

Strategic Environmental Assessment

Nottinghamshire
Local Flood Risk
Management Strategy
(LFRMS)

Environmental
Report

July 2015



**Nottinghamshire
County Council**

<i>Rev</i>	<i>Date</i>	<i>Details</i>	<i>Prepared by</i>	<i>Reviewed by</i>	<i>Approved by</i>
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2	October 2014	Revised Interim Environmental Report	Ian McCluskey Senior Sustainability Consultant	Ian McCluskey Senior Sustainability Consultant	Alan Houghton Associate
2	July 2015	Environmental Report (Draft LFRMS for consultation)	Ian McCluskey Senior Sustainability Consultant	Ian McCluskey Senior Sustainability Consultant	Alan Houghton Associate



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1 INTRODUCTION

1.1 Background

- 1.1.1 Nottinghamshire County Council (NCC) has worked to produce a Local Flood Risk Management Strategy (LFRMS); which is a key duty under Section 9 of the Flood and Water Management Act, (FWMA, 2010). The purpose of the LFRMS is to guide the management of local flood risk across the County of Nottinghamshire.
- 1.1.2 The LFRMS has been informed by a Strategic Environmental Assessment (SEA), which identifies any likely significant effects of the strategy and helps to demonstrate how the LFRMS contributes to the achievement of wider environmental objectives. This Environmental Report presents the findings of the SEA process, and how this has influenced the development of the LFRMS.
- 1.1.3 So far, the Council has already produced and consulted upon an SEA Scoping Report, which sets out the key issues that will be a focus of the assessment. Further detail about what was involved in this process can be found in sections 1.33 to 1.36 of this report.

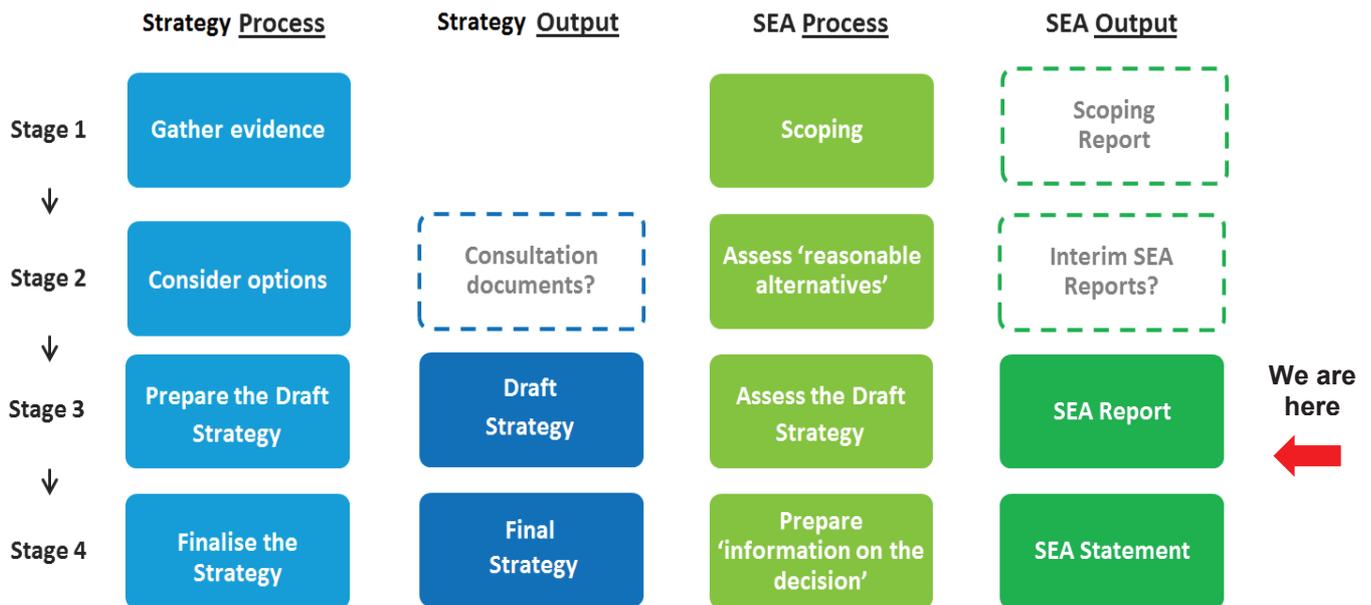
1.2 SEA Explained

- 1.2.1 SEA is a process that involves the systematic identification and evaluation of the potential environmental impacts of high-level decision-making (i.e. a plan, programme or strategy).
- 1.2.2 SEA is also a tool for communicating the likely effects of a 'plan', 'programme' or 'strategy' (and any reasonable alternatives), explaining the decisions taken with regard to the approach decided upon, and encouraging engagement from key stakeholders such as local communities, businesses, water companies / local drainage boards and statutory environmental consultees.
- 1.2.3 Although SEA can be applied flexibly, it is a legal requirement under the Environmental Assessment of Plans and Programmes Regulations 2004 (which were prepared in order to transpose into national law the EU Strategic Environmental Assessment (SEA) Directive).¹
- 1.2.4 The regulations set out prescribed processes that must be followed. In particular, the regulations require that a report is published for consultation alongside the draft strategy that 'identifies, describes and evaluates' the likely significant effects of implementing 'the plan, and reasonable alternatives'.² The Environmental Report ('SEA Report') must then be taken into account alongside consultation responses when finalising the strategy.
- 1.2.5 As illustrated in Figure 1-1, SEA can be viewed as a four-stage process that produces a number of statutory and non-statutory outputs.

¹ Directive 2001/42/EC: <http://ec.europa.eu/environment/eia/sea-legalcontext.htm>

² Regulation 12(2) <http://www.legislation.gov.uk/uksi/2004/1633/regulation/12/made>

Figure 1-1: The 'Four-Stage' SEA Process



1.3 What stage of the SEA process are we at?

1.3.1 Undertaking an SEA is an iterative process, but it typically follows the four stages identified in figure 1.1 above.

