

Flood risk management plans 2021-2027: Strategic environmental assessment Environmental report

July 2021

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SEA Environmental Report Cover Sheet

PART 1

To: SEA.gateway@gov.scot

PART 2

An SEA Environmental Report is attached for the plan, programme or strategy (PPS) entitled:

Flood risk management plans 2021-2027

The Responsible Authority is:

Scottish Environment Protection Agency (SEPA)

PART 3

Please tick the appropriate box

☒

The PPS falls under the scope of Section 5(3) of the Act and requires an SEA under the Environmental Assessment (Scotland) Act 2005. **or**

☐

The PPS falls under the scope of Section 5(4) of the Act and requires an SEA under the Environmental Assessment (Scotland) Act 2005. **or**

☐

The PPS does not require an SEA under the Environmental Assessment (Scotland) Act 2005. However, we wish to carry out an SEA on a voluntary basis. We accept that, as this SEA is voluntary, the statutory 5 week timescale for views from the Consultation Authorities cannot be guaranteed.

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(electronic
signature
is acceptable)

H. Panter

Date

26 July 2021

Non-Technical Summary

This is the summary of the environmental report for the 14-draft flood risk management plans, covering the period 2021 to 2027, that set out the future direction and priorities for managing flooding in Scotland. The environmental report presents the results of a strategic environmental assessment (SEA) carried out as part of the preparation of the flood risk management plans.

The environmental report and this summary are required to be published with the draft flood risk management plans in order that people can understand and comment on how environmental effects should be taken into account in the development of the final flood risk management plans. The final flood risk management plans will be published in December 2021.

These 14 flood risk management plans, taken together, will comprise a national flood risk management plan for Scotland, as required by the European Union Floods Directive and the Flood Risk Management (Scotland) Act 2009, and update the first set of flood risk management plans published in 2015.

Flood risk management plans

Flood risk management plans set the direction and priorities for flood risk management in Scotland. They are being produced by SEPA, in collaboration with local authorities, Scottish Water and other partners.

The flood risk management plans aim to reduce overall flood risk in the most sustainable way. They focus on areas, known as target areas, that we have identified as containing significant flood risk across Scotland. To enable a sustainable and holistic approach, they

also consider the catchments and coastal areas that contribute to this risk, including cross-border catchments between Scotland and England.

The flood risk management plans identify the hazards and risks of flooding from river, sea, and surface water; set out objectives for reducing flood risk; and select the best combination of actions to meet these objectives.

To supplement the flood risk management plans, lead local authorities are producing local flood risk management plans that describe the delivery and funding arrangements for the actions. (Note it is only the flood risk management plans and not the local flood risk management plans that are the focus of this Strategic Environmental Assessment).

The public consultation on the draft flood risk management plans seeks views on the proposed flood risk management objectives and actions. Consulting at this stage in the planning process enables SEPA to provide an early and effective opportunity for engagement to ensure views are taken into account before the final flood risk management plans are produced.

Scotland's environment: current condition and pressures

Scotland has a population of around 5.4 million and this is projected to rise. There are 284,000 homes and businesses at flood risk in Scotland (1 in 11 homes and 1 in 7 businesses). Scotland's environment is varied with an extensive coastline, numerous freshwater and sea lochs, large areas of forest, moorlands, peatlands and uplands. Extensive areas of land are protected for their habitats and species. The quality of the environment, landscape and rich cultural heritage make extremely important contributions to Scotland's economy and the wellbeing of its people. The condition of Scotland's

environment is generally good and improving. Water quality is mainly good or excellent and areas of woodland are expanding. Relevant pressures on the environment include water quality pressures from pollution (such as run off from the rural and urban environment), loss of natural habitat due to development and climate change, erosion of peatlands, and fragmentation of habitats such as wetlands and woodlands. Climate change is likely to lead to increased flooding due to sea level rise and changes to patterns of rainfall.

Strategic environmental assessment

We have assessed the likely environmental effects of the draft flood risk management plans. Our environmental assessment is strategic. It considers the potential effects of the types of actions identified for each of the 14 Flood risk management plans and, on a combined basis, across Scotland.

The types of actions considered within the assessment include:

- *Data collection and mapping*: actions to improve our understanding of flood risk and identify whether there is a need for data collection or to improve our strategic flood maps;
- *Planning and resilience*: non-structural actions that avoid creating new flood risk and improve resilience to flooding;
- *Flood studies*: locations where further study is required to identify actions to manage flood risk; and
- *Flood schemes and works progressing to design and implementation stage during Cycle 2: 2021 – 2027*: proposals for flood schemes or works to be progressed to design and implementation stages, subject to funding. Some schemes and works are

scoped out of this assessment, as detailed in the main body of the Environmental Report.

The key effects for the whole of Scotland are given in this non-technical summary. More detail can be found in the main body of the environmental report and in appendices E to R (which provide further assessment and recommendations for the individual flood risk management plans).

The flood risk management plans propose a wide range of actions to manage flood risk; some actions focus on specific target areas whereas some apply across the whole of Scotland. The actions are anticipated to have significant positive effects on population, human health and material assets, through reducing flood risk and protecting people, property and infrastructure.

The effects of the Plans on other aspects of the environment are described in the table below and comprise a mix of positive, negative, mixed and neutral effects. No significant negative effects have been identified from this assessment, although the effects will depend on the actions chosen for inclusion in the final flood risk management plans, how these are designed and implemented and take account of the sensitivity of the surrounding environment.

Flood studies are proposed across many target areas, but it is not possible to assess the environmental effects at this stage. Instead, for these target areas, our assessment highlights the key environmental constraints that should be taken into account to minimise potential negative effects and identifies any opportunities for environmental enhancement.

The key recommendations in the table below include recommendations to mitigate negative environmental effects or opportunities for environmental enhancement that should be considered as the actions within the flood risk management plans are implemented. SEPA will monitor the effects that the flood risk management plans are having on the environment. The main mechanism will be through the flood risk management plans themselves, which will report on improvements to flood risk management.

Summary of potential effects of the draft flood risk management plans and key recommendations

SEA topic	Summary of assessment	Key recommendations
Population and human health	Overall, the Plans could have a significant positive effect on population and human health. The proposed actions seek to reduce flood risk to a significant number of homes and communities, targeting the most vulnerable communities. In improving the resilience of these communities, this would protect human health and support wellbeing.	Opportunities should be sought to provide and enhance the quality of public open space and improve access to the natural environment, to improve health and wellbeing. Actions should also seek to support local regeneration proposals and to target opportunities towards the most disadvantaged communities.
Biodiversity	Overall, the flood risk management plans could have mixed effects on biodiversity, with effects dependent on the type and location of actions. Where actions provide opportunities for habitats protection, restoration and creation, there could be benefits for biodiversity. There is the potential for negative effects where actions may impact on designated sites or disrupt natural processes.	Potential negative effects can be mitigated through the identification of impacts, sympathetic design and timing of works to avoid or minimise the effects on habitats and wildlife, along with consultation with relevant organisations. Opportunities for habitat creation or improvement should be sought as actions are progressed. Potential negative effects on protected sites are assessed by SEPA as part of the Habitats Regulations

SEA topic	Summary of assessment	Key recommendations
		Appraisal for the flood risk management plans and mitigation applied where required. Habitats Regulations Appraisal will be applied at more detailed levels of flood risk management planning.
Water	<p>Overall, the Plans could have mixed effects on water; depending on the type and location of actions.</p> <p>There is potential for negative effects on water quality where engineered actions impact on sensitive water environments and the potential for degradation of beds and banks of rivers and coastlines. This is balanced with the opportunity to support River Basin Management Plan objectives to prevent deterioration and improve water quality status, with overall positive effects on the water environment.</p>	<p>Potential negative effects on the water environment can be mitigated by understanding the effects on physical processes, including flows and erosion, within rivers and coastal waters; minimising potential habitat loss; and including habitat creation in flood risk management actions.</p> <p>Negative effects should be addressed during flood studies and design of flood schemes and works.</p> <p>Actions that can affect the freshwater environment (such as flood storage actions) are regulated under the Controlled Activities Regulations, which aim to protect the water environment. Mitigation is considered as part of the authorisation process.</p>

SEA topic	Summary of assessment	Key recommendations
		Some actions, particularly those deemed as development, will be regulated under the land use planning system; and environmental effects will be addressed through project level Environmental Impact Assessments.
Soil	<p>Overall, the Plans could have a neutral effect on soil, depending on the quality of the land and extent and location of the action.</p> <p>Potential benefits if high value land and associated soils is protected from flooding, and where carbon-rich soils are restored or improved.</p> <p>Alterations to natural processes, however, could result in the loss or erosion of areas of high value agricultural land or carbon rich soils (e.g., peatland).</p>	<p>Modelling of natural processes can help to better predict and mitigate potential negative effects on soil. This should be considered during flood studies and design of flood schemes and works.</p>
Climatic factors	Overall, the Plans could have a positive effect on climatic factors as the actions provide resilience in terms of future climate change whether through	Flood studies (including adaptation plans) should seek to develop actions and management plans that can be adapted to a changing climate. Flood schemes and

SEA topic	Summary of assessment	Key recommendations
	structural actions or planning and resilience measures. Actions should be developed in line with the Plans' national principles to 'Take a long term, risk-based approach to flood risk management decisions and one that considers the impacts of and adaptability to climate change'.	works should be designed to include consideration of the long-term impacts of climate change. Opportunities should be sought during flood studies and design of flood schemes and works to avoid highly engineered solutions which could negatively affect greenhouse gas emissions and to minimise the use of non-renewable or high energy resources in maintenance and construction.
Material assets	Overall, the Plans could have a significant positive effect on material assets and key infrastructure, where present, by reducing flood risk. This protection of material assets would provide resilience and adaption for future climate change predictions and reduce the resource required to replace assets.	Opportunities to minimise waste and resource use should be examined during flood studies and design of flood schemes and works.
Cultural heritage	Overall, the Plans could have mixed effects on cultural heritage.	Potentially negative effects on cultural heritage can be mitigated through the identification of any heritage assets (including archaeology) and the early

SEA topic	Summary of assessment	Key recommendations
	<p>The actions are likely to benefit the historic environment by helping to improve understanding of flood risk (thereby enabling better adaptation planning) and through reducing the level of flood risk. There is potential for negative effects where the construction of new defences are in areas of high cultural or archaeological sensitivity, although this would be depend on the type and design and location of actions.</p>	<p>engagement of heritage interests during flood studies and design of flood schemes and works.</p>
Landscape	<p>Overall, the Plans could have neutral effects on landscape.</p> <p>Positive effects on landscape could results from actions that restore or create natural habitats. There is, however, potential for actions that include the construction of new engineered features to interrupt the views of rivers or coasts, or negatively affect the local landscape. These negative effects would depend on the</p>	<p>Potential negative effects to landscape should be addressed during flood studies and design of flood schemes and works.</p> <p>Opportunities for enhancement of the local landscape and public realm should be considered including expansion of green network infrastructure where appropriate. Catchment-based approaches to flood risk management should seek to identify landscape scale opportunities.</p>

SEA topic	Summary of assessment	Key recommendations
	type, design and location of actions and would likely be localised.	Consultation with NatureScot, National Park Authorities (where appropriate) and affected communities is recommended.

Abbreviations

EIA	Environmental Impact Assessment
LPD	Local Plan District
PVA	Potentially Vulnerable Area
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SFM	Sustainable Flood Management
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SUDS	Sustainable Drainage Systems

1 Introduction

1.1 Background

The Flood Risk Management (Scotland) Act 2009 introduced a new plan-led approach to flood risk management in Scotland. The legislation aims to reduce overall flood risk in the most sustainable manner. It requires the production of flood risk management plans covering each of 14 Local Plan Districts as shown on Figure 2.1. The requirements are met via a set of complementary plans for each Local Plan District: a flood risk management plan produced by SEPA, and a Local flood risk management plan produced by a Lead Local Authority.

In December 2015, SEPA published Scotland's first set of flood risk management plans (formerly known as flood risk management strategies) that set out the future direction and priorities for managing flooding. The Local flood risk management plans (published by Lead Local Authorities in June 2016) described the delivery and funding arrangements for the agreed priorities.

The plans are updated every six years, and accordingly SEPA will publish the next, second, flood risk management plans in 2021 covering the period 2021 to 2027.

1.2 Purpose and content of the Environmental Report

As part of the preparation of the flood risk management plans, SEPA is carrying out a Strategic Environmental Assessment (SEA). SEA is required by the Environmental Assessment (Scotland) Act 2005 and is a systematic method for considering the likely environmental effects of certain plans, programmes and strategies. SEA aims to: integrate environmental factors into the preparation of and decision-making for plans, programmes

and strategies; and enhance environmental protection; increase public participation; and facilitate the openness and the transparency of decision-making.

The purpose of this environmental report is to: provide information on the draft flood risk management plans; identify, describe and evaluate the likely significant effects of the flood risk management plans and their reasonable alternatives; and provide an early and effective opportunity for the Consultation Authorities (namely NatureScot and Historic Environment Scotland) and the public to offer views on any aspect of this environmental report.

