



Draft National Flood and Coastal Erosion Risk Management Strategy for England:

Amended Strategic Environmental Assessment (SEA) Environmental Report

23 May 2019

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Non Technical Summary

This is a summary of the environmental report for the draft national flood and coastal erosion risk management (FCERM) strategy for England. The environmental report presents the results of a strategic environmental assessment (SEA) carried out as part of the preparation of the draft strategy. The environmental report and this summary are required to be published with the draft strategy.

The national flood and coastal erosion risk management strategy

The Environment Agency is required to develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England. The draft strategy is a review of the strategy published in 2011. The final strategy is due for publication in 2020. It will apply to all sources of flooding and coastal change, such as coastal erosion and flooding from rivers, the sea and surface water. The national strategy provides an overarching framework for action by all people involved in managing the risks of flooding and coastal change. These are known as risk management authorities. They include the Environment Agency, unitary or county councils, district councils, internal drainage boards, highway authorities and water and sewage companies.

The vision of the draft strategy is a nation ready for, and resilient, to flooding and coastal change - today, tomorrow and to the year 2100. The draft strategy has been split into 3 high level ambitions:

- climate resilience places
- today's growth and infrastructure - resilient to tomorrow's climate
- a nation of climate champions, able to adapt to flooding and coastal change through innovation

To achieve these ambitions, the draft strategy presents a number of strategic objectives spanning the next 10 to 30 years. The strategic objectives are supported by over 30 shorter-term measures. The measures cover a wide range of activities needed to manage the increased risk of flooding and coastal change due to climate change. The strategic objectives and measures can be grouped under the following broad themes:

- planning for resilient places, this including information and approaches for updating plans and strategies for managing flooding and coastal change in different places
- delivering flood and coastal change resilience, this including different ways for managing the risk of flooding and coastal change and how projects are undertaken
- preparing for and recovering from flooding and coastal change, for people at continued risk of flooding or who have been affected by a flood event
- raising awareness of flooding and coastal change, engaging people in decision-making and improving collaborative working across everyone involved in risk management

Environmental context

The environmental report outlines the current state of the environment in England and future trends of relevance to the management of flooding and coastal change. As a national strategy this review concentrates on information and other plans, policies and

programmes relating to England. In areas that cross administrative boundaries there is a requirement for risk management authorities to effectively coordinate flood risk assessment and management. The review has taken this in account in the consideration of other key plans, policies and programmes. The importance of cross-border working is also recognised in the draft strategy.

The challenge of climate change and the urgency of managing and adapting to a changing climate is highlighted. So too are the risks of flooding and coastal change to places where people live, work and visit and also the many services people and businesses rely upon. There is increasing evidence of the impact of flooding on people's health and wellbeing. Also recognised are the positive benefits of the natural environment to health and wellbeing, such as through recreation and helping to relieve stress.

Many habitats and species are associated with the water environment, including rivers, wetlands and coastal areas. Some sites are designated at a national and international level for their importance for nature conservation. The water quality of many rivers continues to be affected by pollution from the land and other sources. The unsustainable abstraction of water is also affecting both groundwater bodies and surface waters. Climate change and predicted drier summers could further intensify these trends. Climate change is also predicted to lead to more intense rainfall events and wetter winters. This could increase soil erosion in some parts of the country that are already experiencing this, because of intensive agricultural production or urban development. Contaminated land, including historic landfill sites, could also be affected by increased flooding and coastal change.

There are many historic buildings and other features that are located near to rivers or on the coast and have close links to the water environment. These heritage assets are vulnerable to the effects of flooding and coastal change and to climate change. Historic buildings, trees and woodland, and rivers all contribute to the character of the landscape in urban and rural areas. In rural areas land management has an important influence on its character as well as other benefits for wildlife, recreation and managing flood risk.

Strategic Environmental Assessment

A Strategic Environmental Assessment (SEA) is undertaken to ensure that environmental effects are considered during the development of a plan or strategy alongside technical, economic or other considerations. In doing so it can also contribute to the promotion of sustainable development. The environmental report sets out the findings of the assessment.

To ensure the assessment focused on the likely significant effects of the draft strategy, a scoping phase was undertaken at an early stage. This concluded that significant effects on air quality were unlikely and therefore this issue was not assessed in detail. The potential for the draft strategy to have significant effects on other environmental issues was identified. These included: biodiversity, population and human health, resource management, water, climatic factors, material assets, cultural heritage and landscape. These environmental issues were assessed in detail using a set of assessment criteria to help identify potential negative and positive effects on the environment. These criteria supported the following high level questions on whether the draft strategy will:

- protect and recover nature
- improve health, wellbeing and equality
- improve and sustain resources
- protect and improve the water environment

- mitigate and adapt to climate change
- support sustainable communities and a prosperous economy
- conserve and enhance the historic environment
- conserve and enhance landscape character

The assessment focused on those aspects of the draft strategy which could give rise to significant environmental effects. Several measures were considered unlikely to do this and therefore were not assessed further. This included measures that:

- focus on the development of guidance on best practice
- propose the setting up of organisational structures
- seek to influence skills development in higher education and other organisations

The remaining measures and strategic objectives were assessed in groups relating to the broad themes already outlined and including:

- planning for resilient places
- delivering flood and coastal change resilience
- preparing for and recovering from flooding and coastal change
- raising awareness, engagement and collaborative working

The assessment has fed into the preparation of the draft strategy and has helped to influence its environmental content. Examples of this are the inclusion of additional strategic objectives and measures on the environment.

As part of the assessment consideration was given to possible alternatives to the draft strategy. This included looking at a 'do nothing' alternative that assumed no action is taken to revise the original FCERM strategy as published in 2011. This alternative was rejected because of a number of factors. In particular, the national strategy as published in 2011 indicates a 6 yearly review to ensure it remains fit for purpose. The 25 year environment plan also makes a commitment to revising it during 2019.

The assessment of alternatives also explored how the draft strategy has been developed. An extensive engagement process has informed the development of the draft strategy, including 5 working groups involving a wide range of stakeholders. This has helped to feed in different ideas on managing flooding and coastal change. Many of those ideas have evolved and been incorporated into the draft strategy. Alternatives to these ideas have been discounted, in particular as they lacked stakeholder support, were not deliverable, lacked sufficient ambition and/or would not allow us to achieve our objectives in updating the national strategy.

Local level FCERM plans and FCERM projects that are developed in accordance with the final strategy will also need to consider alternatives for different places. These local level assessments will be at a more relevant scale to consider the implications of different alternatives for managing flooding and coastal change.

Summary of significant environmental effects and mitigation measures and enhancement opportunities

The following is a summary of the likely significant effects of the draft strategy as identified by the strategic environmental assessment. Also outlined are mitigation measures required to manage potential negative effects and enhancement opportunities to help realise greater environmental benefits. This includes a general summary of similar

mitigation measures and enhancement opportunities as well as some specific ones that are outlined under each environmental topic.

The assessment of the draft strategy is proportionate to its national context and has considered potential impacts at the national level. The final strategy will set out a national framework for local flood and coastal erosion risk management strategies and projects. Many of these local level strategies and projects will also have separate environmental assessments. These local level assessments are at a more relevant scale to consider potential environmental effects in particular places.

During the assessment a number of uncertainties were identified reflecting the context of the national strategy. This included, for example, uncertainty on the type of risk management tools which will be used in different places. The draft strategy contains no detailed locational information. As a result there was also uncertainty on the sensitivity of different places to new flood and coastal infrastructure or other risk management tools.

Biodiversity

The draft strategy could result in both positive and negative effects on biodiversity. This variation is mainly due to measures linked to the planning and delivery of flood and coastal risk management. The draft strategy has a longer term objective that all development will seek to support environmental net gain in all local places. The draft strategy also requires risk management authorities to achieve biodiversity net gain in all programmes and schemes. It is envisaged this will benefit biodiversity in the medium to longer term. Other measures in the draft strategy that encourage using the natural environment as part of risk management will also benefit biodiversity. This includes risk management solutions that work with natural processes and use natural flood management approaches, land management and sustainable drainage systems.

The assessment recognises that some tools for managing the risk of flooding and coastal change can have negative effects on habitats and species. The construction of new flood and coastal infrastructure, for example, can result in the loss, damage or fragmentation of habitats. In coastal and estuarine areas risk management activities that maintain levels of protection can result in the loss of inter-tidal habitats, such as saltmarsh. In other coastal locations, risk management can contribute to protecting and maintaining the ecological interest of particular types of habitats. In these areas there could be negative effects if resilience to flooding and coastal change cannot be sustained in the future.

Many designated sites of national, European and international conservation value are associated with freshwater, wetland, estuarine and coastal/marine habitats. A Habitats Regulations Assessment (HRA) is being prepared for the national strategy. This considers the potential implications of the national strategy for designated European sites. These include Special Areas of Conservation, Special Protection Areas and Ramsar sites. Initial findings of the HRA recognise the draft strategy includes measures that could benefit the conservation of European sites. Due to uncertainties at the national scale, however, initial findings conclude that a precautionary approach is taken. This is because it is not possible to be certain there will not remain the possibility of negative effects on the integrity of European sites. This is in terms of the implementation of local level plans, strategies and projects arising from the framework provided by the national strategy.

The overall effect of the draft strategy on biodiversity will depend on a range of factors at the local level. These include the type, scale and design of risk management tools used and the sensitivities of the local area. The assessment has taken into account the initial findings of the HRA process. Adopting a similar precautionary approach, the assessment identifies a potential negative effect on biodiversity, which could be significant at a national scale.

Mitigation for the identified negative effects includes existing requirements to undertake HRAs for local level risk management plans and projects. This is to determine whether they are likely to adversely affect the integrity of European sites and any required compensatory habitat. Working with Natural England and other stakeholders on initiatives, such as Habitat Compensation Programmes, will also support this.

It is recommended the further development of a national suite of resilience tools include tools that have the potential to benefit biodiversity. This includes risk management solutions that work with natural processes, use natural flood management and adopt sustainable land management. The involvement of Natural England is also recommended at a national and local level.

There is the opportunity to show how risk management solutions, such as sustainable drainage systems, can contribute to the natural environment in urban areas.

Population and human health

The draft strategy recognises the impacts flooding and coastal change can have on communities and businesses and the effects on people's health, wellbeing and livelihoods. The assessment confirms the effects of the draft strategy on population and human health are likely to be mainly positive, especially in the medium to longer term. It is considered many of these benefits are likely to be significant at the national scale. Measures associated with planning, delivery and preparing for and recovering from flooding and coastal change, in particular, are considered likely to benefit health and wellbeing. This is because they can reduce the potential hazards of a flooding event. They can also help to alleviate the wider anxiety and stress of experiencing and or being at risk of flooding. The assessment also identified at the local level some risk management tools can help to improve the provision of and access to green space. This can also improve health and wellbeing by encouraging physical exercise as well as the benefits of greater contact with the natural environment.

Areas of deprivation and social inequality can have increased vulnerability to the risk of flooding and coastal change and less able to cope with its consequences. It is anticipated the measures in the draft strategy are likely to make a positive contribution to tackling social deprivation and equality. This is for similar reasons as for health and wellbeing as well as using investment in risk management to support economic growth and regeneration. The draft strategy acknowledges that in some places it will not be possible to prevent flooding and coastal change happening. In response, the draft strategy emphasises the importance of putting in place a combination of risk management and planning tools to support people and businesses.

It is recommended the introduction of new funding or financing for risk management retains a level of prioritisation for deprived areas at significant risk. To ensure all sectors of the community are engaged in decision-making, additional support may be needed to enable this and tailored to the local area.

Resource management

The draft strategy is likely to have mainly positive effects on resource management, although it is anticipated these will not be significant at a national level. The assessment identified potential positive effects relating to protecting and conserving soils. This is mainly associated with the use of tools, such as natural flood management approaches and land management practices. These can help to reduce surface water runoff and soil erosion with benefits also for water quality and water resources. The potential for positive effects on soil conservation, however, is dependent on the local geology, topography and land use. Taking this into account, the overall effect on soil conservation is unlikely to be significant at the national scale.

The construction of new or improved flooding or coastal infrastructure will involve the use of resources and create waste. Other tools such as property level resilience, however, can help to reduce waste and resource use at the local level. This is because they can avoid the need for extensive repairs, rebuilding and refurbishment after a flooding event. Overall, the effects on resource use and waste are likely to be localised and not considered to be significant at a national scale.

The further development of a national set of resilience tools should include consideration of potential benefits for protecting and conserving soils. Working at a catchment scale and involving land managers will help to identify places where risk management can align with priorities for conserving soils.

It is recommended that guidance for risk management authorities encourages sustainable construction practices and takes account of the whole life costs of risk management activities. This will help to promote the efficient use of resources and reduce waste.

Water

The assessment identified that the draft strategy could result in positive and negative effects on the water environment. New or improved flood and coastal infrastructure, for example, can affect the natural functioning of rivers and obstruct the passage of protected fish species. Other risk management tools that work with natural processes, however, can contribute to improving the condition of water bodies. This can involve reconnecting watercourses with a functioning floodplain or habitat creation, such as saltmarsh in coastal areas.

The draft strategy also encourages the expanded use of natural flood management approaches and strengthening links with land management practices. This has the potential to benefit water quality and the sustainable management of water resources. This is because these types of resilience tools can help to reduce surface water runoff and the input of pollutants and sediments to watercourses. Reducing surface water runoff can also increase infiltration rates and the recharge of groundwater resources. These benefits are likely to be further reinforced by the proposal to better align the planning of flooding and coastal change and sustainable water management.

The ability to protect and improve the water environment at the local level will depend on a number of factors. These include the type of risk management solutions, the local area and the sensitivity of the water bodies likely to be affected. Overall, it is anticipated the effect of the draft strategy on the water environment is unlikely to be significant at the national level.

At the local level Water Framework Directive (WFD) assessments are required to assure the compliance of risk management activities with WFD objectives. Sharing good practice on WFD assessments across the risk management sector could further support this. There is also the opportunity to use new and updated guidance to show how different resilience tools can contribute towards WFD objectives and water resources.

Climatic factors

The draft strategy is likely to make a significant positive contribution to adapting to climate change in the medium to longer term. Significant positive effects at the national level are anticipated. This is due to measures associated with planning and delivering risk management and preparing and recovering from flooding and coastal change. The assessment identified both positive and negative effects at the local level relating to climate change mitigation. This is because the building of new or improved flooding or coastal infrastructure will add to greenhouse gas emissions. Other risk management solutions, however, can have lower carbon footprints such as the use of natural flood management approaches. Risk management tools that include habitat creation can even

help to store carbon, such as through woodland planting and peatland restoration. Overall, the effect on climate change mitigation is considered to be neutral. This is because increases or reductions in carbon emissions from risk management activities are unlikely to be significant in a national context.

To help mitigate local level effects on carbon emissions, an additional measure is recommended on encouraging low or zero carbon risk management approaches. This could be further reinforced by including similar encouragement in new and updated guidance for risk management authorities.

Material assets

Material assets have been defined to include homes, businesses, infrastructure, agricultural land and existing flood and coastal change risk management assets. The assessment concluded the draft strategy is likely to have mainly positive effects on material assets, with many of these benefits likely to be significant at a national scale. In particular, it is anticipated measures linked to planning and delivering risk management will significantly improve the resilience of communities, the economy and infrastructure. Measures associated with preparing for and recovering from flooding are also likely to be beneficial.

The further development of a national set of resilience tools for managing flooding and coastal change should take into account potential implications for agricultural land. Early engagement at the national and local level with the agricultural sector is also advised.

Cultural heritage

The draft strategy could result in positive and negative effects on the historic environment. The assessment identified this variation in potential effects was mainly due to measures linked to the planning and delivery of flood and coastal risk management. Many historic places are at risk of flooding and coastal change. As a result new or improved infrastructure or other measures that reduce the risk and consequences of flooding can be beneficial. The construction of permanent infrastructure and other tools such as habitat creation, however, can also have negative effects on the historic places. This can be due to impacts on the setting and character of historic places or through altering ground conditions with potential implications for archaeological remains. It is anticipated that with mitigation potential negative effects can be significantly reduced at the local level.

The draft strategy indicates in certain areas it may not be possible to provide resilience to climate change and reduce the likelihood of flooding and coastal change in the future. Depending on the location, this could have negative impacts on historic places. An increase in the frequency and severity of flooding, for example, could prevent the active use of historic buildings. This could lead to a deterioration in their condition that also affects the character of surrounding areas. In response, the draft strategy encourages the use of proactive and long term planning approaches in these areas to help inform decision-making.

The draft strategy commits risk management authorities to contribute to improving the historic environment through their investments. It also seeks to ensure that all new development will bring environmental net gain in all local places. The assessment concluded that potential effects on the historic environment at the local level area will depend on a number of factors. These include the type and scale of risk management solutions, their design and implementation and the sensitivity of historic places to change. Taking this into account, it is anticipated effects on the historic environment are unlikely to be significant at the national level.

At the local level plans, strategies and proposals for flood and coastal risk management will need to comply with requirements for environmental assessment. Cultural heritage

assessments should inform this process and make use of local data on the historic environment. This can include historic landscape characterisation and Historic Environment Records held by local authorities.

The further development of a national set of resilience tools should include consideration of potential implications for the historic environment and involve Historic England. It is also recommended the Environment Agency continue to work with Historic England on investigating the impact of flooding on historic places. Risk management authorities should ensure they have access to specialist cultural heritage advice.

The introduction of flood resilience measures in building and material standards will need to take account of the sensitivities of historic buildings.

Landscape

The assessment identified the potential for positive and negative effects on the character of urban and rural landscapes. Similar to cultural heritage this variation relates in the main to measures linked to the planning and delivery of flood and coastal risk management. The construction of new risk management infrastructure can result in the loss of features that contribute to the character of place. Risk management projects, however, can also provide the opportunity to improve the character of landscapes in rural and urban areas and their use by people. This can be through habitat creation, enhancing the public realm and improving walking and cycling networks. In urban areas, the introduction of sustainable drainage systems can also contribute to networks of green space. In rural areas especially, the expansion of natural flood management approaches provides opportunities to enhance landscape character. Strengthening the link between risk management and land management practices has the potential to encourage longer term changes in land use and management.

In areas where it might not be possible to provide resilience to future climate change, the assessment identified the potential for larger scale landscape change. This could have positive and negative effects for people and nature. This will depend on the scale of the change and how people use the existing landscape for leisure, recreation or for their livelihoods. It is anticipated such areas are likely to be place specific and potential effects are not likely to be significant in a national context.

The assessment concluded the draft strategy's commitments to improve the natural, built and historic environment and support environmental net gain will benefit landscape character. At the local level effects on landscape character will depend on the type of risk management solutions, the local area and the sensitivity of the landscape to change. With mitigation at the local level, potential negative effects can be significantly reduced. Overall, it is therefore considered potential effects on landscape character are unlikely to be significant at the national level.

At the local level plans, strategies and proposals for flood and coastal risk management will need to comply with requirements for environmental assessment. Landscape character assessments should inform this process and make use of local data on landscape characterisation. There is also the opportunity to use strategic maps developed by the Environment Agency on the potential for working with natural processes across England.

The further development of a national set of resilience tools should include consideration of potential implications for the landscapes and involve Natural England. It is also recommended that organisations and land managers with an interest in landscape change and management are engaged at a national and local level. This includes the Forestry Commission, Natural England and the agricultural sector.

Cumulative effects

The assessment considered the potential cumulative effects of the draft strategy by looking at the following:

- the inter-relationships between the different environmental topics and possible interactions of the different measures in the draft strategy
- the interaction between the draft strategy and other national plans, policies and programmes

The assessment identified a number of inter-relationships between the environmental topics. An example of this is the positive effect of the draft strategy on climate change adaptation. This is reflected across the topics on climatic factors, material assets and population and human health. Another example is the potential benefits of risk management tools that work with natural processes, use natural flood management and encourage sustainable land management practices. This underpins a number of inter-relationships between topics on biodiversity and water as well as with resource management (soils) and material assets (agricultural land).

The assessment highlights the draft strategy could potentially lead to a focus of risk management activities in particular areas, such as urban and coastal areas. Depending on the local area this could affect wildlife habitats, historic buildings, and recreational green space. Aligning risk management investment with economic growth could also increase development pressure in a local area with potential effects on the environment. It is advised that strategic planning approaches and local level environmental assessments will help to mitigate these potential effects.

Overall, the assessment concluded the draft strategy is supportive and aligns well with national strategies on planning, climate change, resources, biodiversity, industry and clean growth. The draft strategy also strongly aligns with the commitments set out in the 25 year environment plan.

General summary of significant environmental effects

Overall, the assessment found that the draft strategy is likely to have effects that are predominantly positive or neutral. In particular, the assessment identified significant positive effects in relation to population and human health, climatic factors and material assets. Adopting a precautionary approach, the assessment identified a potentially significant negative effect on biodiversity although potential benefits were also noted. For other topics a mix of potential negative and positive effects were typically identified and a neutral effect indicated. This includes resource management, water, cultural heritage and landscape. For these topics on balance, and taking account of stated uncertainties, potential effects were not considered significant at a national scale.

General summary of mitigation and enhancement opportunities

A number of mitigation measures and enhancement opportunities were similar across the range of environmental topics outlined above. These included the:

- requirement for many local level plans and strategies to undertake strategic environmental assessments or sustainability appraisals
- requirement for many projects at the local level to undertake environmental impact assessments
- integration of environmental considerations as part of proposed guidance for risk management authorities
- provision of further guidance on net environmental gain and how this can include a wide range of environmental and sustainability aspects

- engagement at the national and local level with environmental organisations and stakeholders
- role of environmental organisations in supporting and contributing to incident response and recovery
- inclusion of environmental aspects in future skills, training and professional development and engagement activities
- need to invest in supporting skills and resources to enable the input of environmental specialists to local decision-making on flood and coastal change risk management
- use of the Environment Agency's strategic overview role to promote and champion good practice on the management of flooding and coastal change

Monitoring

The Environment Agency will develop arrangements for the monitoring and reporting of the final strategy's progress. The environmental report outlines proposals for monitoring the significant environmental effects of the national strategy. The topics we are proposing to monitor due to their significant environmental effects are population and human health, biodiversity, climatic factors and material assets. It is anticipated the majority of these can be monitored by using and adapting existing monitoring arrangements. This includes monitoring the number of households and businesses at risk of flooding and coastal change. It also includes annual monitoring on progress towards meeting Water Framework Directive objectives and the monitoring of environmental outcomes associated with risk management projects. The proposals for monitoring will be finalised in conjunction with the preparation of the final strategy.

