005. Photograph courtesy of Danny Harcus.

Actions to manage flooding in Westray

Actions have been selected that will deliver the agreed objectives. The actions describe where and how flood risk will be managed. The following actions highlighted below, based on a detailed assessment and comparison of economic, social and environmental criteria, have been selected as the most appropriate to meet the objectives set for Westray.

Year 1 2016/2017.	Year 2 2017/2018.	Year 3 2018/2019.	Year 4 2019/2020.	Year 5 2020/2021.	Year 6 2021/2022.
	New flood warning.				
			Flood protection study.		
Awareness Raising, Emergency Plans, Flood Forecasting, Self Help, Maintenance, Planning Policies.					

Action (ID):	New Flood Warning (3000020010).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Not started.	Delivery:	2017-2018.
Description:	The area under consideration covers the coastline of the Orkney Islands. A flood warning system will be developed and implemented. The geographical extent of specific flood warning areas will be developed as part of this process.		
Coordination arrangement:	A flood protection study is proposed for Pierowall. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered when informing reviews of the flood warning system.		
Funding arrangement:	The maintenance of SEPA's flood warning service is funded by Scottish Government through SEPA's grant in aid settlement. In addition, the Government provide grant funding to enable SEPA to implement new flood warning schemes.		

Action (ID):	Flood Protection Study (3008010010)		
Objective (ID):	Reduce flood risk in Pierowall from coastal flooding (300801).		
Delivery lead:	Orkney Islands Council.		
Status:	Not started.	Delivery:	2019-2020.
Description:	A flood protection study is required to consider flood protection works for Pierowall. The study should primarily focus on coastal management actions, direct defences and property level protection, but other actions may also be considered in order to develop the most sustainable range of options. The investigation will assess the impact from wave overtopping to confirm the existing risk and define the height and extent of flood protection work.		
Potential Impacts:			
Economic impact:	The study could benefit 40 residential and 20 non-residential properties at risk of flooding in this location, with potential damages avoided of up to £1.5 million.		
Social impact:	The development of flood protection works following the study would potentially reduce risk to 88 people. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people. The B9066 could also benefit from reduced flooding, improving access across Pierowall during floods. Negative impacts through disturbance to the local community during the construction phase should be considered.		
Environmental impact:	Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment. Opportunities to mitigate any environmental impacts may include design and timing of works. The study should consider the effects on coastal habitats through any potential increased disruption of natural processes, coastal squeeze and possible increase to coastal erosion risk. The study should also minimise the visual impacts of the actions for the local community. The scheduled monument may benefit depending on the extent of any works.		
Coordination arrangement:	Orkney Islands Council will work with SEPA and the local community on Westray in order to obtain the appropriate level of information in order to ensure the flood protection study meets the stated objective. SEPA will work with the local authority to ensure that new information about flood risk resulting from the proposed flood protection study is considered in developing the new flood warning system.		
Funding arrangement:	OIC funding will come from revenue and capital budgets.		

The following actions apply to all PVAs and across the entire County. More information regarding these actions can be found in Chapter 2.3.

Action (ID):	Flood Forecasting (3000020009).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	SEPA.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Self Help (3000020011).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Members of the public.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Maintenance (3000020007).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Orkney Islands Council, asset / land managers.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Emergency Plans / Response (3000020014)		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Category 1 and 2 responders (OLECG).		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Planning Policies (30000100001).		
Objective (ID):	Avoid an overall increase in flood risk (300001). Reduce overall flood risk (300002).		
Delivery lead:	Planning Authority.		
Status:	Existing.	Delivery:	On-going.

Action (ID):	Awareness Raising (3000020013).		
Objective (ID):	Reduce overall flood risk (300002).		
Delivery lead:	Responsible Authorities.		
Status:	Existing.	Delivery:	On-going.

3.10 Other flood risk management activities in Orkney

The actions listed within section 2.3 are to be implemented on an ‘Orkney wide’ scale, therefore ensuring that areas not designated as PVAs will still benefit from actions implemented within the first cycle, 2016-2022, of the Plan.

The Flood Risk Management (Scotland) Act 2009 includes actions to be implemented across Orkney, in addition to those listed within sections 2.3 and 3.2 – 3.9 of this Plan. The main additional flood risk management activities to be implemented by Responsible Authorities that have a significant effect and should be considered in conjunction with the Plan are summarised as follows:

Surface Water Management Planning

As described at Chapter 1.5, surface water flooding is experienced in all areas. However, the management of surface water flooding does not always require a Surface Water Management Plan or specific study. Responsible authorities in Orkney will therefore undertake broader surface water management planning over the period of the first FRM cycle. Such planning include ensuring a suitable response is provided to reports of flooding and implementing actions from issuing warnings, setting warning signs for members of the public, closing sections of the road network all the way through to using powers available under Section 56 – described in more detail below.

Section 18 and 59: Works of Clearance and Repair

Orkney Islands Council (OIC) must from time to time (or as directed by Scottish Ministers) assess relevant bodies of water including watercourses within its area, for the purpose of ascertaining whether the condition of any such body of water gives rise to a risk of flooding of land within its area. Where such a risk is identified and where OIC considers that clearance and repair works will substantially reduce that risk, such operations will be added to a schedule of clearance and repair works which will be available for public inspection. This is commonly referred to as Schedule 18. Under s.59 of the Act, the local authority must carry out the works in the Schedule 18 if it considers that this will contribute to the implementation of actions in the Plan, but that these works will not affect the implementation of actions in this Plan. Details of how to access Orkney Islands Council Schedule 18 are included in Annex 4 of the Plan.

Section 56: General Power to manage flood risk

Without affecting the implementation of actions in this Plan, a local authority may do anything which it considers will contribute to the implementation of actions in the Plan or is necessary to reduce the risk of a flood which is likely to occur imminently and have serious adverse consequences for human health, the environment, cultural heritage or economic activity in its area. This may include carrying out flood protection works, which may not be identified as actions in the Plan.

Annexes

Annex 1.	All actions, by date, to be implemented across the Orkney Local Plan District.
Annex 2.	Supporting information.
Annex 3.	Consultation and engagement.
Annex 4.	Schedule of clearance and repair.
Annex 5.	Licensing acknowledgements.
Annex 6.	What to do in the event of a flood – a contact sheet.