1.3.2 This Environmental Report essentially represents the outcome of stage 3 of this process. However, to enable us to undertake the assessments to inform this report it was necessary to determine the scope of the SEA (i.e. stage 1) and consider alternative strategies (stage 2).

Stage 1: Scoping

1.3.3 The scoping stage of SEA involves the following key tasks, which are undertaken to identify the environmental issues that should be a focus of the SEA and how the assessments will be undertaken.

- Reviewing the policy context.
- Establishing the current and projected baseline position for a range of environmental factors.
- Identifying the key environmental issues.
- Establishing a methodological framework that will be used as a basis for undertaking assessments (referred to as a SEA Framework).
- Identifying limitations and assumptions.

1.3.1 After gathering this information, the Council prepared a Scoping Report to present the scope of the SEA to interested parties.

1.3.4 The Scoping Report was published and sent to the statutory bodies (English Heritage, Natural England, and the Environment Agency) to seek input and feedback on the scope of the SEA. In particular whether:

- the relevant policy context had been reviewed;
- up-to-date and relevant baseline information had been gathered;
- the most important environmental issues have been identified; *and*
- the assessment methodology is appropriate.

1.3.5 Following the period of consultation (which lasted over 5 weeks between May 1st and July 2nd, 2014), the Council responded to feedback as deemed necessary before finalising the Scoping Report. However it should be remembered that the scope of the SEA constantly evolves as new evidence and information become available.

Stage 2: Assessment of Reasonable Alternatives

1.3.6 Stage 2 of the SEA process involves identification and assessment of 'reasonable alternatives'. This means comparing different approaches that could be taken to achieve the objectives of the LFRMS.

1.3.7 As an interim stage of the strategy development process, three strategic alternative approaches to delivering the LFRMS objectives were identified and assessed against the SEA Framework. Chapter 2 of this Environmental Report presents the findings of this assessment.

Stage 3: Assessment of the Draft LFRMS

1.3.8 The SEA process runs parallel to the preparation of the LFRMS. Therefore, as the LFRMS is being developed, it is useful to undertake an assessment of the emerging principles, objectives, measures and actions. This means that the findings of the SEA can be taken into consideration before the LFRMS is finalised.

1.3.9 Prior to preparing the draft Local Flood Risk Management Strategy, NCC prepared a document setting out the key issues and guiding principles for its development. A list of draft objectives was proposed in this document. These draft objectives were appraised against the SEA objectives to identify their broad compatibility with the objectives in the LFRMS. Chapter 6 of this Environmental Report presents the findings of this objectives compatibility assessment.

1.3.10 As the LFRMS was further developed, a draft action plan was prepared containing a set of objectives, measures and detailed actions. This draft action plan was assessed as part of the SEA process, and the findings were taken into consideration as the LFRMS was being finalised for consultation.

Stage 3: Finalising and assessing the LFRMS

1.3.11 Once the draft LFRMS was finalised ready for consultation, the SEA was updated to reflect any changes made to the LFRMS in light of SEA findings and other feedback. The findings of the SEA (of the final draft LFRMS) are presented in Chapter 8 of this Environmental Report.

2 NOTTINGHAMSHIRE LFRMS

- 2.1.1 NCC is designated a Lead Local Flood Authority (LLFA) under the FWMA and as such has responsibilities, duties and powers to help coordinate the management of flood risk across the County. Nottingham City Council as a separate LLFA covers the administrative area of Nottingham City and will be producing a separate LFRMS.
- 2.1.2 The City and County Council are working closely together to ensure their respective LFRMS' are complementary and provide integrated benefits in terms of both flood risk and the wider environment.
- 2.1.3 The purpose of the LFRMS is to identify the extent of flood risk in Nottinghamshire how it will be managed in partnership with others and to outline Nottinghamshire's approach to local flood risk management in the County.
- 2.1.4 The LFRMS will build upon the Preliminary Flood Risk Assessment (PFRA) produced in June 2011. The PFRA provided a high level overview of existing and potential flood risk from a variety and combination of flood sources including: surface water, groundwater and ordinary watercourses, as well as the interaction with Environmental Agency designated Main Rivers and reservoir flooding.
- 2.1.5 The SEA process has been fully integrated into the development of the LFRMS to ensure that environmental considerations have been taken into account. This Environmental Report illustrates how the SEA has influenced the LFRMS process. Where possible, the SEA also identifies opportunities for environmental enhancement as well as mitigating any potentially adverse effects of the LFRMS.
- 2.1.6 The County Council has prepared five objectives for inclusion in the LFRMS (listed below). These give an indication of the scope of the LFRMS. Each objective is supported by a number of key actions and breakdowns of these key actions (see Appendix A).
1. To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire.
 2. To increase levels of awareness within local organisations and communities so they can become more resilient to flooding and understand their land drainage responsibilities.
 3. To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach.
 4. To integrate local flood risk management into the planning process and support sustainable growth.
 5. To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our cultural heritage and landscape and deliver environmental benefits.

3 CONTEXTUAL REVIEW

- 3.1.1 An important step when seeking to establish the appropriate ‘scope’ of an SEA involves reviewing ‘contextual’ messages (e.g. issues, objectives or aspirations) set out within relevant published plans, policies, strategies and initiatives (PPSIs) at international, national and local level. Environmental context messages are important, as they aid the identification of the ‘issues and opportunities’ that should be a focus of the SEA. Assessments should also take account of the cumulative impacts that could arise as a result of other plans and programmes within and beyond the plan period.
- 3.1.2 A detailed review of plans, policies and strategies was set out in the Scoping Report, and this has been reproduced as Appendix C to this Environmental Report. Table 3.1 below draws out and summarises the key strategic issues that emerged from this policy review and are important in setting the scope of the SEA.