This consultation

The environmental report has been published with the draft strategy. The consultation is open for 8 weeks, from 9 May 2019 to 4 July 2019.

To assist with this consultation, we have set out some specific consultation questions below on which we would welcome your views.

Question 1: Do you agree with the conclusions of the environmental assessment? (yes / no)

If not, please explain why.

Question 2: Are there any further significant environmental effects (positive or negative) of the draft strategy which you think should be considered? (yes / no)

If yes, please describe them.

Question 3: Are there further mitigations for potential negative effects or opportunities to achieve positive effects that should be considered for the final national FCERM strategy? (yes / no)

If yes, please give details.

How to respond

You can respond to this consultation online, by email or post.

You can view the consultation documents and questions online at on the consultation pages (<https://consult.environment-agency.gov.uk/fcrm/national-strategy-public>)

Please submit your response online. This will help us gather and summarise responses quickly, accurately and cost-effectively.

However, if you prefer, you can submit your response by email or post using our response form. You can download the response form using the above link. Please submit by email to: FCERMstrategy@environment-agency.gov.uk

Or by post to:

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1. Introduction

1.1. The draft national flood and coastal erosion risk management strategy

1.1.1. Background

The Flood and Water Management Act 2010 requires the Environment Agency to develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management (FCERM) in England (the national strategy).

The first national strategy for England was published in May 2011. It provided the overarching framework for action by all risk management authorities to tackle all sources of flooding and coastal change, including surface water.

The government committed in its 25 year environment plan that the Environment Agency would revise the national strategy in 2019. The Environment Agency has been leading a conversation with people and organisations who are affected by or work to manage flooding and coastal change. These conversations have formed the basis of a new long-term strategy for flooding and coastal change in England, to be delivered in collaboration and to benefit us all. The draft strategy is a review of the strategy published in 2011.

The final FCERM strategy will apply to all risk management authorities and all sources of flooding and coastal change, such as flooding from rivers and surface water. Risk management authorities comprise the following and have a duty to co-operate with each other and to share information:

- Environment Agency
- lead local flood authorities (unitary councils or county councils)
- district councils
- internal drainage boards
- highway authorities
- water and sewerage companies

Risk management authorities are required to exercise their flooding and coastal change functions in a manner which is consistent with the national strategy and associated guidance. Lead local flood authorities must also produce local FCERM strategies which must be consistent with the national strategy. Lead local flood authorities and internal drainage boards may only carry out FCERM works where they are desirable having regard to the relevant local strategy. The Environment Agency and coast protection authorities may only carry out FCERM works where they are desirable having regard to the national strategy.

1.1.2. Ambitions, strategic objectives and measures

The draft strategy sets out a new philosophy for managing all sources of flooding and coastal change. This is in the context of the challenge of climate change and a significant increased risk of flooding and coastal change.

The vision of the draft strategy is for England to be a nation ready for, and resilient to, flooding and coastal change - today, tomorrow and to the year 2100.

Looking to the year 2100, the draft strategy aims to blend long-term ambitions with shorter-term practical steps. The focus of the draft strategy is on the objectives we should take forward as a nation over the next 10 to 30 years to help support the longer-term

ambitions for change needed by 2100. It also sets out shorter-term measures to achieve the strategy's objectives.

The strategy has been split into three high level ambitions:

- climate resilient places
- today's growth and infrastructure – resilient to tomorrow's climate
- a nation of climate champions, able to adapt to flooding and coastal change through innovation

The delivery of these ambitions is achieved through a series of strategic objectives which have either 2030 or 2050 timescales associated with them. These objectives are then supported by a number of measures with shorter timescales to show how the longer term objectives will be achieved. These are explained in the draft strategy and set out in its supporting consultation document. The strategic objectives for each of the high level ambitions are also summarised below.

Ambition 1: Climate resilient places

Strategic objective 1.1: Between now and 2050 the nation will be resilient to future flood and coastal risks. Over the next year the Environment Agency will work with partners to explore and develop the concept of standards for flood and coastal resilience.

Strategic objective 1.2: Between now and 2050 risk management authorities will help places plan and adapt to flooding and coastal change across a range of climate futures.

Strategic objective 1.3: Between now and 2030 all those involved in managing water will embrace and embed adaptive pathway approaches to enhance the resilience of our environment to future flooding and drought.

Strategic objective 1.4: Between now and 2030 risk management authorities enhance the natural, built and historic environments so we leave it in a better state for the next generation.

Strategic objective 1.5: Between now and 2030, risk management authorities will use funding and financing from new sources to invest in making the nation resilient to flooding and coastal change.

Ambition 2: Today's growth and infrastructure – resilient to tomorrow's climate

Strategic objective 2.1: Between now and 2030 all new development will contribute to achieving place based resilience to future flooding and coastal change.

Strategic objective 2.2: Between now and 2030 all new development will seek to support environmental net gain in local places.

Strategic objective 2.3: Between now and 2030 all risk management authorities will contribute positively to local economic regeneration and sustainable growth through their investments in flooding and coastal change projects.

Strategic objective 2.4: Between now and 2050 places affected by flooding and coastal change will be 'built back better' and in better places.

Strategic objective 2.5: Between now and 2030 all flooding and coastal infrastructure owners will understand the responsibilities they have to support flood and coastal resilience in places.

Strategic objective 2.6: Between now and 2050 the Environment Agency and risk management authorities will work with infrastructure providers to ensure all infrastructure investment is resilient to future flooding and coastal change.

Ambition 3: A nation of climate champions, able to adapt to flooding and coastal change through innovation

Strategic objective 3.1: Between now and 2030 young people at 16 should understand the impact of flooding and coastal change, but also recognise the potential solutions for their place, and opportunities for career development.

Strategic objective 3.2: Between now and 2030, people will understand the potential impact of flooding and coastal change on them and take action.

Strategic objective 3.3: Between now and 2030 people will receive a consistent and coordinated level of support from all those involved in recovery from flooding and coastal change.

Strategic objective 3.4: Between now and 2030, the nation will be recognised as world leader in managing flooding and coastal change, as well as developing and attracting talent to create resilient places.

There are over 30 measures supporting these strategic objectives. They address a range of aspects relating to the following broad themes:

- planning for resilient places
- delivering flood and coastal change resilience
- preparing for and recovering from flooding and coastal change
- raising awareness, engagement and collaborative working

With the final strategy the Environment Agency will publish an action plan on how we will take forward the strategic objectives and measures with partners. The final strategy will also sit alongside the Environment Agency's next 5 year action plan, due to be published in 2020.

1.2. Need for the strategic environmental assessment

Strategic Environmental Assessment (SEA) is a process that ensures consideration is given to the environment during the development of certain “plans and programmes”. In doing so, it contributes to the promotion of sustainable development and environmental protection.

SEA is required by The Environmental Assessment of Plans and Programmes Regulations 2004 (the Regulations). In accordance with the Regulations the Environment Agency has determined that the update to the national strategy requires an SEA.

1.3. The SEA environmental report

1.3.1. General purpose and content

This environmental report provides a brief description of the SEA process that we have followed and the decisions we have taken during this. It considers other policy and legislation that should be taken into account. It also identifies environmental issues and trends that provide a context for the national strategy. The environmental report sets out the assessment of the potential significant environmental effects of implementing the national strategy and of reasonable alternatives. The environmental report also sets out relevant mitigation and enhancement measures and proposals for monitoring the significant environmental effects of the implementation of the national strategy.

The final strategy will set out a national framework for lead local flood authorities to update their local FCERM strategies. It also provides a national framework for risk management authorities to undertake individual FCERM projects. Many of these local level strategies

and projects will also undergo separate environmental assessments. These environmental assessments are at a more relevant scale to consider the spatial implications of flood and coastal erosion risk management. This environmental report, and the SEA process, are therefore proportionate to the context of the national strategy and avoiding duplication of assessments to be carried out at the local level.

1.3.2. Regulatory requirements

The SEA has been undertaken to fulfil the requirements of the Regulations detailed in section 1.2. The Regulations set out requirements for an environmental report. Provided below is an outline of how these requirements are addressed in this report.

The Regulations require an outline of the contents and main objectives of the national strategy and its relationship with other relevant plans and programmes. Section 1 sets out the main objectives of the national strategy. An outline of the content of the national strategy is also provided in section 5. Section 2 sets out the key themes arising from a review of relevant plans and programmes. A full list of plans and programmes reviewed is set out in Annex A.

Also required are the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the national strategy. The environmental characteristics of areas likely to be significantly affected are similarly required. In accordance with the Regulations section 2 provides an overview of the current environmental context for England and how this might evolve. Section 2 and section 5 also describe the environmental characteristics likely to be significantly affected.

In accordance with the Regulations section 2 identifies any existing environmental problems which are relevant to the national strategy. In particular, this includes those relating to any areas of particular environmental importance. This includes areas designated under the Bird Directive and the Habitats Directive.

The Regulations require coverage of the environmental protection objectives established at international, EU or national level, which are relevant to the national strategy. The way those objectives and any environmental considerations have been taken into account during its preparation is also required. To meet this requirement section 2 provides a summary of environmental protection objectives as part of the review of relevant plans and programmes.

In accordance with the Regulations the likely significant effects on the environment of the national strategy are described in section 5. The Regulations state this should include short, medium and long term effects, permanent and temporary effects, positive and negative effects and secondary, cumulative and synergistic effects.

Also required are measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the national strategy. Mitigation measures and opportunities for additional environmental improvements are provided in section 5.

The Regulations require an outline of the reasons for selecting the alternatives dealt with. They also require a description of how the assessment was undertaken, including any difficulties encountered in compiling the required information. Section 4 sets out the alternatives considered. Sections 2 and 5 outline the technical difficulties encountered during the assessment process.

In accordance with the Regulations proposals for monitoring significant environmental effects of implementing the national strategy are provided in section 6.

A non-technical summary of the information provided to meet the above requirements is set out at the front of this document. It is also available as a separate document.

1.3.3. Structure

In summary, the structure of the SEA environmental report is as follows:

Section 1: Introduction to the national strategy, SEA and the environmental report.

Section 2: A review of key plans, policies, programmes and legislation relevant to the national strategy. Also an overview of the strategic environmental context (baseline) and outline of existing environmental issues and any identified trends.

Section 3: An outline of the assessment approach used to assess the likely significant environmental effects of the national strategy.

Section 4: An outline of how alternatives have been considered in the development of the national strategy.

Section 5: The results of the SEA process and a description of the significant environmental effects of the draft strategy and proposed mitigation and enhancement measures.

Section 6: An outline of proposals for monitoring the significant environmental effects of the national strategy. Also an outline of the next stages within the SEA process and the finalisation of the national FCERM strategy.

1.4. This consultation

We have prepared this environmental report to consult with interested parties, in particular the statutory SEA consultation bodies, on the results of the SEA process. In England the SEA consultation bodies are Natural England, Historic England and the Environment Agency. In Wales the consultation bodies are Natural Resources Wales, Cadw and the Welsh Government. In Scotland the consultation bodies are the Scottish Environment Protection Agency, Scottish Natural Heritage, Historic Environment Scotland and the Scottish Government. We are also consulting with the Marine Management Organisation.

To assist with this consultation, we have set out some specific consultation questions below on which we would welcome your views:

Question 1: Do you agree with the conclusions of the environmental assessment? (yes / no)

If not, please explain why.

Question 2: Are there any further significant environmental effects (positive or negative) of the draft strategy which you think should be considered? (yes / no)

If yes, please describe them.

Question 3: Are there further mitigations for potential negative effects or opportunities to achieve positive effects that should be considered for the final national FCERM strategy? (yes / no)

If yes, please give details.

The consultation on this environmental report is open for 8 weeks, from 9 May 2019 to 4 July 2019.

You can view the consultation documents and questions online on the consultation pages (<https://consult.environment-agency.gov.uk/fcrm/national-strategy-public>)

Please submit your response online. This will help us gather and summarise responses quickly, accurately and cost-effectively.

However, if you prefer, you can submit your response by email or post using our response form. You can download the response form using the above link. Please submit by email to: FCERMstrategy@environment-agency.gov.uk

Or by post to:

Morena Staiano
Environment Agency
Horizon House
Deanery Road
Bristol
BS1 5AH

You can also request a printed version of the document and response form using these contact details or by phone to Morena Staiano on 020 7714 1037.

2. Strategic context

2.1. Introduction

In this section we present a review of key plans, policies, programmes and legislation relevant to the national strategy. We also give an overview of the strategic environmental context (baseline) relating to flood and coastal erosion risk management in England.

The review focuses on the strategic context for England. In areas that cross administrative borders with Scotland or Wales there is a requirement for responsible authorities to effectively coordinate flood risk assessment and management. This is in accordance with the Flood Risk (Cross Border Areas) Regulations 2010. In recognition of this cross-border context the review of key plans, policies, programmes and legislation also includes key references to Scotland and Wales as appropriate.

2.2. Scoping of environmental issues

2.2.1. Scoping the assessment

The scoping phase of the SEA considered the range of environmental issues required to be considered by the Regulations. It also considered the extent to which the issues are likely to be affected by the national strategy. The issues listed in the Regulations are:

- biodiversity, flora and fauna
- population and human health
- soil
- water
- air
- climatic factors
- material assets
- cultural heritage, including architectural and archaeological heritage
- landscape
- the inter-relationship between the above issues

The environmental report need only consider these factors in detail to the extent reasonably required taking account of, amongst other things, the:

- contents and level of detail in the national strategy
- stage of the national strategy in decision-making processes
- extent to which matters are more appropriately assessed at different levels in the decision-making process

A key question when determining whether an issue should be assessed in detail in this environmental report was whether the national strategy was likely to result in significant effects on that factor. Also considered was whether assessment would be more appropriate at a different level in the decision-making process. This, for example, could be when adopting local FCERM strategies or undertaking individual FCERM works.

Since the SEA concerns a national strategy without location or area specific proposals, we focused on whether the impact is likely to be nationally significant. It is considered impacts on specific locations or sensitive sites are best addressed by an assessment of a lower level strategy or scheme.

To help inform the scoping process we considered the SEA environmental report prepared for the current national strategy as published in 2011. We also applied our professional judgement and experience of developing other plans and strategies on managing the risk of flooding and coastal change. As outlined further in section 2.2.2 our proposals were also subject to consultation through a SEA scoping report.

In this context, we scoped into the assessment the following issues or topics. For each topic a short accompanying justification is provided.

Biodiversity, flora and fauna

There is a likely significant interaction between the national strategy and statutory obligations for designated sites of national and international importance. The national strategy also has the potential to significantly affect natural capital and the services it provides.

Population and human health

The national strategy has the potential to result in significant impacts on population and communities. Additionally, public authorities responsible for managing the risk of flooding and coastal change need to have regard to statutory obligations on equality.

Resource management (including soil, contaminated land and waste)

The national strategy has the potential to result in significant strategic impacts on soils and the sustainable use of resources.

Water (water resources and water quality)

There will be a significant interaction between the national strategy and statutory obligations for protecting and improving the water environment.

Climatic factors

The national strategy has the potential to have a significant influence on England's ability to adapt to climate change. This includes improving the resilience of communities and the economy. There is also the potential to contribute to climate change mitigation.

Material assets (including homes and businesses, agricultural land, infrastructure and FCERM assets)

The national strategy has the potential to have a significant strategic impacts on existing as well as planned material assets. This includes their future resilience to the risks of flooding and coastal change.

Cultural heritage (including architectural and archaeological heritage)

Significant impacts on heritage assets arising as a direct consequence the national strategy are considered unlikely. Any impacts there may be are likely to be indirect through the national strategy's influence upon local FCERM strategies and FCERM works. Such impacts are more appropriately assessed through the spatially specific framework provided by local level strategies or subsequent projects. In relation to the national strategy the main focus for considering the historic environment is at a landscape scale. This is because it is at this scale the national strategy could have an influence on the use, appreciation and significance of historic places.

Landscape

Significant impacts on statutory designated landscapes arising as a direct consequence of the national strategy are considered unlikely. Any impacts there may be are likely to be indirect through the national strategy's influence upon local FCERM strategies and FCERM works. Such impacts are more appropriately assessed by spatially specific local

level strategies or subsequent projects. For similar reasons potential visual impacts on receptors are scoped out of the assessment. There is the potential for the national strategy to have a significant influence on land management and the wider character of the landscape. As such we have focused the assessment on the character and quality of landscapes.

The topic we have scoped out of the assessment is air. We considered that significant impacts on air quality as a result of the national strategy were unlikely to occur. Carbon emissions, however, are considered under climatic factors which is scoped into the assessment.

2.2.2. SEA scoping report and consultation responses

The SEA scoping report set out our proposed approach to the likely extent and level of information to be included in the assessment process. This included the range of environmental issues proposed for further assessment as outlined in the previous section. The scoping report was subject to public consultation in 2018 and published on the gov.uk website. We received comments on the scoping report from the following organisations:

- Scottish Natural Heritage
- Scottish Environment Protection Agency (SEPA)
- Forestry Commission
- Association of Local Government Archaeological Officers (ALGAO)
- South West Water

Overall, the responses to the scoping report were supportive of the proposed approach to the assessment process.

Several responses suggested additional plans or legislation. These suggestions have been incorporated as well as a greater recognition given to the cross-border context with Scotland and Wales. This is outlined in more detail in section 2.3.

Several responses suggested additional data sets to inform the baseline of the national strategy. The proposed data was generally considered to be more relevant to local level plans and strategies and their environmental assessments. The data sets, however, have been highlighted in this assessment as examples of the types of data to be taken into account at the local level. Examples of this include sections 5.2.7 and 5.2.8 which highlight local level data relevant to the historic environment and to landscape and woodland.

In response to comments a number of aspects informing the assessment process have been clarified. One respondent highlighted the wider benefits to the environment of woodland creation and management. For the purposes of the assessment, woodland creation and management has been linked to risk management tools such as natural flood management, habitat creation and land management. The assessment in section 5 has also highlighted wider benefits of these to flood risk and water quality and resources and climate change mitigation. This is in addition to biodiversity and landscape.

The approach to considering the significance of environmental effects has been reviewed further to more information being available on the content of the national strategy. This is set out in section 3.4.

One respondent raised the need to assess potential impacts on water and wastewater assets and performance. We have assumed the scope of 'key infrastructure' under the SEA topic of material assets includes these assets and is outlined in section 5.2.6.

More information was also requested on demonstrating a net gain in biodiversity. This is an area of ongoing work by the Environment Agency. It is anticipated this will inform the

future monitoring arrangements of the final strategy. Monitoring proposals for the SEA are outlined in section 6.

2.3. Review of plans, policies and programmes

The Regulations require that consideration is given to the relationship with other plans and programmes and environmental objectives.

We have considered plans that are relevant to flood and coastal erosion risk management and wider environmental objectives or issues relevant to the SEA. This consideration has taken into account how:

- the objectives of these plans / legislation / strategies potentially influence or contribute to the national strategy and the SEA
- the objectives of these plans / strategies may be influenced by the national strategy and the SEA

The review can also help to identify where other planning processes and organisations may be able to support flood and coastal erosion risk management.

A full list of the national level plans, policies and programmes reviewed is set out in Annex A. As outlined above, in recognition of the cross-border context the review also includes relevant references to Scotland and Wales as appropriate.

Sections 2.5 to 2.12 below include a targeted selection of key plans, strategies or legislation. These are considered to be particularly relevant to the topic and to managing the risk of flooding and coastal change. They are also considered to be appropriate to the geographic scale of the national strategy.

2.4. Strategic environmental context

The overview of the environment context or baseline for the national strategy focuses on relevant aspects of the current state of the environment. It also considers its likely evolution without the implementation of the updated national strategy. Given this is a national strategy, the overview focuses on the context for England, wherever possible. It identifies existing environmental problems (issues) and ongoing and future trends that are of particular relevance to managing the risk of flooding and coastal change.

The Regulations require technical difficulties to be documented with regard to the assessment. Given the context of the national strategy, baseline information has been gathered to highlight national issues and trends. For some of the environmental topics covered it was not possible to obtain baseline information specific to England. In these cases, information for England and Wales, or the wider UK has been used.

The Environment Agency is making available an evidence base that has been drawn on to develop the strategy. This will be available on request from 23 May 2019, please email FCERMstrategy@environment-agency.gov.uk for a copy.

The overview of the strategic context is set out according to the environmental issues / topics scoped into the assessment as outlined in section 2.2.1. In summary, these are as follows:

- biodiversity (including fauna and flora)
- population and human health
- resource management (incorporating soil, contaminated land and waste)
- water (covering water resources and water quality)
- climatic factors (including carbon)

- material assets (covering homes and businesses; infrastructure; agricultural land; FCERM assets)
- cultural heritage (including architectural and archaeological heritage)
- landscape

For each of the above SEA topics the following sections provide a summary of the:

- strategic baseline
- environmental trends and issues
- key plans, strategies and legislation
- interactions and themes of particular relevance to the national strategy

Annex B sets out the main information sources for each of the topics covered.

2.5. Strategic context: biodiversity

Baseline

Biodiversity provides services that are critical to human health, wellbeing and the economy. This includes food production, water and climate regulation and pollination.

Terrestrial and freshwater habitats support a diverse range of specialised plants and animals. In 2016, however, 86% of water bodies had not reached good ecological status. The main reasons for this were pressures from agriculture and rural land management, the water industry, urban areas and transport.

The UK has 17,820 km of mainland coastline and the widest range of marine habitats of any coastal waters in Europe. Estuaries in the UK are a crucial link in the migratory chain for waders and wildfowl. They provide breeding grounds to many bird species, including those of international importance. Coastal wetlands have also been valued at providing £1.5 billion in annual benefits through buffering the effects of storms and managing flooding.