This report presents an environmental baseline at a national level and an assessment of likely significant effects of the draft flood risk management plans, within Local Plan Districts and across Scotland, in terms of the following aspects of the environment: biodiversity, population and human health, soil, water, climatic factors, material assets, cultural heritage and landscape. The scoping report, published in October 2019, scoped out air quality on the basis that the draft flood risk management plans are unlikely to result in a significant impact on air quality. Where significant adverse effects are anticipated, potential mitigation actions or monitoring requirements have been identified.

The assessment is presented in the following sections of this environmental report:

- The flood risk management plans (Section 2);
- Relevant aspects of the current state of the environment (Section 3);
- Approach to the SEA objectives and alternatives considered (Section 4);
- Environmental assessment of the flood risk management plans (Section 5);
- Mitigation and monitoring (Section 6); and

- Next steps (Section 7).

This environmental report is supported by a more detailed baseline and assessment for the draft flood risk management plan in each Local Plan District as presented in Appendices E to R.

1.3 SEA activities undertaken to date

1.3.1 Screening and scoping

SEPA determined that the flood risk management plans fall within the scope of the Environmental Assessment (Scotland) Act 2005. We published the screening determination within our scoping report, which was issued for consultation from 2 October to 6 November 2019.

The scoping report set out the proposed scope of and approach to the SEA. We received five responses to the scoping report consultation. Due to the cyberattack on SEPA in December 2020, we are unable to include our analysis of the responses in Appendix A as originally planned.

1.3.2 Notification of consultation period

In our scoping report we proposed a three-month consultation period for the draft SEA Environmental Report, with a start date of December 2020 to run in conjunction with the consultation on the draft flood risk management plans. Due to changes in the consultation dates for the draft flood risk management plans and the cyberattack on SEPA, the consultation period for the environmental report was amended to start on 30 July 2021.

2. The flood risk management plans

2.1 Key facts

The flood risk management plans 2021-2027 build on the first published in 2015. The plans provide an update on our understanding of flood risk and set the future direction and priorities for managing flooding. Table 2.1 sets out the key facts about the flood risk management plans.

Table 2.1: Key facts about the flood risk management plans 2021-2027

Responsible Authority	Scottish Environment Protection Agency (SEPA)
Title	Flood risk management plans 2021-2027
Purpose	To set the overarching direction and priorities for the sustainable management of flood risk in Scotland. To help deliver the vision for sustainable flood risk management, as set out in the Scottish Government guidance on Delivering Sustainable Flood Risk Management ¹
What prompted the flood risk management plans	The Flood Risk Management (Scotland) Act 2009, which transposes the EU Directive (2007/60/EC) on the assessment and management of flood risks
Period covered	December 2021 - December 2027 (Cycle 2)
Frequency of updates	Every six years (Cycle 1: 2015 – 2021; Cycle 2: 2021 – 2027; Cycle 3: 2027 – 2033)
Area covered	Scotland, via 14 flood risk management plans, one for each Local Plan District
Objectives of flood risk management plans	The objective is to reduce overall flood risk in the most sustainable way

¹ Scottish Government 2019. Delivering sustainable flood risk management: guidance. Link: <https://www.gov.scot/publications/flood-risk-management-scotland-act-2009-delivering-sustainable-flood-risk-management/>

2.2 Areas covered by the flood risk management plans

The Flood risk management plans focus on Potentially Vulnerable Areas (PVA) that SEPA has identified as containing significant flood risk (Figure 2.1). Within each Potentially Vulnerable Area, target areas have been identified that are the focus of further assessment. A total of 444 target areas have been identified within the 14 Local Plan Districts across Scotland.

To enable a sustainable and holistic approach, the Flood risk management plans identify and consider the catchments and coastal areas that contribute to the sources of flood risk in these target areas, including cross-border catchments between Scotland and England.

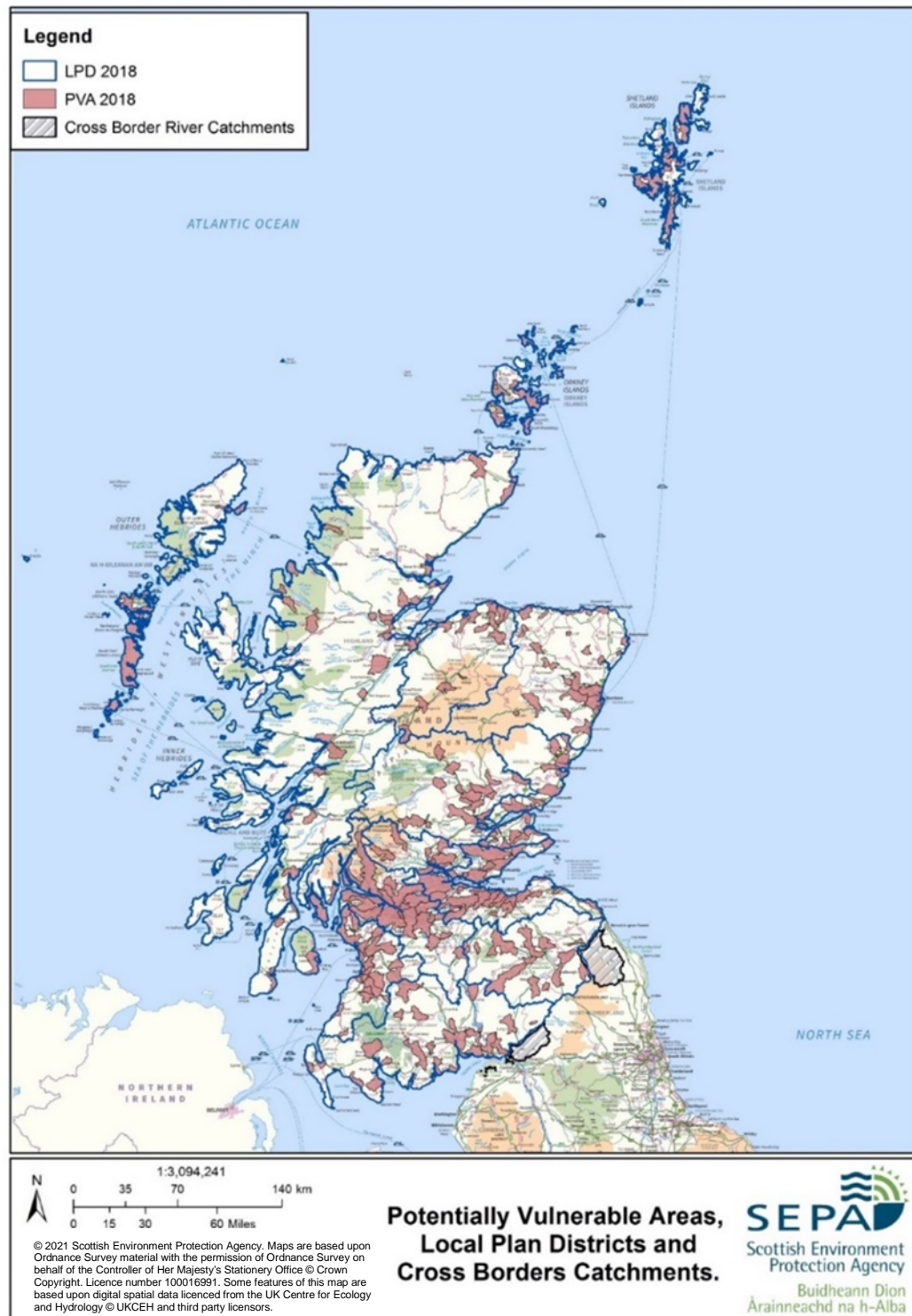


Figure 2.1: Potentially Vulnerable Areas (PVAs), Local Plan Districts (LPDs) and Cross Border River Catchments

2.3 Key content of the flood risk management plans

2.3.1 Overview and principles

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 requires that the environmental report includes “an outline of the contents and main objectives of the plan or programme”. The purpose of this section is to explain the nature, contents, objectives and timescale of the second Flood risk management plans 2021-2027.

The flood risk management plans set out the plan for the management of flood risk in Scotland in a sustainable manner, focusing on areas of significant flood risk as shown on Figure 2.1. The Plans consider flood risk from rivers, the sea and surface water. For each target area, the Plans identify the main flood hazards and impacts, set objectives for managing current and future flood risk, and select the most sustainable combination of actions to meet the objectives.

Scottish Government’s guidance on delivering sustainable flood management identifies seven sustainable flood management (SFM) outcomes that give Scotland a direction towards managing flood risk in a sustainable way. The SFM outcomes were used as the basis for the setting of national principles and objectives, which then influence the selection of the most sustainable combination of actions, within the flood risk management plans.

Based on the SFM outcomes, the Plans set out three high-level national principles for sustainable flood management as follows:

- Take a long term, risk-based approach to flood risk management decisions and one that considers the impacts of and adaptability to climate change;

- Deliver coordinated and integrated flood risk management by engaging with communities and working in partnership, sharing data, expertise, services and resources; and
- Consider whole catchments and coastlines and work with natural processes and the environment to deliver multiple outcomes.

These overarching principles for sustainable flood risk management underpin the identification of flood risk objectives and actions within the flood risk management plans.

2.3.2 Flood risk management objectives and actions

The key aspects of the flood risk management plans relevant to the SEA are the objectives, which set out what flood risk management should seek to achieve, and the actions, which set out how these objectives could be achieved.

Flood risk management objectives

In each target area, SEPA and the responsible authorities have set objectives for the management of flood risk. In some locations, the objectives provide a short-term direction that will be reviewed and updated when more information is available. In others they provide a long-term direction for the management of flooding within a community. The objectives along with the current understanding of flood risk help to identify the actions that are required in the short and long term.

Flood risk management actions

The flood risk management plans identify the most sustainable combination of actions to meet the objectives. There are specific actions for individual target areas, and also actions

that apply across all the 14 LPDs. The actions, and how they have been categorised for the purpose of the SEA, are listed in Table 2.2.

Table 2.2: Scoped-in flood risk management actions, and categorisation for the purposes of the SEA

Category (for the SEA)	Scoped-in actions from the flood risk management plans
Data collection and mapping Actions that seek to improve our understanding and mapping of flood risk, and/or identify whether there is a need for further study.	<ul style="list-style-type: none"> • Data collection • Strategic mapping improvements • Sewer flooding assessment • National updates to SEPA's hazard and risk assessments for flooding and reservoirs
Planning and resilience Actions that help to avoid flood risk and seek to improve resilience to flooding	<ul style="list-style-type: none"> • Property flood resilience schemes • Flood forecasting and warning • Community resilience group • Community engagement • Local land use planning • Awareness raising • Self help
Flood studies A study will identify the most appropriate next steps for the target area	<ul style="list-style-type: none"> • Flood study • Surface water management plan • Site protection plan • Shoreline management plan • Adaptation plan • Integrated catchment study • Catchment/coastal management implementation (if study is required)

Category (for the SEA)	Scoped-in actions from the flood risk management plans
<p>Flood schemes and works at design/ implementation stage in Cycle 2 (2021 – 2027)</p> <p>Proposals for flood schemes or works or catchment/coastal management actions that will be progressed to design and implementation stages, depending on funding. Some schemes and works are scoped out - see Section 2.3.</p>	<ul style="list-style-type: none"> • Flood scheme or works design • Flood scheme or works implementation • Catchment/coastal management implementation (if at design stage)

Actions scoped out of the SEA

Not all of the actions within the flood risk management plans are assessed in this SEA. The following types of actions have been scoped out:

1. 42 formal flood protection schemes currently being designed or implemented by Local Authorities. These were assessed in the SEA for the 2015 Flood Risk Management Strategies. Environmental Impact Assessment (EIA) will be applicable to formal Flood Protection Schemes.
2. Flood schemes or works already at implementation stage (design stage is complete). These are scoped out, as the SEA will not influence their design. EIA, if applicable, is more relevant for these actions
3. Flood schemes or works that will not commence to design stage until a flood study has been completed. In these locations, we have assessed the potential effects of the flood study, rather than any flood schemes or works that may stem from the study.
4. Flood schemes or works that will commence to design stage from 2028. These schemes and works will be reviewed as part of the preparation of the FRM plans 2027 – 2033, and it will be more appropriate to assess them in the SEA at that time.
5. Any actions from other plans, programmes or strategies, where the action would be more meaningfully assessed therein. Includes actions that are being progressed by other organisations through existing / ongoing projects. Also includes national land use planning actions and emergency plans.
6. Maintenance of existing flood defences and watercourses. These are scoped out as they are a continuation of existing activities.