Table 3.1 - Summary of key issues drawn from the policy review

SEA Topic	Key Themes Emerging from the Review of Policies, Plans and Strategies
Biodiversity, Flora and Fauna	<ul style="list-style-type: none"> • Preservation, restoration and enhancement of habitats and species particularly those of national/international conservation designation is emphasised in local and national policy guidance
Climatic Factors	<ul style="list-style-type: none"> • Reductions in carbon emissions are encouraged within policy documents • Adaptation and mitigation of climate change effects is encouraged within policy
Cultural Heritage	<ul style="list-style-type: none"> • Protection and enhancement of historic assets is a key national objective
Landscape & Visual Amenity	<ul style="list-style-type: none"> • Designated areas such as AONBs and National Parks are afforded further protection within planning policies.
Material Assets	<ul style="list-style-type: none"> • Sustainable development is a key thread of national planning guidance
Population and Human Health	<ul style="list-style-type: none"> • National policy aims to deliver prosperous, healthy and sustainable communities • Suitable public access to open space is an objective of national policy
Soils	<ul style="list-style-type: none"> • The preservation of the best and most versatile land is a policy consideration • Policy emphasises the dangers to human health and the wider environment of contaminated land.
Water	<ul style="list-style-type: none"> • Inclusion of SUDS is an important local policy consideration • Managing flood risk and mitigating the effects of flood and drought is an important policy objective • Reductions in water pollution incidents is a policy consideration

4 ESTABLISHING THE BASELINE POSITION

- 4.1.1 Another important step when seeking to establish the ‘scope’ of an SEA involves reviewing the ‘baseline’ for a range of environmental topics. Doing so helps to enable identification of those key environmental issues that should be a particular focus of the appraisal, and also helps to provide ‘benchmarks’ for the appraisal of significant effects.
- 4.1.2 Just as it is important for the scope of SEA to be informed by an understanding of current baseline conditions, it is also necessary to consider how the baseline conditions might ‘evolve’ in the future under the no plan / business as usual scenario.
- 4.1.3 The SEA Directive provides a non-exclusive list of topics that may be appropriate for consideration as baseline evidence. Within this report the topics have been grouped into three specific sections, as detailed in table 4-1 below.

Table 4-1: SEA Topics

Sustainability Theme	Topics Covered	
Environmental Resources	<ul style="list-style-type: none"> • Geology and Soils • Landscape and Visual Amenity • Biodiversity, Flora and Fauna • Land Use and Natural Resources 	<ul style="list-style-type: none"> • Water Resources • Fisheries • Climate Change and Air Quality
Resource Management and Material Assets	<ul style="list-style-type: none"> • Economic Infrastructure and Material Assets 	<ul style="list-style-type: none"> • Cultural Heritage
Population and Human Health	<ul style="list-style-type: none"> • Population • Deprivation 	<ul style="list-style-type: none"> • Human Health

NB: it should be noted that there are links between different ‘topics’ and that some information could cut across (or be relevant to) several themes.

4.2 Environmental Resources

- 4.2.1 This section summarises the key environmental issues for the following topics, then concludes with a decision as to which issues should be scoped in or out of the SEA.
- Geology and Soils;
 - Landscape and Visual Amenity;
 - Biodiversity, Flora and Fauna;
 - Land Use and Natural Resources;
 - Water Resources;
 - Fisheries; and
 - Climate Change and Air Quality

Geology and Soils

- 4.2.2 Areas identified for flood scheme development could conflict with the conservation of the best agricultural soils, areas of potential land contamination, and sites of geological importance. Extreme flood events could lead to the loss of soils of value for agriculture. A positive effect of flooding is that alluvial deposits contribute to the long term fertility of the river flood plain areas such as the Trent Valley. The high quality agricultural land often coincides with flood risk areas as flooding is beneficial to the soil as they distribute and deposit river sediments over large areas of land, replenishing nutrients in the topsoil and so making agricultural land more fertile.
- 4.2.3 Land, which would be affected by flooding, is primarily in the Trent Valley and its tributaries immediately to the west. Also the small area of Grade 1 land on the northern boundary of the County would be affected. The Idle, Ryton, Poulter, Meden, and Maun Valley's (tributaries of the Trent in the north and west of the County), as well as the River Smite and Devon Valley, would also be affected, (tributaries of the Trent in the south of the County). The agricultural areas developed on the Zechstein group geology would also be impacted by flood events associated with streams flowing westwards into Derbyshire. In summary some of the 'best and most versatile agricultural land' in the County will be affected by flood events.
- 4.2.4 As described there are a number of historic landfill sites with possible sources of contamination throughout the County. These represent a significant risk to present and future development across the region including construction of flood defences, or that which could be affected by floods. A particular concern within the County, due to the number of former mine workings and collieries, is the possibility of acid minewater seepage and flooding as mine waters rebound after cessation of mining activity and ground water rises as a result of flood events.
- 4.2.5 The RIGs and geological SSSIs are distributed throughout the County and some features are located within the valley of the River Trent, such as river cliffs and bluffs, or exposures within former quarries; these could be affected by the construction of new flood schemes, or could be damaged as a result of flood events.

Landscape and Visual Amenity

- 4.2.6 Local flood alleviation schemes are unlikely to have a significant impact on landscape character but will be required to be designed such that they blend into the local environment e.g. through the use of sensitive facing materials on flood walls, temporary sections of flood wall to preserve access to the riverfront and views.
- 4.2.7 Should any major flood alleviation schemes be identified then these could potentially have significant direct impact on the physical landscape and landscape character. Landscape and Visual Impact Assessments may be required for such schemes and the potential cumulative impacts will also need to be considered.
- 4.2.8 The design and planting of new woodland within the county is guided by several factors including its location, planning policies (e.g. Sherwood Forest Regional Park, Greenwood Community Forest area,) landscape character, and existing archaeological and ecological constraints. This woodland planting could strengthen the Green Infrastructure of the County and provide some flood alleviation measures where appropriate.
- 4.2.9 There are opportunities for flood alleviation schemes to contribute towards the amenity of an area e.g. restoration of parklands in urban areas and for these to be 'softer' approaches with multi environmental benefits wherever feasible instead of hard engineered flood defences.