Legal protection by designating sites is a key tool for conserving terrestrial and marine habitats and species. International and national designations include 72 Ramsar Sites, 254 Special Areas of Conservation and 88 Special Protection Areas. A number of these European sites are cross-border with either Wales or Scotland. There are also over 4000 Sites of Special Scientific Interest, of which around half are in unfavourable condition.

Marine Conservation Zones have also been designated to contribute to an ecologically coherent network of Marine Protected Areas.

At the local level there is also an extensive network of sites of nature conservation interest, including local nature reserves and local nature conservation / wildlife sites.

Trends and issues

Indicators suggest the current status of biodiversity is mixed. While the condition of protected areas is improving, wildlife in the wider countryside, such as farm land birds, remains in long term decline. The main pressures on biodiversity include agricultural and forestry practices, climate change, the spread of non-native invasive species and pollution by hazardous substances.

There is evidence that some pressures on biodiversity are being reduced, such as from air pollution. There is some recovery from other pressures, such as acidification on land. However other pressures remain at damaging levels and include nitrogen deposition and seabed disturbance. Pressures that are increasing include climate change and the spread of non-native species.

Certain habitats are particularly vulnerable to climate change. This includes wetlands due to changes in water availability. There is also the impact of sea level rises on coastal habitats, this resulting in habitat loss or degradation. In many coastal areas such habitats are important in providing a natural flood defence. It is envisaged an increasing emphasis on applying a natural capital approach will better take account of the wider benefits provided by habitats and species.

Key plans, strategies and legislation

- National Planning Policy Framework 2018
- 25 year environment plan 2018
- Biodiversity Strategy 2020 (2011)
- Conservation of Habitats and Species Regulations 2017 (as amended)
- Marine and Coastal Access Act 2009 (as amended)
- Wildlife and Countryside Act 1981(as amended)
- Natural Environment and Rural Communities Act 2006

Interactions and themes relevant to the national strategy

Measures for managing flooding and coastal change can have a significant effect on the biodiversity of wetland and coastal environments. They have the potential to make positive improvements for habitats and wildlife as well as have potential adverse effects.

Taking a more strategic, catchment wide approach to risk management is widely regarded as enabling better planning for working with natural processes. This approach enables different solutions to be considered, such as the use of natural flood management, and how they can enhance biodiversity and natural networks.

The 25 year environment plan calls for a greater use of flood risk management approaches that work with natural systems. This includes creating natural habitats, such as woodland and saltmarsh and restoring peatland. The expanded use of natural flood management approaches is also encouraged to complement more traditional flood defences.

The use of a natural capital approach should be encouraged to help inform decision-making on managing the risk of flooding and coastal change. This will enable better and more efficient decisions that support environmental enhancement and realise the benefits provided by nature.

2.6. Strategic context: population and human health

Baseline

In 2017 the population of England increased to over 55 million. Many places where people live and work are at risk of flooding and coastal change, however, awareness of this risk is variable.

There is an evidenced connection between flooding and health. It has been shown that people who were flooded were more likely to have depression, anxiety or post-traumatic stress disorder than those unaffected.

Public health priorities for England include obesity and physical exercise, and wellbeing and mental health. Health indicators, such as on obesity, show higher levels of prevalence in deprived areas. Men and women living in more deprived areas also have lower wellbeing scores, on average, than those living in less deprived areas.

Human connection with the natural environment is increasingly recognised as being of value for health and wellbeing. The proportion of people visiting the natural environment several times a week or more has increased since 2010. This figure varies across England with the highest rates in the South East and South West and lowest rates in London and the West Midlands.

As an indication of the recreational services provided by the water environment, the value of the time spent at UK freshwater habitats in 2015 is estimated at £303 million.

Trends and issues

Although the rate of population growth in England has slowed, overall levels continue to increase. The number of households in England is projected to increase from 22.7 million in 2014 to 28 million in 2039. This is mainly due to a trend for smaller average household sizes.

Climate change is likely to increase the number of people and properties at risk of flooding and coastal erosion. The proportion of new residential development constructed in flood risk areas remains below 9% a year. However, increased demand for new housing may increase pressures to build in areas at flood risk. This can correlate to areas of higher deprivation.

Coastal communities are particularly vulnerable to the threats of flooding and coastal change. This is because populations in coastal areas are often poorer and older than the UK average.

By law the Environment Agency's principle aim is to protect the environment in such a way as to contribute to sustainable development, which includes protecting human health. There is increasing evidence on the short and long term impacts of flooding on health and wellbeing. Communities can also be affected by disruption to local services, utilities and transport infrastructure.

The health benefits of engaging with and accessing the natural environment is supported by an extensive range of studies. These indicate that places with more accessible green space are associated with better physical and mental health. In respect of mental health benefits this can include reductions in stress, fatigue, anxiety and depression.

Key plans, strategies and legislation

- National Planning Policy Framework 2018
- 25 year environment plan 2018
- Environment Act 1995 (as amended)
- Equality Act 2010 (as amended)

Interactions and themes relevant to the national strategy

Challenges to managing flooding and coastal change include an increasing population and housing growth. Areas of deprivation that are at risk of flooding or coastal erosion also need particular support.

Of increasing urgency is tackling the potential effects on communities of increased risk to flooding and coastal erosion due to climate change. How this might affect different communities and the services they use, will need to be considered when planning for new housing and sustainable communities.

Risk management schemes and activities can deliver improvements to health and wellbeing by managing the risk and consequences of flooding and coastal erosion. Rivers and other watercourses, particularly in urban areas, provide an opportunity for daily interaction with the natural environment. As part of green and blue infrastructure networks

they can also support a range of leisure and recreational activities. These can help encourage more active lifestyles and in many places form an important part of the local tourism economy.

The implementation of flood and coastal change infrastructure can impact green spaces and leisure and recreational facilities and their use. They can also offer opportunities to enhance recreational and leisure provision and improve the quality and accessibility of green space.

Public bodies responsible for managing flooding and coastal change have an obligation to ensure everyone can participate in their services. This includes all groups protected by the Equality Act. It is therefore important, that people are given the opportunity to become involved to bring their knowledge of local places and to help shape decision-making.

2.7. Strategic context: resource management

Baseline

Soils underpin a range of essential services including food production, carbon storage, protecting biodiversity and absorbing, filtering and storing water. Intensive agricultural production and industrial pollution has degraded soils over many years. Some areas of England have experienced major losses in soil function due to erosion, a decline in organic matter and compaction. It is estimated this degradation costs around £1 billion per year in England and Wales.

Peat soils are estimated to store around half of the UK's soil carbon and make up 11% of England's total land area. Over 70% of peat soils, however, are drained or in poor condition. In urban areas soils are subject to high levels of sealing.

Historic land use and activity has created a legacy of land that could be affected by contamination. Estimates vary on the extent of this with possibly over 100,000 sites. Of these sites it is estimated that 5 to 20% require action to address potential risks to human health and the environment.

Over the last 20 years sustainable waste management and the application of the waste hierarchy has led to a major decrease in waste being disposed to landfill. There has also been an increase in recycling. In 2014, the UK generated 55 million tonnes of (non-hazardous) construction and demolition waste which achieved a recovery rate of nearly 90%.

Trends and issues

Climate change, the intensification of agricultural production and expanding urbanisation have the potential to increase soil erosion. This is due to higher rates of surface water run-off, which can also affect water quality through sedimentation and pollutants.

Evidence is demonstrating the importance of improving soil health. Protecting and restoring peatland is a key priority due to the many services it provides for drinking water supply, water quality, managing flood risk and carbon storage.

Since 2000 progress has been made in identifying and remediating contaminated land sites. Surveys indicate, however, there are at least another 10,000 sites that need further investigation to establish the risks they pose to human health and the environment. As a result of climate change coastal landfill sites may also be at increased risk of exposure to coastal erosion.

Household waste recycling rates in England have risen from around 11% in 2000/1 to about 45%. Recycling rates in construction have also improved over the same period. Since 2013, however, rates for both have not progressed.

Improvements in waste and resource management are needed to meet ambitions for doubling resource efficiency and eliminating avoidable waste of all kinds by 2050. This will include moving towards a more circular economy and a greater emphasis on product lifecycles.

Key plans, strategies and legislation

- Our Waste, Our Resources: A Strategy for England 2018
- National Planning Policy Framework 2018
- 25 year environment plan 2018
- Clean Growth Strategy 2017
- UK Peatland Strategy 2018
- Environmental Protection Act 1990 (as amended)
- Environmental Permitting (England and Wales) Regulations 2016 (as amended)
- Waste (England and Wales) Regulations 2011 (as amended)

Interactions and themes relevant to the national strategy

Soils filter and store water with benefits for water quality, water resources and for managing flood risk. These vital functions are reduced when soil condition is degraded, such as through erosion and poor farming practices.

Measures for managing flood risk can also contribute to reducing soil erosion. This can include encouraging sustainable land management, working with natural processes and promoting natural flood management approaches. Schemes which improve river channel morphology and integrate habitat creation can also be beneficial.

At the local level flooding and coastal change infrastructure can help to reduce the risk of flooding of contaminated land, including historic landfill sites. The implementation of schemes also has the potential to affect contaminated sites, especially in urban areas. Associated remediation, however, can provide local benefits to economic regeneration as well as avoid potential risks to human health and the environment.

To help preserve stocks of material resources the delivery of flooding and coastal change infrastructure should champion resource efficiency and sustainable waste management. This should include the sustainable procurement of materials and taking into account the whole lifecycle of products from purchase to disposal.

2.8. Strategic context: water

Baseline

In 2016, 86% of river water bodies had not reached good ecological status. Phosphorus was the most common reason underlying this, typically due to pollution from farm land and sewage effluent.

Groundwater provides around 30% of England's drinking water and its quality is particularly affected by nitrates from agriculture.

Abstraction is a major cause of damage to wetlands. In 2017, abstraction from around 28% of groundwater bodies and up to 18% of surface waters was at higher than sustainable levels. In 2016, unsustainable abstraction prevented at least 6% and possibly up to 15% of rivers from meeting good ecological status or potential.

Bathing water quality has improved over the last 30 years with 98% passing minimum standards and 65% at excellent status in 2017. Further information on marine and coastal habitats and species is covered in section 2.5 on biodiversity.

Freshwater habitats vary significantly and provide many different services. Water is a key element of natural capital. Annual monetary values of some of the services provided by UK freshwaters include:

- over £1 billion for freshwater abstraction (excluding groundwaters)
- £1 million for fish caught in UK inland waters
- £303 million for the time spent at UK freshwater habitats

Trends and issues

There are considerable pressures on water quality and water resources. These include climate change, population growth and changes in how land is used and managed. Other key pressures are from pollution from waste water and diffuse sources in urban and rural areas.

Water quality in rivers has improved markedly in recent decades, but improvements have not continued in recent years. For surface waters, improvements are predicted to be achieved by 2021. However, nearly 50% of groundwater bodies will not reach good chemical status by 2021.

Higher rates of surface water runoff increase the risk of soil erosion and sedimentation and associated pollution from nutrients and other contaminants.

There is no clear trend in the pattern of droughts. It is predicted that summer river flows and groundwater levels may decrease with implications on the availability for abstraction and drinking water. Decreases will also affect water quality.

Improving and sustaining the quality and quantity of water is a priority, as well as the need to improve the way flood risk is managed. A holistic approach to achieving all three is increasingly encouraged. Expanding the use of natural flood management approaches, sustainable drainage systems and sustainable land management practices would contribute to this.

Key plans, strategies and legislation

- 25 year environment plan 2018
- Water Abstraction Plan 2018
- Creating a great place for living - Enabling resilience in the water sector 2016
- Water Environment (Water Framework Directive [WFD]) (England and Wales) Regulations 2017
- Environmental Permitting (England and Wales) Regulations 2016 (as amended)
- Water Resources Act 1991 (as amended)
- Flood and Water Management Act 2010
- Marine and Coastal Access Act 2009 (as amended)
- Environment Act 1995 (as amended)

Interactions and themes relevant to the national strategy

Maintaining clean and sustainable supplies of water is vital to support sustainable communities and a prosperous economy. Reducing the damaging abstraction of water and

groundwater and improving water quality is also necessary. This is required to protect the water environment as a key natural asset and the services it provides.

In addition to compliance, flood risk management can complement the delivery of Water Framework Directive (WFD) objectives. Opportunities to support WFD, for example, include flood risk schemes that re-naturalise heavily modified watercourses and support natural processes.

Risk management measures also have the potential to benefit water resources by influencing land management practices, working with natural processes and using natural flood management approaches. Such measures help to improve the attenuation, infiltration and storage of surface water run-off and the replenishment of groundwater resources.

Sustainable land management practices can also benefit water quality by reducing soil erosion. This is due to reduced rates of surface water runoff and the input of sediments, nutrients and other pollutants into watercourses.

In urban areas, the introduction of sustainable drainage systems and the creation of green infrastructure can help manage surface water runoff. Greater collaboration between risk management authorities, planning authorities and developers will help to ensure these benefits are realised in new development and existing places.

2.9. Strategic context: climatic factors

Baseline

England's climate is changing and will continue to change as a result of greenhouse gas emissions. The dominant cause of greenhouse gas emissions is from human activity.

The global increase in temperature over the 20th century is mirrored in the UK climate. The 21st century has so far been warmer than the previous three centuries. Overall, there is a trend towards milder, wetter winters and hotter, drier summers.

Sea levels around the UK have risen on average 1 to 2 mm per year during the 20th century. This has increased to 3 mm per year in the past decade.

The Climate Change Act requires the UK to reduce its emissions by at least 80% by 2050 (compared to a 1990 baseline). To progress this a series of intermediate targets are set in 'carbon budgets' providing caps on greenhouse emissions in the UK during a 5 year period. To date five carbon budgets have been set from 2008 to 2032.

Trends and issues

Significant progress has been achieved in cutting greenhouse gas emissions. Overall between 1990 and 2016 the UK reduced emissions by 42% (on 1990 levels). However, unless further action is taken to reduce emissions, global temperature may rise to 4°C above pre-industrial levels by the end of the century.

A warmer atmosphere can hold more moisture, leading to heavier rainfall and more frequent flooding, including outside of recognised flood risk areas. Whilst dry periods, when combined with higher temperatures, are likely to result in more severe and prolonged droughts.

It is predicted that summer temperatures could be 5.4 °C hotter by 2070, while winters could be 4.2 °C warmer. During wetter winters there could be 35% more precipitation, whilst drier summers could see a decrease in rainfall of up to 47% by 2070.

By the end of this century global sea levels are expected to have risen by between 0.4 and 1 metre above the 1990 level. It is predicted that sea level will continue to rise around the

UK, probably at a faster rate than in recent decades. If action is not taken to reduce emission, UK sea levels could rise by as much as 4 metres by 2300. This will exacerbate flood risk and accelerate the process of coastal change.

The impact of climate change on flood and coastal erosion risk will vary locally. General trends include a continued rise in sea levels around England where even small rises could add to very high tides, affecting places inland as well as coastal areas. Wetter winters and more intense rainfall will increase river flows and cause more surface run-off, leading to local flooding and erosion. This may in turn increase pressure on drains and sewers and impact water quality.

Key plans, strategies and legislation

25 year environment plan 2018

National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting 2018

Clean Growth Strategy 2017

Climate Change Act 2008

Interactions and themes relevant to the national strategy

Climate change is unavoidable and will increase the risk of flooding and coastal erosion.

Managing the risk of flooding and coastal change requires continued consideration of long-term climate change. Action is urgently needed to adapt to a changing climate and accommodate future sea level rise, intense rainfall and more frequent flood events.

Flooding and coastal erosion are natural processes and many landscapes have evolved based on regular flood and erosion patterns. In some places, however, flooding and coastal change can have negative consequences. The risk of flooding and coastal change cannot be eliminated everywhere, particularly in the context of climate change. Early adaptation to climate change, will help to manage the risks and consequences of increased flooding and coastal change and impacts on communities. This will require a holistic approach to flood and coastal erosion risk management. Together with traditional engineered solutions, other measures will be needed as part of an integrated approach. This should include improving the long-term resilience of homes businesses and infrastructure. Increasing the uptake of sustainable drainage systems in urban areas and the expanding the use of natural flood management approaches should also be encouraged.

Risk management activities should champion low carbon solutions and reductions in CO₂ emissions. Collaborative working with other sectors and suppliers, for example, could enable opportunities for reducing transport and the use of more sustainable modes of transport.

2.10. Strategic context: material assets

Baseline

It is estimated that 5.2 million homes and businesses in England are at risk of flooding, of which about 1.8 million homes are at risk of coastal flooding and erosion in England.

More frequent and more severe flooding from all sources has been found to be the most significant climate change risk to UK infrastructure. All infrastructure sectors are affected by flooding, with coastal infrastructure also at risk from rising sea levels and higher rates of coastal erosion.

The Environment Agency manages and maintains around 7,000 km of defences on main rivers, around 1,000 km of coastal defences and 22,300 structures. Local authorities, internal drainage boards and private riparian owners are also responsible for maintaining 2,400km of defences and around 26,700 structures.

Around 90% of large raised reservoirs are classified as 'high risk', where, in the event of an uncontrolled release of water human life would be endangered. The Environment Agency regulates over 1800 third-party-owned large raised reservoirs and operates 213 such reservoirs mainly for flood risk management purposes.

The Agricultural Land Classification provides a method for assessing the quality of farmland. The best and most versatile land is defined as Grades 1, 2 and 3a. Grades 1 and 2 together form about 21% of all farmland in England. The subgrade 3a also covers about 21%. It has been estimated that the total area of agricultural land at risk of flooding is around 12% (1.3 million ha).

Trends and issues

Climate change will increase the risk of flooding and coastal erosion to homes and businesses. Recent evidence, for example, predicts a rise in sea level of 0.4 to 1m by 2100 and a coast subject to continuing change. The Environment Agency is making available an evidence base that has been drawn on to develop the strategy. This will be available on request from 23 May 2019, please email FCERMstrategy@environment-agency.gov.uk for a copy.

Major infrastructure development is underway and or planned across a range of sectors. This is in support of economic growth and increased productivity and sustainable and prosperous communities. There is growing evidence on the resilience to flooding of locally significant infrastructure. Different sectors, however, are at different stages in taking action to improve the resilience of existing and planned infrastructure.

Agriculture and land management policy is likely to have a greater focus on environmental enhancement and delivering wider benefits, such as reducing flood risk.

Key plans, strategies and legislation

- National Planning Policy Framework 2018
- 25 year environment plan 2018
- National Infrastructure Delivery Plan 2016
- Industrial Strategy 2017

Interactions and themes relevant to the national strategy

Planning for new housing, economic growth and sustainable communities needs to take account of the future implications of climate change. Managing and adapting to the risk of flooding and coastal change contributes to a sustainable economy and resilient communities.

Economy and society depend on a secure supply of services such as electricity, telecommunications, water, healthcare and transport. Improving the resilience of key local infrastructure will require collaboratively working across a range of sectors in the public and private sector.

Agriculture has a key role in helping to manage flooding and coastal change. A new Environmental Land Management Scheme with a greater emphasis on environmental enhancement provides opportunities to promote natural flood management approaches.

Effective and resilient risk management requires the ongoing maintenance and legal compliance of assets across a range of public and private interests. This includes risk management authorities, infrastructure sectors and private land owners.

2.11. Strategic context: cultural heritage

Baseline

The National Heritage List for England has 400,000 entries of nationally designated heritage assets. This includes scheduled monuments, listed buildings, parks and gardens, battlefields, protected wrecks and World Heritage Sites.

In 2018 there were nearly 10,000 conservation areas in England. The greatest proportion of these are located in the South East followed by the South West. Almost half of district authorities and unitary councils have Local Lists of heritage assets. A considerable number (5,160) of heritage assets, however, are identified as at risk on the Heritage at Risk Register.

Historic Environment Records are maintained and managed by local authorities and provide access to resources relating to the historic environment of a particular locality. This includes information on designated and non-designated heritage assets.

The historic character of places is described for almost the entirety of England through Historic Landscape Characterisation.

Trends and issues

Since 2010 there has been an increase in all nationally designated heritage assets, particularly in relation to the number of listed buildings. Between 2010 and 2018 there has also been notable increases in the proportion of designated parks and gardens, historic battlefields and historic wreck sites.

Although 2018 saw an overall decline in the number of entries on the Heritage at Risk Register, new heritage assets identified as at risk continue to be added. In 2018 there were 242 new entries.

Visits to heritage properties and attractions continue to increase. The 2017/18 Taking Part Survey, however, indicates there is still a heritage engagement gap, particularly between adults in the upper and lower socio-economic groups.

The historic environment is vulnerable to the direct and indirect effects of climate change, including flooding, coastal change, water availability and extreme weather events.

Key plans, strategies and legislation

- National Planning Policy Framework 2018
- 25 year environment plan 2018
- The Heritage Statement 2017
- Culture White Paper 2016
- Planning (Listed Buildings and Conservation Areas) Act 1990
- Ancient Monuments and Archaeological Areas Act 1979

Interactions and themes relevant to the national strategy

Many heritage assets are close to watercourses or lie within the coastal zone and have close associations with the water environment. Some flooding and coastal change assets are also of heritage significance.

Measures for managing the risk of flooding and coastal change can help to reduce the risk and damaging consequences of flooding to heritage assets. This in turn can contribute to their sustainable development by sustaining their active use and continued maintenance. The design and implementation of flooding and coastal change infrastructure can also provide opportunities for the historic environment. This can include fostering access, enjoyment and engagement in the historic environment as well as enhancing the local character and distinctiveness of places.

The implementation of flood and coastal erosion risk management measures also has the potential to impact designated and non-designated heritage assets. This can include the direct loss of heritage assets as well as impacts on their setting and the historic character of places. There is also the risk of impacting previously unknown archaeological assets.

Protecting, conserving and enhancing heritage assets and the historic environment needs to be taken into account in implementing flood and coastal erosion risk management activities. Information on the historic character of the landscape and how the water environment has changed overtime can also help to inform risk management interventions.

2.12. Strategic context: landscape

Baseline

The diversity of landscape character across England is described by a framework of 159 National Character Area (NCA) profiles. Local landscape character assessments and historic landscape characterisation provide further information about landscape character at the local level. Marine Character Areas (MCAs) are identified for some areas of England as part of seascape assessments undertaken to inform marine planning.