2.4 Contents of the Plans assessed by the SEA

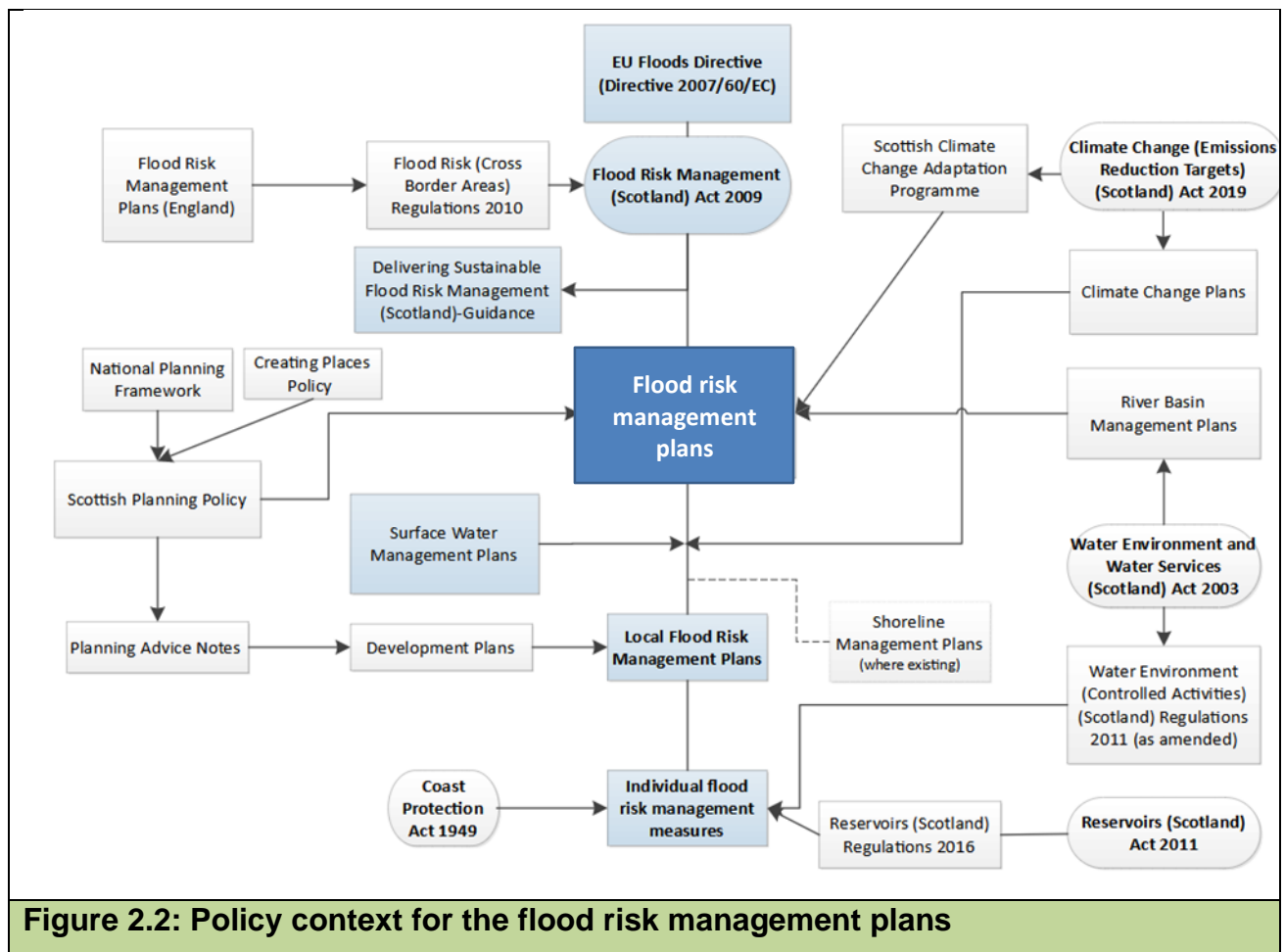
The SEA focuses on the parts of the draft Plans that set objectives or propose new or amended actions to manage flood risk: namely, the objectives and scoped-in actions, as described in Section 2.3 and Table 2.2.

Those parts of the draft Plans which provide factual information, those that describe existing actions, those where environmental assessment will take the form of EIA, and those that describe actions set out by other plans, programmes and strategies are not assessed (refer to Section 2.3).

The SEA makes an assessment at two spatial scales: at the Local Plan District level to identify the impacts of the local actions proposed in each plan (as detailed in Appendices E to R), and at a national scale to identify the cumulative effects of actions across Scotland (in Section 5 of this report).

2.5 Relationship with other plans, programme or strategies and other policy objectives

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 requires that the environmental report includes an outline of the flood risk management plans' relationships with other relevant plans, programmes and strategies, and how environmental protection objectives have been taken into account. This section sets out these relationships and also describes the policy context within which the flood risk management plans operate and the constraints and targets that this context imposes.



The policy context for the flood risk management plans is set out in Figure 2.2. There is a hierarchy of planning, from the strategic (Flood risk management plans), implementation (Local flood risk management plans) to the development and delivery of individual actions. In addition, actions to manage surface water are being developed by Local Authorities in Surface Water Management Plans; these plans aim to reduce the risk of surface water flooding in the most sustainable way, in line with [guidance](#)² from the Scottish Government.

² Scottish Government 2018. Surface water management planning: guidance. Link: <https://www.gov.scot/publications/flood-risk-management-scotland-act-2009-surface-water-management-planning/>

The relationships between the objectives and requirements for the flood risk management plans and other relevant plans, programmes and strategies, have also been considered. These relationships are detailed in Appendix B. Table 2.3 provides a summary of the key environmental requirements and objectives derived from the policy review in terms of each environmental aspect required to be considered within the SEA.

Table 2.3: Key environmental requirements and objectives from other plans, programmes, and strategies.

Sea topic	Key environmental requirements and objectives
Population and human health	<ul style="list-style-type: none"> • Prevent risk to life, injury illness and stress due to flooding; • Reduce the exposure of people to flooding through policies and advice regarding new developments in flood risk areas; • Support the protection/development of core paths for walking, cycling and riding; and • Improve arrangements to warn, inform and advise the public in the event of an emergency.
Biodiversity, flora and fauna	<ul style="list-style-type: none"> • Promote the maintenance, protection and restoration of biodiversity on land and in Scotland's seas at all levels; • Connect people with the natural world to enhance their health and wellbeing and to involve them in decisions about their environment; • Support the management of features of the landscape which are of major importance for wild fauna and flora; • Maximise the benefits of a diverse natural environment and the services it provides to deliver multiple benefits, including social and sustainable economic growth; • Create a natural environment resilient to the threats of climate change, invasive species, habitat fragmentation, pests and diseases; and • Protection of habitats and species that could be adversely affected

Sea topic	Key environmental requirements and objectives
	by flooding and those that benefit from flooding.
Soil	<ul style="list-style-type: none"> • Safeguard and maximise the multiple benefits and functions of soils as a vital part of Scotland's economy, environment and heritage; • Protect and promote carbon-rich soils, such as healthy peatland, due to the benefits of carbon capture and storage; and • Protect from erosion and utilise the soil environment to contribute to sustainable flood management.
Water	<ul style="list-style-type: none"> • Improve the environmental status of water bodies and reduce adverse impacts on the water environment; • Promote sustainable water use by reducing discharge and emissions and the pollution of groundwater; and • Mitigate the impacts of flooding.
Climatic factors	<ul style="list-style-type: none"> • Deliver infrastructure that is adaptable and resilient to climate change, including adapting to future changes in precipitation and sea level, and reduces emissions (e.g. from construction and maintenance, land use change, water pumping). • Improve monitoring of flood risk.
Material assets	<ul style="list-style-type: none"> • Promote sustainable design and innovation to reduce material consumption; • Minimise waste generation; • Support an innovative approach to heat generation/ renewable infrastructure; • Minimise the use of raw materials; and • Safeguard essential infrastructure from flooding.
Cultural heritage	<ul style="list-style-type: none"> • Enhance the cultural, social, environmental and economic value of Scotland's historic assets in order to achieve sustainable development in communities; • Emphasise the positive impact of protecting these assets on building

Sea topic	Key environmental requirements and objectives
	<p>vibrant communities through good design;</p> <ul style="list-style-type: none"> • Detrimental impacts on the historic environment should be minimised; • Strengthen the collaboration between different organisations and groups in protecting the historic environment; and • Protect important cultural heritage assets and historic marine areas from flood risk.
Landscape	<ul style="list-style-type: none"> • Protect Scotland's landscape due to its contribution to quality of life, promoting the country's national identity and enhancing the economy; • Ensure that the unique qualities of Scotland's cities, their historic environment and the character of its urban areas are safeguarded for the future; and • Protect important landscape and natural environmental features from flooding.

2.6 Key stages of environmental influence in development of the Plans

The development of the draft flood risk management plans has been an iterative process as set out in Figure 2.3. Throughout this process, environmental and sustainability considerations have been central to decision-making.

Having identified areas at significant flood risk, the Plans set objectives for a holistic, integrated and sustainable approach to flood risk management taking into account national SFM outcomes and principles. Prior to identifying actions to meet these objectives, environmental constraints and opportunities were reviewed and considered for all target areas at risk and their associated wider catchments and coastal areas, as appropriate. These then directly informed the identification of actions.

The objectives and all identified actions within the draft Plans were formally considered through the SEA process. This environmental report provides an assessment of any identified significant effects and recommends associated actions to mitigate and monitor these.

In addition, given the considerable uncertainty regarding future actions arising from the Plans, in particular the recommendations for numerous proposed flood studies, this SEA identifies and 'signposts' relevant constraints and opportunities that should be taken into account as these are further developed and flood risk management actions identified for future implementation. Certain types of actions (e.g. proposals for flood schemes) recommended within the Plans will also be subject to further environmental assessment, including, as appropriate, Environmental Impact Assessment (EIA), prior to implementation as set out in Figure 2.3.

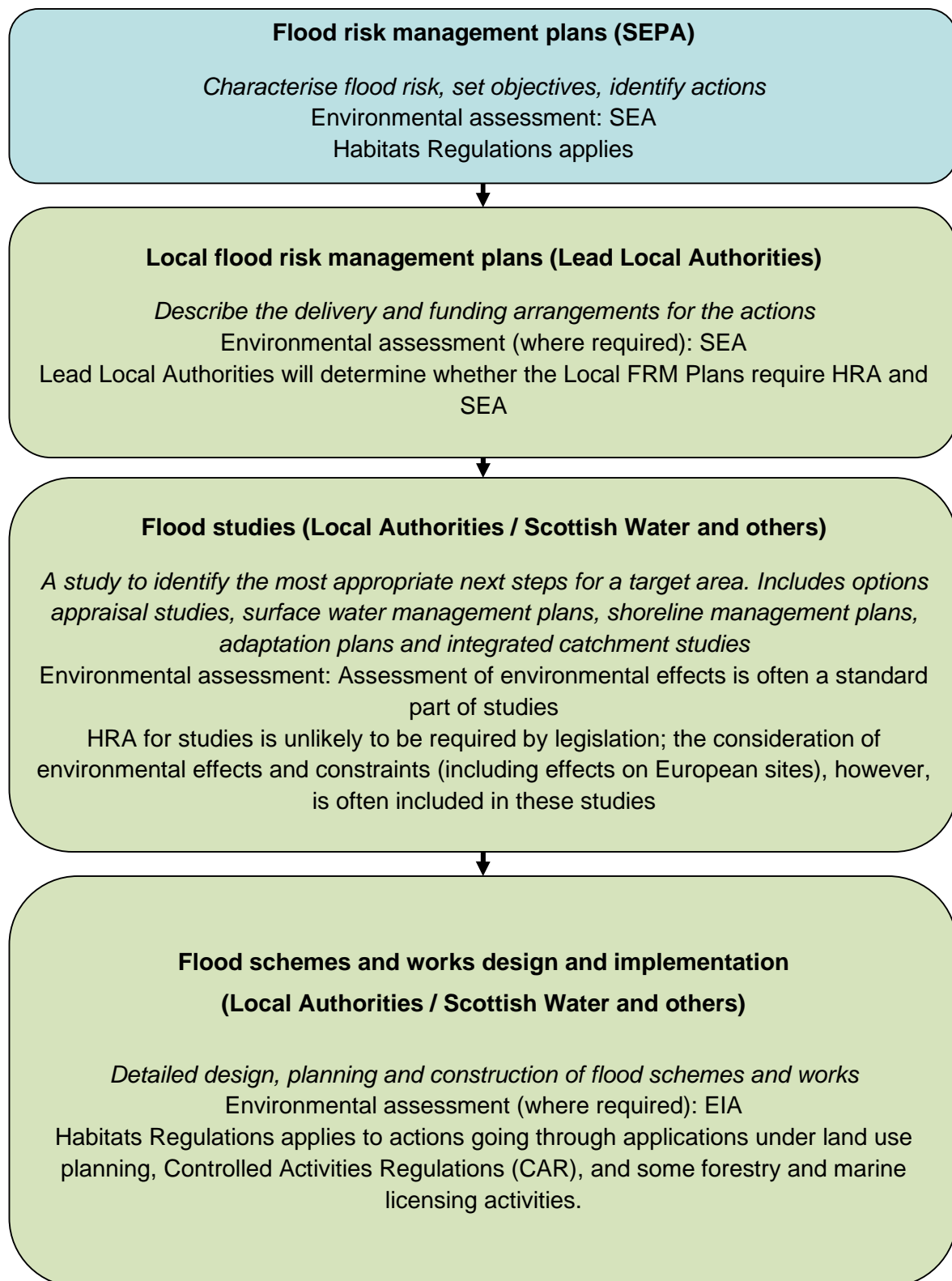


Figure 2.3: Stages in flood risk management planning and links with environmental assessment and Habitats Regulations Appraisal

3. Relevant aspects of the current state of the environment

3.1. Introduction

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 requires that the environmental report includes a description of “the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme”, and “the environmental characteristics of areas likely to be significantly affected”

At a national scale, for each relevant aspect, or environmental topic, the following sections (3.2 to 3.9): provide an overview of existing conditions; summarise existing environmental effects relevant to flood risk management; and summarise the likely evolution of the state of the environment without implementation of the flood risk management plans.