Biodiversity, Flora and Fauna

- 4.2.10 There is a direct overlap between many of the SINC sites and areas that could be affected by localised flooding. Flood risk management activities have the potential to threaten habitats and species where these are unsympathetic to the needs of the natural environment, such as heavy duty maintenance during the nesting season or removal of weirs for flood risk management reasons that adversely affects wetland habitats. However they also provide a great opportunity to enhance the natural environment, for example through water attenuation features, flood compensation areas or re-linking sites to the floodplain, allowing the restoration of wetlands whilst reducing flood risk at the same time.
- 4.2.11 The development of the LFRMS provides an opportunity to explore the environmental improvement initiatives of others, such as the Trent Rivers Trust, Groundworks, and the National Trust etc. and seek development projects with multiple benefits for the environment and society e.g. reduced flood risk, improved amenity and public access and enhanced biodiversity.

Land Use and Natural Resources

- 4.2.12 Changes in the way that land is managed have the potential to affect flood risk. Increasing urbanisation within the County will lead to increased flood risk, increasing runoff, the potential for flash floods, and the necessity to divert and culvert natural drainage pathways. This can be alleviated by the inclusion of sustainable drainage schemes (SUDs) within new developments and retro-fitting these features to existing developments.
- 4.2.13 When considering the risk of flooding in developing new sites for mineral workings and waste disposal. There is a need to maximise those options that pose the least flood risk and to assess opportunities where mineral extraction can improve flood attenuation and storage capacity. Considered management at former mineral working sites can help to reduce the risk of surface water, groundwater and watercourse flooding and provide positive mitigation to the wider area through incorporating the storage of floodwaters.
- 4.2.14 Former mining areas likely to be affected by surface water flooding, with the areas with the greatest potential for conflict being the former colliery sites in the M1 corridor and at Worksop. Flood events within locations of spoil tips with lagoons could create pathways for contamination migration to occur. In addition to the spoil tip lagoons, the now closed mines are in the main no longer pumped and there is reduced management of mine waters in the underground shafts.
- 4.2.15 The management of mine water levels will need to be more proactive if the potential for mine water flood events and the release of contaminated mine waters to adjacent groundwater and surface waters through seepage discharge is to be prevented.
- 4.2.16 Changes in agricultural practices are difficult to predict. For example, changes to the payments farmers receive could encourage more intensive agriculture or conversely less intensive production and more environmental stewardship. However the impact agricultural practices can have on flooding to local communities in Nottinghamshire, have already proven to be significant and is a key area for consideration.

Water Resources

- 4.2.17 All local flood risk management options being proposed should fully consider any WFD implications and, wherever possible, link to and support the programme of measures as set out in the Humber River Basin Management Plan (RBMP). Flooding of key water supply, water distribution and water treatment facilities (for potable waters and waste waters) presents a pollution risk with associated impacts on human health, water quality and ecology;

- Diffuse pollution from agriculture and urban run-off could be exacerbated through flood events;
- Licensed abstractions and discharges should not be affected by local flood risk management options; and
- Generation of new pathways for pollutants to reach controlled waters and the water environment generally through the flooding of waste disposal facilities and/or of former mining areas as discussed in Sections 4.2 and 4.5.

4.2.18 Catchment Abstraction Management Strategies (CAMS) set out how water resources of a catchment will be managed and thereby contribute to implementing the WFD. The CAMS describe where water is available for abstraction and the implications water resource availability has for new and existing water abstraction licences. CAMS covering the Nottinghamshire area include;

- The Idle and Torne CAMS – the River Idle is a significant tributary of the River Trent, formed from the Rivers Maun, Meden and Poulter, the River Torne flows north-eastward to the River Trent at Keadby. Throughout the catchment the main land use is agriculture (arable). The headwaters of the catchments' rivers are industrialised particularly around Mansfield, SSSI's are located throughout the catchment;
- Lower Trent and Erewash CAMS – The River Trent is the main river in the Lower Trent and Erewash CAMS area, including its tributaries; the Rivers Derwent, Soar, Erewash, Leen Greet, Devon, Idle, Torne and Eau and the Dover Beck. Agriculture is the dominant land use in the catchment area;
- Witham CAMS – the major river in the Witham CAMS area is the River Witham which rises at Grantham, through Lincoln and discharges into the Wash at Boston, Agriculture is the dominant land use in the catchment area; and
- The Don and Rother CAMS – has an extensive reservoir system to the west of the area, the main rivers are the Don, Rother, Dearne and Went, the Don and Rother CAMS area also has an extensive canal network.

Fisheries

4.2.19 The need to maximise the opportunity for inclusion of mitigation measures to reduce the impact of barriers to longitudinal migration, especially for juvenile European Eel and ensure that no additional barriers to migration are installed.

4.2.20 Where possible, enhancements to fish habitat utilised by all life stages of fish, should be incorporated into flood risk management schemes.

4.2.21 The amenity and economic value provided by the fishery resource within Nottinghamshire should be protected and enhanced where possible.

Climate Change and Air Quality

4.2.22 Climate change is a key driver to implementing the LFRMS and the time lag between the past emission of greenhouse gases and their subsequent impact upon environmental systems means that some climate change is inevitable.

4.2.23 The UK Climate Impact Projections for the East Midlands shows that winter rainfall is likely to increase. Wetter winters may increase river levels causing flooding on the larger river systems, and localised flooding on smaller watercourses. There may also be a greater incidence of localised pluvial flooding from the projected increase in periods of locally intense rainfall events, which can cause surface water run-off to exceed the capacity of the local water drainage and water attenuation systems. These local events will have greater

impact if the ground is near saturated or saturated from a wetter winter generally. Similarly, a very dry period before sudden intense rainfall when the ground has become 'baked' and hard can also promote intense runoff in a similar way.