Statutory landscape designations include 10 National Parks and 34 Areas of Outstanding Natural Beauty (AONBs), which together account for nearly 25% of England. Some landscapes are also internationally recognised as World Heritage Sites.

There are 32 defined stretches of Heritage Coast that cover 33% of the coastline.

Land management schemes deliver a range of environmental benefits. At the end of 2015 Entry Level Scheme agreements were managing 5,132k hectares of land and Higher Level agreements 1,344k hectares.

The area of woodland in the UK is estimated to be 3.17 million hectares. In England, woodland coverage is estimated to equate to 10% of the land cover or 1.31 million hectares.

Trends and issues

Updated information on trends in the overall character and quality of the landscape is limited. Available studies indicate Environmental Stewardship schemes are maintaining and enhancing landscape character.

In 2018 woodland in active management in England increased to 59%. Rates of new woodland planting and restocking has been variable since the 1970s due to changes in grant schemes across the UK.

Enhancing as well as conserving the environment of designated landscapes is of increasing importance as key natural assets. Evidence is demonstrating the benefits of working at a landscape or catchment scale for managing flooding and coastal change. This includes the opportunities for working with natural processes, such as natural flood management approaches, and woodland planting and management.

New environmental land management systems are likely to have a greater focus on environmental enhancement. This is likely to include restoring and improving natural capital and rural heritage.

Key plans, strategies and legislation

- 25 Year environment plan 2018
- National Planning Policy Framework 2018
- National Parks and Access to the Countryside Act 1949
- Countryside and Rights of Way Act 2000

Interactions and themes relevant to the national strategy

Flood and coastal erosion risk management measures have the potential to impact sensitive landscapes and landscape features and attributes that contribute to local character and distinctiveness. They can also provide opportunities to restore and or strengthen the character and quality of the landscape in both urban and rural places. This can include solutions that work with natural processes and the use of natural flood management approaches.

Sustainable land management practices can deliver flood risk benefits by helping to slow and attenuate flows. This can be through measures such as soil management plans, cropping techniques, riparian buffer strips and habitat creation. There are also opportunities for increased woodland and forest creation to contribute to reducing flood risk.

Working with natural processes, using natural flood management approaches and woodland planting should be encouraged to support the wider environmental benefits they deliver.

3. Assessment methods

3.1. Approach to assessing the national strategy

Our overall approach to the SEA assessment process is summarised below. How the assessment has fed into the plan-making process for the draft strategy is also highlighted.

The assessment process comprised a number of iterative stages. The first stage involved applying a series of parameters to the suite of strategic objectives and measures included in various iterations of the draft strategy. This was undertaken in order to help target the detailed assessment on those aspects which could give rise to significant environmental effects. In case where no significant effects were envisaged these aspects were scoped out of the assessment and not considered further. Further information on this stage, the parameters used and its outcome is provided in section 3.3 below.

In cases where the potential for significant environmental effects was identified the strategic objectives and measures contained in the draft strategy were subject to detailed assessment. This applied the assessment criteria described in section 3.5 to identify potential environmental effects and their likely significance at a national level. Further information on this is given in section 3.4 below.

Consideration was then given to whether there is the opportunity to mitigate any potential negative effects. Opportunities to enhance the benefits of potential positive effects was also considered as part of the assessment. Informed by this the likely significance of the identified effects was reviewed to identify potential residual effects and accompanying mitigation or enhancement measures. The results of this assessment is presented in section 5. Proposals for monitoring the significant effects of the national strategy are set out in section 6.

The assessment process has informed the plan-making process of the draft strategy at a number of stages. In support of the iterative nature of the SEA process and plan-making process, a SEA workshop was arranged in November 2018. This involved the technical leads responsible for preparing the draft strategy. Initial recommendations from the workshop were used to inform the ongoing plan-making process.

An early iteration of the draft strategy was also subject to a preliminary assessment of potential environmental effects. The recommendations from this preliminary assessment were reported on to feed into the ongoing plan-making process.

Further iterations of the draft strategy have also been reviewed with recommendations fed back to the technical team leading on the production of the draft strategy. A series of early reviews have used the initial context of the preliminary assessment and the assessment criteria set out in section 3.5. These early reviews have contributed to securing a number of changes to the emerging national strategy. This includes the following aspects:

- inclusion of an additional measure on wider environmental net gain
- an additional strategic objective and measure on enhancing the natural, built and historic environment
- greater recognition and coverage on working with natural processes in support of risk management and natural flood management approaches
- inclusion of additional content on woodland and forestry, including a specific measure
- greater recognition of opportunities to contribute towards improving the condition of water bodies

3.2. Alternatives

The Regulations require 'reasonable alternatives' to be assessed. To comply with the Regulations we have considered a 'do nothing' alternative. This is defined in terms of the likely evolution of the baseline environment in the absence of a revised national strategy. This assumes that no action is taken to review and refresh the published 2011 national strategy. As a result the current national strategy would continue to be implemented.

In the assessment of 'reasonable alternatives' we have also considered the overall process and approach used in the development of the draft strategy. The national strategy is giving effect to the requirements of the Flood and Water Management Act 2010. Its development has been informed by a collaborative and multi-stakeholder approach. The approach has involved stakeholders within an interest in or affected by flood and coastal risk management. This approach has served to ensure that the generation of ideas for the revision of the national strategy has been an integral feature of the engagement process since the earliest stage in the plan-making process.

Section 4 explains the assessment of 'reasonable alternatives' in more detail.

3.3. Scoping elements of the national strategy

The draft strategy sets out the approach to managing flooding and coastal change under a number of strategic objectives and a series of supporting measures. These have provided the basis for the assessment.

We applied a series of parameters to the strategic objectives and measures. This was undertaken in order to target the assessment on those aspects within the draft strategy which could give rise to significant environmental effects. The parameters were based on the overarching question - is the objective or measure likely to:

- influence the framework of local level strategies/plans for the management of flooding and coastal change
- impact environmental receptors through their implementation and or delivery
- deliver improvements for the environment and natural capital
- influence how people and communities engage with the environment or are affected by flooding and coastal change and the services provided by public bodies

As part of this process we identified several measures that are unlikely to result in significant environmental effects. This included measures that:

- focus on the development of guidance on best practice
- propose the setting up of organisational structures
- seek to influence skills development in higher education and other organisations

It is acknowledged the above types of measures will serve to improve knowledge and support the general implementation of the national strategy. However, it is considered they are unlikely to give rise to significant environmental effects. As such they have been scoped out of the more detailed SEA assessment process and not considered further.

3.4. Defining significance in the assessment

The assessment process identifies the significant environmental effects of the draft strategy. Due to the context of the national strategy, effects on local environmental issues were not considered significant within the context of this assessment. The final strategy will set out a framework for local flood and coastal erosion risk management in England, with implementation including through local FCERM strategies and individual FCERM

projects. Many of these local level strategies and projects will also undergo separate environmental assessments. These environmental assessments are at a more relevant scale to consider the spatial implications of managing flooding and coastal change at the local level.

At this high level of assessment all impacts are considered to have a substantial level of uncertainty associated with them. We have therefore considered whether potential effects are likely to be significantly positive or significantly negative. We have also considered whether on balance the potential effects are not significant or neutral at the national scale. In addition, given the strategic nature of the measures contained in the national strategy the assessment has focused on the likely changes resulting from the national strategy. The assessment has not attempted to quantify likely changes again due to the levels of uncertainty at this national level.

The England-wide and high level nature of the national strategy means that it is not possible to provide definitive criteria to determine the significance of an impact. However, an indication of the characteristics of significant impacts can be provided. For example, this can include impacts that are likely to result in a negative effect on the integrity of features of national or international value. Or conversely impacts that will demonstrably increase the extent or improve the value of such features. It can also include impacts that are likely to conflict with environmental legal objectives, targets or duties. It might also include impacts that are likely to result in a demonstrable change in the health and/or social or economic wellbeing of communities.

3.5. Assessment criteria

Assessment criteria are used in the assessment process to test the effects (positive and negative) that the national strategy could have on the wider environment. The SEA assessment criteria have been derived from the integrated review of relevant national plans, policies and programmes and the strategic environmental context. They were also subject to consultation through the SEA scoping report.

The assessment criteria used for the assessment of the draft strategy are outlined below.

SEA topic: biodiversity

The assessment of this topic considered the high level question or SEA objective: Does the strategy protect and recover nature?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- conserve and protect species and habitats
- support a net gain for biodiversity by restoring and creating habitats and improving their connectivity

SEA topic: population and human health

The assessment of this topic considered the high level question or SEA objective: Does the strategy improve health wellbeing and equality

In support of this the assessment also considered the following criteria in terms of does the strategy:

- improve and enhance the health and wellbeing of communities
- seek opportunities to reduce social deprivation and inequality
- support the provision of more, better quality and accessible green infrastructure / green space

Resource management

The assessment of this topic considered the high level question or SEA objective: Does the strategy improve and sustain resources?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- protect and conserve soils and improve resilience to degradation
- reduce waste and promote the recovery, reuse and recycling of materials

Water

The assessment of this topic considered the high level question or SEA objective:

Does the strategy protect and improve the water environment?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- help secure compliance with the Water Framework Directive and contribute to enhancing the status of water bodies
- contribute to the sustainable management of water resources

Climatic factors

The assessment of this topic considered the high level question or SEA objective: Does the strategy help to mitigate and adapt to climate change?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- contribute to adapting to climate change
- contribute to mitigating the main causes of climate change by promoting low or zero carbon approaches

Material assets

The assessment of this topic considered the high level question or SEA objective: Does the strategy support sustainable communities and a prosperous economy

In support of this the assessment also considered the following criteria in terms of does the strategy:

- protect and improve the resilience of communities and the economy
- protect and improve the resilience of key infrastructure
- protect and conserve the best and most productive agricultural land

Cultural heritage

The assessment of this topic considered the high level question or SEA objective: Does the strategy conserve and enhance the historic environment?

In support of this the assessment also considered the following criterion in terms of does the strategy:

- consider the contribution of historic places to the character of urban and rural landscapes

Landscape

The assessment of this topic considered the high level question or SEA objective: Does the strategy conserve and enhance landscape character?

In support of this the assessment also considered the following criterion in terms of does the strategy:

- conserve and enhance the quality of landscapes for people, places and nature?

Inter-relationships between the environmental topics

The assessment of this topic considered the high level question or SEA objective: Does the strategy protect and enhance natural capital?

In support of this the assessment also considered the following criterion in terms of does the strategy:

- support the integration of natural capital into decision-making

3.6. Cumulative environmental effects

The assessment process has assessed the potential cumulative effects of the draft strategy. This includes consideration of the potential significant environmental effects generated by:

- 'intra-plan' effects and the interaction of key elements within the draft strategy
- 'inter-plan' effects and the potential in-combination effects of the draft strategy with other relevant plans, programmes or policies

The assessment of 'intra-plan' effects has focused on broad themes arising from the inter-relationships between the different SEA topics. This takes account of the high level nature of the national strategy and the strategic nature of the measures. The assessment of 'inter-plan' effects is focused on the potential interactions of the national strategy with other relevant national level plans, programmes or policies.

Section 5.3 describes the assessment of cumulative environmental effects in more detail.

3.7. Habitats regulations assessment

Amongst the areas that could be affected by the measures in the national strategy are those that are considered to be of international importance for nature conservation. These include areas designated under the terms of the 'Habitats Directive' (92/43/EEC) or the 'Birds Directive' (2009/147/EC). These are implemented in England by the Conservation of Habitats and Species Regulations 2017. This requires an assessment be undertaken of the effects of the national strategy on these sites. This is known as a Habitats Regulations Assessment (HRA) and the requirement applies to the following designations:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs)
- Special Protection Areas (SPAs)
- Sites of Community Importance (SCIs)

HRA also applies, as a matter of government policy, to:

- potential Special Protection Areas (pSPAs)
- Ramsar sites (sites designated under the 1971 Ramsar Convention for their internationally important wetlands)

These are referred to collectively as 'European sites'.

A HRA is being prepared for the national strategy in discussion with Natural England, Natural Resources Wales and Scottish Natural Heritage. The overall approach to the HRA takes into account the strategic nature of the national strategy. Also recognised is that many strategies, plans and schemes that are developed by risk management authorities

within the framework set by the national strategy will be subject to their own requirements for HRA. This provides a local level framework to appropriately assess the effects of specific risk management policies and actions on European sites.

Initial findings of the HRA are taken into account within the assessment of significant environmental effects as described in Section 5.

3.8. Water Framework Directive (WFD)

Given the strategic nature of the national strategy we have not carried out a detailed WFD assessment of the individual risk management measures. As outlined in section 3.5 the assessment adopts a strategic approach proportionate to this national level. A high level consideration of potential WFD implications of managing flooding and coastal change is included as part of the SEA topic on water. The assessment as described in section 5, recognises that detailed WFD assessments will be required at the local level. At this level there will be more certainty on the type of flood risk management activity and its location. This will allow a determination of whether or not proposed risk management activities support the objectives set out in the relevant River Basin Management Plan.

3.9. Equality Act

The Equality Act 2010 (as amended) includes a duty for public sector organisations to show due regard to equality. As outlined in section 3.5 we have incorporated criteria on equality considerations as part of the SEA topic on population and human health. This includes the high level question or SEA objective: Does the strategy improve health wellbeing and equality? In addition this is supported by the following criteria in terms of does the strategy:

- improve and enhance the health and wellbeing of communities
- seek opportunities to reduce social deprivation and inequality

Given the context of the national strategy, the assessment of potential effects on equality adopts a strategic approach proportionate to the national level. The assessment, as outlined in section 5, recognises that local level strategies and projects will also be subject to duties under the Equality Act. These local level strategies and projects are at a more relevant scale to consider implications for equality for different groups of people in particular places.

4. Assessment of alternatives

4.1. Introduction

The SEA Regulations provide that an environmental report should identify, describe and evaluate the likely significant effects on the environment of reasonable alternatives, taking into account the objectives and the geographical scope of the plan or programme in question. If alternatives have been rejected at an earlier stage, the environmental report should give reasons for this.

The environmental report should also take account of the stage of the plan or programme in the decision-making process and whether certain matters are more appropriately assessed at different levels in that process in order to avoid duplication.

In this case the draft strategy is a high level document which will, in part, be put into effect through further plans, in particular local FCERM strategies. The consideration of alternatives will be an important aspect in any environmental assessments of such local FCERM strategies. These local level environmental assessments are at a more relevant scale to consider the implications of different alternatives for flood and coastal risk management.

The consideration of alternatives in this environmental report therefore takes account of this more appropriate level in the process of setting the strategy for flooding and coastal erosion risk management. It also takes into account the strategic expression of the objectives and measures as set out in the national strategy.

4.2. 'Reasonable' alternatives

European Commission guidance (see below) indicates that in deciding what alternatives should be addressed, the first consideration is a plan or programme's objectives and geographical scope.

The geographical scope for a national FCERM strategy is England. Our objectives for updating the existing national FCERM strategy are framed by the legal requirement, under section 7 of the Flood and Water Management Act 2010, that any updated strategy should set out our strategy for managing flooding and coastal erosion. It is also framed by our vision that the nation should be ready for, and resilient to, flooding and coastal change up to 2100, taking account of a changing climate. The draft strategy also aims to fulfil government's commitment, in the 25 Year environment plan, to update the existing national strategy in a way that strengthens joint delivery across organisations and government's policy for tackling flooding that includes actions to:

- use more natural flood management solutions where appropriate
- increase the uptake of sustainable drainage systems, especially in new developments
- improve the resilience of properties at risk of flooding and the time it takes them to recover should flooding occur

[Reference: European Commission, Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment. Available at: <http://ec.europa.eu/environment/eia/sea-support.htm>]

4.3. The 'do nothing' alternative

We have defined the 'do nothing' alternative in terms of the likely evolution of the baseline environment in the absence of a revised national strategy. This assumes that no action is

taken to review and refresh the 2011 national strategy. As a result the current national strategy would continue to be implemented.

The SEA of the 2011 national strategy has been used as the basis for the assessment of the 'do-nothing' alternative. The SEA concluded that as a result of the 2011 national strategy there could be significant positive effects on the country's ability to adapt to climate change. The SEA also concluded there could be significant positive effects on population and human health through the management of flooding and coastal change. This would serve to benefit communities and businesses. The assessment identified that effects on biodiversity, water, material assets, soil and contaminated land, could be positive or negative. This would be dependent on the type of risk management solutions implemented, the sensitivities present at the local level and the effectiveness of mitigation measures.

The 'do-nothing' alternative was rejected for the reasons outlined below and as such no further assessment has been undertaken.

An initial consideration is that the national strategy is a statutory document under the Flood and Water Management Act 2010. This requires the national strategy to specify when it will be reviewed. The 2011 national strategy indicates a 6 yearly review to ensure that it remains fit for purpose.

A second important consideration is that since 2011, government policy has changed significantly and as such the 2011 national strategy does not fully reflect the current policy context. An example of this is the publication in 2018 by Defra of: A Green Future: Our 25 year plan to improve the environment. The 25 year environment plan aims to improve the environment within a generation. It sets out government action to help the natural world regain and maintain good health. It explains how we will champion sustainable development and take a natural capital approach to decision-making. In particular, the plan highlights the need to expand the use of natural flood risk management solutions and to work with natural processes. The importance of reconnecting people with the natural environment is also a key theme. If the 'do-nothing' alternative was implemented, the 2011 national strategy would potentially conflict with current government policy. It could also fail to realise opportunities for improving and restoring the natural environment.

A further example of the changing context for the national strategy is the urgency and challenge of climate change. As explained in the draft strategy the most recent climate change predictions confirm we will experience wetter winters and drier summers. There is also an increased likelihood of more intense rainfall leading to flooding as well as a continued rise in sea levels. Urgent and immediate action is needed so we have climate resilience places that are able to manage and adapt to flooding and coastal change.

Finally, the 25 year environment plan makes a commitment to revising the national strategy during 2019. If the 'do-nothing' alternative was implemented, this commitment would not be fulfilled.

4.4. Alternatives in the development of the draft FCERM strategy

In the assessment of 'reasonable alternatives' we have also considered the overall process and approach used in the development of the draft strategy.

A number of approaches for the development of the draft strategy were considered. These included varying levels of engagement and collaboration with partners and stakeholders. One such approach was to develop the draft strategy without widespread stakeholder engagement but doing the minimum required to update the existing strategy to bring it into line with current policy and practice. We rejected that alternative as it would fail to deliver

our objectives for updating the strategy. In particular, it would not strengthen joint delivery across organisations and would fail to secure the benefits that would arise from a fully updated and collaboratively produced strategy. This 'do minimum' option is therefore not considered a 'reasonable' alternative.

Instead of this 'do minimum' option the development of the draft strategy has been informed by a collaborative and multi-stakeholder approach. Since late 2017, for example, over 150 people and 90 organisations have taken part in an extensive engagement process to help shape the direction of the draft strategy. This collaborative and multi-stakeholder approach has facilitated the early engagement of environmental stakeholders and their input to the plan-making process.

The engagement process included the setting up of five working groups of stakeholders to develop the ambition, ideas and actions for the national strategy. The working groups also provided a framework to support an evaluation process for assessing, refining and prioritising the ideas.

A set of guiding principles were agreed at an early stage in the process to help frame the discussions. The guiding principles are reflective of aspirations for how those involved in flood and coastal change management will operate in the future.

During workshops held in the summer of 2018, stakeholders created ideas as well as supporting actions and shared their views on an evaluation process. We complemented this work, for example, by combining any duplicate ideas and clarifying the distinction between possible ideas and actions. Later in 2018 stakeholders were responsible for evaluating the emerging ideas to ensure those taken forward were meeting key criteria. These included that the ideas that were nationally strategic, adhered to the guiding principles and would serve to achieve the overall ambition of the emerging national strategy.

Following the workshops held in 2018 we refined the ideas further through an iterative evaluation and development process. The evaluation process identified ideas to be taken forward in the process with a justification to support these decisions. The development stage further refined the ideas and focused on creating a narrative for the draft consultation document. As part of this narrative measures and strategic objectives were derived from the evaluated set of ideas.

An independently chaired Advisory Group helped steer the overall process and ensure an inclusive input from stakeholders.

This process of stakeholder engagement necessarily involved the consideration of a range of 'alternatives' to the draft strategy as now proposed. This included through the generation over 200 'ideas for change'. These were summarised as 6 'big ideas' for the draft strategy:

- climate (flood) resilience is built into the fabric of society as standard
- communities, businesses and individuals are empowered and supported to be involved in decisions about their local area
- flood recovery works in a way that reduces the fear of the unavoidable consequences of flooding
- everyone has clear expectations of the service they can expect on flooding and coastal change
- we strengthen and grow the 'flood and coastal change family' to provide a cohesive service across all sources of flooding

- the environment is protected, valued, respected and used to reduce flood and coastal risk, support community wellbeing and support natural capital

As described above, our stakeholder engagement, has involved wide-ranging and iterative discussions. These included consideration of matters which may have become alternative 'ideas for change' and/or 'big ideas'. Such alternatives were not pursued. In particular this is because they did not have stakeholder support (as demonstrated through the engagement process), would not have been feasible (in particular considering what was within risk management authorities' powers to deliver) and/or would not have achieved our objectives for updating the national strategy (see section 4.2 above).

Many of the 'ideas for change' and 'big ideas' that were generated through stakeholder engagement have ultimately evolved and been incorporated into the draft strategy's ambitions, objectives and measures. Alternative ways of incorporating them into the draft strategy were considered but discounted. They would not result in a draft strategy with the same high level of ambition as currently proposed, in particular considering the challenges of a changing climate. This also risked not meeting our objectives for updating the existing strategy (see section 4.2).

4.5. Summary

Overall, the collaborative approach to the development of the draft strategy has served to ensure that the generation of ideas has been an integral feature of the engagement process, this engagement having taken place since the earliest stage in the plan-making process. The guiding principles and the progressive approach to assessment and refinement has also helped embed sustainability and environmental considerations in the development of the draft strategy.