Annex 1: All actions, by date, to be implemented across the Orkney Local Plan District, 2016-2022

Delivery Period.	Action.	Location PVA/LPD.	Lead role.	In coordination with.
2016-2017.	Flood Protection Works.	Kirkwall. PVA 03/05.	OIC.	SEPA.
2016-2022.	Flood Protection Study.	Barrier No.2. PVA 03/07.	OIC.	
2016-2017.	Flood Protection Study.	St Margaret's Hope. PVA 03/07.	OIC.	SEPA.
2016-2018.	Surface Water Management Plan.	Kirkwall. PVA 03/05.	OIC.	Scottish Water and SEPA.
2016-2018.	New Flood Warning.	Orkney LPD.	SEPA.	OIC.
2016-2019.	Strategic Mapping and Modelling.	Sanday. PVA 03/01.	SEPA.	
2016-2019.	Strategic Mapping and Modelling.	Stromness. PVA 03/04.	SEPA.	
2016-2019.	Strategic Mapping and Modelling.	Kirkwall. PVA 03/05.	SEPA.	
2017-2018.	Flood Protection Study.	Whitehall. PVA 03/02.	OIC.	SEPA.
2016-2017.	Flood Protection Works.	Kirkwall. PVA 03/05.	OIC.	SEPA.
2017-2019.	Strategic Mapping and Modelling.	Stromness. PVA 03/04.	Scottish Water.	
2017-2019.	Strategic Mapping and Modelling.	Kirkwall. PVA 03/05.	Scottish Water.	
2018-2019.	Flood Protection Study.	St Marys. PVA 03/05.	OIC.	SEPA.
2019-2020.	Flood Protection Study.	Pierowall. PVA 03/08.	OIC.	SEPA.

2020-2021.	Flood Protection Study.	Longhope Ayre. PVA 03/06.	OIC.	SEPA.
On-going.	Flood Forecasting.	Orkney LPD.	SEPA.	
On-going.	Maintenance.	Orkney LPD.	Asset/land managers.	
On-going.	Emergency Plans and Response.	Orkney LPD.	OLECG.	CAT 1 and 2 responders.
On-going.	Planning Policies.	Orkney LPD.	OIC.	
On-going.	Awareness Raising.	Orkney LPD.	Responsible Authorities.	Responsible Authorities.
On-going.	Self Help.	Orkney LPD.	Individuals.	Responsible Authorities.

Annex 2: Supporting information

Sources of flooding described in the Flood Risk Management Strategy and Local Flood Risk Management Plan for Orkney.

The Flood Risk Management Strategy addresses the risk of flooding from rivers, the coast and surface water. The risk of flooding from rivers is usually due to rainfall causing a river to rise above bank level spreading out and inundating adjacent areas. Coastal flooding is where the risk is from the sea. Sea levels can change in response to tidal cycles or atmospheric conditions. Over the longer term sea levels and coastal flood risk may change due to climate change. Surface water flooding happens 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. There can be interactions between these sources of flooding, but for the purposes of this strategy they are dealt with independently.

The following aspects of flooding have not been incorporated into the strategy and not the plan:

- Groundwater is generally a contributing factor to flooding rather than the primary source. It is caused by water rising up from underlying rocks or flowing from springs.
- Reservoir breaches have been assessed under separate legislation (Reservoirs (Scotland) Act 2011). Further information and maps can be found on SEPA's website.
- The Flood Risk Management (Scotland) Act 2009 does not require SEPA or responsible authorities to assess or manage coastal erosion. However, SEPA has included consideration of erosion in the Flood Risk Management Strategies by identifying areas that are likely to be susceptible to erosion and where erosion can exacerbate flood risk. As part of considering where actions might deliver multiple benefits, we have looked to see where the focus of coastal flood risk management studies coincides with areas of high susceptibility to coastal erosion. Subsequent detailed studies and scheme design will need to consider coastal erosion in these areas.

Coastal flood modelling. The information on coastal flooding used to set objectives and identify actions is based on SEPA modelling using simplified coastal processes and flooding mechanisms at work during a storm. Wave overtopping cannot be accurately modelled at a national scale due to the importance of local factors such as prevailing wind conditions, the depth and profile of the near-shore sea bed or the influence of any existing defences or management structures. As a result, coastal flood risk may be underestimated in some areas. Conversely, in locations with wide and flat floodplains, the modelling may overestimate flood risk. To address this, in a number of locations where more detailed local models were available they have been incorporated into the development of the Flood Risk Management Strategies. Where wave overtopping has been specifically identified as a concern – but where no further detailed modelling is available – particular compensation has been made in the selecting actions to address coastal flood risk.

Commonly used terms in flood risk management.

Below are explanatory notes for the approach taken in the Flood Risk Management Strategy and this Plan and commonly used terms in flood risk management.

- Reference to flood risk. During the development of the strategy flood risk has been assessed over a range of likelihoods. For consistency in reporting information within the strategies, unless otherwise stated, all references to properties or other receptors being 'at risk of flooding' refer to a medium likelihood flood (up to a 1 in 200 chance of flooding in any given year). By exception, references will be made to high or low risk flooding, which should be taken to mean a 1 in 10 chance/likelihood or 1 in 1000 chance/likelihood of flooding in any given year respectively.

High.	10% AEP (1 in 10 in any given year)
Medium.	0.5% AEP (1 in 200 in any given year)
Low.	0.1% AEP (1 in 1000 in any given year)

- Annual Average Damages have been used to assess the potential economic impact of flooding within an area. Depending on its size or severity each flood will cause a different amount of damage to a given area. Annual Average Damages are the theoretical average economic damages caused by flooding when considered over a very long period of time. It does not mean that damage will occur every year: in many years there will be no damages, in some years minor damages and in a few years major damages may occur.
- High likelihood events, which occur more regularly, contribute proportionally more to Annual Average Damages than rarer events. Within the Flood Risk Management Strategies Annual Average Damages incorporate economic damages to the following receptors: residential properties, non-residential properties, vehicles, emergency services, agriculture and roads. They have been calculated based on the principles set out in the Flood Hazard Research Centre Multi-Coloured Handbook (2010).
- History of flooding. The history of flooding sections of this document report floods that have occurred up to July 2015.

Flood risk management planning process.

Flood risk management in Scotland aims to manage flooding in a sustainable way. Sustainable flood risk management considers where floods are likely to occur in the future and takes action to reduce their impact without moving the problem elsewhere. It considers all sources of flooding, whether from rivers, the sea or from surface water. It delivers actions that will meet the needs of present and future generations whilst also protecting and enhancing the environment.

The sustainable approach to managing flood risk works on a six year planning cycle, progressing through the key stages outlined below.

Identifying priority areas at significant flood risk.

The first step to delivering a risk-based, sustainable and plan-led approach to flood risk management was SEPA's National Flood Risk Assessment, which was published in 2011. The assessment considered the likelihood of flooding from rivers, groundwater and the sea, as well as flooding caused when heavy rainfall is unable to enter drainage systems or the river network. The likelihood of flooding was examined alongside the estimated impact on people, the economy, cultural heritage and the environment. It significantly improved our understanding of the causes and consequences of flooding, and identified areas most vulnerable to floods.