3.2. Population and human health

National overview

Scotland's population was estimated at 5.46 million in 2019 and has increased by 8% in the past decade³. Over 9% of homes in Scotland (229,000) are estimated to be exposed to any type of flooding⁴. Flooding can cause risk to life, injury, illness and stress, and impacts may be greater for more socially vulnerable groups⁵.

³ NRS Scotland Mid-Year Population Estimates, Scotland- [online] Available at: <https://www.nrscotland.gov.uk/files/statistics/population-estimates/mid-19/mid-year-pop-est-19-report.pdf>

⁴ SEPA 2018. The National Flood Risk Assessment 2018. Link: <https://www.sepa.org.uk/data-visualisation/nfra2018/>

⁵ Scottish Government (2015) Mapping flood disadvantage in Scotland. Reports can be found at: <https://www.gov.scot/publications/managing-flood-risk-research/>

Scotland's cities are where 70% of the population live, which accounts for just 2% of the land surface⁶. Scotland's major cities of Edinburgh, Glasgow, Dundee and Aberdeen are in the central belt and on the east coast.

Flooding can impact on people through risk to life, health impacts of exposure to water and contaminants, and immediate and long term mental health impacts including the fear of future flooding. People who have been flooded report that the emotional and non-material impacts (e.g. stress, anxiety, inconvenience, loss of sentimental items) are greater than more tangible material impacts (e.g. financial loss)⁷.

People and communities exposed to the same flood event can experience very different outcomes in their longer-term wellbeing. Factors such as age, health, income and housing tenure can impact on people's vulnerability to flooding. The population is projected to age, with an additional 4% of the population becoming of pensionable age in the 25 years to mid-2043.⁸

Actions to manage flood risk can have wider positive and adverse impacts on people and human health. For example, some actions can help to create or restore habitats and green spaces, which in turn provide opportunities for recreation, leisure and wildlife watching. There is a clear positive relationship between greenspace and health, and

⁶ Scotland's Environment (2014) Scotland's State of the Environment Report 2014 – 7 People and the environment [online] Available at: <https://www.environment.gov.scot/media/1170/state-of-environment-report-2014.pdf>

⁷ Werritty, A., Houston, D., Ball, T., Tavendale, A. and Black, A. (2007) Exploring the social impacts of flooding and flood risk in Scotland. Scottish Executive Social research.

⁸ National Records of Scotland (2019) Projected Population of Scotland (2018-based). Available at: <https://www.nrscotland.gov.uk/files/statistics/population-projections/2018-based/pop-proj-2018-scot-nat-pub.pdf>

compelling evidence for benefits from urban green space and mental health⁹. According to the Scottish Household Survey 2019, over two thirds (66%) of adults in Scotland have access to open green or blue water space within a five-minute walk from their home (not including their own garden), this is decrease from 2013 when it was 68%.

Environmental effects relevant to the flood risk management plans

- Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are deprived or isolated.
- Some flood risk management actions, such as those that restore natural processes, can contribute to greenspace provision and provide benefits in terms of recreation, leisure, amenity, health and well-being.
- Some flood risk management actions, such as flood walls, can restrict or alter access (both short and long term) to riverbanks and shorelines, and remove amenity and opportunities for recreation.
- Flood alerts/ warnings help people take action to protect themselves and their property and can help reduce anxiety about future flooding.

Likely evolution of this environment without the flood risk management plans

There are 284,000 homes and businesses at flood risk in Scotland (1 in 11 homes and 1 in 7 businesses). Under the 2080s UKCP09 High Emissions scenario, an additional

⁹ Health Scotland, Greenspace Scotland, Scottish Natural Heritage and Institute of Occupational Medicine (2008) Health Impact Assessment of greenspace: A Guide. Available at: <https://www.scotphn.net/wp-content/uploads/2015/11/Health-Impact-Assessment-of-greenspace-a-Guide.pdf>

110,000 properties (1 in 9 homes and 1 in 6 businesses) are projected to be at risk of flooding from rivers, surface water and the sea¹⁰.

Demographic change and increasing demands for housing could further increase flood risk and impacts on human health, particularly where this takes place in deprived areas.

Although urban greenspaces are popular, people are visiting their local urban greenspace less frequently (decline in weekly visits in 2018 compared to 2013 and 2011)¹¹.

3.3. Biodiversity, flora and fauna

National overview

The diversity of Scotland's biological and geological natural features is a particularly rich and valued natural resource. A series of nature conservation designations aim to protect the best examples nationally and internationally of the nation's wildlife populations, habitats and earth science features.

According to NatureScot, as of 2020, Scotland's international and nationally designated sites are as follows¹²:

- *International*: 51 Ramsar sites (wetlands);

¹⁰ SEPA 2018. The National Flood Risk Assessment 2018. Link: <https://www.sepa.org.uk/data-visualisation/nfra2018/>

¹¹ Greenspace Scotland 2018: The Third State of Scotland's greenspace report 2018. <https://www.greenspacescotland.org.uk/statistics>

¹² SNH (2020). Safeguarding protected areas and species - National Designations [online]. Available at: <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-areas/national-designations>

- *European:* 251 Special Areas of Conservation (SAC) and 153 Special Protection Areas (SPA);
- *National:* 1,422 Sites of Special Scientific Interest (SSSIs) and 217 Marine Protected Areas (MPAs).

In total these designations cover 1,870 sites protecting nature across Scotland, although some of their boundaries overlap and they host 5,389 designated natural features.

The UK Biodiversity Action Plan has identified 39 priority habitats and 197 priority species either occurring or known to have occurred until recently within Scotland. In March 2020, 79% of natural features on nationally protected nature sites were reported as being in “favourable” condition¹³.

Wetlands are sensitive habitats and support a wide range of animals and plants that are not found elsewhere. These habitats can reduce flooding through slowing the flow of rain into rivers and lochs. Most wetlands within protected sites are in favourable condition, with the exception of lowland raised bogs where 59% of sites are in unfavourable condition.

Scotland's woodlands and forests support a wide range of important plants and animals, in particular, rare and threatened species which are often found in and around semi-natural woodland. As of 2020, 19% of Scotland's land area comprised woodland and

¹³ <https://www.nature.scot/sites/default/files/2020-05/Official%20Statistics%20-%20Protected%20sites%20-%20proportion%20in%20favourable%20condition%202020.pdf>

forestry¹⁴. The conditions of these areas are moderately good, with indications sustainable management will continue improvement.

Mountains, moorlands, blanket bog and rough grassland define much of Scotland's wild landscape, making up 90% of the high mountain habitat in the UK. Of Scotland's uplands, 24% lies within SPAs, 16% within SACs and 22% in SSSIs¹⁵.

Scotland's water environment supports an array of habitats containing nationally and internationally important species. Overall, wildlife within rivers and lochs is considered to be in good condition, however habitats within inshore waters are declining in condition¹⁶.

Actions to manage flood risk can have positive and negative impacts on habitats and species. For example, wetlands can contribute to the management of flooding by slowing the flow of rainwater into rivers, lochs and other watercourses, and by storing water in the floodplain helping to reduce the peak of floodwater passing through towns and cities.

However, wetlands can also be damaged by flooding – for example through sedimentation. Where water levels change on a more permanent basis, this can alter the diversity and composition of wetland species. Sensitively designed schemes can lessen impacts (through mitigation) and look to deliver benefits.

Environmental effects relevant to the flood risk management plans

- The status of biodiversity in Scotland is mixed. For example, the quality of rivers and coastal waters has improved and native woodland has increased while

¹⁴ <https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2020/1-woodland-area-and-planting/>

¹⁵ <https://www.environment.gov.scot/media/1197/land-mountains-and-uplands.pdf>

¹⁶ <https://www.environment.gov.scot/media/1172/water.pdf>

farmland species have been in decline. Risks to our biodiversity, flora and fauna include:

- pressure on wetlands from factors such as land management and changing weather patterns;
- fragmentation of semi-natural habitats;
- nutrient enrichment affecting river and coastal water quality;
- invasive non-native species; and
- changing climate.
- Flooding can impact on habitats and species, both positively and negatively. Some benefit from regular flooding, whereas others may be damaged by sediment or pollutants in flood water or by the actions of flood water.
- Actions to manage flood risk can have positive and negative impacts on habitats and species. For example:
 - habitat creation, restoration or enhancement (for example as part of natural flood management or sustainable drainage systems (SuDS)) can benefit biodiversity, fauna and flora.
 - actions can also help to protect vulnerable designated sites from significant flood risk and ensure that sites that benefit from flooding continue to flood.
 - Some engineering actions, such as the creation of flood walls, could destroy or fragment habitats and in turn impact species, although sensitively designed schemes can lessen impacts through mitigation.

Likely evolution of the environment without the flood risk management plans

- Policies and programmes are in place to protect and restore biodiversity, flora and fauna - many areas show signs of improvement, while some challenges remain.
- Biodiversity, flora and fauna continue to be vulnerable to damage caused by sediment or pollutants in flood water or by the actions of flood water.

3.4. Soil

National overview

Soil is often overlooked as one of a country's most important assets. It is a non-renewable resource that supports a range of natural processes as well as providing environmental, societal and economic benefits to the human population.

Soils provide the basis for agriculture to feed the population and control the flow and quality of water. It is also the foundation for the built environment, providing a stable base for infrastructure and buildings. Soil has inherent links to several SEA topics, including climatic factors, biodiversity, water and air quality, as described below.

Poor soil structure can increase the risk of localised flooding as it reduces the amount of water that can soak into the soil, increasing run off into rivers¹⁷. A study in Scotland found that in winter, 18% of agricultural topsoils had very poor soil structural conditions¹⁸.

A significant amount of Scotland's soil comprises peatland which is a key part of the landscape and cultural heritage. Peatlands cover more than 20% of the country's land area, storing 1.6 bn tonnes of CO₂ through carbon sequestration. It is estimated that over 80% of Scotland's peatlands are degraded, which emit more CO₂ than they sequester¹⁹. Benefits of peatland restoration includes reducing flood risk through the reduction of surface water run-off.

¹⁷ Scotland's Soils – part of Scotland's Environment (2019) State of Scotland's soils – State of Scotland's Soil Report 2011 [online] Available at: <http://soils.environment.gov.scot/soils-in-scotland/state-of-scotlands-soils/>

¹⁸ https://www.crew.ac.uk/sites/www.crew.ac.uk/files/sites/default/files/publication/CRW2014_03%20Final%20Report_0.pdf

¹⁹ <https://soils.environment.gov.scot/resources/peatland-restoration/>

Environmental effects relevant to the flood risk management plans

- Soil is at risk from a number of threats including climate change, land use, land management change and development.
- Good soil structure filters and stores water, helping to reduce surface and sediment laden runoff.
- Actions to manage flood risk that deliver more sustainable land management, create habitats or improve the physical condition of rivers may have positive impacts on soil function.
- Negative impacts may also occur, for example, as a result of construction works that increase compaction, soil sealing, or reduce geodiversity.

Likely evolution of the environment without the flood risk management plans

- Data is currently lacking on the state of Scotland's soils and this makes it difficult to predict future trends. However, loss of soil organic matter, changes in soil biodiversity, erosion/landslides and soil sealing are expected to remain significant issues²⁰.

3.5. Water

National overview

²⁰ Dobbie, K.E., Bruneau, P.M.C and Towers, W. (eds) 2011. The State of Scotland's Soil. Link: <https://www.sepa.org.uk/media/138741/state-of-soil-report-final.pdf>

Scotland has more than 125,000 km of rivers and streams, varying from small highland burns to deep water, wide lowland rivers such as the Tay. There is also a 220 km canal network in Scotland²¹.

Scotland's water is essential for all life and activity, ranging from drinking water to maintaining habitats and supporting a significant part of the economy. Scotland has approximately 19,000 km of coastline, incorporating 470 km² of fishing zones that underpin coastal fishing communities. Water is also used for industrial processes such as whisky production, hydroelectricity generation and recreational activities. Scotland's rivers and lochs contain 90% of the entire UK's freshwater and cover 2% of the land area, making Scotland vital to the UK's water supply.