This engagement process has necessarily involved the consideration of a wide range of ideas, many of which could be considered 'alternatives' to the draft strategy. Such alternatives have, however, been discounted through this engagement process as:

- not having stakeholder support
- not being within our or others' powers to deliver
- not being sufficiently ambitious for a national strategy intended to respond to the challenge of climate change and set a vision for 2100
- otherwise not achieving our objectives for updating the existing strategy

Given this, we consider that there are no reasonable alternatives that would result in materially different environmental effects. As such section 5 presents the assessment of the potential significant environmental effects of the draft strategy as published for consultation.

5. Significant environmental effects of the draft national FCERM strategy

5.1. FCERM objectives and measures proposed within the draft strategy

The draft strategy sets out a long term aspiration for a nation more resilient to flooding and coastal change. To support this the draft strategy has been split into three high level ambitions:

- climate resilient places
- today's growth and infrastructure – resilient to tomorrow's climate
- a nation of climate champions, able to adapt to flooding and coastal change through innovation

The delivery of these ambitions is achieved through a series of strategic objectives as outlined in section 1.2.2. In turn each strategic objective is supported by a number of measures. For the purposes of the SEA the measures, which were scoped-in to the assessment, have been grouped into the following broad themes:

- planning for resilient places
- delivering flood and coastal change resilience
- preparing for and recovering from flooding and coastal change
- raising awareness, engagement and collaborative working

Annex C provides a summary of the groups of measures and their related strategic objective by each of the above themes. These groupings have provided the basis for the assessment.

The assessment considered the potential environmental effects (positive and negative) of each grouping using the SEA criteria set out in section 3.5. There are considerable overlaps between the likely impacts of the draft strategy across the SEA topics. To avoid repetition, therefore, the impact of the draft strategy as a whole is described in the following sections. For each main SEA topic mitigation and enhancement measures are proposed to reduce potential negative effects and or improve positive effects. Where relevant, each topic also includes an outline of identified uncertainties that have been taken into account.

5.2. Assessment of the significant environmental effects of the draft FCERM strategy

The results of the assessment as summarised in Table 5.1 indicate that the draft strategy is likely to have effects that are predominantly neutral or positive. In particular, the assessment identified significant positive effects in relation to population and human health, climatic factors and material assets. This finding was represented across most of the groups of measures. Where the results of the assessment indicate a neutral effect this often reflects a mix of potential negative and positive effects. As explained further below, on balance these effects were not considered significant at the national scale. The following sections outline examples of this in further detail for each of the relevant SEA topics.

Adapting a precautionary approach, the assessment identified a potentially significant negative impact on biodiversity. This is associated with the broad groupings of measures linked to the planning and the delivery of flood and coastal risk management. The reasoning for this is explained in more detail below.

Table 5.1 Summary of significant environmental effects by SEA topic and assessment theme (abbreviated)

SEA Topic	Planning	Awareness, engagement	Delivering	Preparing and Recovery
Biodiversity	Significant Negative	Not significant / Neutral	Significant Negative	Not significant / Neutral
Population and Human Health	Significant Positive	Not significant / Neutral	Significant Positive	Significant Positive
Resource Management	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral
Water	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral
Climatic Factors	Significant Positive	Not significant / Neutral	Significant Positive	Significant Positive
Material Assets	Significant Positive	Not significant / Neutral	Significant Positive	Significant Positive
Cultural Heritage	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral
Landscape	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral	Not significant / Neutral

5.2.1. Biodiversity

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy protect and recover nature?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- conserve and protect species and habitats
- support a net gain for biodiversity by restoring and creating habitats and improving their connectivity

Results summary

The measures in the draft strategy could result in both positive and negative effects on biodiversity. This variation particularly relates to measures linked to the planning and delivery of flood and coastal risk management and is explored in more depth below.

The draft strategy has a longer term objective that all new development will seek to support environmental net gain in all local places. This is supported by requiring all risk management authorities to achieve net biodiversity gain in all programmes and schemes. It is envisaged in the medium to longer term this will benefit biodiversity by improving the planning and delivery of flood and coastal risk management.

Other measures in the draft strategy that encourage using the natural environment as an integral part of risk management will also benefit biodiversity. In particular, the draft strategy commits to expand and mainstream working with natural processes across all risk management authorities. Risk management solutions that work with natural processes can help to avoid and mitigate potential negative effects on habitats and species. They can also generate significant opportunities to support a net gain for biodiversity by restoring and creating habitats and improving their connectivity. This can include solutions such as reconnecting functioning flood plains, re-naturalising watercourses, wetland creation, the setting back of defences and managed realignment in coastal areas. This can directly support Water Framework Directive (WFD) objectives and contribute to the creation and restoration of other wetland and coastal and estuarine habitats.

Resilience tools illustrated by the draft strategy include land management and natural flood management approaches. Working at a catchment scale, such approaches can benefit habitats and species and their connectivity. This can include woodland planting and management, wetland creation and peatland restoration. The introduction of a new environmental land management system provides the opportunity to underpin the future expansion of natural flood management and sustainable land management. In urban areas the further expansion of sustainable drainage systems, can also benefit biodiversity where they are associated with new and or improved green spaces.

The draft strategy advocates the adoption of an adaptive pathways approach in strategies and plans prepared by risk management authorities, local authorities and water companies. The approach could have positive effects on biodiversity by helping to ensure risk management solutions respond to the environmental conditions of particular places. This might be in terms of potential constraints, such as designated sites, as well as opportunities for delivering a net gain in biodiversity. The approach could also be beneficial by encouraging working at a catchment scale and the use of risk management tools that can contribute to restoring and creating habitats. This includes, for example, schemes which work with natural processes, the use of natural flood management approaches and sustainable land management practices. Taking a longer term perspective could also facilitate future planning for expanded woodland and forestry planting and management. The flexible and iterative nature of the approach should also allow for changes in environmental conditions to be taken into account in informing future actions.

Measures for more closely aligning the planning of flooding and coastal change and sustainable water management is likely to have a positive effect on biodiversity. In particular, this provides opportunities to expand the use of natural flood management approaches and sustainable land management. These types of measures can benefit both terrestrial and wetland habitats and species through habitat creation and improvements in water quality and availability.

The draft strategy explains place based resilience standards are likely to involve a combination of tools that will vary from place to place. Some tools for preventing and protecting against the risk of flooding and coastal change can conflict with statutory nature conservation obligations. This can include new or improved permanent flood and coastal infrastructure. Without mitigation they can have adverse effects on protected habitats and species, including eels and protected fish species. This can include the loss, damage or fragmentation of habitats through construction activities. The introduction of new infrastructure can also impact ecological connectivity with potential implications for the passage of protected fish species, such as eels.

New infrastructure can have further indirect effects on habitats and their associated species due to changes in the physical or chemical regimes of water bodies and the

frequency and extent of surface water flooding. In coastal and estuarine areas risk management activities that maintain or hold the line of existing defences to climate change can result in the loss of inter-tidal habitats as a result of coastal squeeze. With mitigation and in some cases compensation the negative effects of new infrastructure can be significantly reduced. In some parts of the country, however, opportunities for providing compensatory habitat are reducing.

Supporting resilience standards in places may also involve increased levels of maintenance of existing flood and coastal change infrastructure. This also has the potential to impact biodiversity. An example of this is conveyance works. If undertaken at an inappropriate time of year such works can have negative effects on habitats and the migration of protected fish species.

In certain locations risk management can contribute to protecting and maintaining the ecological interest of designated sites. An example of this is protecting fresh water sites from saline inundation. The draft strategy suggests, however, in certain areas it may not be possible to provide resilience to climate change. As a result the risk of flooding or coastal change is likely to increase in the future. This could have negative effects on habitats and associated species that are dependent on particular conditions afforded by the protection from flooding or coastal change. Depending on the location, this could affect habitats such as saline lagoons, salt marsh, and coastal and flood plain grazing marsh. Many designated sites of national, European and international conservation value are associated with freshwater, wetland, estuarine and coastal / marine habitats. A Habitats Regulations Assessment (HRA) is being undertaken for the national strategy in accordance with the Habitats Regulations 2017. The HRA considers the potential implications of the national strategy for European sites, either alone or in combination with other projects and plans.

Similar to the SEA, the HRA process has had to take account of the high level nature of the national strategy. This includes the lack of spatial information at the local level. The HRA considers a range of generic impact types arising from typical risk management activities. At the national scale, however, it is not possible to predict potential effects on particular sites. The initial findings of the assessment acknowledge that potential impacts of risk management activities on European sites could arise as a result of lower level strategies, plans and activities. Impacts at this local level are anticipated rather than as a direct result of the national strategy. As such the importance of a tiered approach to HRA is highlighted. This is required to allow for more detailed assessment at the local level. In this way the assessments can consider potential impacts on particular European site(s) and site specific mitigation.

Initial findings from the HRA recognise that the draft strategy includes measures that could benefit the conservation of European sites and avoid potential negative effects on their integrity. Due to uncertainties at the national scale, however, initial findings conclude a precautionary approach must be taken. This is because it is not possible to be certain there will not remain the possibility of negative effects on the integrity of European sites. This is in terms of the implementation of lower tier strategies, plans and activities arising from the national strategy.

It is envisaged that measures linked to preparing for and recovering from flooding and coastal change will not result in significant effects on biodiversity. This is because the majority of measures will not deliver on the ground activities that could impact habitats or species. The assessment identified some potential beneficial aspects associated with improvements in responding to and recovering from flooding or coastal erosion. The improved coordination and collaborative working with environmental organisations, such as Natural England, could benefit biodiversity at the local level. This could aid the planning

and timely delivery of on the ground recovery activities to avoid potential direct or indirect effects on habitats and species.

Measures supporting increased awareness, engagement and collaborative working are considered to be mainly positive, although not significant at the national scale. Engagement can help to input more informed local knowledge of places and their biodiversity and foster support for solutions which benefit biodiversity. Improved engagement could also help to identify and draw on local expertise and work with local biodiversity specialists and interested people in delivering solutions. The assessment identified a potential risk that increased local demand to tackle flooding could increase pressure for risk management interventions in sensitive places. It will be important that wider engagement is accompanied by an understanding of potential impacts on the environment of different risk management solutions.

The assessment identified a number of uncertainties in assessing potential positive and negative effects at a national level. These include the:

- combination of risk management tools which will be progressed at the local level to achieve resilience standards in particular places
- sensitivity of particular places in relation to risk management plans tools and activities
- implications for biodiversity in places where resilience to flooding or coastal change cannot be sustained in the future
- extent to which natural flood management and sustainable land management will be taken up to deliver risk management and its funding context
- extent to which new or improved flood and coastal infrastructure will create, restore or improve the connectivity of habitats in urban and rural areas
- effectiveness of measures at the project level to mitigate or compensate for habitat loss and securing a net gain for biodiversity

In summary, the overall effect of the draft strategy on biodiversity will depend on a number of factors at the local level. These include the type, scale and design of risk management tools implemented and the sensitivities of the local area likely to be affected. A number of uncertainties remain especially with regard to the agreement of place based resilience standards and the combination of risk management tools they will involve in different places. Also of importance will be decisions taken with regard to those areas where resilience to flooding or coastal change cannot be sustained in the future. Taking account of these uncertainties and previous experience of delivering risk management, the assessment adopts a precautionary approach in line with the HRA process. This concludes there remains a potential negative impact on biodiversity which could be significant at a national scale.

Mitigation and enhancement

Existing regulatory provisions require the undertaking of Habitat Regulation Assessments. This is to determine whether a proposed plan or project is likely to adversely affect the integrity of a designated European site. It is recommended we continue to work with Natural England and other stakeholders at a strategic level to support initiatives, such as Habitat Compensation Programmes. These operate at a regional level across England and are developed to encourage a strategic approach to compensatory habitat creation. They aim to avoid delays to schemes by creating compensatory habitat in advance as well as potentially supporting corporate targets for creating new habitat.

At the local level new and improved infrastructure proposals and other activities for flood and coastal risk management will also need to comply with requirements for environmental

assessment. The assessment process will help to identify ways in which to avoid, reduce or mitigate or compensate for any negative effects identified.

The further development of a national suite of resilience tools should include tools that have the potential to benefit biodiversity. This includes resilience tools which work with natural processes, use natural flood management approaches and adopt sustainable land management. At the national level their further development should involve Natural England. Engagement at the local level should also include key stakeholders, such as Natural England, relevant Wildlife Trusts and local authority environment teams.

It is recommended more prominence is given to the beneficial role of the natural environment in urban areas. This could include, for example, the expansion and improvement of green infrastructure networks and the introduction of sustainable drainage systems that utilise green space.

Advice and practical support on an adaptive pathways approach in plans and strategies should promote resilience tools that can benefit biodiversity. There is the opportunity to include similar advice in other proposed updates to guidance on funding appraisal, sustainable development and planning.

In developing new ways of funding risk management activities, it is recommended that the requirement to demonstrate a net gain for biodiversity is embedded as part of the application and assurance procedures.

A clearer recognition of the role of environmental organisations in supporting and contributing to incident response and recovery is recommended.

To help achieve a net gain in biodiversity, it is recommended biodiversity considerations are incorporated in future training, continual professional development and engagement with communities. It also needs to be considered in the development of practical skills, capabilities and resourcing across the sector. This includes access to specialist advice, such as ecologists with expertise in freshwater and marine ecology and fishery experts.

The Environment Agency's strategic overview role provides the opportunity to champion risk management solutions that deliver net gain for biodiversity. Working at a strategic level should continue with relevant statutory bodies and nature conservation organisations. This should include Natural England, the Marine Management Organisation, and the Royal Society for the Protection of Birds (RSPB) and Wildlife Trusts. This could facilitate improvements in sharing data on biodiversity and approaches for measuring and monitoring net gain.

5.2.2. Population and human health

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy improve health, wellbeing and equality?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- improve and enhance the health and wellbeing of communities
- seek opportunities to reduce social deprivation and inequality
- support the provision of more, better quality and accessible green infrastructure / green space

Results summary

The draft strategy recognises the impacts flooding and coastal change can have on communities and businesses and the effects on people's health, wellbeing and livelihoods.

It is in this context the draft strategy presents an overall vision for a nation more resilient to flooding and coastal change. The assessment has confirmed the draft strategy will have a positive effect on human health, wellbeing and equality. It is considered many of these benefits could be significant at the national scale.

Measures associated with planning, delivery and preparing for and recovering from flooding and coastal change are likely to benefit the health and wellbeing of communities. They can reduce the potential hazards of a flood or coastal erosion event. It is also anticipated the measures will contribute to alleviating the wider anxiety and stress of experiencing and or being at risk of flooding. Key aspects in support of this include:

- ensuring new development is resilient to flooding and coastal change by influencing the planning process and standards for building and materials
- providing greater practical and financial support to improve the resilience of existing properties
- ensuring the infrastructure people rely upon is resilient
- developing a better and shared understanding of how resilient places are to flooding and coastal change and the actions people need to take
- providing greater clarity on the tools available in different places to manage risk and the advice and support available
- establishing positive and long term planning approaches that can be adapted to different places and their socio-economic and environmental needs

Areas of deprivation and social inequality can have increased vulnerability to the risk of flooding and coastal change and a reduced ability to cope with the consequences of flooding. The measures outlined above are also likely to make a positive contribution to tackling social deprivation and equality. Additionally, the draft strategy seeks to strengthen the relationship between investment in flood and coastal change projects and supporting economic growth and regeneration. This has the potential to strengthen local economies with positive effects on social deprivation and equality.

The draft strategy has a longer term aspiration that all new development will seek to support environmental net gain in all local places. This is supported by requiring all risk management authorities to achieve net biodiversity gain and tasked with achieving an environmental net gain. This has the potential to support the provision of more, better quality and accessible green infrastructure. The delivery of new or improved risk management infrastructure, for example, can provide opportunities for extending or enhancing green infrastructure networks. Other tools such as natural flood management approaches and sustainable drainage systems can also deliver improvements in green space. A healthy natural environment is an important element of climate resilience places with benefits for the health and wellbeing of communities. This can include encouraging more physical activity as well as the health benefits of greater contact with nature.

The assessment identified a risk and potential negative effect that the implementation of resilience standards could disadvantage certain communities. This could be in cases where resilience to climate change cannot be sustained. Alternatively, it could be where communities outside of major urban areas are unable to finance more complex risk management interventions. In response, emphasis is placed on the need for a combination of resilience tools to support people and businesses remaining at risk. Also advocated is the use of an adaptive pathways approach to provide a positive and proactive planning framework for such areas.

The assessment identified a further risk associated with new ways of funding risk management. Funding aligned to private development could potentially focus on more

prosperous communities, which could exacerbate socio-economic inequality. There is a further risk this could reduce opportunities for integrating wider benefits for local communities, such as recreational provision and green infrastructure.

It is anticipated that measures supporting awareness raising, engagement and collaborative working are likely to be beneficial to health, wellbeing and equality. Engagement at an earlier stage will help to identify local issues, concerns and opportunities relating to the socio-economic and environmental conditions of places. This in turn can inform decision-making and plans for managing the risk of flooding and coastal change. Examples of this might include the identification of areas deficient in green space or recreational provision. In such areas new or improved flood infrastructure could incorporate design features that help to improve provision.

The assessment identified several potential risks associated with fostering an inclusive approach to raising awareness and engagement. A reliance on digital tools, for example, could potentially disadvantage some groups. Similarly certain communities and or sections of the community may be less able to engage and influence decision-making.

The assessment identified a number of uncertainties in assessing potential positive and negative effects at a national level. These include the:

- nature of other socio-economic factors which may be underpinning the health, wellbeing and equality of communities in particular places
- places where standards of protection may be reduced and potential implications for communities
- extent to which risk management schemes will contribute to improving the provision, quality and accessibility to green space
- likely extent, type and geographic occurrence of new financing and funding sources for risk management activities

In summary, the effects on population and human health are likely to be mainly positive, especially in the medium to longer term. This is particularly with regard to the health and wellbeing of communities at risk of flooding or coastal change. Taking account of uncertainties, it is considered the overall effect is likely to be significant at a national scale.

Mitigation and enhancement

At the local level proposals for flood and coastal risk management will need to comply with requirements under the Equality Act and environmental assessment.

In preparing local strategies and plans it is recommended account is taken of national and local data sets on population and indices of deprivation. This will help align priorities for places at highest risk from flooding or coastal change and the most vulnerable communities and social groups.

It is advised the introduction of new funding and financing for risk management retains a level of prioritisation for funding for risk management in deprived areas at significant risk. This should be reflected in the planned update to the appraisal guidance.

It is recommended more prominence is given to the beneficial role of the natural environment in urban areas. This could include, for example, the expansion and improvement of green infrastructure networks and the introduction of sustainable drainage systems that utilise green space.

It would be useful to clarify the scope for delivering net environmental gain can include recreation and amenity provision as well as green space. Examples include extended cycle ways and footpaths or exercise/play equipment or improved sports facilities.

To ensure all sectors of the community are engaged in an inclusive way, additional support and actions at the local level may be needed to facilitate this and tailored to the particular context.

There is the opportunity for the Environment Agency as part of its strategic overview role to share and disseminate relevant good practice. This could include fostering inclusive engagement and the incorporation of equality considerations in the planning, design and delivery of risk management solutions.

5.2.3. Resource management

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy improve and sustain resources?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- protect and conserve soils and improve resilience to degradation
- reduce waste and promote the recovery, reuse and recycling of materials

Results summary

The draft strategy is likely to have mainly positive effects on resource management, although it is anticipated these will not be significant at a national level.

The draft strategy indicates that tools for achieving place based resilience standards can include natural flood management and land management. Utilising these types of tools can help to reduce surface water runoff and soil erosion and contribute to conserving soils and improving their resilience. Land use change, such as expanded woodland and forestry creation and active management, could also provide similar benefits. Strengthening the link between risk management and funding for land managers through a new environmental land management system has the potential to enhance these benefits. It is envisaged this will help to encourage more extensive take up at a catchment scale and encourage longer term changes in land management.

At the local level risk management schemes can provide opportunities to improve soil quality and tackle the remediation of contaminated soils. Extending the use of sustainable drainage systems and green infrastructure networks, for example, may provide opportunities for the unsealing of soils in urban areas.

The draft strategy advocates the adoption of an adaptive pathways approach in strategies and plans prepared by risk management authorities. This could be beneficial by encouraging working at a catchment scale and the use of tools that can help protect and conserve soils. This includes, for example, the use of natural flood management approaches and sustainable land management practices. Taking a longer term perspective will also facilitate future planning for agriculture and woodland and forestry planting and management. The flexible and iterative nature of the approach should also allow for changes in environmental conditions to be taken into account in informing future actions. This, for example, might include changes in the condition of soils in a particular place due to changing climatic conditions or land use practices.

More closely aligning the planning of flooding and coastal change and sustainable water management is also likely to have a positive effect on soils. In particular, this provides opportunities to expand the use of natural flood management approaches and sustainable land management. These types of measures can benefit soil conservation as well as water quality and availability. This is through reduced rates of surface water runoff serving to

reduce soil erosion. In turn this can help reduce diffuse pollution from the input of sediments and other pollutants to watercourses.

The potential for positive effects on protecting and conserving soils will depend on the local area and its geology, topography and existing land use. Taking this in account the overall effect on soil conservation is considered unlikely to be significant at a national scale.

The assessment identified that activities involving the construction of new or improved flooding or coastal infrastructure will involve the use of resources and create waste. The adoption of sustainable approaches for construction, waste management and procurement will help to reduce waste and promote the recovery, reuse and recycling of materials. Tools such as property level resilience also have the potential to reduce waste and resource use. This is because they can avoid the need for extensive repairs, rebuilding and refurbishment following a flooding event. Overall, the effects of local scheme delivery and adaption activities on waste and the efficient use of resources are likely to be localised. As such the effects are considered unlikely to be significant at a national scale.

The assessment concluded that the majority of measures linked to preparing for and recovering from flooding and coastal change will not have significant effects. This is because they will not deliver on the ground activities that could impact soils or resource use. The potential benefits of property level resilience on resource use have already been highlighted. The assessment also identified potential benefits at the local level associated with the improved coordination and collaborative working across all organisations. This could benefit the planning and delivery of resilience and recovery activities where contaminated land is at risk of flooding or erosion or has been affected.