Based on the National Flood Risk Assessment, SEPA identified areas where flooding was considered to be nationally significant. These areas are based on catchment units as it is within the context of the wider catchment that flooding can be best understood and managed. These nationally significant catchments are referred to as Potentially Vulnerable Areas. In Scotland, 243 Potentially Vulnerable Areas were identified. They are estimated to contain 92% of the total number of properties at risk.

A small number of Candidate Potentially Vulnerable Areas were identified after the National Flood Risk Assessment in light of new information that warranted further assessment and appraisal. They are included in the flood risk management planning process. The National Flood Risk Assessment will be updated to inform each subsequent planning cycle.

Improving the understanding of flooding.

SEPA developed flood hazard and flood risk maps between 2012 and 2014. These maps improved our understanding of flooding and helped inform the subsequent selection of actions to manage flood risk in Potentially Vulnerable Areas. The flood hazard maps show information such as the extent of flooding, water level, as well as depth and velocity where appropriate. The flood risk maps provide detail on the impacts on people, the economy, cultural heritage and the environment.

In 2012 SEPA also developed an assessment of the potential for natural flood management. The assessment produced the first national source of information on where natural flood management actions would be most effective within Scotland. Flood hazard and flood risk maps and the assessment of the potential for natural flood management can be viewed on the SEPA website www.sepa.org.uk.

Identifying objectives and selecting actions.

The objectives and actions to manage flooding will provide the long-term vision and practical steps for delivering flood risk management in Scotland.

Working collaboratively with local partnerships, SEPA has agreed the objectives for addressing the main flooding impacts. Actions that could deliver these agreed objectives have been appraised for their costs and benefits to ensure the right combinations are identified and prioritised. The actions considered in the development of this strategy include structural actions (such as building floodwalls,

restoring flood plains, or clearance and repair works to rivers) and non-structural actions (such as flood warning, land use planning or improving our emergency response). Structural and non-structural actions should be used together to manage flood risk effectively.

An assessment of the potential for natural flood management was used to help identify opportunities for using the land and coast to slow down and store water. Natural flood management actions were recommended in areas where they could contribute to the management of flood risk. In such instances these actions were put forward as part of flood protection or natural flood management studies.

Annex 3: Consultation and engagement.

SEPA has been keen to hear from the people and communities that live under the threat of flooding to ensure that the technical analysis of the risks is accurate and that efforts to manage flooding are targeted to where most can be achieved. SEPA held two public consultations during the development of the Flood Risk Management Strategies. The first was on the general approach to flood risk management planning and the identification of priority areas (2011); the second, held jointly with Orkney Islands Council, was on the understanding of flooding in these priority areas and on the objectives and actions to manage flooding (2015).

Further advice has been sought from relevant organisations at key stages. The strategy and plan have benefited from Local Advisory Groups, providing important community and area-based knowledge on both the causes and consequences of flooding and on the appropriate actions for future management. Local Advisory Groups have been especially helpful in considering flood risk management planning in the context of wider plans and initiatives. The Orkney Islands Local Advisory Group include representatives from a range of sectors, including government agencies, the local authority, non-government organisations, utility companies and land and asset managers.

In producing the Flood Risk Management Strategy which informed this Plan, SEPA has also taken advice from a National Flood Management Advisory Group. Over 50 member organisations, reflecting the national importance and impact of flooding on our communities, economy, environment and cultural heritage, have been invited at key stages to provide comment and input.

Advert to go to local newspaper.

Orkney Islands Council

Orkney Flood Risk Management Plan (2016)



The Environmental Assessment (Scotland) Act 2005

Under Section 8(1) of the above Act Orkney Islands Council has formally determined, in consultation with Historic Scotland, the Scottish Environment Protection Agency and Scottish Natural Heritage that implementation of the Orkney Flood Risk Management Plan (2016) is unlikely to lead to significant environmental effects beyond those which have already been identified and addressed through SEA of the Flood Risk Management Strategy for Orkney.

Therefore, no environmental report will be prepared alongside the Orkney Flood Risk Management Plan (2016).

Copies of this determination and the associated Statement of Reasons are available from Orkney Islands Council Customer Services, Council Offices, School Place, Kirkwall, Orkney KW15 1NY, as well as the Council's website at www.orkney.gov.uk.

Gavin Barr

Executive Director

Development and Infrastructure

Orkney Islands Council

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Orkney Local Flood Risk Management Plan Screening Determination

Statement of Reasons

The Flood Risk Management Strategies identify where the risks of flooding and benefits of investment are greatest. The Orkney Flood Risk Management Plan details the prioritised actions that will be delivered with this investment. Eight areas are identified as being potentially vulnerable to flood risk across the Orkney local plan district and sets out the following objectives which focus on the main sources and impacts of flooding identified for each Potentially Vulnerable Area:

- Avoid an overall increase of flood risk to residential and non-residential properties.
- Reduce overall flood risk in the local plan district from all flood sources.
- Reduce the number of residential properties in at risk and economic damages from surface water flooding in Kirkwall.
- Reduce disruption to roads at high risk from coastal flooding, with particular reference to the Churchill Barriers and the causeway linking Hoy to South Walls.
- Reduce risk from coastal flooding in Sanday, Whitehall, Kirkwall, St Mary's, St Margaret's Hope and Pierowall.

The following actions are proposed in these areas:

- Improve understanding of flood mechanisms in Sanday
- Undertake a flood protection study for the Whitehall area of Stronsay.
- Construction of a sea wall along the coastline in Kirkwall.
- Maintenance of existing flood protection works in Kirkwall.
- Undertake a flood protection study for the village of St Mary's, Holm.
- Undertake a flood protection study for The Ayre in South Walls.
- Undertake a flood protection study for St Margaret's Hope, South Ronaldsay.
- Undertake a natural flood risk management study for Churchill Barrier No.2.
- Undertake a flood protection study for Churchill Barrier No.2.
- Undertake a flood protection study for the village of Pierowall, Westray.

Other actions include flood warning schemes and surface water management plans. One flood defence construction project is identified - the harbour wall in Kirkwall. A planning application for this project has been submitted and potential environmental issues will be addressed through the development management process.

The long term environmental effects of implementing these actions are anticipated to be positive or neutral, in terms of reducing the adverse effects of flooding on human health and well-being, as well as certain natural and cultural heritage resources. The Plan acknowledges that there is potential for flood defence measures to impact on certain environmental receptors and confirms that the proposed flood protection/management studies will include assessment of the likely environmental effects of all technically feasible options identified. It also confirms that project level impact assessments will be undertaken where required by planning and environmental regulations. The findings of these assessments will inform Strategic

Environmental Assessment of any projects that are identified for inclusion in future planning cycles.