- 4.2.24 The predicted increase in future extreme weather events such as flooding has the potential to impact upon energy production, disrupt transport and communication links and cause damage to property and loss of valuable agricultural soils. Extreme weather events may also potentially affect the natural and historic environment as well as pose a risk to health and safety of the population. Since river systems, ground water and aquifers are interconnected across county boundaries extreme weather events such as high or prolonged rainfall may have impacts on neighbouring authority areas both up and downstream.
- 4.2.25 The projected wetter winters may provide an opportunity for capturing and storing water in reservoirs to be released during the drier summer periods. Flooding on land within the river flood plain, such as within the Trent Valley, may leave alluvial deposits which can contribute to an improvement in the fertility of the soils within these areas.
- 4.2.26 The Nottinghamshire LFRMS provides an ideal opportunity for the provision of green infrastructure to accommodate sustainable drainage systems, which may provide a way for communities to become more resilient to the impacts of climate change. However where there is insufficient land available, for example where land has already been developed, this may not be feasible. The NLFRMS also presents opportunities to integrate and connect the various green infrastructure schemes.
- 4.2.27 Flood management schemes need to be designed to allow for the projected increase in peak rainfall intensity and peak river flows, which by 2055-2085 may be an increase of as much as 20%³.
- 4.2.28 Flood management options may involve construction activities, land use changes, planning zone changes or alterations to flooding regimes each will have the potential to contribute to the release of carbon dioxide emissions. Whilst the choice of materials used in regards to construction activities will have a huge bearing on CO2 emissions, the other flood management options are likely to be insignificant. The processes within the entire life-cycle of the flood management option should be assessed in order to reach a balanced decision. Conversely some flood management measures may have the potential to contribute to a reduction in CO2 emissions, particularly where the space to accommodate these can be incorporated in to urban regeneration or the planning of new development.

Air Quality

- 4.2.29 The SEA for the National Flood Risk and Coastal Erosion Risk Management Strategy considered that significant impacts on air quality as a result of the strategy were unlikely to occur. Therefore air quality was scoped out of the assessment.
- 4.2.30 The National Flood Risk and Coastal Erosion Risk Management Strategy is unlikely to have a significant effect on air quality at the regional level. Therefore it is logical to project that the NLFRMS is equally as unlikely to affect air quality. The issue of air quality is therefore scoped out of this SEA. Specific effects of strategic policy on air quality would be considered further at the project EIA stage for any relevant proposed development.

³ Technical Guidance to the National Planning Policy Framework Table 5: Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows.

Table 4-2: Scoping Conclusions for Environmental Resources

Issue	Scoped (In/Out/?)	Reason
Geology and Soils		
Geological sites	Out	RIGs and geological SSSIs are distributed throughout the County, some of which are located within the valley of the River Trent (river cliffs and bluffs). These could be affected by the construction of new flood schemes; however these will be monitored by the EA as main rivers fall within their statutory responsibilities. Accordingly, any SEA required will be undertaken by the EA.
Soils	In	If new flood defence infrastructure were developed it could conflict with the conservation of the Grade 1 and 2 agricultural land located in flood risk areas such as the grade 1 land at the Humberhead Levels.
Contaminated land	In	Areas at risk of land contamination from historic mineral extraction activities, landfills and industry may emerge as a significant issue.
Landscape & Townscape		
AONB	Out	No designated areas exist within the LFRMS.
Landscape character & quality	In	Flood defence measures have the potential to affect landscape character and quality.
Design quality	Out	More appropriately addressed at a project scale when detailed information concerning design of flood measures is available.
Sense of place/distinctiveness	Out	More appropriately addressed at a project scale when detailed information concerning design of flood measures is available.
Biodiversity, Flora and Fauna		
Internationally designated sites	In	The SAC and potential prospective SPA are located within an area that is likely to encounter potential surface water flooding.
Nationally designated Sites	In	SSSI sites are located throughout the County and so some are likely to be at risk of flooding.
Locally Designated Sites	In	The County's SINCs are located in areas identified for risk of surface water flooding.
LBAP habitats and Species	In	LFRMS measures have the potential to affect habitats and species by altering groundwater levels or flow levels to water dependant habitats and species.
Nature Improvement Areas	In	Flood risk has the potential to harm the County's NIA at Humberhead Levels.
Habitat Fragmentation	In	Flood reduction measures have the potential to alter habitat connectivity.

Land Use and Natural Resources		
Agricultural areas	In	Land management practices can significantly affect flood risk, the River Devon area north of Newark has been highlighted as a priority area to improve water quality and flood management.
Mineral Resources	In	Former mining areas at risk of flooding have potential for contamination migration to occur, particularly in relation to mine waters; areas with the greatest potential for conflict are the former colliery sites in the M1 corridor and at Worksop.
Waste Management	In	Historic and active waste treatment and waste disposal facilities are located within the flood plain of the River Trent and its tributaries; they are therefore at risk of flooding, which may cause the spread of contaminants.
Water Resources		
Water Infrastructure	In	Key water supply, distribution and treatment facilities at risk of flooding.
Surface Water Quality	In	Potential pollution could be exacerbated through surface water runoff and sewerage overflow containing contaminants during flood events.
Attenuation of runoff	In	Flood defence measures have the potential to affect runoff levels as well as disturb/improve watercourses/bodies.
Fisheries		
Water Quality	In	Pollution from flooding has the potential to harm current fish populations
Habitat Fragmentation	In	Flood reduction measures have the potential to alter current habitat passage systems
Climate Change and Air Quality		
Climate Change Adaptation	In	Climate Change is anticipated to cause an increase in rainfall and potentially a rise in the risk of flooding.
Greenhouse gas emissions	Out	Flood risk reduction measures are unlikely to have anything other than a negligible impact on the overall level of emissions and air quality in the County.
Air Quality	Out	Flood risk reduction measures are unlikely to have anything other than a negligible impact on the overall level of emissions and air quality in the County.