There are 3652 river, loch, estuary, coastal water and groundwater bodies in Scotland classified for River Basin Management Planning. There are also 1,526 protected areas that are associated with the water environment, including bathing waters, shellfish waters, areas protected for wildlife conservation or areas used to supply drinking water.

In 2019, a total of 65% of Scotland's surface water and groundwater bodies were assessed as being in a good or better condition. This is a 2% improvement on the condition of water bodies reported in 2015, and further improvements are anticipated ²².

Approximately 19% of the Scottish coastline (3,802 km) is soft and has the potential to erode. It is estimated that between half and a third of coastal infrastructure (buildings, roads, rail and water network) are within these erodible sections.²³

²¹ Environment Scotland (2019) <https://www.environment.gov.scot/our-environment/water/scotland-s-freshwater/>

²² <https://consultation.sepa.org.uk/rbmp/draft-river-basin-management-plan-for-scotland/>

²³ National Coastal Change Assessment (NCCA) – National Overview
<http://dynamiccoast.com/files/reports/NCCA%20-%20National%20Overview.pdf>

Effective protection of coastal areas and management of inland water bodies is key to managing flood risk. Actions may include restoring beds, banks and coastline to a more natural state, however, other engineered actions may also be considered.

Environmental effects relevant to the flood risk management plans

- Scotland's water quality and water resources are at risk from factors such as population growth and development, land use change and management, diffuse pollution, water abstraction, and climate change.
- Flooding is a natural process, but patterns of flooding can also be altered and exacerbated by human activities, particularly those relating to changes in land use or river morphology.
- Flood risk management actions can benefit water resources by encouraging more sustainable land use that increases the infiltration and storage of surface water runoff or improving the physical condition of rivers or coastlines (and contribute towards River Basin Management Planning objectives).
- As flooding can lead to, or increase, the release of pollutants and sediment, actions to manage flood risk (particularly natural flood management actions and SuDS) can also deliver benefits to water quality.
- Flood risk management actions can have negative impacts on water, for example, engineered defences that damage river or coastal morphology, and alter river or coastal processes.

Likely evolution of the environment without the flood risk management plans

- The proportion of Scotland's surface and groundwater water bodies at good status or better is expected to increase as we work towards meeting River Basin Management Plan targets²⁴.
- Climate change is likely to cause an increase in flooding, which could lead to an increase in pollution from agriculture, sewerage, and development runoff.

3.6. Climatic factors

National overview

Climate change is a threat to all countries and the expected impacts will include higher seasonal rainfall and increased frequency, intensity of adverse weather events and increased sea levels which will affect flood risk to communities and infrastructure.

Scotland has experienced an increase of approximately 1°C in recent decades and total annual rainfall has also increased about 11% above the average for the early 1900s²⁵.

Climate change projections indicate that the climate trends observed over the last century will continue and intensify over the coming decades. Key long-term climate change trends for Scotland are that weather may become more variable, typical summers will be hotter and drier, winter and autumn will be milder and wetter and sea levels will continue to rise²⁵. Increases in summer heat waves, extreme temperatures and drought, as well as an increase in the frequency and intensity of extreme precipitation events, are also expected.

²⁴ SEPA 2017. The State of Scotland's Water Environment 2017.

https://www.sepa.org.uk/media/373204/state_of_scotlands_water-environment_-2017.pdf

²⁵ Adaptation Scotland: Climate trends and projections [online] Available at:

<https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

SEPA has predicted increases in peak river flows by up to 56% by the year 2100 and an increase of peak rainfall intensity by 35% in the east of Scotland and 55% in the west. Sea level rise is also predicted to result in an increase of up to 1.02 m from 2017 to 2100²⁶. These factors will in turn contribute to changes in flood risk.

Environmental effects relevant to the flood risk management plans

- Climate projections show an increased chance of milder, wetter winters and hotter drier summers. Variation in regional rainfall patterns will continue²⁷.
- Convective storms, which can cause surface water flooding, are likely to be more intense in summer months.
- Sea level rise is likely to lead to an increase in flood risk and coastal erosion. The effects of this may be exacerbated by coastal squeeze where coastal habitats are squeezed between a fixed (artificial or natural) landward boundary and rising sea level.
- Flood risk management actions can have positive effects in relation to climatic factors. For example, natural flood management measures such as river or intertidal habitat restoration can make a catchment more resilient to the effects of climate change; measures such as peatland restoration can increase carbon sequestration and reduce greenhouse gas emissions. Well-designed SuDS and

²⁶ https://www.sepa.org.uk/media/426913/lups_cc1.pdf

²⁷ UK Climate Projections: Headline Findings. September 2019 Version 2.
<https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp-headline-findings-v2.pdf>

blue-green infrastructure may help urban areas adapt to other climate impacts such as heat waves.

- Some flood risk management actions, such as construction of flood walls, can have an adverse effect on emissions. This impact can be reduced through the identification of opportunities to use construction materials with a lower environmental impact as well as reduce the transport of materials and the use of more sustainable modes of transport.

Likely evolution of the environment without the flood risk management plans

- Climate change is likely to cause an increase in high river flows leading to increased flooding.
- Periods of intense rainfall are expected to increase, particularly in the summer, leading to an increased risk of surface water flooding.
- Sea level rise is likely to cause an increase in coastal flooding and erosion.

3.7. Material assets

National overview

Flooding can cause significant damage to properties and their contents, utilities, transport and community infrastructure. In rural areas, disruption has potential to be particularly severe due to rare or absent infrastructure. Managing flood risk can therefore produce positive impacts for material assets through protecting existing assets and avoiding materials needed to repair or replace assets that were damaged by flooding.

Material assets in the environmental sense includes finite mineral, aggregate and fossil fuel resources. Scotland has significant valuable material assets, encompassing those within the natural and built environments. The country has access to a range of these crucial natural resources that underpin the operation of the country, such as water, soil, fossil fuels and minerals.

Material assets is a wide-ranging topic, considering the natural and built environment, including housing and critical infrastructure. The flood risk management plans have the potential to have influence on how future flood risk management interventions are utilised and on any proposed new construction.

Environmental effects relevant to the flood risk management plans

- Flooding can damage property, content, infrastructure, and natural assets such as farmland. Actions to manage flood risk can reduce damage to these assets and reduce the resource use that would be required to repair and replace assets.
- Natural assets can be restored via flood risk management actions that work with natural processes (such as river restoration).
- The process of construction, including that of structural flood management actions, may use significant material resources and generate waste.

Likely evolution of the environment without the flood risk management plans

- Climate change and development are likely to increase flood damages to material assets.

- Food supply and demand, energy supply and demand, water supply, development, and woodland creation will continue to compete for Scotland's land use and shape its resources and natural assets.

3.8. Cultural heritage

National overview

Scotland contains a unique and varied selection of irreplaceable historical sites that contribute to quality of life, the character of the country, cultural identity, education and economy. Many of these sites are protected by international, national or local designations and some that are undesignated. Some of these are on islands, such as the World Heritage Sites on St Kilda and Orkney. Assets of historic value include buildings, sites of archaeological significance, battlefields, townscapes and landscapes. Scotland's protected assets includes the following²⁸:

- Six World Heritage Sites;
- 8,000 Scheduled Monuments;
- 47,000 Listed Buildings;
- 363 Gardens and Designed Landscapes;
- Eight Scheduled Wrecks; and
- 40 Historic Battlefields.

²⁸ Historic Environment Scotland (2018): Scotland's Historic Environment in Numbers 2018 [online]. Available at: <https://www.historicenvironment.scot/archives-and-research/publications/>

Undesignated sites account for 95% of the historic environment but still provide contextual information to help better understand designated sites.

Scotland's historic assets attracted 18 million visitors in 2016 and over five million paying visitors, providing an educational role and a significant contribution to the tourist economy²⁹. Cultural heritage assets are distributed around the country but can be found in clusters around historic settlements and on the coast.

Some of the key pressures on the historic environment are development, changing land use, climate change, coastal erosion, flooding, and renewable energy. Archaeology and coastal landscapes are vulnerable to coastal erosion, rises in sea level, flooding and storminess.

Actions to manage flood risk can help to protect cultural heritage from flood damage.

However, engineering works can disturb or damage cultural heritage, and flood protection structures in the vicinity of cultural heritage sites can alter the setting.

Environmental effects relevant to the flood risk management plans

- Scotland's cultural and historic environment assets and their settings are under pressure from rising sea levels, more rainfall, changes in vegetation patterns and new pests. Some assets are already at significant risk from flooding or coastal erosion, as identified in Historic Environment Scotland's Climate Change Risk Assessment.

²⁹ Historic Environment Scotland (2018): Scotland's Historic Environment in Numbers 2018 [online]. Available at: <https://www.historicenvironment.scot/archives-and-research/publications/>

- Actions to manage flood risk could impact on cultural heritage, for example, engineering works could directly disturb or damage assets or alter their environmental setting.
- Conversely, flood risk management actions that work to restore features of the landscape could improve the setting of our cultural heritage and encourage access and enjoyment of that heritage.
- Changes to hydrological patterns can also impact on (both positively and negatively) wetland archaeology, by enhancing or adversely affecting wetlands.

Likely evolution of the environment without the flood risk management plans

- Flood risk to cultural heritage is likely to increase as a result of climate change. Rising sea levels and increased storm events will endanger historic landscapes, structures, buildings and archaeology while more frequent periods of intense rainfall will cause flooding and erosion to historic buildings and heritage sites.
- Out of 352 sites under the care of Historic Environment Scotland, 89% are exposed to high or very high levels of risk associated with climate change, with 53% of those 352 sites considered to require action beyond existing mitigation. Of these 17% are exposed to river flood risk and approximately 10% are at risk from coastal flooding and erosion.³⁰

³⁰ Historic Environment Scotland 2018: A climate change risk assessment of the properties in care of Historic Environment Scotland. Link: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=55d8dde6-3b68-444e-b6f2-a866011d129a>

3.9. Landscape

National overview

Rich in diversity, Scotland's landscapes are internationally renowned. Landscapes are a significant part of the country's cultural and national heritage, contributing to the economy and the wellbeing of the population. They play a key role in attracting tourism and providing opportunity for outdoor recreation.

Scotland has two national parks (Loch Lomond and the Trossachs and the Cairngorms) and 40 National Scenic Areas (NSAs) that cover over 13% of Scotland. NSAs include mountain ranges and other unique and picturesque landscapes. Local Landscape Areas have also been established at a local level by several local authorities. Areas that are designated locally or for conservation purposes are also afforded protection from inappropriate development.

Scotland's landscapes also play a valuable role in Scotland's cultural heritage and contributing to the economy by attracting tourism, with tourism based on Scotland's landscapes estimated to be worth £420 million annually.³¹

Scottish landscapes will be affected by the direct impacts of climate change, including increased flooding, erosion and sea-level rise.

Environmental effects relevant to the flood risk management plans

- Pressures on Scotland's landscape include climate change, erosion and landslips, land use, and development.

³¹ <https://www.environment.gov.scot/media/1196/land-landscape.pdf>

- Flood risk management actions could impact both positively and negatively on landscape. For example, hard engineered flood protection schemes could reduce landscape quality.
- Actions that work with natural processes to restore features of the landscape or manage the land in a more sustainable way can improve landscape character and quality.

Likely evolution of the environment without the flood risk management plans

- The competing demands of agriculture, forestry, development and energy supply will continue to influence Scotland's landscape. These will in turn be influenced by climate change and our response to the impacts of this change.

3.10. Key considerations within Local Plan Districts

In addition to the national overview of the state of the environment provided in Sections 3.2 to 3.9, a description of environmental constraints relevant to the SEA is provided for each of the 14 Local Plan Districts in Appendices E to R. These descriptions of specific constraints are provided in the form of both maps and text and cover all SEA topics, with the exception of climatic factors which has been covered at the national scale within this environmental report.

While the national review provides a broad and nuanced overview of relevant environmental aspects at a national scale, the data used and baseline descriptions presented at the Local Plan District scale a focus only on the key constraint information readily available at the LPD scale which is directly used in the assessment. These supplement the national review by providing a regional snapshot and provide a background

to the assessment of key environmental constraints relevant to flood risk management for all target areas within each of the Local Plan Districts.

A specific review of relevant constraints for each target community (refer to Appendices E to R for details in each Local Plan District) has been undertaken to inform the development of all types of flood risk management actions or 'signpost' constraints that should be taken into account during future implementation of these actions.

4. Approach to the SEA and alternatives considered

4.1 Introduction

Section 14 of the Environmental Assessment (Scotland) Act 2005 requires the likely significant environmental effects of the flood risk management plans and their reasonable alternatives to be identified, described and evaluated. This section outlines the reasons for selecting the reasonable alternatives, sets out the objectives against which the flood risk management plans and the reasonable alternatives were assessed, and describes the scope and method of assessment undertaken. Comments from the Consultation Authorities (Scottish Natural Heritage, Historic Scotland and others) received during consultation on the Scoping Report in October 2019 have been taken into account and informed the methods, scope and level of detail in this environmental report.