The Orkney Flood Risk Management Plan falls under the scope of Section 5(3) of the Act and therefore requires to be screened for SEA. However, the Plan contains no measures or actions in addition to those that have already been assessed as part of the FRM Strategy for Orkney; therefore it is unlikely to lead to any additional significant environmental effects.

Orkney Islands Council has therefore determined that further environmental assessment of the Orkney Flood Risk Management Plan (2016) will not be undertaken.

The Orkney Local Flood Risk Management Plan

Habitats Regulations Appraisal Record

A Habitats Regulations Appraisal is used during the preparation of a plan or project in order to avoid adverse effects on the integrity of European designated natural heritage sites. The requirements are set out in the EC Habitats Directive, applied in Scotland through The Conservation (Natural Habitats and c.) Regulations 1994 (as amended).

HRA is required for any plan or project which is not directly connected with, or necessary to, the management of a European site, but would be likely to have a significant effect on such a site, either individually or in combination with other plans or projects. The competent authority (plan making body) can only agree to the plan or project once it has ascertained that it will not adversely affect the integrity of the sites concerned, unless there are exceptional circumstances. Article 6(4) provides that if, in spite of a negative assessment of the implications for the site, and in the absence of alternative solutions, the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected.

European sites, also known as Natura 2000 sites are:

- Special Protection Areas (SPA), classified under the Birds Directive;
- Special Areas of Conservation (SAC), designated under the EC Habitats Directive 1992.
- Candidate Special Areas of Conservation (cSAC).

In Scotland, proposed SPAs and proposed SACs are also treated as European Sites. The term 'Habitats Regulations Appraisal' is used to describe the multi-stage process which includes:

- the decision on whether the plan should be subject to appraisal;
- the 'screening' process for determining whether an 'appropriate assessment' is required; and
- any 'appropriate assessment' that may be required.

An appropriate assessment is only required where the plan-making body determines that the plan is likely to have a significant effect on a European site. If the competent authority determines that an appropriate assessment is required, the authority must consult with SNH and have regard for SNH's response when finalising the plan. Informal consultation with SNH throughout the process is recommended.

The Flood Risk Management Strategies.

The Flood Risk Management Strategies identify where the risks of flooding and benefits of investment are greatest throughout Scotland. Local Flood Risk Management Plans supplement the Strategies for the Local Plan Districts, coordinating the efforts of all organisations that tackle flooding from the sea, rivers or

from surface water. The Strategy identifies where the risk of flooding and benefits of investment are greatest and the Plan details the prioritised actions that will be delivered with this investment.

The Orkney Flood Risk Management Plan details how and when the actions to deliver the goals set in the Strategy are to be delivered in the Orkney Local Plan District during the first six-year planning cycle, from 2016 to 2022. It describes the short-term direction of flood risk management in the Orkney Local Plan District, which is expanded upon in the Strategy.

Flood Risk Management Planning is not directly connected with, or necessary to, the management of any European site, therefore the Flood Risk Management Strategies qualify for Habitats Regulations Appraisal in order to ensure that implementation of their proposed actions will not result in significant adverse effects on the qualifying interests or the integrity of any European site.

The Scottish Environment Protection Agency (SEPA) has undertaken a Habitats Regulations Appraisal of the Flood Risk Management Strategies and the conclusion of this process was that none of the actions proposed in the Orkney Strategy would lead to a likelihood of significant effect on any European site. No further actions have been included in the Plan in addition to those that are included in the Strategy; therefore Orkney Islands Council has adopted the findings of the HRA that was undertaken of the Strategies. However the Council has also opted to prepare this Habitats Regulations Appraisal Record which summarises the HRA findings in relation to the actions that are included in Orkney Strategy and Flood Risk Management Plan.

The Orkney Flood Risk Management Plan.

The Plan details the prioritised actions that will be delivered with the investment for 2016-2022. Eight areas are identified as being potentially vulnerable to flood risk across the Orkney Local Plan District and the Plan sets out the following objectives which focus on the main sources and impacts of flooding identified for each Potentially Vulnerable Area (PVA):

- Avoid an overall increase of flood risk to residential and non-residential properties.
- Reduce overall flood risk in the local plan district from all flood sources.
- Reduce the number of residential properties in at risk and economic damages from surface water flooding in Kirkwall.
- Reduce disruption to roads at high risk from coastal flooding, with particular reference to the Churchill Barriers and the causeway linking Hoy to South Walls.
- Reduce risk from coastal flooding in Sanday, Whitehall, Kirkwall, St Mary's, St Margaret's Hope and Pierowall.

The following actions are proposed in these PVAs:

- Improve understanding of flood mechanisms in Sanday
- Undertake a flood protection study for the Whitehall area of Stronsay.
- Construction of a sea wall along the coastline in Kirkwall.

- Maintenance of existing flood protection works in Kirkwall.
- Undertake a flood protection study for the village of St Mary's, Holm.
- Undertake a flood protection study for The Ayre in South Walls.
- Undertake a flood protection study for St Margaret's Hope, South Ronaldsay.
- Undertake a natural flood risk management study for Churchill Barrier No.2.
- Undertake a flood protection study for Churchill Barrier No.2.
- Undertake a flood protection study for the village of Pierowall, Westray.

Other actions include flood warning schemes and surface water management plans. One flood defence construction project is identified - the harbour wall in Kirkwall. A planning application for this project has been submitted and potential environmental issues will be addressed through the development management process. A further action, "installation of a concrete caisson off the east site of Churchill Barrier No.2", is referred to in the Plan but is not proposed in the Plan and would be likely to proceed irrespective of whether the FRM Plan is adopted.

Approach adopted for the Appraisal.

The Appraisal was carried out following David Tyldesley and Associates 2015. Habitats Regulations Appraisal of Plans Guidance for Plan-making Bodies in Scotland Version 3.0 as provided by Scottish Natural Heritage. The actions of the Plan were screened for their likely significant effects on all Orkney Natura 2000 sites. These effects have been assessed in relation to the qualifying interests of the sites as well as the sites' conservation objectives. The conservation objectives of Orkney's Natura 2000 sites are set out in Table 1 below.

Table 1: The conservation objectives for Natura 2000 sites in the Orkney Islands.

Conservation objectives for qualifying habitats.	<p>To avoid deterioration of the qualifying habitats thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features. To ensure for the qualifying habitats that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Extent of the habitat on site; • Distribution of the habitat within site; • Structure and function of the habitat; • Processes supporting the habitat; • Distribution of typical species of the habitat; • Viability of typical species as components of the habitat; • No significant disturbance of typical species of the habitat.
Conservation objectives for qualifying species.	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status

	<p>for each of the qualifying features and to ensure for the qualifying species that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site. • Distribution of the species within the site. • Distribution and extent of habitats supporting the species. • Structure, function and supporting processes of habitats supporting the species. • No significant disturbance of the species.
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The criteria for screening actions are set out in Table 2 below.