4.3 Resource Management and Material Assets

4.3.1 Whilst the term “material assets” is not defined in the SEA Directive for the purpose of this Report, “material assets” refers to buildings, utilities and the transport infrastructure. This section considers the following topics;

- Heritage; and
- Economic Infrastructure and Material Assets

Heritage

4.3.2 The LFRMS options may involve construction activities, land use changes or alterations to flooding regimes that may adversely affect cultural heritage sites, including buildings of architectural merit and archaeological sites and their settings. Options may also manage flood risk to heritage features or create improved access to historic environment sites.

4.3.3 Nottinghamshire has a significant number heritage assets at risk of surface water flooding, particularly in the Newark Area. The Registered Park and Gardens of Holme Pierrepont Hall to the north east of the City of Nottingham is located in the flood plain of the River Trent. The historic battlefield site of Stoke Field is also located in the Trent Valley flood plain.

4.3.4 In many areas of Nottinghamshire, water features form a positive heritage asset such as at Thoresby Park. This is an English Heritage registered Park and Garden and the lake, formed by the damming of the River Meden in 1715, is a central feature of the park design. The maintenance and control of water levels reinforces the integrity of the design in designated heritage assets such as this. Thoresby Park is not the only registered park with formally designed water bodies, it is true that Humphrey Repton is associated with the Thoresby lake, but Clumber, Rufford, Newstead, Welbeck are all substantial Grade I listed country house estates (often referred to as the Dukeries) with registered design landscapes that contain lakes and water courses as a major component of their heritage interest.

Economic Infrastructure and Material Assets

4.3.5 Future employment and housing sites will be needed to create jobs and homes for both existing residents, and those moving into the County. Affordable housing and accessible transport by sustainable modes is crucial in order to connect the population to future housing and employment sites.

4.3.6 Strategically planned sites for both utilities (e.g. power distribution lines, main substations) and digital infrastructure (e.g. masts and street cabinets for superfast broadband) which are resilient to future flooding will be critical in order to keep the economy connected and hence productive.

4.3.7 Main transport routes throughout the county will need to be protected to allow safe access to key areas.

4.3.8 The Nottinghamshire LFRMS should seek to manage flood risk to the economic infrastructure of Nottinghamshire and protect the critical assets. Existing and new infrastructure networks for energy, transport and digital communication will need to improve their long term resilience to flooding.

Table 4-3: Scoping Conclusions for Resource Management and Material Assets

Issue	Scoped (In/Out/?)	Reason
Heritage		
World Heritage Sites	Out	There are no World Heritage Sites within Nottinghamshire
Scheduled Ancient Monuments	In	There are 158 Scheduled Ancient Monuments scattered throughout the County, the majority of which being in Newark and Sherwood District.
Historic Parks and Gardens	In	Of the many registered parks and gardens within Nottinghamshire, the registered Park and Gardens of Holme Pierrepont Hall is located in the flood plain of the River Trent. The lake at Thorseby Park registered park is formed by a damming of River Meden, water management is required to ensure the current status of the lake is maintained.
Conservation Areas	In	There are 136 conservation areas scattered throughout the County the majority of which being in Newark and Sherwood District.
Listed Buildings	In	There are 3,778 listings scattered throughout the County, with increased flood risk could put these buildings at risk. The highest concentration of these is within Bassetlaw District Council.
Battlefield	Out	The historic battlefield site of Stoke Field is located in the Trent Valley flood plain.
Economic Infrastructure and Material Assets		
Housing	In	Actions arising from the LFRMS could affect the properties within flood risk areas. The highest allocation of new housing is for Newark and Sherwood District Council.
Employment	In	Level of flood risk could have a significant effect on existing industry and employment areas.
Transport Infrastructure	In	Actions arising from the LFRMS have the potential to affect key transport routes within the study area.
Power Networks	In	The Staythorpe and Cottam main power substations lie within Flood Zone 3 and so are potentially at risk of future flooding.

4.4 Population and Human Health: Key Environmental Issues

4.4.1 This section deals with considerations regarding the population, deprivation and public health of the residents of Nottinghamshire.

Human health

4.4.2 One of the most significant risks of local flooding is that which it poses to the health and well-being of the local population within Nottinghamshire. In 2011, the County had a population of 785,8004, a rise of 37,300 people from the comparable 2001 figure (a rise of 4.7%); slightly higher than the average growth rate for England (4.2%) though lower than the regional average (East Midlands 6%).

4.4.3 Options should seek to manage flood risk to the benefit of the population of Nottinghamshire by minimising the flood risk to people, property and key community services including emergency services, major roads, schools and hospitals.

4.4.4 The options should also help to protect the health of communities (both physical and psychological) from the adverse effects of flooding. It should recognise that additional provision is likely to be required for those communities living in those areas identified as having higher levels of deprivation, who may be less resilient to the impacts of flooding. Greater social provision and better education and communication may be required.

Table 4-4: Scoping Conclusions for Population and Human Health

Issue	Scoped (In/Out/?)	Reason
Population and Human Health		
Population	In	Reduce the risk of flooding for those areas with a high concentration of elderly or to those where supported evacuation may be required.
Levels of Deprivation	In	Management of flood risk is influenced by levels of development the delivery of which can be more limited in more deprived areas.
Access to Services	In	Access to services is may be compromised in rural areas where there are fewer services and elsewhere during extreme events.
Human Health	In	Potentially assisting health improvement through the provision of additional or improved areas for recreation.

⁴ Preliminary results from the 2011 census

5 THE SEA FRAMEWORK

- 5.1.1 Table 5-1 presents the proposed SEA framework; which consists of 14 objectives, each with supporting indicators. The framework has been established through consideration of the key issues identified through scoping (i.e. the policy and baseline review).
- 5.1.2 The SEA framework provides a methodological framework by which the environmental effects of the Strategy can be assessed by examining how the LFRMS would impact upon the baseline position relating to each environmental objective.

Table 5-1: The SEA Framework.