Measures relating to fostering greater awareness, engagement and collaborative working are considered to be mainly positive, although unlikely to be significant at the national scale. The assessment highlighted the opportunities the measures offer for engaging with key stakeholders, such as the farming community. This could help to demonstrate the positive interrelationships between flood risk management, soil conservation, land management and natural flood management approaches.

The assessment identified a number of uncertainties in assessing potential positive and negative effects at a national level. These include:

- the combination of risk management tools which will be progressed at the local level to achieve resilience standards in particular places
- the sensitivity of particular places in relation to soil erosion and the extent to which risk management tools can help tackle the issue
- the extent to which natural flood management and sustainable land management will be taken up to deliver risk management and their funding through future land management systems
- the extent to which new or improved flood and coastal infrastructure will include sustainable drainage systems and habitat creation that can benefit soils

In summary, there is uncertainty as to the degree to which land use and land management will be implemented as part of resilience standards. The potential positive effects for protecting and conserving soils will also depend on the local area. The effects of schemes and adaptation activities on waste and resource use are likely to be localised and not significant at a national scale. The overall impact of the draft strategy on resource management is considered to be neutral with no significant effects at the national level. This takes into account the uncertainties at this national scale and the localised nature of the predicted effects.

Mitigation and enhancement

The further development of a national suite of resilience tools should include consideration of the potential interactions with protecting and conserving soils. Involvement of national level organisations, such as the National Farmers Union, is also recommended.

Advice and practical support on an adaptive pathways approach in plans and strategies should promote resilience tools and delivery practices that can benefit resource management. There is the opportunity to include similar advice in other proposed updates to guidance on funding appraisal, sustainable development and planning.

At the local level, strengthening collaborative working at a catchment scale will facilitate the identification of priorities for soil conservation and how different risk management tools can best support these. Also recommended is early engagement with key stakeholders, such as the Forestry Commission and the agricultural sector, to inform local decision-making.

It is recommended that risk management plans and revised guidance on sustainable development include proactive policies on sustainable development. This will serve to promote the efficient use of resources and reduce waste. This should also take account of the circular economy and whole life asset costs. It is similarly recommended procurement frameworks for flood and coastal infrastructure require adherence to sustainable construction practices.

Investment in skills, training and continual professional development should include knowledge of how different risk management tools can benefit the sustainable management of resources. The Environment Agency through its strategic overview role could also demonstrate how infrastructure can be designed and implemented to reduce waste and maximise resource efficiency.

5.2.4. Water

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy protect and improve the water environment?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- help secure compliance with the Water Framework Directive and contribute to enhancing the status of water bodies
- contribute to the sustainable management of water resources

Results summary

The measures in the draft strategy could result in positive and negative effects on the water environment. This variation particularly relates to measures linked to planning and delivering flood and coastal change risk management activities and solutions.

Plans, strategies and schemes focused on preventing and protecting against the risk of flooding and coastal change can conflict with Water Framework Directive (WFD) objectives. Without mitigation they can have negative effects on the status of a water body(s). New or improved permanent flood and coastal infrastructure, for example, can alter the natural functioning of a watercourse and separate it from its flood plain. Infrastructure can also impede the passage of protected fish species. In certain situations, however, infrastructure for preventing and protecting against risk can benefit the water environment. This can be through reducing the likelihood of flooding or erosion of historic landfill sites or waste water facilities and the release of pollutants. The introduction of new

or improved infrastructure can also provide the opportunity to integrate design features, such as passage for protected fish species. In particular, risk management solutions that work with natural processes can contribute to enhancing the status of water bodies. This can involve restoring naturally functioning watercourses and reconnecting them with a functioning flood plain and habitat creation. In coastal areas the development of saltmarsh, can also reduce the need for constructing and maintaining engineered solutions and help to take the energy out of tidal zones.

The draft strategy has a longer term objective that all new development will seek to support environmental net gain in all local places. This is supported by requiring risk management authorities to achieve net biodiversity gain in their programmes and schemes. It is envisaged in the medium to longer term this will benefit the biodiversity of watercourses and other water bodies by improving the planning and delivery of flood and coastal risk management. Moreover, the draft strategy specifically encourages risk management authorities to help improve the condition of water bodies.

Possible tools for achieving place based resilience standards can include natural flood management, land management as well as flood and coastal change infrastructure. The use of sustainable land management practices and natural flood management approaches can help to reduce surface water runoff and soil erosion. This can benefit water quality by helping to reduce diffuse pollution and the sedimentation of watercourse. In urban areas, the introduction of sustainable drainage systems and expansion of green infrastructure networks can have similar benefits. Depending on the locality and the sensitivity of the watercourses these types of tools can help improve the WFD status of water bodies. They can also contribute to the sustainable management of water resources. This is due to reduced pollution and by improving the attenuation and infiltration of surface water runoff and the recharge of groundwater resources.

Strengthening the link between risk management and funding for land managers through a new environmental land management system has the potential to enhance these benefits. It is envisaged this will help to encourage the greater take up of tools such as natural flood management and land management at a catchment scale. It will also help enable longer term changes in land use and management, such as woodland and forestry planting.

The draft strategy proposes to more closely align the planning of flooding and coastal change and sustainable water management. This is likely to have a positive effect on the water environment. It provides opportunities to expand the use of natural flood management approaches and sustainable land management. These types of measures can benefit aquatic and wetland habitats and species, such as through habitat creation and improvements in water quality and availability. Greater collaboration with water companies early on in the planning process is also likely to have positive effects on the water environment. Water quality, for example, would benefit by identifying and developing solutions for wastewater assets at risk of flooding or coastal change.

The assessment identified a potential risk relating to new financing and funding. In circumstances where funding is aligned to private sources, this could constrain possible solutions and reduce opportunities for integrating wider benefits for supporting WFD objectives. This would, however, depend on the locality, the funding available and the nature of the scheme.

The draft strategy advocates the adoption of an adaptive pathways approach in strategies and plans prepared by risk management authorities, local authorities and water companies. The approach could have positive effects on water quality and resources by helping risk management solutions respond to the environmental conditions of particular places. This might be in terms of potential constraints, such as designated water bodies, as well as opportunities for delivering WFD objectives. The approach could also be

beneficial by encouraging working at a catchment scale and using risk management tools that can benefit the water environment. Taking a longer term perspective could also facilitate future planning for expanded woodland and forestry planting and management. This could also be beneficial for water quality and resources by helping to reduce surface water runoff, soil erosion, diffuse pollution and sedimentation. Furthermore, the flexible and iterative nature of the approach should allow for changes in environmental conditions to be taken into account in informing future actions. This could include, for example, changes in the status of water bodies and the availability of water.

The assessment concluded that measures linked to preparing for and recovering from flooding and coastal change will not have significant effects on water quality or resources. This is because they do not involve on the ground activities that could impact the water environment.

Measures relating to fostering greater awareness, engagement and collaborative working are considered to be mainly positive, although unlikely to be significant at the national scale. They provide opportunities to establish a wider understanding of the water environment and WFD and water resource management to help support future decision-making. Without this there is a risk that local demand to address flooding and coastal change could increase pressure for risk management interventions in sensitive places.

The assessment identified a number of uncertainties in assessing potential positive and negative effects at a national level. These include the:

- combination of risk management tools which will be progressed to achieve resilience standards in particular places
- sensitivity of particular places and water bodies at the local level to risk management interventions
- extent to which natural flood management and sustainable land management will be adopted to deliver risk management
- effectiveness of measures at the plan and project level to mitigate impacts on the water environment

In summary, the ability to protect and improve the water environment at the local level will depend on a number of factors. These include the nature of the risk management solutions, the geographic area and the sensitivity of the water bodies likely to be affected. With mitigation, as informed by WFD assessments, negative effects can be reduced. Overall, the effect of the draft strategy on the water environment is likely to be neutral. This takes into account the range of potential positive and negative effects and uncertainties at the national scale.

Mitigation and enhancement

Existing regulatory provisions require the undertaking of WFD assessment to assure compliance with WFD objectives where this is feasible. It is recommended that examples of good practice on WFD assessments are more widely shared and disseminated with all stakeholders involved in risk management activities.

Advice and practical support on an adaptive pathways approach in plans and strategies should promote resilience tools that can benefit WFD and water resources. There is the opportunity to include similar advice in other proposed updates to guidance on funding appraisal, sustainable development and planning. It is recommended the advice includes how plans and projects and their supporting assessments can take account of WFD considerations. This should incorporate guidance on delivering a net gain for biodiversity associated with the water environment.

It is recommended more prominence is given to the beneficial role of the natural environment in urban areas. This could include, for example, the expansion and improvement of green infrastructure networks and the use of sustainable drainage systems.

Requirements to demonstrate the delivery of biodiversity net gain and wider environmental benefits should underpin any new ways of funding and financing risk management activities.

Investment in skills, training and continual professional development should include knowledge of how different risk management tools can benefit water quality and resources. It is also advised that engagement activities at the local level incorporate WFD and water resource considerations.

There is the opportunity for the Environment Agency to champion risk management solutions which also support WFD and the sustainable management of water resources. There is also the opportunity to disseminate advice on undertaking WFD assessments and improving sharing data on the water environment.

5.2.5. Climatic factors

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy help to mitigate and adapt to climate change?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- contribute to adapting to climate change
- contribute to mitigating the main causes of climate change by promoting low or zero carbon approaches

Results summary

The draft strategy is likely to make a significant positive contribution to adapting to climate change. The urgency of taking action to manage and adapt to the flooding and coastal change risks associated with climate change underpin all the measures related to planning for resilient places. This includes the provision of updated and consistent information and evidence on current and future flooding and coastal change. This will help to inform the preparation and updating of risk management plans and strategies and proposals. Other information, such as the Long Term Investment Scenarios, will further help to inform decision-making and policy development for managing flooding and coastal change.

The draft strategy includes measures for the adoption of an adaptive pathways approach in strategies and plans prepared by risk management authorities. It is envisaged the approach will support decision-making by taking account of a range of climate change scenarios. More closely aligning the planning of flooding and coastal change and sustainable water management is also likely to have a positive effect on adapting to climate change.

It is anticipated measures that encourage greater collaborative working with infrastructure providers and proactive engagement in the planning process will enable more resilient development and infrastructure. The introduction of flood resilience measures as part of building and material standards will also be beneficial in adapting to climate change.

Measures associated with the delivery of risk management activities and solutions are also considered likely to have a significant positive effect on adapting to climate change. This includes an improved clarity on place based resilience standards for flooding and coastal

change and the shared understanding this can provide on how resilient places are to a changing climate. It is also envisaged there will also be greater clarity and shared ownership of the combination of tools this will involve in different places and the actions people and business need to take and the support available.

Risk management tools available to achieve place based resilience standards can include land management and natural flood management. As described in the topics on water, biodiversity and resource management, these types of tools can contribute to restoring and improving natural capital and improve its resilience to future climate change. A healthy natural environment is an important element of climate resilience places. The draft strategy encourages this via a longer term aspiration that all new development will bring environmental net gain in all local places. This is further supported by requiring all risk management authorities to achieve net biodiversity gain in all programmes and schemes.

The assessment identified a potential risk that new sources of funding and financing may be predicated on shorter time frames. This is because they could be responding to development opportunities, rather than the longer term perspective required for adapting to climate change. The draft strategy, however, seeks to strengthen the funding link between agriculture and managing the risk of flooding and coastal change. This could help to encourage a longer term change in land use and land management practices that would benefit climate change adaptation.

It is envisaged that measures proposed to better prepare for and recover from flooding and coastal change will have a significant positive effect on adapting to climate change. This includes a range of aspects including:

- greater practical and financial support for flood resilient measures, such as property level resilience
- an expanded flood warning service
- improved collaborative working across all sectors involved in responding to and recovering from incidents

The assessment also identified positive benefits associated with the measures fostering greater awareness, engagement and collaborative working. The measures seek to increase awareness and understanding of the urgency of climate change and the need for everyone to take action to create climate resilient places. Wider engagement and involvement also provides the opportunity to improve awareness and understanding of the full range of possible resilience tools that can contribute to climate change adaptation. Due to uncertainties, however, these benefits are not likely to be significant at the national level. This takes account of the uncertainty of the influence of education and awareness raising and the extent of engagement and involvement at the local level.

The assessment identified both positive and negative effects at the local level on climate change mitigation. At the local level risk management actions that involve new or improved infrastructure will add to greenhouse gas emissions. This is due to the embodied carbon within engineered solutions, the use of pumped systems and emissions generated during construction. Other risk management solutions that work with natural processes, however, are likely to have lower carbon footprints than traditional engineered solutions. This can include solutions that reconnect watercourses with their flood plain, managed realignment, habitat creation and the use of natural flood management approaches. Risk management tools that include habitat creation, can also contribute to carbon sequestration at the local level such as through peatland restoration, woodland planting or saltmarsh creation. The measures for raising awareness and engagement additionally provide the opportunity to share advice on how risk management can achieve low or zero carbon solutions.

In summary, it is considered the national strategy will make a positive contribution to adapting to climate change in the medium to longer term. Significant positive effects at the national level are anticipated. This is especially in relation to measures associated with planning and delivering risk management and preparing and recovering from flooding and coast change. The effect on climate change mitigation is considered to be neutral. This is because any increases or reductions in carbon emissions through risk management activities are unlikely to be significant in a national context.

Mitigation and enhancement

It is recommended an additional measure is included on encouraging plans, strategies and proposals to achieve low or zero carbon approaches. This would serve to formalise and give effect to one of the principles used in the development of strategy on aspiring to be carbon neutral. This could be further extended to an aspiration to be at least carbon neutral. It could also be reinforced in the revision of the sustainable development guidance to risk management authorities.

Advice and practical support on an adaptive pathways approach in plans and strategies should promote resilience tools that help to address climate change mitigation. This includes working with natural processes, expanding natural flood management, land management and habitat creation. There is the opportunity to include similar advice in other proposed updates to guidance on funding appraisal, sustainable development and planning. It is also recommended the consideration of carbon emissions is strengthened in other processes. This includes the environmental assessment of local level plans and projects as well as procurement frameworks and assurance procedures.

It is advised that new funding and financing sources for risk management are fully informed and based on consistent standards for adapting to climate change.

Investment in skills, training and continual professional development should include knowledge of how different risk management tools can achieve low or zero carbon solutions. It is also advised that engagement activities at the local level incorporate climate mitigation as well as adaptation considerations. There is the opportunity for the Environment Agency through its strategic overview role to champion risk management solutions which contribute to climate change mitigation.

5.2.6. Material assets

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy support sustainable communities and a prosperous economy?

In support of this the assessment also considered the following criteria in terms of does the strategy:

- protect and improve the resilience of communities and the economy
- protect and improve the resilience of key infrastructure
- protect and conserve the best and most productive agricultural land

Results summary

The draft strategy recognises the damaging impacts flooding and coastal change can have on communities and businesses and the key infrastructure both depend on. It is anticipated the draft strategy will have a predominantly positive effect on supporting sustainable communities and a prosperous economy. Many of these benefits are likely to be significant at the national scale.

The urgency of taking action to manage and adapt to the risks of climate change underpins the draft strategy and its suite of objectives and measures. It is anticipated measures associated with planning and delivery will make a significant positive contribution to the resilience of communities, the economy and key infrastructure. Key aspects in support of this include:

- the provision of updated and consistent evidence and information on current and future flooding and coastal change to inform strategic planning and investment decisions
- improved clarity on resilience standards for flooding and coastal change nationally and locally and the resilience tools available to achieve them
- greater collaborative working with infrastructure providers and the water industry to inform the resilience of their planning and investment decisions
- proactive engagement in the planning process to ensure resilient development and infrastructure
- the introduction of flood resilience measures as part of building and material standards
- the adoption of an adaptive pathways approach in strategies and plans prepared by risk management authorities and other local planning authorities
- improved working across all flood and coastal infrastructure owners so that existing infrastructure is maintained to standards that provide protection to a changing climate

The benefits of adopting an adaptive pathways approach include its long term, iterative and positive approach to managing flooding and coastal change. In particular, it will facilitate place-based decision-making and planning. It is envisaged this will help inform how risk management activities can be tailored to the particular needs of local communities, key infrastructure and economic priorities. The flexible and iterative nature of the approach should also allow for changes in socio-economic conditions to be better taken into account and inform future actions.

It is envisaged place based resilience standards will benefit the resilience of local communities, the economy and key infrastructure. This is because they will help to establish a shared understanding of how resilient places are to a changing climate. A national suite of resilience tools is also likely to provide greater clarity on the combination of tools available to achieve agreed place-based standards. It is envisaged this will help clarify and incentivise the actions people and business need to take and the support available for those remaining at risk.

The draft strategy seeks to strengthen the relationship between investment in flood and coastal change projects and supporting economic growth and regeneration. It is considered this will further improve the resilience of local economies as well as benefit communities through new and or sustained employment opportunities.

The assessment identified similar risks as for population and human and potential negative effects. This includes the risk that the implementation of resilience standards could disadvantage certain communities. This might be in places where it may not be possible to provide resilience to future climate change. Alternatively, it could be where communities outside of major urban areas are unable to finance more complex risk management interventions. In response emphasis is placed on the need for a combination of resilience tools to support people and businesses remaining at risk. Also advocated is the use of an adaptive pathways approach to provide a positive and proactive planning framework for such areas.

Measures associated with preparing for and recovering from flooding are also considered likely to have a significant positive effect. Flood resilient measures, such as property level

resilience, enable people to return to their homes and businesses more quickly after a flooding event. Greater practical, financial and legal support for people and businesses to improve the resilience of their properties will hence be beneficial. The introduction of flood resilience measures can also contribute to improving the resilience of key infrastructure. Other measures are also likely to be beneficial. This includes improved flood warning and the planning and coordinated working of all organisations involved in responding to and recovering from an event.

Measures supporting greater awareness, engagement and collaborative working are considered likely to have a positive effect, especially in the medium to longer term. By increasing awareness of the risk and impacts of flooding and coastal change, it is envisaged this will inspire people and businesses to take action. Putting people at the heart of decision-making on climate resilient places and involving everyone in shaping solutions for different places is also likely to be beneficial. In particular, engaging people and businesses at an earlier stage will help to identify and improve understanding of what is valued or important to them. This in turn will help to better inform decision-making and planning for flooding and coastal risk management and place-based solutions.

The assessment identified a potential conflict in prioritising different material assets in urban and rural areas. The local agreement of resilience standards, however, would provide the opportunity to better understand the importance of different assets in specific places, including agriculture. In rural areas it would also provide a platform for discussions with the agricultural community on actions and support for managing flooding and coastal change. This might be in relation to changes in land management and the expansion of natural flood management. Strengthening the link between funding and risk management provides the opportunity to facilitate such changes. Overall, it is considered impacts on agricultural land are likely to be localised and hence unlikely to be significant at a national scale.

The assessment identified a number of uncertainties in assessing potential positive and negative effects at a national level. These include the:

- implications for local communities, their economy and infrastructure in places where resilience to flooding or coastal change cannot be sustained in the future
- implications for agricultural land in places where resilience to flooding or coastal change cannot be sustained
- take up of an adaptive pathways approach to help long term planning for sustainable communities and the economy
- implementation of agreed resilience standards and how this will affect communities, the economy and infrastructure at the local level.
- extent to which land management and natural flood management approaches will be taken up as part of resilience standards and their funding context

In summary, it is considered the measures are likely to have a positive effect on material assets which is likely to be significant at a national level. In particular, this is due to the significant contribution to improving the resilience of communities, the economy and key infrastructure.

Mitigation and enhancement

The further development of a national suite of resilience tools should have regard to the potential implications for agricultural land. At the national level collaborative working with key stakeholders, such as the National Farmers Union, could help to tailor wider communication with the agricultural sector.

Early engagement with the agricultural community nationally and locally is also recommended. This will help to tailor support and maximise opportunities afforded by strengthening the link between land management practices and risk management.

It is advised the introduction of new funding and financing for risk management retains a level of prioritisation for funding for risk management in deprived areas at significant risk. This should be reflected in the planned update to the appraisal guidance.

5.2.7. Cultural heritage

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy conserve and enhance the historic environment?

In support of this the assessment also considered the following criterion in terms of does the strategy:

- consider the contribution of historic places to the character of urban and rural landscapes

Results summary

The measures in the draft strategy could result in positive and negative effects on the historic environment. This variation particularly relates to measures linked to the planning and delivery of flood and coastal risk management.

Place based resilient standards for flooding and coastal change will involve a combination of tools and activities that will vary from place to place. Many historic places are associated with the water environment. Some risk management tools, such as new or improved permanent infrastructure can have negative effects on historic places. This in turn can have implications for the character of both urban and rural landscapes. At the local level, for example, this could include the introduction of permanent structures within sensitive historic townscapes with the potential to affect their character and setting. Risk management interventions can also alter the water regime of places, which can negatively affect the archaeological interest of associated landscapes. With mitigation, as informed by cultural heritage assessments, potential negative effects can be significantly reduced at the local level. Moreover, new infrastructure can also serve to reduce the risk of flooding or coastal change to historic places. This in turn can support the conservation of the historic environment by avoiding the harm caused by flooding and erosion. It can also help to sustain the active use and maintenance of historic buildings and so contribute to the character of the landscape.

The draft strategy underlines the importance of land management and natural flood management approaches in managing the risk of flooding and coastal change. Associated activities, such as habitat creation, can affect historic places and the character of rural landscapes. At the local level information on the historic character of landscapes can show how the water environment has changed overtime. This can be used to help inform risk management activities at a landscape scale as well as influence the planning, design and implementation of schemes.

Other tools focused on adapting to residual risk, such as the implementation of property level resilience, can also have negative and positive effects on historic places. To avoid harm to the significance of historic places their design and implementation needs to be appropriately informed. Once implemented, however, they can help to reduce the damaging effects of flooding and avoid or minimise future interventions to recover from flooding.