Table 2: Criteria for screening actions.

Type of action.	Criteria.	Screening decision.
Policy statement.	General policy statement: not likely to have a significant effect on a European site.	No likely significant effect.
Actions/projects referred to but not proposed by the FRM Plan.	Projects/works/actions referred to in the FRM Plan but not proposed by the Plan and would be likely to proceed irrespective of whether the Plan is adopted. These may need to be assessed for in-combination effects.	No likely significant effect (in relation to the FRM Plan).
Actions proposed by the FRM Plan.	No likely effects on any European site: will not lead to development or other change.	No likely significant effect.
Actions proposed by the FRM Plan.	No likely significant effects on a European site: it is not possible to identify where or when or how the policy might be implemented, or where the effects may occur or which sites, if any, may be affected.	No likely significant effect.

Actions proposed by the FRM Plan.	No likely significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.	No likely significant effect.
Actions proposed by the FRM Plan: natural flood management or flood protection study.	Could have a likely significant effect on a European site: action is a study for NFM or flood protection.	Likely significant effect.
Actions proposed by the FRM Plan: works seeking funding.	Could have a likely significant effect on a European site: action is NFM and/or flood protection works and funding is being sought. Actions will be taken forward by Local Authorities, Scottish Water and other responsible authorities under the FRM Act.	Likely significant effect.

The findings of these assessments are reported in Table 3 and Table 4.

A further 'shadow' screening exercise was undertaken to determine the likelihood of significant effects on two marine areas which have been identified as the North Orkney marine draft SPA and the Pentland Firth and Scapa Flow marine draft SPA. The findings of these assessments are reported in Table 5. Draft SPAs do not have any policy or statutory protected status, so it is not a requirement to include them in the HRA; however including them as a "shadow" HRA can be helpful where there is clear connectivity and potential for impact such that in the event of designation there might be a need to review existing consents.

Habitats Regulation Assessment Conclusion

Screening of the actions of the Plan has confirmed that none of the proposed actions are likely to have significant effects on the qualifying interests or conservation objectives of existing or draft Natura 2000 sites in Orkney. It is therefore concluded that, pending the representations from SNH, implementation of the actions of the Orkney Flood Risk Management Plan will not have an adverse effect on the integrity of a European site in the Orkney Isles. Subsequently, there is no requirement to undertake an 'Appropriate Assessment' of any of the actions included in the Plan.

Table 3: Screening the likely effects on Special Protection Areas which may result from actions proposed by the Orkney FRM Plan.

		Special Protection Areas (SPA)												
		Auskerry	Calf of Eday	Copinsay	East Sanday Coast and Ramsar site	Hoy	Marwick Head	Orkney Mainland Moors	Papa Westray	Pentland Firth Islands	Rousay	Sule Skerry & Sule Stack	Switha	West Westray
QUALIFYING INTEREST OF NATURA 2000 SITE		Aggregations of breeding Arctic tern and Storm petrel	Aggregations of breeding great cormorant, great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of non-breeding purple sandpiper, turnstone and bar-tailed godwit	Aggregations of breeding Arctic skua; northern fulmar; great black-backed gull, great skua; guillemot, kittiwake; peregrine; puffin and red-throated diver. Aggregations of breeding seabird assemblage	Aggregations of breeding guillemot and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding and non-breeding hen harrier. Aggregations of breeding short-eared owl and red-throated diver	Aggregations of breeding Arctic tern and Arctic skua	Aggregations of breeding Arctic tern	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot and kittiwake. Aggregations of breeding seabird assemblage.	Aggregations of breeding gannet, guillemot, Leach's petrel, puffin, shag, storm petrel Aggregations of breeding seabird assemblage	Aggregations of non-breeding Greenland barnacle goose	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot, kittiwake and razorbill. Aggregations of breeding seabird assemblage.
Action	LSE (Yes, No)	Assessment notes and conclusions												
Sanday – improve understanding of flood extents and depths.	No	It is not possible to identify where or when or how the policy might be implemented or where effects may occur or which sites, if any may be affected.												
Whitehall – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Kirkwall flood protection works.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Kirkwall – maintenance of existing flood protection works.	No (in relation to the FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted).												
St Mary's -flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Hoy and South Walls – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
St Margaret's Hope – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – natural flood risk management study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												

		Special Protection Areas (SPA)												
		Auskerry	Calf of Eday	Copinsay	East Sanday Coast and Ramsar site	Hoy	Marwick Head	Orkney Mainland Moors	Papa Westray	Pentland Firth Islands	Rousay	Sule Skerry & Sule Stack	Switha	West Westray
QUALIFYING INTEREST OF NATURA 2000 SITE		Aggregations of breeding Arctic tern and Storm petrel	Aggregations of breeding great cormorant, great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of non-breeding purple sandpiper, turnstone and bar-tailed godwit	Aggregations of breeding Arctic skua; northern fulmar; great black-backed gull, great skua; guillemot, kittiwake; peregrine; puffin and red-throated diver. Aggregations of breeding seabird assemblage	Aggregations of breeding guillemot and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding and non-breeding hen harrier. Aggregations of breeding short-eared owl and red-throated diver	Aggregations of breeding Arctic tern and Arctic skua	Aggregations of breeding Arctic tern	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot and kittiwake. Aggregations of breeding seabird assemblage.	Aggregations of breeding gannet, guillemot, Leach's petrel, puffin, shag, storm petrel Aggregations of breeding seabird assemblage	Aggregations of non-breeding Greenland barnacle goose	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot, kittiwake and razorbill. Aggregations of breeding seabird assemblage.
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Pierowall – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Participate in flood warning schemes.	No	General policy statement: not likely to have a significant effect on a European site.												
Promote measures to improve public awareness of actions that can be taken to minimise effects of flooding.	No	General policy statement: not likely to have a significant effect on a European site.												
Installation of a concrete caisson off east side of No.2 Churchill Barrier.	No (in relation to the FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted).												

Table 4: Screening the likely effects on Special Areas of Conservation which may result from actions proposed by the Orkney FRM Plan.