SEA Objectives*	Indicators (used to measure success/impact)
To protect the nature of the high quality agricultural land of the County.	Percentage of agricultural land at risk of flooding and acreage of land under sensitive catchment management
Integration of Green and Blue infrastructure to enhance the landscape quality.	Numbers of flood risk management measures delivering enhanced landscape quality.
To conserve and where possible, enhance designated sites in the County, increasing connectivity of wildlife corridors, passages and habitats.	Number/ Area of designated sites benefitting from flood risk management. Number of schemes where flood management measures have increased connectivity.
To reduce the risk of contamination from mine water during groundwater flooding events.	Mine water levels to be maintained at predetermined levels
To reduce the risk of contamination from waste facilities during flooding events.	Number of waste management facilities benefitting from reduced risk of flooding.
To protect and improve the water environment.	The number of watercourses that reach/maintain good quality
To undertake flood management actions that will stand the test of time and be adaptable to future changes in the climate.	Number of schemes that have considered the impact of climate change. Number of specific climate change adaptation actions undertaken.
To conserve and where possible enhance the County's historic environment and cultural/heritage assets;	The number/area of designated cultural/heritage assets benefitting from a reduced risk of flooding.
Support economic regeneration objectives;	Number of planning permissions granted contrary to Environment Agency advice
Reduce the risk of flooding to properties and businesses	The number of people, properties and critical infrastructure at risk of flooding. Percentage of properties protected by flood management schemes

SEA Objectives*	Indicators (used to measure success/impact)
Conserve and protect vital infrastructure, assets and properties	Number of properties and critical infrastructure assets protected or benefitting from a reduced risk of flooding.
To contribute towards reducing the risk to the health and wellbeing through increasing flood plain storage.	Area assigned for flood reduction measures that contribute to open space and recreational needs.
To provide opportunities for increased physical fitness through flood management measures within open space and recreational areas, supporting sustainable growth.	Number of measures with open space/recreational uses within areas with high levels of obesity.
Ensure the inequalities gap does not widen and increase levels of awareness within local communities.	Number of specific actions that have been delivered in deprived areas.

6 OBJECTIVES COMPATIBILITY APPRAISAL

6.1 Introduction

6.1.1 To evaluate the effects of implementing the LFRMS at a 'high level', the eight objectives outlined in an early draft of the LFRMS were assessed against the objectives established in the SEA Framework. These 8 objectives were subsequently reduced to five objectives to ensure a more concise and focused approach and to avoid duplication.

6.1.2 Factors such as the likelihood, duration, permanence and sensitivity of receptors were considered to help form a professional opinion on how significant the effects would be (i.e. how compatible the objectives are), ranging from:

- Major Positive ✓✓✓
- Moderate Positive ✓✓
- Minor Positive ✓
- Insignificant effects -
- Minor Negative ✗
- Moderate Negative ✗✗
- Major Negative ✗✗✗
- Uncertainty ?

6.1.3 It should be noted that the ability to forecast effects is limited by the understanding of the baseline and the future baseline. It is also inherently difficult to ascertain environmental effects at this strategic level, as the LFRMS objectives could be interpreted [and implemented] in a number of different ways. For example, natural flood management schemes would be expected to have different effects on the environment compared to 'artificial' measures; yet both approaches would help to achieve objectives that aim to protect properties and people.

6.1.4 The appraisal matrix for the objectives compatibility assessment is presented in Appendix B and discussed below.

6.2 Assessment findings and recommendations

6.2.1 The appraisal found that the draft LFRMS objectives were broadly compatible with the SEA objectives, which is to be expected given that there is a focus on reducing flood risk (and associated impacts) and improving resilience to flooding (which is typically positive in terms of impacts on social, economic and environmental factors).

6.2.2 The draft LFRMS objectives were particularly compatible with the SEA objectives relating to 'population and health' as there is a clear focus on addressing flood risk to communities, properties and critical infrastructure.

6.2.3 The SEA objectives relating to biodiversity and environmental protection were also very compatible with the draft LFRMS objectives, especially those that seek to enhance habitat provision and green infrastructure networks. Improved resilience for 'material assets' such as buildings and businesses would also be anticipated.

- 6.2.4 The draft LFRMS objectives 4 (critical infrastructure) and 5 (planning process) were not considered to be particularly relevant in terms of achieving significant effects on the environmental baseline. This is because those objectives are focused more on procedural matters.
- 6.2.5 It was considered that draft LFRMS objectives 1 (flood risk) and 6 (biodiversity) were possibly incompatible with SEA objective 1 concerning agricultural land. For example the objective to implement flood management schemes (especially if prioritising habitat creation), might inadvertently lead to a change in the function and quality of some agricultural land. Objective 3 'Partnership working' referred to the promotion of a 'catchment wide approach' to flood management, which would implicitly cover this issue. However, the SEA recommended that the importance of preserving high quality agricultural land could be made more explicit in the LFRMS objectives. This could then be picked up further through the development of specific LFRMS measures and an action plan.

6.3 Finalising the LFRMS objectives

- 6.3.1 The LFRMS objectives were refined as work on the strategy developed. This led to the reduction in the number of objectives from eight to five (as outlined in section 4.2 of the LFRMS).
- 6.3.2 The recommendations made in the SEA on the draft objectives were as follows:
- The importance of preserving high quality agricultural land could be made more explicit in the LFRMS objectives.*
- 6.3.3 As the objectives were amended, measures were developed that addressed this recommendation. Namely that the LFRMS Objective 3 regarding 'partnerships and catchment based approaches' included a measure to 'Maintain and improve communications with farmers and landowners in rural areas to pursue multi-beneficial schemes'. This ought to ensure that the quality of agricultural land is taken into consideration when considering the use of farm land to achieve multi-beneficial outcomes.