4.2 Scope of assessment

During the scoping stage, we considered whether the potential environmental effects (positive and negative) of the flood risk management plans are likely to be significant. A summary of our conclusions, taking into account any relevant scoping consultation feedback, is given in

Table 4.1.

This scopes in all SEA topics for consideration within the assessment, with the exception of air quality. The findings are consistent with the previous SEA undertaken for the first flood risk management plans 2015-2021: the same topics have been scoped into the assessment

as the overarching purpose of the Plans remains the same, and the environmental and policy contexts remain largely unchanged.

Table 4.1: Scoping of SEA issues

SEA Topic	Potential effect of flood risk management plans	Scope in?
Biodiversity, flora and fauna	The flood risk management plans may have positive and negative impacts on biodiversity, habitats and species through changes to flood hazard, and through implementation of actions.	IN
Population and human health	Flood risk has implications for physical and mental health and well-being. The flood risk management plans will address risk to human health from flooding and will therefore contribute to improving human health and wellbeing.	IN
Soil	The flood risk management plans may have an impact on soil through land use changes, and through proposed construction activities.	IN
Water	The flood risk management plans are expected to have a significant impact on the water environment principally through reducing flood risk. Actions could also impact on hydrological processes, hydromorphology, and ecology. Impacts could be short term (e.g. from construction) or longer term (e.g. from land use change).	IN
Air	The flood risk management plans will not have significant effects on air quality, noise or odour.	OUT
Climatic factors	The flood risk management plans aim to improve resilience to climate change. Actions could impact on net greenhouse emissions	IN

SEA Topic	Potential effect of flood risk management plans	Scope in?
	through land use change and through use of energy and resources in construction and maintenance of actions.	
Material assets	The flood risk management plans will contribute to the protection of material assets, including the built environment, transport network and community facilities. Impacts on resource use could be positive and negative.	IN
Cultural heritage	The flood risk management plans will seek to protect cultural heritage at significant flood risk. The flood risk management plans should also give due regard to protecting cultural heritage from any adverse effects of implementing actions.	IN
Landscape	The actions contained in the flood risk management plans may impact on landscape.	IN

4.3 Reasonable alternatives considered

Consideration was given at each stage of the development of the flood risk management plans to identify and assess any reasonable alternatives to the key components of the Plans. As described in Section 2.6, the development of the draft flood risk management plans has been an iterative process and environmental and sustainability considerations have been central to decision-making throughout. A range of approaches to objective setting were considered taking into account the nature and level of risk at target areas and seeking to deliver an integrated and sustainable approach to flood risk management.

Building on our understanding of flood risk and any previous studies undertaken during the first flood risk management plans (2015 – 2021), environmental constraints and opportunities were reviewed and considered for all target areas at risk and their associated wider catchments and coastal areas. These constraints and opportunities then directly

informed the identification of flood risk management actions within target areas. Through this process, a range of potential actions were considered and the actions that best deliver sustainable flood risk management were selected for inclusion. The ‘reasonable alternatives’ are therefore the actions that were rejected during this process.

Where more detailed actions have yet to be developed (e.g. where flood studies are recommended), the review of environmental constraints and opportunities undertaken as part of this SEA assessment and the findings of the assessment of the actions recommended in the first flood risk management plans (2015-2021) will be used to inform and influence the way the future studies and design will be carried out and the key factors to be considered, informing the alternative approaches to implementation. Therefore, the SEA will continue to influence the consideration of alternatives during the future implementation of the Plans.

4.4 Assessment framework

4.4.1 SEA objectives and assessment questions

The assessment considers the proposed flood risk management objectives and actions in the flood risk management plans (as set out in Section 2.4) in terms of a set of SEA objectives and assessment questions to identify the significant environmental effects (Table 4.2). The proposed SEA objectives and assessment questions build on the questions used in the SEA of the first flood risk management plans (2015-2021) but have been amended to better focus on the most pertinent environmental issues relating to flood risk management.

Table 4.2: SEA objectives and assessment questions

SEA topic	SEA objective	Do the flood risk management plans...
Population and human health	To protect and improve human health and wellbeing through improved environmental quality	Target communities at greatest flood risk?
		Reduce the impact of flooding to communities?
		Deliver benefits to human health and wellbeing?
Biodiversity, fauna and flora	Conserve and where appropriate enhance species, habitats and biodiversity	Avoid adverse impacts on European Designated sites?
		Avoid adverse impacts on, and improve, other protected species and habitats (including Sites of Special Scientific Interest)?
		Work with natural processes?
Soil	Protect and where appropriate enhance the function and quality of the soil resource	Safeguard soil quality, quantity and function, including valuable soil resources such as agricultural land and carbon rich soils?
Water	To prevent deterioration, protect and where appropriate enhance the water environment	Protect and improve the water environment?

SEA topic	SEA objective	Do the flood risk management plans...
Air	Scoped out of assessment	
Climatic factors	Contribute to mitigation of and adaptation to climate change	Ensure adaptability to the effects of future climate change?
		Contribute to reducing greenhouse gas emissions?
Material assets	Contribute to protecting property and infrastructure	Protect material assets e.g. infrastructure, properties?
	Reduce resource consumption	Promote resource efficiency, including reducing use of energy, waste, water and minerals?
Cultural heritage	Protect and where appropriate enhance the character, diversity and special qualities of cultural heritage and the historic environment	Protect the historic environment and its setting?
		Improve the quality of the wider built environment?
Landscape	Protect and where appropriate enhance the character, diversity and special qualities of landscapes	Protect, enhance or restore landscape quality?
		Avoid adverse effects on protected landscapes?

4.4.2 Assessment approach and criteria

An assessment has been undertaken of the elements of the flood risk management plans determined to have the potential for significant environmental effects as described in Section 2.4: these elements are the flood risk management objectives; and scoped-in flood risk management actions. The assessment for each of these elements has been tailored to reflect the information available as follows:

- **Flood risk management objectives:** high level compatibility assessment of the objectives against SEA principles/objectives. This assessment determined whether these are considered to be: compatible, incompatible, no or negligible relationship, or uncertain.
- **Flood risk management actions:** two scales of assessment, national and local, were undertaken depending on the type of actions as categorised in Table 4.3. Those actions considered to have limited potential for location-specific significant environmental effects are assessed at the national scale (i.e. data collection and monitoring and planning and resilience actions). Those actions with potential for location-specific significant environmental effects (i.e. flood studies and flood schemes/works progressing to design / implementation in Cycle 2) are assessed at a local scale within each of the 14 Local Plan Districts. The approach to the assessment was dependent on the information available regarding the proposed actions, as described in Table 4.3.

For all assessments, a matrix-based approach was used. This approach has several advantages including the systematic recording of potential effects and their significance, together with any assumptions, uncertainties and suggested mitigation or enhancement

measures. The criteria used to rate constraints and identify the significance of effects are detailed in Appendix C. The criteria used to determine the significance of effects range from significant beneficial (++), through neutral (0), to significant adverse (--).

Table 4.3: Action types and approach to assessment

Action type	Approach and scale of assessment
Data collection and mapping	NATIONAL SCALE: Consideration of the likely significant environmental effects of undertaking data collection and mapping actions at a national scale using the SEA objectives and assessment questions in Table 4.2 and the significance criteria in Appendix C.
Planning and resilience	NATIONAL SCALE: Consideration of the likely significant environmental effects of undertaking planning and resilience actions at a national scale using the SEA objectives and assessment questions in Table 4.2 and the significance criteria in Appendix C.
Flood studies	LOCAL SCALE: Identification and rating of key environmental constraints within each target community or, where more appropriate, the wider catchment or coastal associated with the source of flood risk, using the criteria identified in Appendix C. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

Action type	Approach and scale of assessment
Flood schemes and works at design / implementation stage	<p>LOCAL SCALE: Consideration of the likely significant environmental effects of undertaking these actions at a local scale using the SEA objectives and assessment questions in Table 4.2 and the significance criteria in Appendix C. The assessment was informed by the presence/absence of key environmental constraints within a target area (defined in terms of the receptors listed in Table C.1 of Appendix C) and the likely type of action, with the associated limitations as set out in Section 4.4.4.</p> <p>Although the action types may change as the schemes/works progress through the design stage, we have assessed the most likely combination of actions. The action types we have considered, along with examples to illustrate the definitions, are:</p> <ul style="list-style-type: none"> • River / coastal defences e.g. flood walls, embankments, demountable defences • Storage, conveyance and control e.g. alterations to the size, shape or position of channels, pipes and culverts, alteration to in-stream features such as weirs, changes to valves, gates or sluices • SuDS (Sustainable drainage systems) e.g. rain gardens, swales, green roofs, retention basins or ponds

Action type	Approach and scale of assessment
	<ul style="list-style-type: none"> • Property flood resilience: resistance and resilience measures to prevent water entering a property or to help it recover more quickly in the event of a flood • River and floodplain restoration e.g. woodland, wetland or peatland enhancement or restoration, in-stream structures, channel re-alignment, floodplain reconnection • Coastal restoration e.g. dune protection or restoration.

4.4.3 Approach to cumulative effects across the flood risk management plans

The cumulative assessment brings together the assessments of the types of actions described in Section 4.4.2. It considers the potential effects of implementing, in combination, all actions identified within the Plans for all 14 Local Plan Districts. These effects are considered via the SEA objectives and assessment questions in Table 4.2 and the significance criteria in Appendix C.

4.4.4 Assumptions and limitations

The assessment was underpinned by the following key assumptions and limitations:

- The actions that could give rise to similar effects were grouped together, to reflect the strategic nature of this assessment. Flood risk management actions were not individually considered, by type or location, with the exception of flood schemes and works at design / implementation).
- Assumptions were made regarding potential pathways of effect between types of flood risk management actions and environmental constraints, based on limited

information considered in a strategic context. Therefore, the level of constraint and significance of effects identified for individual target areas may be under or over-predicted.

- Whilst the assessment includes all environmental aspects required to be considered for an SEA at a national scale; the local-scale assessments (i.e. the assessment of flood studies and flood schemes and works) were based on a limited set of nationally consistent data sets and environmental receptors (as defined in terms of the receptors listed in Table C.1 of Appendix C). Therefore, there are likely to be additional constraints identified for individual target areas, as further details of actions are developed, which will be considered through subsequent environmental assessment activities.
- The assessment of the potential effects of flood schemes and works is based on consideration of the presence and sensitivity of the key environmental receptors located within relevant target areas, with the application of professional judgement as relevant. Where the effects of actions are unknown at this stage, due to the magnitude of the effect being largely dependent upon the design or location of the action, an effect of neutral was usually assumed. For example, neutral effects from actions were typically assumed for biodiversity and the water environment, unless an internationally or nationally designated site was present within the target community or where a watercourse within the catchment to the target community is failing to meet its target River Basin Management Plan objectives as a result of its physical condition, respectively.

- The assessments undertaken seek to provide an overview of the key effects of the flood risk management plans, but given the stated limitations, do not seek to contradict or override more specific studies undertaken by local authorities, Scottish Water or other partner organisations. a local level following or separate to the Plans. Where more specific information is available regarding the type and location of an action or the sensitivity of the receiving environment, in particular in relation to the proposals for flood schemes and works, any assessments based on such information would supersede those presented within this report.

4.5 Supporting studies - Habitat Regulations Appraisal

The development of the flood risk management plans also includes separate, but linked, consideration of the effects of the proposed targeted actions identified in the Plans on European and international sites designated for nature conservation (i.e. SAC, SPA and Ramsar sites) in terms of the Conservation (Natural Habitats, &c.) Regulations, 1994, as amended. This process, known as Habitats Regulations Appraisal for the purposes of assessing these Plans, considers whether the targeted actions identified within the Plans for all 14 Local Plan Districts could affect European/international sites, focusing in particular on flood schemes and works progressing to design stage. Specific mitigation actions will be recommended for all actions, target areas and sites where likely significant effects are identified.

5. Environmental assessment of the flood risk management plans

5.1 Introduction

Section 14 of the Environmental Assessment (Scotland) Act 2005 requires the likely significant environmental effects of the flood risk management plans and their reasonable alternatives to be identified, described and evaluated. This section reports the results of the environmental assessment.

The relevant contents of the draft flood risk management plans described in Section 2 were assessed using the framework described in Section 4. The findings of the assessment are summarised in this section in terms of the overall potential effects of identified flood risk management objectives and types of flood risk management action at a national scale across the 14 draft flood risk management plans. The assessments of each type of flood risk management action within each Local Plan District (including assessments of any potential cross-border effects) are provided in Appendices E to R.

Section 5.4 considers the cumulative effects of all types of actions within the 14 draft flood risk management plans identified at a national scale across all Local Plan Districts and includes recommendations for mitigation of identified effects, as appropriate.

5.2 Assessment of environmental effects: flood risk management objectives

A compatibility assessment was undertaken to consider the likely significant environmental effects arising from the proposed flood risk management objectives (see Appendix D).