		SPECIAL AREAS OF CONSERVATION					
		Faray & Holm of Faray	Hoy	Loch of Isbister	Loch of Stenness	Sanday	Stromness Heaths and Coast
QUALIFYING INTEREST OF NATURA 2000 SITE		Grey seal.	Alkaline fen; Alpine & Boreal heath; Blanket Bog; Calcareous rocky slopes with chasmophytic vegetation; European dry heaths; Natural dystrophic lakes & ponds; Northern Atlantic wet heaths with <i>Erica tetralix</i> ; Petrifying springs with tufa formation; Vegetated sea cliffs of the Atlantic and Baltic coasts.	Otter; Natural eutrophic lake with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation; Transition mires and quaking bogs.	Coastal lagoons.	Mudflats & sandflats not covered by seawater at low tide; Common seal; Reefs.	Alkaline fens; European dry heaths; Vegetated sea cliffs of the Atlantic and Baltic coasts.
Action	LSE (Yes, No)	Assessment notes and conclusions					
Sanday – improve understanding of flood extents and depths	No	It is not possible to identify where or when or how the policy might be implemented or where effects may occur or which sites, if any may be affected.					
Whitehall – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Kirkwall flood protection works: seeking funding	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Kirkwall – maintenance of existing flood protection works	No (in relation to FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted). These need to be assessed for in-combination effects.					
St Mary's -flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Hoy and South Walls – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
St Margaret's Hope – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – natural flood risk management study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Pierowall – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Participate in flood warning schemes	No	General policy statement: not likely to have a significant effect on a European site.					
Promote measures to improve public awareness of actions that can be taken to minimise effects of flooding	No	General policy statement: not likely to have a significant effect on a European site.					
Installation of a concrete caisson off east side of No.2 Churchill Barrier	No (in relation to FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted). These need to be assessed for in-combination effects.					

Table 3: Screening the likely effects on Special Protection Areas which may result from actions proposed by the Orkney FRM Plan.

		Special Protection Areas (SPA)												
		Auskerry	Calf of Eday	Copinsay	East Sanday Coast and Ramsar site	Hoy	Marwick Head	Orkney Mainland Moors	Papa Westray	Pentland Firth Islands	Rousay	Sule Skerry & Sule Stack	Switha	West Westray
QUALIFYING INTEREST OF NATURA 2000 SITE		Aggregations of breeding Arctic tern and Storm petrel	Aggregations of breeding great cormorant, great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of non-breeding purple sandpiper, turnstone and bar-tailed godwit	Aggregations of breeding Arctic skua; northern fulmar; great black-backed gull, great guillemot, kittiwake; peregrine; puffin and red-throated diver. Aggregations of breeding seabird assemblage	Aggregations of breeding guillemot and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding and non-breeding hen harrier. Aggregations of breeding short-eared owl and red-throated diver	Aggregations of breeding Arctic tern and Arctic skua	Aggregations of breeding Arctic tern	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot and kittiwake. Aggregations of breeding seabird assemblage.	Aggregations of breeding gannet, guillemot, Leach's petrel, puffin, shag, storm petrel Aggregations of breeding seabird assemblage	Aggregations of non-breeding Greenland barnacle goose	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot, kittiwake and razorbill. Aggregations of breeding seabird assemblage.
Action	LSE (Yes, No)	Assessment notes and conclusions												
Sanday – improve understanding of flood extents and depths.	No	It is not possible to identify where or when or how the policy might be implemented or where effects may occur or which sites, if any may be affected.												
Whitehall – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Kirkwall flood protection works.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Kirkwall – maintenance of existing flood protection works.	No (in relation to the FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted).												
St Mary's -flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Hoy and South Walls – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
St Margaret's Hope – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – natural flood risk management study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												

		Special Protection Areas (SPA)												
		Auskerry	Calf of Eday	Copinsay	East Sanday Coast and Ramsar site	Hoy	Marwick Head	Orkney Mainland Moors	Papa Westray	Pentland Firth Islands	Rousay	Sule Skerry & Sule Stack	Switha	West Westray
QUALIFYING INTEREST OF NATURA 2000 SITE		Aggregations of breeding Arctic tern and Storm petrel	Aggregations of breeding great cormorant, great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding great black-backed gull, guillemot, northern fulmar and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of non-breeding purple sandpiper, turnstone and bar-tailed godwit	Aggregations of breeding Arctic skua; northern fulmar; great black-backed gull, great skua; guillemot, kittiwake; peregrine; puffin and red-throated diver. Aggregations of breeding seabird assemblage	Aggregations of breeding guillemot and kittiwake; Aggregations of breeding seabird assemblage.	Aggregations of breeding and non-breeding hen harrier. Aggregations of breeding short-eared owl and red-throated diver	Aggregations of breeding Arctic tern and Arctic skua	Aggregations of breeding Arctic tern	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot and kittiwake. Aggregations of breeding seabird assemblage.	Aggregations of breeding gannet, guillemot, Leach's petrel, puffin, shag, storm petrel Aggregations of breeding seabird assemblage	Aggregations of non-breeding Greenland barnacle goose	Aggregations of breeding Arctic skua, Arctic tern, fulmar, guillemot, kittiwake and razorbill. Aggregations of breeding seabird assemblage.
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Pierowall – flood protection study.	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.												
Participate in flood warning schemes.	No	General policy statement: not likely to have a significant effect on a European site.												
Promote measures to improve public awareness of actions that can be taken to minimise effects of flooding.	No	General policy statement: not likely to have a significant effect on a European site.												
Installation of a concrete caisson off east side of No.2 Churchill Barrier.	No (in relation to the FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted).												

Table 4: Screening the likely effects on Special Areas of Conservation which may result from actions proposed by the Orkney FRM Plan.

		SPECIAL AREAS OF CONSERVATION					
		Faray & Holm of Faray	Hoy	Loch of Isbister	Loch of Stenness	Sanday	Stromness Heaths and Coast
QUALIFYING INTEREST OF NATURA 2000 SITE		Grey seal.	Alkaline fen; Alpine & Boreal heath; Blanket Bog; Calcareous rocky slopes with chasmophytic vegetation; European dry heaths; Natural dystrophic lakes & ponds; Northern Atlantic wet heaths with <i>Erica tetralix</i> ; Petrifying springs with tufa formation; Vegetated sea cliffs of the Atlantic and Baltic coasts.	Otter; Natural eutrophic lake with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation; Transition mires and quaking bogs.	Coastal lagoons.	Mudflats & sandflats not covered by seawater at low tide; Common seal; Reefs.	Alkaline fens; European dry heaths; Vegetated sea cliffs of the Atlantic and Baltic coasts.
Action	LSE (Yes, No)	Assessment notes and conclusions					
Sanday – improve understanding of flood extents and depths	No	It is not possible to identify where or when or how the policy might be implemented or where effects may occur or which sites, if any may be affected.					
Whitehall – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Kirkwall flood protection works: seeking funding	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Kirkwall – maintenance of existing flood protection works	No (in relation to FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted). These need to be assessed for in-combination effects.					
St Mary’s -flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Hoy and South Walls – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
St Margaret’s Hope – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – natural flood risk management study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Pierowall – flood protection study	No	No significant effects on any European site; makes provision for change but which could have no conceivable connectivity with a European site.					
Participate in flood warning schemes	No	General policy statement: not likely to have a significant effect on a European site.					
Promote measures to improve public awareness of actions that can be taken to minimise effects of flooding	No	General policy statement: not likely to have a significant effect on a European site.					
Installation of a concrete caisson off east side of No.2 Churchill Barrier	No (in relation to FRM Plan)	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted). These need to be assessed for in-combination effects.					