The draft strategy indicates in certain areas it may not be possible to provide resilience to climate change and reduce the likelihood of flooding or coastal change in the future. Depending on the location this could have negative effects on historic places. An increase in the frequency and severity of flooding, for example, can have implications for sustaining the active use of historic buildings. This may accelerate a deterioration in their condition which can negatively affect the character of the wider townscape. Future coastal erosion could also affect historic places associated with the coastal zone and estuarine areas. This could lead to potential changes in the historic character of these landscapes. Examples include networks of historic flood embankments and habitats with valued cultural heritage associations, such as coastal and flood plain grazing marshes.

The draft strategy commits risk management authorities to contribute to improving the historic environment through their investments. The strategy also has a longer term aspiration that all new development will bring environmental net gain in all local places. It tasks risk management authorities to work with others to realise this. It is envisaged this could also benefit the historic environment by improving the planning and delivery of flood and coastal risk management. This assumes the definition of environmental net gain includes cultural heritage.

The adoption of an adaptive pathways approach in strategies and plans could have positive effects on cultural heritage. It is envisaged the approach will help to ensure risk management solutions respond to the environmental conditions of particular places. This might be in terms of potential constraints, such as designated historic places, as well as opportunities for enhancing the historic environment. Taking a longer term perspective could also facilitate future planning for the conservation and enhancement of the historic environment in different places.

New ways of financing risk management activities could have positive and negative effects. Greater collaboration and partnership working with the heritage sector, such as the Heritage Lottery Fund and Historic England could provide opportunities to align funding streams. Where funding is more aligned to development funding, there is a risk this could reduce opportunities for integrating wider benefits for the historic environment.

The assessment concluded that the measures linked to preparing for and recovering from flooding and coastal change will not result in significant effects. This is because the majority of measures will not deliver on the ground activities that could impact the historic environment. The assessment identified a potential benefit of greater practical, financial and legal support for people and businesses to improve the resilience of their properties. This could be beneficial by reducing the length of time buildings are unoccupied following an incident and at risk from a further deterioration in condition. The improved coordination and collaborative working with environmental organisations, such as Historic England, during incidents and recovery activities could also benefit the historic environment.

Measures relating to fostering greater awareness, engagement and collaborative working are considered to be mainly positive, although unlikely to be significant at the national scale. They provide opportunities to establish a wider understanding of the historic environment in different places to help support future decision-making. Without this there is a risk that local demand to address flooding and coastal change could increase pressure for risk management interventions in sensitive places. Engaging communities will also improve understanding of local issues, opportunities and what aspects of the historic environment are valued in a particular place. Local engagement can also help to identify and draw on the expertise of local heritage specialists and facilitate working with local interest groups.

The assessment identified a number of uncertainties in assessing potential positive and negative effects at a national level. These include the:

- combination of risk management tools/activities which will be progressed at the local level to achieve resilience standards in particular places
- sensitivity of particular places in relation to the historic environment and risk management
- implications for the historic environment in places where resilience to flooding or coastal change cannot be sustained in the future
- extent to which flood resilience measures will affect historic properties
- extent to which natural flood management and land management will be taken up to deliver risk management
- effectiveness of measures at the local level to avoid, reduce or mitigate for impacts on the historic environment

In summary, potential effects on the historic environment are dependent on a number of factors. These include the type and scale of risk management solutions, their design and implementation and the sensitivity of historic places to change. It is considered the overall potential effect on the historic environment is likely to be neutral with no significant effects anticipated at the national level. This is based on the following considerations:

- the range of potential positive and negative effects at the local level
- the more localised context of historic places
- the identified uncertainties at this national scale
- the potential benefits to the historic environment of reducing the wider risk of flooding or coastal change and adapting to residual risks

Mitigation and enhancement

At the local level, plans, strategies and proposals for flood and coastal risk management will need to comply with requirements for environmental assessment. Cultural heritage assessments would typically inform this process. The assessment process will help to identify ways in which to avoid, reduce or mitigate for any negative effects identified.

It would be useful to clarify the scope for delivering net environmental gain can include the historic environment. This could be reinforced in updated guidance on sustainable development. This will help to ensure the objective and measures on net gain reflect all relevant environmental and sustainability aspects.

The further development of a national suite of resilience tools should include consideration of the potential implications for the historic environment and the involvement of Historic England.

Historic environment considerations should be included in advice and practical support on new planning approaches and the proposed updates to guidance on planning and sustainable development.

Requirements to demonstrate the delivery of wider environmental benefits should underpin any new ways of funding and financing risk management activities.

The introduction and implementation of flood resilience measures in building and material standards will need to take account of the sensitivities of historic buildings.

Engagement at the local level should include key stakeholders, such as Historic England and local authority historic environment teams. This would provide the opportunity to use a range of available data on the historic environment to inform decision-making. This includes landscape scale data sets on historic landscape characterisation and urban

characterisation. Also available are local authority Historic Environment Records with information on designated and non-designated heritage assets.

It is recommended the Environment Agency continue to work with Historic England to further investigate the impact of flooding on historic places. Collaborative working is also recommended on the development of flood resilience products and standards and advice for people and the wider heritage sector.

The measures could be enhanced by the inclusion of a clear recognition of the role of environmental stakeholders, such as Historic England, in supporting and contributing to incident response and recovery.

It is recommended historic environment considerations are included in future training and continual professional development and engagement with communities. The historic environment also needs to be considered in the development of practical skills, capabilities and resourcing across the sector. This includes access to specialist cultural heritage advice such as from archaeologists and built conservation specialists.

5.2.8. Landscape

Assessment criteria

The assessment of this topic considered the high level question or SEA objective: Does the strategy conserve and enhance landscape character?

In support of this the assessment also considered the following criterion in terms of does the strategy:

- conserve and enhance the quality of landscapes for people, places and nature

Results summary

The measures in the draft strategy could result in positive and negative effects on the character of urban and rural landscapes. As with cultural heritage, this variation relates in the main to measures linked to the planning and the delivery of flood and risk management activities and solutions.

Risk management plans, strategies and schemes have the potential to both negatively and positively affect landscape character. They can help to protect existing landscapes from the effects of flooding and coastal change. New or improved infrastructure, however, can also result in the loss of landscape features that contribute to the character of a place and its use by people. In urban areas, for example, schemes can affect remaining areas of green space used for informal or formal sport and recreation. Such interventions can also provide opportunities to enhance the quality of landscapes, by improving or extending green infrastructure networks or enhancing the public realm. This in turn can serve to improve people's connection with the water environment. This could include enhancing views of watercourses or enabling better physical access such as walking and cycling networks. Risk management tools that work with natural processes can also enhance landscape character for people and nature. This includes schemes that re-naturalise modified watercourses, create wetland habitats and managed realignment in coastal areas.

The draft strategy explains that in certain areas it may not be possible to provide resilience to climate change and reduce the likelihood of flooding or coastal change in the future. This could bring about larger scale landscape change, as for example, in the coastal zone. Such change could have positive and negative effects for people and nature. This will depend on the scale of the change and how people use and interact with the existing landscape for leisure, recreation or for their livelihoods. The scale and extent of these changes is not possible to predict. It is considered they are likely to be place specific and

target areas of highest risk for flooding and coastal change. As such the potential effect is not likely to be significant in a national context.

The adoption of an adaptive pathways approach in strategies and plans could have positive effects on landscape character. It is envisaged the approach will help to ensure risk management solutions respond to the environmental conditions of particular places. This might be in terms of potential constraints, such as designated landscapes, as well as opportunities for enhancing the quality of rural and urban landscapes and their use by people and wildlife. The approach could also be beneficial by encouraging working at a catchment scale and the use of tools such as natural flood management. These can contribute to restoring and enhancing features and attributes which contribute to the landscape character and quality. This includes, for example, schemes which re-naturalise modified watercourses, the use of natural flood management approaches and sustainable land management practices. Taking a longer term perspective could also facilitate future planning for larger scale landscape change, for example, expanded woodland and forestry planting and management.

More closely aligning the planning of flooding and coastal change and sustainable water management is likely to have a positive effect on landscape character. In particular, this provides opportunities to expand the use of natural flood management approaches, sustainable land management and sustainable drainage systems. These types of measures can contribute to enhancing the character of urban and rural landscapes as well as improving water quality and availability.

The draft strategy has a longer term aspiration that all new development will seek to support environmental net gain in all local places. It is envisaged in the medium to longer term could benefit landscape character by improving the planning and delivery of flood and coastal risk management. This assumes the definition of environmental net gain includes wider improvements to urban and rural landscapes.

As with cultural heritage, new ways of financing risk management activities could have positive and negative effects. Greater collaboration and partnership working at a landscape scale could provide benefits for enhancing landscape character. An example of this would be expanding the use of natural flood management approaches. Strengthening the link between risk management and funding would further support this. Longer term changes in land use and management may also be encouraged, such as increased woodland and forestry creation and management. Where funding is more aligned to private development there is a risk this could reduce opportunities for integrating improvements benefiting urban and rural landscapes. This would depend, however, on the locality, the nature of the scheme and the available funding.

The assessment concluded that the measures linked to preparing for and recovering from flooding and coastal change will not result in significant effects. This is because the majority of measures will not deliver on the ground activities that could impact landscape character.

Measures relating to fostering greater awareness, engagement and collaborative working are considered to be mainly positive, although unlikely to be significant at the national scale. As with cultural heritage, they provide opportunities to establish a wider understanding of the landscape in different places to help support future decision-making. Without this there is a risk that local demand to address flooding and coastal change could increase pressure for risk management interventions in sensitive places. Involving people at an earlier stage in decision-making, is likely to be beneficial by improving understanding of local issues and concerns about future landscape change. It also provides opportunities for enhancing the character of urban and rural landscapes.

The assessment identified a number of uncertainties in assessing potential positive and negative effects at a national level. These include the:

- combination of risk management tools/activities which will be progressed at the local level to achieve resilience standards in particular places
- sensitivity of the landscape in particular places to land use change and risk management interventions
- implications for landscape character and the likely extent of change in places where resilience to flooding or coastal change cannot be sustained in the future
- extent to which natural flood management, sustainable land management and land use change will be taken up and their future funding
- effectiveness of measures at the project level to avoid or mitigate impacts on landscape character

In summary the effects on landscape character could be positive and negative and dependent on a number of factors. These include the nature of risk management solutions, the geographic area and the sensitivity of the landscape to change in different places. With mitigation at the local level, as informed by landscape assessments, negative effects can be significantly reduced. Overall, it is considered the effect on landscape character is likely to be neutral with no significant effects anticipated at the national level. This is based on the following considerations:

- the range of potential positive and negative effects at the local level for urban and rural landscapes and their use by people and nature
- the identified uncertainties at this national scale
- the likelihood that larger scale landscape change in direct support of managing flooding and coastal change will be localised to particular places at highest risk

Mitigation and enhancement

At the local level, plans, strategies and proposals for flood and coastal risk management will need to comply with requirements for environmental assessment. Landscape character assessments would typically inform this process. The assessment process will help to identify ways in which to avoid, reduce or mitigate or any negative effects identified.

The further development of a national suite of resilience tools should include consideration of the potential implications for the landscapes and involve Natural England. This would facilitate discussions on protected landscapes and national data sets for describing and monitoring landscape change, such as the series of National Character Areas. It would also be beneficial to engage at a national level with key stakeholders and land owners. This includes the Forestry Commission, National Trust, RSPB and the agricultural sector. These organisations have an interest in future landscape change and can influence large scale land use change and land management.

It would be useful to clarify the scope for delivering net environmental gain can include benefits for urban and rural landscapes. This could be reinforced in updated guidance on sustainable development. This would help to ensure the objective and measures on net gain reflect all relevant environmental and sustainability aspects.

It is recommended more prominence is given to urban contexts and how the character of these landscapes can be enhanced in ways which also help to reduce flood risk. This can include, for example, the improvement of green infrastructure networks and the introduction of sustainable drainage systems that utilise green space.

Urban and rural landscape considerations should be included in advice and practical support on new planning approaches and the proposed updates to guidance on planning and sustainable development.

Requirements to demonstrate the delivery of biodiversity net gain and wider environmental benefits should underpin any new ways of funding and financing risk management activities.

Engagement at the local level should include key stakeholders, such as Natural England, the Forestry Commission and local authority landscape specialists and designers. This would provide the opportunity to use landscape scale data sets on landscape characterisation. Use can also be made of strategic maps developed by the Environment Agency to identify the potential for working with natural processes across England. The maps are part of a wider evidence based programme and identify potential areas for:

- floodplain reconnection
- run-off attenuation features and gully blocking
- woodland planting covering floodplain planting, riparian planting and wider catchment woodland

It is recommended landscape considerations are incorporated in future training and continual professional development and engagement with communities. It also needs to be considered in the development of practical skills, capabilities and resourcing across the sector. This includes access to specialist advice such as landscape architects and designers.

5.3. Assessment of cumulative effects

The cumulative effects of the draft strategy have been assessed in terms of potential intra-plan effects and inter-plan effects.

The consideration of intra-plan effects has taken into account key inter-relationships between the different SEA topics assessed in sections 5.2.1 to 5.2.8. Also considered are instances where interactions between different measures in the draft strategy could generate significant environmental effects.

For inter-plan effects the focus is on the potential interactions with other relevant national plans, policies or programmes.

5.3.1. Inter-relationships between environmental topics and intra-plan effects

To aid the consideration of the inter-relationships between the SEA topics, the assessment considered the high level question: does the strategy protect and enhance natural capital? In support of this we also considered whether the strategy supports the integration of natural capital into decision-making for flood and coastal change risk management. This helped to also consider the potential interaction of the measures within the draft strategy.

Natural capital can be defined as the elements of nature that directly or indirectly produce value to people. It represents our stocks of natural resources such as water, air, land, minerals and forests and natural processes such the water cycle and nutrient cycling. These natural capital assets provide a flow of ecosystem services including food, clean water, flood regulation and recreation. These services can benefit people in a variety of ways. Natural capital is therefore a useful approach to consider in a holistic way potential implications of the draft strategy across the range of SEA environmental topics.

The assessment summary set out in sections 5.2.1 to 5.2.8 above highlights a number of interactions between the different measures set out in the draft strategy. In particular, the assessment identified the potential for both positive and negative effects of the groups of

measures used as the basis for the assessment. This was especially in relation to measures associated with planning for resilient places and delivering flood and coastal change resilience. The assessment results also indicated a number of recurrent inter-relationships between the SEA topics.

These interactions and inter-relationships are summarised below together with the extent to which they demonstrate the value of integrating natural capital into decision-making.

Climate resilient places

The urgency of taking action to manage and adapt to the risks of current and future climate change underpins the draft strategy. This is reflected in an overarching ambition of achieving climate resilience places that are able to manage and adapt to flooding and coastal change. This in turn is supported by the full suite of strategic objectives and measures. As a result there is a considerable overlap between SEA topics covering climatic factors, material assets and population and human health. This is due to the positive contribution the draft strategy will make in adapting to the risks of climate change. This in turn has positive effects on the resilience of communities and local economies, the key infrastructure they depend on and human health and wellbeing.

The draft strategy recognises a wider range of tools for creating climate resilient places will be needed in conjunction with traditional engineered infrastructure. Possible tools for achieving place based resilience standards include natural flood management, land management and sustainable drainage systems. These types of tools have the potential to support the protection and restoration of natural capital. Examples of this include habitat creation, expanding green infrastructure networks, woodland management and reducing soil erosion and the input of sediments and pollutants to watercourses. It is envisaged their inclusion in a national suite of tools would help to facilitate the integration of natural capital into decision-making. This includes decision-making at the national and local level on standards for flood and coastal resilience and the combination of tools to achieve them.

To further enhance the integration of natural capital into decision-making for climate resilient places, the following is recommended:

- engagement at the national level with key organisations and stakeholders, such as Natural England, the Forestry Commission and the National Farmers Union
- local engagement with people and businesses incorporates environmental considerations to raise awareness of the potential impacts and opportunities of different risk management solutions
- investment in supporting skills and resources to enable the input of environmental specialists, such as ecologists, to local decision-making

Working with natural processes

As indicated above, tools for achieving place based resilience standards can include natural flood management, land management and sustainable drainage systems. The draft strategy also seeks to mainstream approaches that work with natural processes across all risk management authorities. Working with natural processes and use of these types of tools can support the protection and restoration of natural capital and the services it provides. This is reflected in a number of interactions across the SEA topics, which also demonstrate the benefits of integrating natural capital into decision-making.

The assessment highlights a positive link between biodiversity and human health and wellbeing due to the benefits of interactions with the natural environment. In urban areas in particular, risk management interventions can help to improve or expand green infrastructure networks through habitat creation or sustainable drainage systems. This in turn can have benefits for both physical health and mental wellbeing.

There is also strong inter-relationship between biodiversity and the water environment especially in relation to the quality and quantity of water resources. Risk management solutions that work with natural processes can support WFD objectives with benefits for habitats and species associated watercourses, the coastal zone and wetlands. Habitat creation and management, such as linked to natural flood management or land management, can also benefit water quality and water resources. A reduction in soil erosion and the sedimentation and pollution of watercourses can further benefit biodiversity associated with the water environment. This is in addition to contributing to wider ecosystem services, such as the provision of freshwater.

The benefits of reducing soil erosion are similarly reflected in inter-relationships between water quality and resources, resource management (soil conservation) and material assets (agricultural land).

The assessment also identified multiple inter-linkages between biodiversity, water, cultural heritage and the SEA topic on landscape. All of these aspects can contribute to the character of the landscape in urban and rural places. Risk management interventions at the local level will therefore need to consider these aspects in an integrated way as well as individually. This will help to ensure potential negative effects on landscape character are avoided or minimised and opportunities for improving its quality are realised.

To further enhance the integration of natural capital into decision-making and support working with natural processes, the following is recommended:

- updated guidance on risk management demonstrates the benefits of the natural environment in urban areas and encourages solutions that support green infrastructure networks
- engagement at the national and local level includes the agricultural sector to help align risk management approaches and soil conservation
- decision-making at the local level is informed by National Character Areas and landscape character assessments

Local flood and coastal resilience standards

The assessment highlighted a potential risk that place based resilience standards for managing flooding and coastal change could lead to a focus of interventions in particular areas. In urban areas, for example, new or improved risk management infrastructure could affect various receptors. Depending on the local area, for example, this could include habitats and species, recreational green space and heritage assets. Another example, is the coastal zone. In such areas resilience standards could involve maintaining protection from flooding and coastal change through new or improved infrastructure. In other places, it may not be possible to sustain the existing level of resilience. As outlined in section 5.2.1 both of these policy options could have negative consequences for designated sites associated with coastal and estuarine areas.

As outlined in the draft strategy the use of an adaptive pathways approach can help to inform the long term strategic planning of these areas. It is also envisaged many local level strategies and plans would be supported by environmental assessments, including Habitat Regulations Assessments.

Sustainable economic growth and regeneration

The draft strategy seeks to strengthen the link between risk management and enabling economic growth and development. The assessment identified this could be beneficial for local communities and the economy. It could also help to secure the revitalisation of historic places, including the reuse of historic buildings. Enabling economic growth, however, could also have negative implications for environmental receptors. An example

of this is the potential for new economic growth to affect green space or brownfield land with nature conservation interest.

It is recommended the environmental assessments of risk management plans and strategies at the local level, consider potential impacts of any associated economic development. This in turn would help provide the context for project level environmental assessments.

5.3.2. Inter plan effects

This section considers the effects on the environment of the interaction between the draft strategy and other relevant national plans, policies and programmes.

A Green Future: Our 25 year plan to improve the environment

The 25 year environment plan aims to deliver cleaner air and water, protect threatened species and provide richer wildlife habitats. It calls for an approach to agriculture, forestry, land use and fishing that puts the environment first. It also aims to expand the use of natural flood management solutions and make at risk properties more resilient to flooding. In relation to development, it encourages the use of embedding an environmental net gain principle for development. The draft strategy strongly aligns with these principles and commits to expand and mainstream working with natural processes across all risk management authorities. Illustrative examples of resilience tools include land management and natural flood management approaches. Working at a catchment scale, such approaches can benefit habitats and species and their connectivity. The draft strategy also has a longer term objective that all new development will seek to support environmental net gain in all local places. This is supported by requiring all risk management authorities to achieve net biodiversity gain in all programmes and schemes.

National Planning Policy Framework (NPPF)

The draft strategy supports economic growth and the development of sustainable communities. This is reflected in an overarching ambition of achieving climate resilience places that are able to manage and adapt to flooding and coastal change. The measures in the draft strategy also seek to better align risk management with enabling economic growth and regeneration. Additionally the draft strategy commits risk management authorities to enhance the natural, built and historic environment. This includes achieving biodiversity net gain in all programmes and projects. Various measures also encourage strengthening working between risk management authorities and the planning process. Risk management plans, strategies and proposals at the local level will also need to comply with requirements for environmental assessment and planning policy. As a result it is considered the draft strategy is supportive of policies within the NPPF.

Biodiversity Strategy 2020

The measures in the draft strategy could result in both positive and negative effects on biodiversity. The strategy encourages working with natural processes and the use of tools such as, land management and natural flood risk management approaches. Working at a catchment scale, such approaches can benefit habitats and species and their connectivity. The draft strategy has a longer term objective that all new development will seek to support environmental net gain in all local places. This is supported by requiring all risk management authorities to achieve net biodiversity gain in all programmes and schemes. In this context, it is considered that the draft strategy broadly aligns with the policy aspirations of the Biodiversity Strategy 2020.

The assessment identifies that some tools for preventing and protecting against the risk of flooding and coastal change can conflict with statutory nature conservation obligations. This will be dependent on the type, scale and design of risk management tools and the

sensitivities of the local area likely to be affected. At the local level, many plans, strategies and proposals for flood and coastal risk management will need to comply with requirements for environmental assessment. Where relevant this would also include habitats regulations assessment. These environmental assessments would propose appropriate mitigation or compensation where adverse effects on habitats and species are identified.

National Adaptation Programme

The draft strategy has been assessed as having a significant positive impact on the country's ability to adapt to climate change. This is especially in relation to measures associated with planning and delivering risk management and preparing and recovering from flooding and coast change. This supports and will enhance wider policy initiatives to adapt to the impacts of climate change such as those in the National Adaptation Programme.