Overall, it was determined that the flood risk management objectives were either

compatible or had no/limited relationship with the SEA objectives. No flood risk management objectives were found to be incompatible.

The primary aim of the flood management objectives is to reduce overall flood risk and avoid a future increase in flood risk. This is compatible with the SEA objectives for population and human health and material assets; with the delivery of significant benefits in terms of protecting people, properties and infrastructure, and associated benefits to health and wellbeing. Reducing flood risk, and avoiding an increase in future flooding, avoids or reduces the energy use and resources needed to clean up, dry out and replace the fabric and contents of properties. These flood risk management objectives are also compatible with the SEA objectives for biodiversity, landscape and cultural heritage, where sites and assets will benefit from a reduction in flood risk and in particular, for the SEA objectives for biodiversity and water, the emphasis on a more sustainable and catchment-based approach to flood risk management, working with natural processes. Where the flood risk management objectives consider the potential increase of flood risk due to climate change and increasing urban development, this is compatible with the SEA objective to contribute to mitigation of and adaptation to climate change.

5.3 Assessment of environmental effects

5.3.1 Data collection and mapping

Data collection and mapping actions, such as strategic mapping improvements, sewer flooding assessments and data collection, are recommended for nearly one quarter of target areas. In these locations, a better understanding of flood risk is needed before the need for and type of any further study, and subsequent flood risk management action, can be identified. Updates to SEPA's hazard and risk assessments for flooding and reservoirs

are also proposed across all LPDs. The assessment for data collection and mapping actions considers the potential environmental effects of undertaking these types of actions on a national scale across Scotland.

These actions have been assessed as having **neutral effects** across all SEA topics (see Appendix D), however, they do play an important role in flood risk management. Improved flood mapping, for example, enables better land use planning, helps the public to understand the risk to their communities and to take action to protect themselves, and enables us to identify where flood risk management actions may be needed in future. The environmental constraints review undertaken for all target areas (presented at a LPD scale in Appendices E to R) should be considered alongside these actions and inform any future flood studies that could arise.

5.3.2 Planning and resilience

Planning and resilience actions are recommended nationwide. They include targeted actions such as property flood resilience and flood forecasting and warning improvements (proposed for two thirds of target areas), and LPD-wide actions such as awareness raising and self-help. This assessment considers the potential environmental effects of undertaking planning and resilience actions on a national scale across Scotland.

Given that the focus of these actions is to reduce flood risk to people, properties and infrastructure, **significant positive effects** were identified for the **SEA objectives of population and human health and material assets**, with the actions supporting improving health and wellbeing. Engaging with the community and the creation of community resilience groups will also enhance wellbeing. Where actions such as flood warning and resilience could help respond to sea level rise and increased rainfall, it is considered that

this will support the SEA climate objective for mitigation and adaptation to climate change. Positive effects are anticipated with the protection of cultural heritage assets through reduced flood risk, however, consideration should be given to the design of property flood resilience measures to avoid impact to the setting of historic buildings/structures. In four LPDs, there are also potential benefits to biodiversity, water and landscape through targeted land use planning actions that seek to protect natural features that help to managing flooding. No potential negative effects were identified in terms of the SEA objectives.

The identification of environmental constraints undertaken for each target community and associated wider catchment and coastal areas (presented for each LPD in Appendices E to R) should help to inform the implementation of such actions, identifying any potential issues that may need to be addressed through sensitive design and mitigation, subject to further specific environmental assessment.

The assessment of these targeted actions in terms of the SEA objectives is summarised in Table 5.1, with further details provided in Appendix D.

Table 5.1: Summary assessment of planning and resilience actions (refer to Appendix C for significance criteria applied).

SEA objectives							
Population & human health	Biodiversity	Soil	Water	Climatic factors	Material assets	Cultural heritage	Landscape
++	0	0	0	+	++	0	0

5.3.3 Flood studies

Flood studies including, for example, options appraisal studies, surface water management plans, shoreline management plans, adaptation plans and integrated catchment studies, are recommended for over 85% of target areas. These studies will seek to better understand current and future flood risk and identify the next steps for managing flood risk for specific target areas. Until the studies are complete, we do not know which types of actions will be recommended. Therefore, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated wider catchments and/or coastal areas. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The constraints review identifies the presence of numerous environmental constraints relevant to flood risk management, flagging the most highly constrained target areas within each Local Plan District. High level constraints are present in terms of all the SEA topics across numerous locations, varying by location, as summarised below:

- **Population and health:** risk of flooding to homes and businesses identified with a target community, with associated impacts on human health and wellbeing.
- **Biodiversity:** international and national designated sites are present within target community, wider catchment or coastal area.
- **Soil:** large areas of prime agricultural land or highly valuable peatland within target community, wider catchment or coastal area.

- **Water:** river water bodies present within the catchment (identified within 2015 River Basin Management Plan) that are failing (in 2018) to meet their 2027 River Basin Management Plan objectives as a result of their physical condition.
- **Material assets:** risk of flooding to key infrastructure identified within target area.
- **Cultural heritage:** internationally or nationally important heritage assets (e.g. world heritage site, scheduled monument, battlefields, garden and designed landscape, conservation area and listed buildings) identified within target area.
- **Landscape:** nationally important landscapes (e.g. national scenic areas and national nature reserves) present within target area.

The constraints review undertaken for each target area is described for each LPD in Appendices E to R.

As the flood studies are developed during the implementation of the flood risk management plans, these should be subject to further environmental assessment. Actions should be developed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

5.3.4 Flood schemes and works at design / implementation stage in Cycle 2 (2021 – 2027)

Flood schemes and works are proposed for design / implementation stage during Cycle 2 (2021 – 2027) in 76 target areas across 10 Local Plan Districts. (Additional schemes and works are proposed for design and/or implementation but have been scoped out from the SEA, as described in Section 2.3). Depending on funding, each scheme or works will progress one or more actions (such as river or coastal defences; storage, conveyance and

control; SuDS; river and floodplain restoration; coastal restoration) through to design and implementation.

Although the types and locations of actions may change during design, we are able to use the information on the likely actions to undertake a more specific assessment using the approach described in Table 4.3. The approach takes into account the identified key environmental constraints identified within each target area and associated wider catchment or coastal area (defined in terms of the receptors listed in Table C.1 of Appendix C) and the type of action proposed, with the associated limitations as set out in Section 4.4.4. While the assessments seek to provide an overview of potential effects, given limitations of this high-level approach, these do not seek to contradict or override more specific studies undertaken by local authorities or Scottish Water or other partner organisations.

The proposed actions and assessment are documented for each relevant target area and summarised at a Local Plan District scale for each SEA topic in Appendices E to R. A summary of the assessment findings for each Local Plan District is provided in Table 5.2 and in the text below. This identifies the cumulative effect of implementing the range of proposed flood schemes and works within each of the Local Plan Districts.

Table 5.2: Flood schemes and works at design / implementation stages in Cycle 2 (2021 – 2027) scoped into the SEA: summary of assessment by Local Plan District (refer to Appendix C for significance criteria applied)

LPD	Number of target areas with flood schemes/works scoped into SEA	SEA objective							
		Population & human health	Biodiversity	Water	Soil	Climatic Factors	Material Assets	Cultural Heritage	Landscape
1	8	++	-/+	-/+	0	+	++	0	0
2	No scoped-in schemes or works proposed in LPD 2								
3	No scoped-in schemes or works proposed in LPD 3								
4	1	++	0	0	0	+	++	0	0
5	3	++	-/0	0	0	+	++	0	0
6	6	++	-/+	-/+	0	+	++	0	0/+
7	5	++	-/+	-/+	0	+	++	0	-/+

LPD	Number of target areas with flood schemes/works scoped into SEA	SEA objective							
		Population & human health	Biodiversity	Water	Soil	Climatic Factors	Material Assets	Cultural Heritage	Landscape
8	4	++	-/+	-/+	0	+	++	-/+	0
9	3	++	-/+	-/+	0/+	+	++	0	0/+
10	3	++	-/0	-/+	0	+	++	0	0
11	22	++	-/+	-/+	0	+	++	0	-/+
12	15	++	-/+	-/+	0	+	++	0	0/+
13	3	++	-/+	-/+	0	+	++	-/+	-/0
14	3	++	0	0/+	0	+	++	0	0

Population and human health

The proposed flood schemes and works could have significant positive effects on population and human health and wellbeing, including more disadvantaged and vulnerable communities, due to reduced flood risk to homes and communities at both inland and coastal locations.

Where SuDS, storage conveyance and control, and river and floodplain restoration actions are proposed, these could help deliver benefits to people and properties through better regulation of the flow of water. These actions may also provide opportunities for enhanced or improved access to greenspace, in particular within urban areas. River and coastal defences may result in mixed effects on existing recreational assets including coastal and river side open space/pathways with both the potential to restrict existing access through construction of defences or improve accessibility by formalising and protecting pathways. Effects are likely to be localised and where negative, could be mitigated through sensitive siting and design.

Overall, it is considered that the proposed flood schemes and works could have a **significant positive effect** on population and human health.

Biodiversity

The proposed flood schemes and works could have mixed effects on biodiversity, depending on the sensitivity of the location and the type of recommended actions. At locations where new river or coastal defences actions are proposed, there is the potential for negative effects if habitat is lost or degraded. This may be balanced with possible habitat creation and restoration as a result of coastal, river and floodplain restoration, and some SUDS and storage, conveyance and control actions.

Potential negative effects are identified where actions are proposed in target areas (or their wider catchment or coastal areas) that have high biodiversity value, reflected in the number and extent of internationally and nationally important protected sites (i.e. SACs, SPAs, Ramsar sites, SSSIs or MPAs). These are largely concentrated in more rural or coastal target areas. Where actions were identified in target areas where no national or internationally designated sites are present, it was considered that any negative effects on biodiversity would be localised and therefore not significant. The effects on protected sites are dependent on the location and design of the action and will be assessed through Habitats Regulations Appraisal and at more detailed levels of flood risk management planning.

Overall, it is considered that the proposed flood schemes and works could have a **mixed effect** on biodiversity. There is potential, however, for minor negative effects: around one quarter of the flood schemes and works were assessed as having potential negative effects and another quarter, mixed effects. The effects will depend on the design and location of actions.

Water

The effects of proposed flood schemes and works on the water topic are predominately neutral or mixed, depending on the sensitivity of the location and the nature of the recommended actions.

Potential positive effects are identified where there are opportunities for enhancement through natural flood management and the supporting of River Basin Management Plan objectives, in particular where water bodies have been identified as failing due to their physical condition. There could also be potential beneficial effects from river and floodplain

restoration and storage conveyance and control actions to watercourses by regulating water flow, reducing existing problems such as erosion and reducing flood risk. Negative effects could result where river defences and storage, conveyance and control actions can interfere with natural processes and cause some or all of the floodplain to be disconnected from waterbodies, leading to loss of natural habitat to capture, filter and recycle nutrients or pollutants and a reduction in water quality.

At coastal locations there could be potential negative effects from coastal defences and potential benefits from coastal restoration on coastal morphology. Beach recharge, through coastal restoration, and coastal defences can reduce erosion, however, defences may interfere with coastal processes, altering rates of erosion and deposition elsewhere. The magnitude and direction of potential effects will depend on the existing conditions and sensitivity to change of the coastline.

Overall, it is considered that the flood schemes and works could have a **mixed effect** on water.

Soil

The effects of the proposed flood schemes and works on soil are considered to be predominately neutral.

Where storage conveyance and control actions are proposed, there is the potential for the loss of small areas of land and potential for erosion. This is balanced with habitat restoration actions which have the potential to protect soils from erosion, to retain nutrients and to protect and improve carbon-rich soils. It is considered that river/coastal defences actions could have a neutral effect on soil, although there may be benefits where agricultural land is protected from flooding. The significance of the effects will depend on the existing condition of the land, whether it is of high value (e.g. prime agricultural land or peatland), and the nature, extent and location of the action.

Overall, it is considered that the proposed flood schemes and works could have a **neutral effect** on soil.

Climatic factors

Where flood schemes and works are designed to take into account the effects of a changing climate, positive effects in terms of climatic factors are anticipated due to improved resilience of properties and infrastructure to future climate change. Although no negative effects were identified, there is potential for defences and storage, conveyance and control actions to result in loss or degradation of habitats (floodplain wetland or woodland or peatland) that store carbon. These negative effects, however, would be dependent on the extent and location of the action.

Overall, it is considered that the proposed flood schemes and works could have a **positive effect** on climatic factors.

Material assets

The proposed flood schemes and works would have **significant positive effects** on material assets due to reduced flood risk to properties and, where present, infrastructure. There could also be reductions in resource consumption associated with recovery, repair and replacement actions in the event of a flood.

Cultural heritage

The proposed flood schemes and works could have neutral or mixed effects on cultural heritage, depending on the sensitivity and value of the location and the nature of the recommended actions.