Table 5: Screening the likely effects on draft Special Protection Areas which may result from actions proposed by the Orkney FRM Plan.

	draft Special Protection Areas (dSPA)	
	North Orkney marine dSPA	Pentland Firth and Scapa Flow marine dSPA
QUALIFYING INTEREST OF NATURA 2000 SITE	Aggregations of Annex 1 species: great northern diver, red-throated diver, Slavonian grebe and Arctic tern and migratory species: common eider, long-tailed duck, velvet scoter and European shag.	Aggregations of Annex 1 species: great northern diver, red-throated diver, black-throated diver, Slavonian grebe and Arctic tern and migratory species: European shag, common guillemot, common eider, long-tailed duck, common goldeneye and red-breasted merganser.
Action	Assessment notes and conclusions	
Sanday – improve understanding of flood extents and depths	It is not possible to identify where or when or how the policy might be implemented or where effects may occur or which sites, if any may be affected. No conceivable connectivity with the draft European sites.	
Whitehall – flood protection study	No Likely Significant Effect on the draft European site; makes provision for change but which could have no conceivable connectivity with the draft European sites.	
Kirkwall flood protection works	Makes provision for change but could have no Likely Significant Effect on the draft European site, because any potential effects would be trivial, or “de minimis” or so restricted that it would not undermine the conservation objectives for the draft European site. May need to be assessed for in-combination effects in the event of draft site being progressed to a proposed site (pSPA) or being designated.	No Likely Significant Effects on the draft European site; makes provision for change but which could have no conceivable connectivity with the draft European site.
Kirkwall – maintenance of existing flood protection works	Projects/works/actions referred to in the FRM Plan but not proposed by the FRM Plan (and would be likely to proceed irrespective of whether the FRM Plan is adopted). May need to be assessed for in-combination effects in the event of draft site being progressed to a proposed site (pSPA) or being designated.	No Likely Significant Effects on the draft European site; makes provision for change but which could have no conceivable connectivity with the draft European site.
St Mary’s -flood protection study	No Likely Significant Effect on the European site; makes provision for change but which could have no conceivable connectivity with the draft European site.	Action is solely for a study for flood protection hence no Likely Significant Effect. Future flood protection works at this location could exert Likely Significant Effect, as St Mary’s is situated within draft SPA; further appraisal, including consideration of cumulative effects, will be required at project level in event of draft site being progressed to a proposed site (pSPA) or being designated.
Hoy and South Walls – flood protection study	No Likely Significant Effect on the European site; makes provision for change but which could have no conceivable connectivity with the draft European site.	Action is solely for a study for flood protection hence no Likely Significant Effect. Future flood protection works at this location could exert Likely Significant Effect, as the causeway between Hoy and South Walls is situated within draft SPA; further appraisal, including consideration of cumulative effects, will be required at project level in event of draft site being progressed to a proposed site (pSPA) or being designated.
St Margaret’s Hope – flood protection study	No Likely Significant Effect on the European site; makes provision for change but which could have no conceivable connectivity with the draft European site.	Action is solely for a study for flood protection hence no Likely Significant Effect. Future flood protection works at this location could exert Likely Significant Effect, as St Margaret’s Hope is situated within draft SPA; further appraisal, including consideration of cumulative effects, will be required at project level in event of draft site being progressed to a proposed site (pSPA) or being designated.
Reduce disruption to roads at high risk of flooding, in particular the causeways on the Churchill Barriers – flood risk management study	No Likely Significant Effect on the European site; makes provision for change but which could have no conceivable connectivity with the draft European site.	Action is solely for a study for flood protection hence no Likely Significant Effect. Future flood protection works at this location could exert Likely Significant Effect, as the Churchill Barriers are situated within draft SPA; further appraisal, including consideration of cumulative effects, will be required at project level in event of draft site being progressed to a proposed site (pSPA) or being designated.
Reduce disruption to roads at high risk of flooding, in particular the causeways on the	No Likely Significant Effect on the European site; makes provision for change but which could have no conceivable connectivity with the draft European site.	Action is solely for a study for flood protection hence no Likely Significant Effect. Future flood protection works at this location could exert Likely Significant Effect, as the Churchill Barriers are situated within draft SPA; further appraisal, including consideration of cumulative effects, will be required at project level in event of draft site being progressed to a proposed site (pSPA) or being designated.

draft Special Protection Areas (dSPA)		
	North Orkney marine dSPA	Pentland Firth and Scapa Flow marine dSPA
QUALIFYING INTEREST OF NATURA 2000 SITE	Aggregations of Annex 1 species: great northern diver, red-throated diver, Slavonian grebe and Arctic tern and migratory species: common eider, long-tailed duck, velvet scoter and European shag.	Aggregations of Annex 1 species: great northern diver, red-throated diver, black-throated diver, Slavonian grebe and Arctic tern and migratory species: European shag, common guillemot, common eider, long-tailed duck, common goldeneye and red-breasted merganser.
Churchill Barriers – flood protection study		
Pierowall – flood protection study	No Likely Significant Effect on the draft European site; makes provision for change but which could have no conceivable connectivity with the draft European sites.	
Participate in flood warning schemes	General policy statement: not likely to have a significant effect on the draft European site.	
Promote measures to improve public awareness of actions that can be taken to minimise effects of flooding	General policy statement: not likely to have a significant effect on the draft European site.	
Installation of a concrete caisson off east side of No.2 Churchill Barrier	Excluded from the appraisal because, although mentioned in the Plan, it is not a proposal generated by the Plan. Could have no conceivable connectivity with the draft European site.	Excluded from the appraisal because, although mentioned in the Plan, it is not a proposal generated by the Plan. May need to be assessed for in-combination effects in the event of draft site being progressed to a proposed site (pSPA) or being designated.

Annex 4: Schedule of clearance and repair.

Section 18 of the Flood Risk Management (Scotland) Act 2009: Schedule of clearance and repair.

Orkney Islands Council maintains a schedule of all clearance and repair works undertaken throughout the county as required under Section 18 of the Flood Risk Management (Scotland) Act 2009.

Local Authority.	Method of public access to the Section 18 schedules.	Hyperlink or web access.
Orkney Islands Council.	By arrangement.	Not available at date of publication.



Clearance and repair works includes inspection and clearance of culvert headwalls and trash screens throughout the year.

Annex 5: Licensing acknowledgments.

The information described in this Annex relates to the Figures and Maps that have been generated by SEPA and have been reproduced in this Local Flood Risk Management Plan from the Orkney Flood Risk Management Strategy. The Orkney Local Plan District Partners gratefully acknowledges the cooperation and input that various parties have provided, including inter alia, the following organisations:

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Local authorities.