Clean Growth Strategy

The draft strategy could have both positive and negative effects at the local level on climate change mitigation. At the local level risk management actions that involve new or improved infrastructure will add to greenhouse gas emissions. Solutions that work with natural processes, however, are likely to have lower carbon footprints than traditional engineered solutions. Risk management tools that include habitat creation, can also contribute to carbon sequestration at the local level such as through peatland restoration or woodland planting. The measures for raising awareness and engagement additionally provide the opportunity to share advice on how risk management can achieve low or zero carbon solutions. As a result, it is considered that the draft strategy supports initiatives for cleaner growth such as those in the Clean Growth Strategy 2017.

Industrial Strategy: Building a Britain fit for the future

The Industrial Strategy aims to help businesses create better, higher-paying jobs across the UK with investment in the skills, industries and infrastructure of the future. This will in turn boost productivity, raise living standards and improve quality of life. The Industrial Strategy focuses on five foundations of productivity: ideas, people, infrastructure, business environment and places. Objectives of particular relevance to the draft strategy include those to drive a major upgrade to infrastructure, ensuring land is available for housing growth and strengthening cultural assets. The draft strategy supports economic growth and the development of sustainable communities. This is reflected in an overarching ambition of achieving climate resilience places that are able to manage and adapt to flooding and coastal change. The measures in the draft strategy also seek to better align risk management with enabling economic growth and regeneration. There is potential for both positive and negative in combination effects with the draft strategy, especially in relation to the development of new assets. For example, there could be negative effects in relation to biodiversity and positive effects in relation to improved community resilience. At the local level, many plans, strategies and proposals for flood and coastal risk management will need to comply with requirements for environmental assessment. These environmental assessments, where undertaken, would describe measures envisaged to avoid, prevent, reduce, or if possible offset any identified adverse effects. In this context, it is considered the draft strategy is supportive of the principles within the Industrial Strategy.

Our Waste, Our Resources

The effects of the draft strategy on waste and resources has been assessed as being localised and unlikely to be significant at a national scale. Activities involving the construction of new or improved flooding or coastal infrastructure will involve the use of resources and create waste. The adoption of sustainable approaches for construction,

waste management and procurement at the local level would help to reduce waste and promote the recovery, reuse and recycling of materials. Tools such as property level resilience also have the potential to reduce waste and resource use at the local level. The draft strategy aims to expand and mainstream working with natural processes. Such solutions can reduce the need for traditional engineered infrastructure with a consequent reduction in resource use and waste. The draft strategy is therefore considered to be aligned to the principles set out in *Our Waste, Our Resources: A Strategy for England 2018*.

Cross border working with Wales and Scotland

The Welsh Government's national FCERM strategy is also in the process of being revised and expected to be published in 2019. At a national level the Environment Agency will work with Natural Resources Wales to ensure our national strategies for managing flooding and coastal change are mutually supportive. Relevant to both Wales and Scotland the draft strategy also recognises the requirement for responsible authorities to effectively coordinate flood risk assessment and management. This is in accordance with the Flood risk (Cross Border Areas) Regulations 2010.

5.4. Summary of mitigation and enhancement opportunities

The assessment has identified the significant effects on the wider environment likely to occur as a result of implementation of the draft strategy. The assessment process also identified opportunities to enhance the positive and mitigate any negative environmental effects. As outlined in sections 5.2.1 through to 5.2.8 there are a range of proposed mitigation measures and enhancement opportunities. Key themes common to most of the SEA topics included the:

- integration of environmental considerations as part of planned updates to existing guidance and the preparation of new guidance on planning or delivering risk management
- engagement at the national and local level with environmental organisations and stakeholders
- embedding of environmental aspects in future skills, training and professional development and engagement activities
- use of the Environment Agency's strategic overview role to promote and champion good practice on delivering flood and coastal change risk management

Additional safeguards exist to ensure that the environmental implications are addressed in related decision-making processes at the local level. These include the following:

- adherence to updated guidance on sustainable development to be prepared by the Environment Agency and using the United Nations Sustainable Development Goals
- strategic environmental assessment, where required, should be undertaken for relevant plans and programmes developed by risk management authorities
- environmental impact assessment, where required, should be undertaken on projects that are likely to have significant effects on the environment, with such assessments including impacts on population and human health
- sustainability appraisals should be undertaken during the development of local plans by local planning authorities and are required to comply with the SEA Regulations
- strategic flood risk assessments should be produced by local authorities to influence decisions on the location of development and measures to avoid exacerbating flood risk

- Habitats Regulations Assessments should be undertaken to determine whether certain proposed plans or projects are likely to adversely affect the integrity of a European site
- Water Framework Directive (WFD) assessments should be undertaken to the assure compliance of activities with WFD objectives where this is feasible
- obligations under the Equality Act require public bodies to ensure everyone can participate in their services regardless of their protected characteristics

6. Monitoring and next steps

6.1. Outline of proposed monitoring for significant environmental effects

Once the national strategy is finalised and adopted the Regulations require significant environmental effects to be monitored. This section presents an outline of the actions we expect to undertake in relation to monitoring the significant environmental effects of the national strategy.

Whilst it is feasible to monitor the significant effects of the national strategy, it will not be possible to determine whether any changes in these factors can be directly attributed to the national strategy. This is because there are too many other influences on environmental outcomes for a direct relationship to be identified. Nevertheless, it is reasonable to monitor environmental outcomes to determine whether changes to the national strategy are required. This might be needed to further reduce potential conflicts or make a greater contribution to achievement of environmental objectives.

This report does not propose new monitoring specifically linked to the national strategy. A more practical, efficient and effective process is to link to monitoring that is already undertaken or planned in the development of policy and risk management actions. The proposed monitoring reflects the effects identified as significant by the SEA process.

No monitoring is proposed to address the following topics as no significant effects were identified for these as summarised in section 5:

- resource management
- water
- cultural heritage
- landscape

The SEA environmental topics we are proposing to monitor due to their likely significant environmental effects are set out below.

Population and human health

The Environment Agency is required to periodically report to the Minister about flood and coastal erosion risk management. Data on the changes in the number of households and businesses at risk of flooding or coastal erosion is already collected. We recommend this data continues to highlight changes in flood risk for deprived communities.

Biodiversity

Annual monitoring is already undertaken to determine the length of rivers improved to help show progress toward meeting Water Framework Directive objectives. It is recommended we continue to improve the reporting of environmental outcomes associated with managing flooding and coastal change. As the sector moves towards biodiversity net gain we will also need to consider monitoring arrangements for this across our programmes of work.

Climatic factors

One of the key purposes of national strategy is to enable adaptation to the effects of climate change. As such we anticipate this will be covered under the general reporting requirements and the development of monitoring arrangements for the final strategy.

Material assets

We anticipate risk to property and infrastructure will be covered under the general reporting requirements and the development of monitoring arrangements for the national strategy. It is also recommended the opportunity is taken to link to future information on land management practices and their contribution to managing flooding and coastal change.

6.2. Next steps

6.2.1. This consultation

To assist with this consultation, we have set out some specific consultation questions below on which we would welcome your views:

Question 1: Do you agree with the conclusions of the environmental assessment? (yes / no)

If not, please explain why.

Question 2: Are there any further significant environmental effects (positive or negative) of the draft strategy which you think should be considered? (yes / no)

If yes, please describe them.

Question 3: Are there further mitigations for potential negative effects or opportunities to achieve positive effects that should be considered for the final national FCERM strategy? (yes / no)

If yes, please give details.

The consultation on this environmental report is open for 8 weeks, from 9 May 2019 to 4 July 2019.

You can view the consultation documents and questions online on the consultation pages (<https://consult.environment-agency.gov.uk/fcrm/national-strategy-public>)

Please submit your response online. This will help us gather and summarise responses quickly, accurately and cost-effectively.

However, if you prefer, you can submit your response by email or post using our response form. You can download the response form using the above link. Please submit by email to: FCERMstrategy@environment-agency.gov.uk

Or by post to:

Morena Staiano
Environment Agency
Horizon House
Deanery Road
Bristol
BS1 5AH

You can also request a printed version of the document and response form using these contact details or by phone to Morena Staiano on 020 7714 1037.

6.2.2. Finalising the national strategy

The draft strategy explains how we will continue to develop the national strategy taking into account responses to this consultation. As the national strategy evolves we will

consider any implications this might have for effects on the environment as part of our strategic environmental assessment requirements.

It is anticipated the final strategy will be published in 2020. This will be accompanied by a statement of environmental particulars. This document will provide:

- a summary of how environmental considerations have been integrated into the final strategy
- a summary of how consultation responses to the draft strategy and environmental report have been taken into account
- a summary of how the final strategy has changed since the draft strategy
- what the above means in terms of changes to the environmental effects that were reported in the environmental report
- the reasons for choosing the final strategy as adopted in the light of alternatives
- the measures to be adopted to monitor the effects of the national strategy

Annex A: Plans, policies and programmes reviewed for the SEA

Set out below are the national plans, policies and programmes reviewed and some key legislation. We have focussed on those that are likely to significantly influence the national strategy or our consideration of the environmental effects.

Overarching Plans, Policies and Programmes

- A Green Future: Our 25 Year Plan to Improve the Environment (Defra, 2018)
- Agenda 2030: The UK Government's approach to delivering the Global Goals for Sustainable Development at home and around the world (Department for International Development, 2017)
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2018)
- National Policy Statements (various: Overarching Energy, Renewable Energy, Fossil Fuels, Oil and Gas Supply and Storage, Electricity Networks, Nuclear Power, Ports, National Networks, Airports, Hazardous Waste, Waste Water treatment, Water Resources Infrastructure (consultation draft, Nov 2018) (Various UK Government departments, 2011-18)
- Natural Environment and Rural Communities Act 2006 (HM Government, 2006)
- Planning Policy Wales (Edition 10) (Welsh Government, 2018)
- Scottish National Planning Framework (Scottish Government, 2014)
- Scottish Planning Policy (Scottish Government, 2014)
- Welsh National Development Framework: Issues, options and preferred option consultation document (Welsh Government, 2018)

Biodiversity

- Biodiversity Strategy 2020: A strategy for England's Wildlife and Ecosystem Services (Defra, 2011)
- Coastal Squeeze: Implications for flood management. The requirements of The European Birds and Habitats Directives. Defra policy guidance (Defra, 2005)
- Conservation of Habitats and Species Regulations 2017 (as amended) (HM Government, 2018)
- Eels (England and Wales) Regulations 2009 (as amended) (HM Government, 2011)
- Government Forestry and Woodlands Policy Statement (Defra and Forestry Commission, 2013)
- Marine and Coastal Access Act 2009 (as amended) (HM Government, 2011)
- Natural Environment White Paper: The Natural Choice: Securing the Value of Nature (Defra, 2012)
- Salmon and Freshwater Fisheries Act 1975 (as amended) (HM Government, 1975) (HM Government, 2015)
- The Great Britain Invasive Non-native Species Strategy (Defra, Scottish Government and Welsh Government, 2015)

- UK Forestry Standard: The Government's approach to sustainable forestry (Forestry Commission, 2017)
- UK Marine Policy Statement (HM Government, Scottish Government and Welsh Government, 2011)
- Wildlife and Countryside Act 1981 (as amended) (HM Government, 2016)

Population and Human Health

- Equality Act 2010 (as amended) (HM Government, 2012)
- Strategic Plan for the next 4 years: Better Outcome by 2020 (Public Health England, 2016)
- The Equality Strategy: Building a fairer Britain (HM Government, 2010)

Resource Management

- Our Waste, Our Resources: A Strategy for England (HM Government, 2018)
- Safeguarding our Soils: A Strategy for England (Defra, 2011)
- The Clean Growth Strategy: Leading the way to a low carbon future (HM Government, 2018)
- The Environmental Permitting (England and Wales) Regulations 2016 (as amended) (HM Government, 2018)
- UK Peatland Strategy 2018-2040 (International Union for the Conservation of Nature, 2018)
- Waste (England and Wales) Regulations 2011 (as amended) (HM Government, 2014)

Water

- Control of Pollution Act (HM Government, 1974)
- Creating a great place for living - Enabling resilience in the water sector (Defra, 2016)
- Delivering sustainable flood risk management (Second edition) (Scottish Government, 2019)
- Environment Act 1995 (HM Government, 1995)
- Flood and Water Management (England and Wales) Act 2010 (HM Government, 2010)
- Flood Risk Management (Scotland) Act 2009 (Scottish Government, 2009)
- Future Water, The Government's water strategy for England (vision to 2030) (Defra, 2008)
- Land Drainage Act 1994 (HM Government, 1994)
- National Flood Risk Assessment for Scotland (SEPA, 2018)
- National Flood Risk Assessment for Wales (Natural Resources Wales, 2013)
- Reservoirs Act (HM Government, 1975)
- River basin planning Strategy for the Scotland River Basin District (SEPA, 2016)
- The Urban Waste Water Treatment (England and Wales) Regulations 1994 (as amended) (HM Government, 2003)
- The Water Supply (Water Quality) Regulations 2016 (as amended) (HM Government, 2018)

- Water Abstraction Plan (Defra, 2018)
- Water Act 2014 (HM Government, 2014)
- Water Environment (Water Framework Directive [WFD]) (England and Wales) Regulations 2017 (HM Government, 2017)
- Water Industry Act 1999 (HM Government, 1999)
- Water Resources Act 1991 (as amended) (HM Government, 2009)
- Water Strategy for Wales: Supporting the sustainable management of our natural resources (Welsh Government 2015)

Climatic Factors

- Clean Growth Strategy (HM Government, 2017)
- Climate Change Act 2008 (HM Government, 2008)
- Land Use: Reducing emissions and preparing for climate change (Climate Change Committee, 2018)
- Managing the Coast in a Changing Climate (Climate Change Committee, 2018)
- The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting (Defra, 2018)

Material Assets

- Industrial Strategy: building a Britain fit for the future (HM Government, 2017)
- National Infrastructure Delivery Plan 2016-2021 (Infrastructure and Projects Authority, 2016)

Cultural Heritage

- Ancient Monuments and Archaeological Areas Act 1979 (HM Government, 1979)
- Culture White Paper (Department for Digital, Culture, Media and Sport, 2016)
- Planning (Listed Buildings and Conservation Areas) Act 1990 (HM Government, 1990)
- The Heritage Statement (Department for Digital, Culture, Media and Sport, 2017)

Landscape

- Countryside and Rights of Way Act 2000
- National Parks and Access to the Countryside Act 1949 (HM Government, 1949)

Air

- Air Quality Plan for Nitrogen Dioxide (NO₂) (Defra and Department for Transport, 2017)
- Clean Air Strategy (Defra, 2019)

Annex B: Sources for the strategic environmental context

Biodiversity

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Annex C: Summary of the strategic objectives and measures grouped by the SEA assessment themes

This provides a summary of the groups of scoped-in measures and their strategic objectives by each of the SEA assessment themes. These groupings have provided the basis for the SEA assessment.

Planning for resilient places

Strategic objective 1.2: Between now and 2050 risk management authorities will help places plan and adapt to flooding and coastal change across a range of climate futures.

Measure 1.2.1: By 2021 the Environment Agency and risk management authorities will identify frontrunner places for developing adaptive approaches for a range of different scales and social contexts, working with local places and partners.

Measure 1.2.2: By 2024 the Environment Agency will publish a new picture and evidence of current and future flood risk that will help places better plan and adapt for climate change.

Measure 1.2.3: By 2024 the Environment Agency will develop a national framework to help risk management authorities, people, businesses and public bodies identify the steps and decisions needed to take an adaptive approach to planning for flood and coastal resilience in a place.

Measure 1.2.4: By 2025 the Environment Agency will produce a new set of Long Term Investment Scenarios to inform future policy and investment choices for delivering flood and coastal resilience.

Measure 1.2.5: By 2026 lead local flood authorities will update their local flood risk strategies to incorporate adaptive approaches to planning for flood and coastal resilience in a place.

Strategic objective 1.3: Between now and 2030 all those involved in managing water will embrace and embed adaptive approaches to enhance the resilience of our environment to future flooding and drought.

Measure 1.3.3: From 2020 risk management authorities will seek to better align long term planning for flood and coastal change with water company business planning cycles to identify opportunities for managing both floods and droughts.

Strategic objective 2.1: Between now and 2030 all new development will contribute to achieving place based resilience to flooding and coastal change.

Measure 2.1.1: From 2021 risk management authorities will invest in planning skills and capabilities to ensure they can advise planners and developers effectively to enable climate resilient places.

Measure 2.1.2: From 2025 the Environment Agency and lead local flood authorities will advise local planning authorities on how adaptive approaches should inform strategic local plans.

Strategic objective 2.4: Between now and 2050 places affected by flooding and coastal change will be 'built back better' and in better places.

Measure 2.4.2: By 2021 coast protection authorities and the Environment Agency will refresh the shoreline management plans and keep them under review.

Strategic objective 2.6: Between now and 2050 the Environment Agency and risk management authorities will work with infrastructure providers to ensure all infrastructure investment is resilient to future flooding and coastal change.

Measure 2.6.1: By 2021 the Environment Agency and risk management authorities will work with infrastructure providers to ensure all infrastructure investment is resilient to future flooding and coastal change.

Strategic objective 3.4: Between now and 2030 the nation will be recognised as a world leader in managing flooding and coastal change, as well as developing and attracting talent to create resilient places.

Measure 3.4.1: By 2022 the Environment Agency will continue to work with standards setting organisations to encourage flood resilience requirements to be incorporated into the building and materials standards for homes and businesses built in places at risk of flooding.

Delivering flood and coastal change resilience

Strategic objective 1.1: Between now and 2050 the nation will be resilient to future flood and coastal risks. Over the next year the Environment Agency will work with partners to explore and develop the concept of standards for flood and coastal resilience.

Measure 1.1.1: By 2021 the Environment Agency will enhance the appraisal guidance for flooding and coastal change projects, so that investment decisions better reflect a range of climate change scenarios.

Measure 1.1.2: By 2022 the Environment Agency will work with partners to explore, develop the concept of standards for flood and coastal resilience, and will consider the pros and cons of all options. This will feed into the government's flood policy statement in 2019. The Environment Agency will also develop a national suite of tools that can be used in combination to deliver flood and coastal resilience in places.

Strategic objective 1.3: Between now and 2030 all those involved in managing water will embrace and embed adaptive approaches to enhance the resilience of our environment to future flooding and drought.

Measure 1.3.1: From 2021 the Environment Agency will use the lessons learnt from the Defra £15m natural flood management projects and other pilot projects to expand and mainstream working with natural processes by all risk management authorities.

Measure 1.3.2: From 2021 the Environment Agency will work with farmers, landowners and others to identify opportunities for using agricultural practices (through funding, advice and regulation) to manage flooding and coastal change.

Strategic objective 1.4: Between now and 2030 risk management authorities enhance the natural, built and historic environment so we leave it in a better state for the next generation.

Measure 1.4.1: From 2021 risk management authorities will contribute to improving the natural, built and historic environment through their investments in flood and coastal projects.

Measure 1.4.2: From 2021 risk management authorities will work with partners and others to identify how the nature recovery network, the northern forest and other habitat improvements can help to manage flood risk and coastal change.

Measure 1.4.3: From 2021 risk management authorities will help to ensure 75% of all water bodies are in natural or near-natural condition within 25 years.

Strategic objective 1.5: Between now and 2030 risk management authorities will use funding and financing from new sources to invest in making the nation resilient to flooding and coastal change.

Measure 1.5.1: By 2021 the Environment Agency will work with government on its green finance strategy to explore new options for funding and financing flooding and coastal change that deliver more private funding in the future.

Strategic objective 2.2: Between now and 2030 all new development will seek to support environmental net gain in local places.

Measure 2.2.1: From 2021 all risk management authorities will achieve biodiversity net gain in all programmes and projects.

Measure 2.2.2: From 2021 all risk management authorities will seek to work with developers and planners to achieve environmental net gain as part of strategic development proposals.

Strategic objective 2.3: Between now and 2030 all risk management authorities will contribute positively to local economic regeneration and sustainable growth through their investments in flooding and coastal change projects.

Measure 2.3.1: From 2021 the Environment Agency will identify ways in which flood and coastal infrastructure projects can better contribute to local economic regeneration and sustainable growth.

Strategic objective 2.5: Between now and 2030 all flooding and coastal infrastructure owners will understand the responsibilities they have to support flood and coastal resilience in places.

Measure 2.5.2: By 2024 the Environment Agency will require risk management authorities to report on the resilience of their flood and coastal change infrastructure in a nationally consistent way.

Measure 2.5.3: By 2025 the Environment Agency will work with risk management authorities to develop recommendations for flooding and coastal change infrastructure owners that enable greater collaboration, sharing and monitoring between them.

Preparing for and recovering from flooding and coastal change

Strategic objective 2.4: Between now and 2050 places affected by flooding and coastal change will be 'built back better' and in better places.

Measure 2.4.1: By 2025 the Environment Agency will work with government, insurers and financial institutions to review the legal, policy and behavioural changes needed to 'build back better and in better places' and improve the resilience of homes and business.

Strategic objective 3.3: Between now and 2030 people will receive a consistent and coordinated level of support from all those involved in recovery from flooding and coastal change.

Measure 3.3.2: By 2022 the Environment Agency will have expanded their flood warning service to all places at high risk of flooding from rivers and the sea.

Measure 3.3.3: By 2025 the Environment Agency will work with government to better join up the organisations involved in providing incident response and recovery to provide a consistent and coordinated service

Raising awareness, engagement and collaborative working

Strategic objective 3.1: Between now and 2030 young people at 16 should understand the impact of flooding and coastal change, but also recognise the potential solutions for their place, and opportunities for career development

Measure 3.1.1: By 2021 flooding and coastal change materials will be provided to help teachers deliver existing elements of the national curriculum.

Strategic objective 3.2: Between now and 2030 people will understand the potential impact of flooding and coastal change on them and take action.

Measure 3.2.1: By 2022 government and risk management authority research programmes will identify how best to help people and businesses understand, accept and take responsibility for their risk to flooding and coastal change. This will help all risk management authorities better shape the way they work with people and businesses.

Measure 3.2.2: By 2021 all risk management authorities will develop and use digital tools to better communicate flooding and coastal change. This will help achieve greater awareness and responsibility of the risks people face.

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