The actions could have positive effects by reducing flood risk to cultural heritage assets at risk from flooding. Negative effects could result where flood or coastal defences or other physical actions are proposed in areas with a high concentration of cultural heritage assets, predominately within urban communities, where actions could have negative effects on the physical extent or setting of historic buildings/sites. These effects would be localised and could be mitigated through sensitive design and further assessment.

Overall, it is considered that the proposed flood schemes and works could have **a neutral effect** on cultural heritage.

Landscape

The proposed flood schemes and works could have positive and negative effects on landscape and seascape across the Local Plan Districts, depending on the sensitivity and value of the location and the nature of the recommended actions.

There is the potential for negative effects where river or coastal defences or storage, conveyance and control actions are proposed within areas of high landscape value: these actions could impact on the character of designated areas and views to/from river or coastal locations. Sensitively designed defences may help to improve amenity particularly in areas where the coastline or river corridors are already modified; and coastal, river and floodplain restoration and SuDS have the potential to provide improved natural habitat which could improve landscape character and visual amenity.

Overall, it is considered that the proposed flood schemes and works could have a **neutral effect** on landscape.

5.4 Cumulative effects between the flood risk management plans

The assessment undertaken in Section 5.3 considers, individually, the effects of implementing specific types of flood risk management actions recommended for target areas across all Local Plan Districts.

This section considers the cumulative effects of all types of flood risk management actions recommended in the 14 flood risk management plans. This covers each of the SEA objectives and topics and is presented in Table 5.3. Where negative effects are identified, high level mitigation is proposed. Potential opportunities to deliver additional environment benefits are also identified.

Table 5.3: Summary assessment of all types of recommended flood risk management actions across all Local Plan Districts in terms of the SEA objectives.

Summary of assessment	Mitigation and recommendations
Population and human health	
Overall, the flood risk management plans could have a significant positive effect on population and human health. The actions proposed seek to ensure a reduction in flood risk to a significant number of home and communities, targeting the most vulnerable communities. In improving the resilience of these communities, this would protect human health and support wellbeing.	In the development of flood studies and the design of flood schemes and works, opportunities for recreational benefit and improving access to the natural environment and green space should be considered to improve wellbeing. Actions should seek to support local regeneration proposals and to target opportunities towards the most disadvantaged communities.
Biodiversity	
Overall, the flood risk management plans could have mixed effects on biodiversity, with effects dependent on the type and location of actions.	Potential negative effects can be mitigated through the identification of impact, sympathetic design and timing of flood

Summary of assessment	Mitigation and recommendations
<p>Where actions provide opportunities for habitats protection, restoration and creation, there could be benefits for biodiversity. There is the potential for negative effects where actions may impact on designated sites or disrupt natural processes.</p>	<p>schemes and works to avoid or minimise the effects on habitats and wildlife, along with consultation with relevant organisations.</p> <p>Opportunities for habitat creation and improvement should be sought during the development of flood studies, and as the designs of schemes and works are progressed.</p> <p>Potential negative effects on protected sites is being assessed by SEPA as part of the Habitats Regulations Appraisal for the flood risk management plans/ mitigation will be applied where required. Habitats Regulations Appraisal will be applied at more detailed levels of flood risk management planning.</p>
Water	
<p>Overall, the flood risk management plans could have mixed effects on water, depending on the type and location of actions.</p>	<p>Potential negative effects on the water environment can be mitigated by understanding the effects on physical processes, including flows and erosion, within rivers and coastal waters; minimising potential habitat loss; and including habitat creation in</p>

Summary of assessment	Mitigation and recommendations
<p>There is potential for negative effects on water quality where engineered actions impact on sensitive water environments and the potential for degradation of beds and banks of rivers and coastlines. This is balanced with the opportunity through flood risk management actions to support River Basin Management Plan objectives to prevent deterioration and improve the status of water bodies, with overall positive effects on the water environment.</p>	<p>flood risk management actions. Negative effects should be addressed during flood studies and design of flood schemes and works.</p> <p>Actions that can affect the freshwater environment (such as flood storage actions) are regulated under the Controlled Activities Regulations, which aim to protect the water environment. Mitigation is considered as part of the authorisation process. Some actions, particularly those deemed as development, are regulated under the land use planning system; and environmental effects will be addressed through project level Environmental Impact Assessments.</p>
Soil	
<p>Overall, the flood risk management plans could have a neutral effect on soil, depending on the quality of the land and extent and location of actions.</p>	<p>Modelling of natural processes can help to better predict and mitigate potential negative effects on soil. This should be</p>

Summary of assessment	Mitigation and recommendations
<p>Potential benefits if high value land and associated soils is protected from flooding, and where carbon-rich soils are restored or improved. Alterations to natural processes, however, could result in the loss or erosion of areas of high value agricultural land or carbon rich soils (e.g. peatland).</p>	<p>considered during flood studies and in the design and implementation of flood schemes and works.</p>
Climatic factors	
<p>Overall, the Plans could have a positive effect on climatic factors with the focus of the actions to provide resilience in terms of future climate change whether that be through structural actions or planning and resilience measures. Actions should be developed in line with the Plans' national principles to 'Take a long term, risk-based approach to flood risk management decisions and one that considers the impacts of and adaptability to climate change'.</p>	<p>Flood studies (including adaptation plans) should seek to develop actions and management plans that can be adapted to a changing climate. Flood schemes and works should be designed to include consideration of the long-term impacts of climate change.</p> <p>Opportunities should be sought during flood studies and design of flood schemes and works to avoid highly engineered solutions which could negatively affect greenhouse gas emissions and to</p>

Summary of assessment	Mitigation and recommendations
	minimise the use of non-renewable or high energy resources in maintenance and construction.
Material assets	
Overall, the flood risk management plans could have a significant positive effect on material assets and key infrastructure, where present, by reducing flood risk. This protection of material assets would provide resilience and adaption for future climate change predictions and reduce the resource required to replace assets.	Opportunities to minimise waste and resource use should be examined during flood studies and design of flood schemes and works.
Cultural heritage	
Overall, the flood risk management plans could have mixed effects on cultural heritage.	Potentially negative effects on cultural heritage can be mitigated through the identification of any heritage assets (including archaeology) and the early engagement of heritage interests

Summary of assessment	Mitigation and recommendations
<p>The actions are likely to benefit the historic environment by helping to improve understanding of flood risk (thereby enabling better adaptation planning) and through reducing the level of flood risk. There is potential for negative effects where the construction of new defences is in areas of high cultural or archaeological sensitivity, although this would depend on the type and design and location of actions.</p>	<p>during the development of flood studies and the design and implementation of flood schemes and works.</p>
Landscape	
<p>Overall, the flood risk management plans could have neutral effects on landscape.</p> <p>Positive effects on landscape could result from actions that restore or create natural habitats. There is, however, potential for actions that include the construction of new engineered features to interrupt the views of rivers or coasts, or negatively affect the local landscape. These negative</p>	<p>Potential negative effects on landscape should be addressed during flood studies and design of flood schemes and works.</p> <p>Opportunities for enhancement of the local landscape and public realm should be considered including expansion of green network infrastructure where appropriate. Catchment-based approaches to flood risk management should seek to identify landscape scale opportunities.</p>

Summary of assessment	Mitigation and recommendations
effects would depend on the type, design and location of actions and would likely be localised.	Consultation with NatureScot, National Park Authorities (where appropriate) and affected communities is recommended.

6. Mitigation and monitoring

6.1 Mitigation and recommendations

Schedule 3 paragraph 7 of the Environmental Assessment (Scotland) Act 2005 requires an explanation of “the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme.” Where negative effects have been identified, appropriate mitigation has been proposed for each of the action types considered within the SEA assessment as summarised in Table 6.1.

National level mitigation and recommendations have been provided as part of the cumulative assessment presented in Section 5.4. This is mitigation that will need to be taken forward at more detailed levels of flood risk management planning, such during the development of flood studies and during the design and implementation of flood schemes and works. Other organisations, particularly local authorities and Scottish Water, will usually lead on these activities.

Table 6.1: Key recommendations, including measures envisaged for the prevention, reduction and offsetting of any negative effects

Action type	Potential negative effects	Key recommendations
Data collection and mapping	No significant negative environmental effects	While no significant environmental effects were predicted, it is recommended that the environmental constraints identified for all target areas and presented at a Local Plan District scale in Appendices E to R should be

Action type	Potential negative effects	Key recommendations
		considered alongside these actions and inform any future flood studies that could arise.
Planning and resilience	No significant negative environmental effects	While no significant negative environmental effects were predicted, it is recommended that the environmental constraints identified for each target community and associated wider catchment and coastal areas, as presented for each Local Plan District in Appendices E to R, should help to inform the implementation of such actions. This could inform the identification of potential issues that may need to be addressed through sensitive design and mitigation, subject to further specific environmental assessment.
Flood studies	No significant negative environmental effects	<p>While no significant negative environmental effects were identified, the assessment signposts the level of potential environmental constraints associated with each target community.</p> <p>As the flood studies are developed during the implementation of the Plans these should be subject to further environmental assessment with actions</p>

Action type	Potential negative effects	Key recommendations
		developed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.
Flood schemes and works at design / implementation stage in Cycle 2 (2021 – 2027)	<p>The potential for negative, but not significant, environmental effects, were identified for the following SEA topics: biodiversity, water, cultural heritage and landscape; depending on the location and types of actions. These were primarily from the implementation of actions such as river and coastal defences and storage, conveyance and control.</p> <p>The potential for negative effects were identified in specific target areas where these structural actions are proposed in areas with an identified high number of constraints and where the actions could lead to the potential degradation of the coastline and river beds and</p>	<p>Potential negative effects can be mitigated through the identification of impact, sympathetic design and timing of works to avoid or minimise the effects on habitats and wildlife, along with consultation with relevant organisations. Opportunities for habitat creation should be sought as design is progressed.</p> <p>Potentially negative effects on cultural heritage can be mitigated through the identification of any heritage assets (including archaeology) and the early engagement of heritage interests during the design of flood schemes and works.</p> <p>Potential negative effects on landscape should be addressed early during the design of flood schemes and works.</p>

Action type	Potential negative effects	Key recommendations
	banks and impact on designated sites and landscape character.	

6.2 Monitoring

Section 19 of the Environmental Assessment (Scotland) Act 2005 requires the Responsible Authority (SEPA) to monitor significant environmental effects of the implementation of the flood risk management plans. This must be done in such a way as to also identify unforeseen adverse effects and to take appropriate remedial action.

For the SEA of the 2015 Flood Risk Management Strategies, we proposed to undertake monitoring related to flood risk and the status of the water environment. On reviewing the findings from this data, however, we are not able to use it to monitor the environmental effects. As the monitoring must inform on the effects of the flood risk management plans themselves rather than wider trends, we are reviewing how to make our monitoring more informative. We intend to make use of the extensive existing monitoring of the environment where possible. Our findings from monitoring the 2015 Flood Risk Management Strategies, and the proposed SEA monitoring activities for the 2021 – 2027 flood risk management plans are set out in Table 6.2.

Note that during implementation, the effects of individual projects will be monitored according to plans devised as part of project level environmental impact assessment.

Table 6.2: Assessment of monitoring for the 2015 Flood Risk Management Strategies and proposed monitoring for the flood risk management plans 2021 - 2027

What will be monitored?	2015 Flood Risk Management Strategies: proposed monitoring and findings	Flood risk management plans 2021 – 2027: monitoring proposals
<p>Flood risk to people and properties, cultural heritage and designated environmental sites</p>	<p>Proposed monitoring: SEPA National Flood Risk Assessment and baseline flood risk data</p> <p>Findings: From the 2018 National Flood Risk Assessment, we now understand that there are around 284,000 homes, businesses and services across Scotland at risk of flooding. That is more than twice as many as were identified in the 2011 National Flood Risk Assessment and 2015 Flood Risk Management Strategies.</p> <p>The difference is mainly because there have been major advances in how properties at risk have been identified, not because the physical risk has changed. As a result, we are unable to use this data to monitor the effects from the 2015 Flood Risk Management Strategies.</p>	<p>Use the National Flood Risk Assessment and baseline flood risk, where methods allow, to understand how flood risk has changed.</p> <p>Develop methods for assessing any improvements / degradations in flood risk as the result of flood risk management actions.</p>

What will be monitored?	2015 Flood Risk Management Strategies: proposed monitoring and findings	Flood risk management plans 2021 – 2027: monitoring proposals
Status of the water environment	<p>Proposed monitoring: River Basin Management Planning classification data; monitored via the river basin management plans</p> <p>Findings: The overall condition of waterbodies has improved since 2015, but as a result of the cyberattack we are not able to examine the impact of flood risk management actions on the water environment.</p>	Seek to use River Basin Management Planning data to better understand the effects of flood risk management actions on the water environment.

7. Next steps

The anticipated milestones in the SEA and flood risk management planning processes are outlined in Table 8.1.

Table 7.1 Anticipated milestones

Anticipated milestones	Date
Consultation closes on the draft flood risk management plans and Environmental Report	30 October 2021
Flood risk management plans and Post Adoption Statement published	22 December 2021
Local flood risk management plans published	By 22 June 2022