Lead authorities acknowledge the provision of flood models and other supporting data and information from local authorities in Scotland and their collaboration in the production of flood risk management information.

Scottish Water.

Local authorities acknowledge the inclusion of surface water flooding data generated by Scottish Water in preparation of flood risk information.

Photographs.

Orkney Islands Council acknowledges with gratitude the following persons for providing permission to use their photographs within the body of this plan.

Nicky Budge, Cover photo – Kirkwall Bay, 5 December 2013.

Bruce Flett, boy on scooter, Peedie Sea, Kirkwall, 3 November 2013.

Orkney Library and Archive: flood on Albert Street, Kirkwall, 24 September 1909; Whitehall, Stronsay, circa 1990; Stromness, date unknown circa 1909; Cromarty Square, St Margarets Hope, 14 February 1914.

Diane Grieve, Road network on Sanday affected by coastal flooding, December 2013.

Mark Crook, Sanday from the air highlighting relationship with the sea.

Kirst Teale, Whitehall village during a storm event.

Lizzy Walls, Peedie Sea and Pickaquoy, Kirkwall, 26 October 2006.

Hazel Berston, St Marys village, Holm, 12 January 2005.

Danny Harcus, Coastal flooding, Pierowall, 12 January 2005.

Teenie Harcus, Gill Pier, Pierowall, Westray, 5 December 2013.

Annex 6: What to do in the event of a flood – a contact sheet.

Flooding: what to do and who can help.

What you can do.

You are the first line of defence against floods. It is your responsibility to protect yourself, your family and your property and possessions from flooding. Some actions you can take are listed below.

Get prepared.

- Sign up to SEPA's Floodline service for free alert information. Call 0345 988 1188 or go to [SEPA's flooding site](http://www.sepa.org.uk/flooding).
- Make sure you have adequate insurance which covers flooding.
- Know how to turn off your electricity and water mains supplies.
- Consider how to protect your home: buy sandbags or other flood protection products. Check this list of product suppliers: www.sepa.org.uk/flooding.
- Report to OIC or Scottish Water (contact details overleaf) any concerns you have about the condition of sewer network that may cause flooding. If an automated system always leave a message.

Take action – when safe and possible.

- Establish the source of flooding – foul water, surface water or coastal waters.
- Contact the relevant authority dependent on the source. (contact details overleaf). Always leave a message.
- Use SEPA's Floodline for the latest information (0345 988 1188 or online at www.sepa.org.uk)
- Move pets, vehicles and other valuables to safety, when it is safe to do so.
- Store portable valuable, sentimental and important items upstairs, in a high place or a watertight container.
- Alert your neighbours', particularly the elderly and vulnerable.
- Put sandbags or other flood protection measures in place but ensure you do not block any safety vents; make sure your property is properly ventilated. Makeshift sandbags can be made from bin bags, carrier bags or even pillowcases filled with soil.
- Put the plug in sinks and baths (including overflow) and a sandbag in the toilet bowl to prevent sewage from flowing back up.
- Turn off electric and water. Unplug electrical items and move upstairs if possible.
- Avoid contact with flood water as it may be contaminated with sewage.
- Be aware of hazards below flood water, e.g. displaced manhole covers.
- Emergency Services (999 – Ambulance, Police, and Fire Services) should only be contacted in case of an emergency, i.e. if you are concerned about your safety or the safety of others, and act immediately on any advice provided.

After flood waters have receded.

- Check with Scottish Water before turning water supplies back on: 0800 0778 778 or online at [Scottish Water website](#). Businesses will need to contact their licensed water provider. Anyone on a private water supply should consider whether it could be contaminated.
- Contact the Scottish Flood Forum for further advice. 01698 839021 or via the [Scottish Flood Forum](#) website.
- Do not re-enter any building until you know it is safe to do so.
- Wear protective clothing including rubber gloves and wellies when cleaning up. Watch out for nails and broken glass.
- Open doors and windows to ventilate the house but take care to keep it and valuables secure.
- Contact your electricity company and have your supply checked before turning back on.
- Make a record of flood damage, especially photographs and video footage, and call your insurance company as soon as possible.
- Responsibly dispose of any flood water contaminated items that cannot be properly cleaned, unless you need to keep them for an insurance claim assessor to inspect.
- Consider using flood resistant materials and building methods when repairing damage caused by floods.

Who can help?

The Scottish Environment Protection Agency (SEPA) is Scotland's flood authority and:

- operates flood warning schemes in many parts of Scotland;
- helps local authorities identify sustainable actions to manage flooding;
- provides flood warnings through Floodline: 0345 988 1188;
- provides information, including an online map you can use to check whether your home or business is at risk from river or coastal flooding at: [SEPA Flood Maps](#)

Orkney Islands Council:

- manages flood defence measures and schemes;
- inspects and maintains bridges, roads, gullies, carrying out flood defence infrastructure maintenance and repair works;
- maintains and manages the surface water drainage network;
- works with emergency services in response to severe flooding.

Prior to a potential flood event OIC Operations will –

- issue warnings that there is a risk of flooding;
- ensure Peedie Sea levels are lowered;
- clean gullies and debris from known high risk areas.

During heavy rainfall/recognised flood event OIC operations will

- monitor flood levels in known and reported areas and take appropriate action;
- close roads as necessary;
- respond to reports of flooding.

Flood event contact number: 01856 876338. This is not a 24hr manned emergency line and may be an automated system - always leave a message!

Scottish Water works with local authorities and SEPA to minimise flood risk and:

- manages the public water and waste water network;
- is responsible for minimising risk of sewer flooding.
- To report a flooding incident which appears to be contaminated with sewage phone 0800 0778 778. Always leave a message!
- Scottish Water can only act upon incidents that are reported through their system!
- Any flooding from foul network, internal or external, **MUST** be reported to Scottish Water, if not there will be no response provided and the event not noted on the risk register.

You:

In order that flooding events are suitably recorded Orkney Islands Council would be very grateful if individuals could share relevant information so that incidents can be recorded for future reference.

Details of flood events that should be reported include:

1. Was the event reported to OIC or Scottish Water at the time?
2. Date, time and location
3. Source of flooding – i.e. foul water, surface water, coastal water or other (please identify)
4. Extent of flooding – this can be a photograph or even a sketch with identifiable features
5. Severity of flooding – depth of water in flood areas relative to photo/sketch
6. Time of event – start of flood, approximate time of greatest severity and time of dissipation

Any information is better than no information. Please forward information to Flood Risk Management Team, Engineering Services. Development and Infrastructure, Orkney Islands Council, School Place, Kirkwall, KW15 1NY or by email to developmentandinfrastructure@orkney.gov.uk