7 ASSESSMENT OF REASONABLE ALTERNATIVES

7.1 What are the reasonable alternatives?

- 7.1.1 Due to the strategic nature of the LFRMS, it is considered that there are no ‘reasonable alternatives’ to the guiding principles and objectives that will inform the content of the LFRMS. However, three alternative strategic approaches have been identified that could deliver the aims and objectives of the LFRMS in differing ways.
- 7.1.2 These alternatives originated within the Council’s consultation survey (February – March 2012) which asked respondents how the LFRMS might focus its approach to prioritising flood management resources and activities. These alternative and the assumptions made for each are described in Table 4.1.
- 7.1.3 Other ‘alternatives; such as ‘Do Nothing’ or ‘Business as Usual’ are not considered to be appropriate approaches because the LFRMS is required by the Flood and Water Management Act 2010.

Table 4-1: Reasonable strategic alternatives

Alternatives	Assumptions
1. Focus on reducing flood risk wherever it occurs.	<ul style="list-style-type: none"> This alternative would involve a more dispersed approach to investment and management activities. Whilst this approach would cover a larger geographical area, the measures would be likely to be of a smaller scale. There is a finite resource in terms of staffing and capital expenditure. Therefore, with such an approach any officer time and expenditure profile would be spread thinly. As a consequence of this approach it may be more difficult to deal with urgent or unforeseen priorities.
2. Maintain the current level of flood risk management / protection.	<ul style="list-style-type: none"> Would seek to provide the ‘current’ level of protection to flooding (i.e. the same number of properties, business, investment etc.). However, the ‘benchmark’ would need to be set to take into account climate change and population growth (predicted at this time). Should flooding become more widespread and a greater number of people, properties and areas were to be affected, the level of protection would not necessarily be in-line with this.
3. Focus on reducing flood risk where it has occurred in the past.	<ul style="list-style-type: none"> This approach would focus measures to areas where flooding has been recorded in the past, which is largely around the main urban settlements. This would mean that some areas that are currently at a lower risk of flooding (i.e. with little past flood events recorded) might be more susceptible / vulnerable to flooding in the future? Areas that are currently at risk of flooding (according to past events) may not be defensible in the future due to the impact of climate change.

7.2 Assessment methodology

- 7.2.1 For each of the reasonable alternatives the assessment identifies and evaluates 'likely significant effects' on the baseline / likely future baseline, drawing on the environmental issues identified through scoping as a methodological framework (i.e. the SEA Framework).
- 7.2.2 Every effort is made to predict effects accurately; however, this is inherently challenging given the high level nature of the alternative approaches under consideration. The ability to predict effects accurately is also limited by the level of understanding of the baseline and (in particular) any future baseline. In light of this, where likely significant effects are predicted this is done with an accompanying explanation of the assumptions made.⁵
- 7.2.3 In many instances it is not possible to predict significant effects, but it is possible to comment on the merits of alternatives in more general terms. This is helpful, as it enables a distinction to be made between alternatives even where it is not possible to distinguish between them in terms of 'significant effects'.
- 7.2.4 It is important to note that effects are predicted taking into account the criteria presented within Schedule 2 of the Environmental Assessment Regulations⁶. So, for example, account is taken of the probability, duration, frequency and reversibility of effects as far as possible. Cumulative effects are also considered. These effect 'characteristics' are described within the assessment tables as appropriate.
- 7.2.5 Significant Positive effects are illustrated in the tables with green shading. Significant negative effects are illustrated with red shading. In some instances, there may not be any 'significant impacts' to discuss. Therefore, to assist in the comparison of alternatives, the appraisal findings also highlight the general merits/disadvantages of each approach using the following symbols.

✓	Positive effect (Shaded is significant)
?	Uncertain effect
✗	Negative effect (shaded is significant)
-	Negligible effects

⁵ As stated by Government Guidance (The Plan Making Manual, see <http://www.pas.gov.uk/pas/core/page.do?pageId=156210>):

"Ultimately, the significance of an effect is a matter of judgment and should require no more than a clear and reasonable justification."

⁶ Environmental Assessment of Plans and Programmes Regulations 2004

7.3 Assessment findings

Strategic alternatives for the Local Flood Risk Management Strategy: 1. Focus on reducing flood risk wherever possible. 2. Manage flood risk so as to maintain it at its current level. 3. Focus on reducing flood risk where it has occurred before.	✓	Positive effect (Shaded is significant)
	?	Uncertain effect
	✗	Negative effect (shaded is significant)
	-	Negligible effects

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
1.To protect the nature of the high quality agricultural land of the County.	<p>There is a large amount of 'best and most versatile land' throughout the County, much of which is at risk of surface water flooding to differing extents. Much of these areas also lie within flood plains, so it would be difficult to protect these areas without significant investment, which is unlikely given the need to focus on flooding which has a greater effect on human life, property and critical infrastructure (typically in urban areas). Promoting natural flood management measures on agricultural land (such as washlands) that is valued for agriculture might be appropriate in some cases if this provides an attractive proposition for land owners. However, these measures would be more likely to be part of a wider catchment management approach to reducing flood risk downstream from main rivers. At a local level it may be more appropriate to focus on changes to management practices such as promoting crops that are more resilient / not lost as a result of flooding in higher risk areas (for example 'energy crops'), or planting trees to help reduce infiltration and run off rates.</p> <p>The effects on agricultural land are unlikely to be vastly different under any of the alternatives (and are not considered to be significant). However, there are subtle differences between each approach that could lead to different implications for the quality of agricultural land in some areas.</p> <p>For example, there are some small areas of Grade 2 agricultural land in Ruddington and east of Keyworth in Rushcliffe District and some areas within Mansfield Woodhouse, Mansfield that are highlighted as areas at risk of potential flooding that do not have a history of flooding. Under alternative 3, this might lead to a lack of support to areas like this to help adopt agricultural practices that both reduce the risk and consequences of flooding.</p> <p>Under alternatives 2 and 3, there would be a degree of acceptance that some areas of agricultural land would remain susceptible to flooding (<i>which might actually be beneficial in terms of flood management through natural storage</i>). Management of flood risk would also be focused on minimising the most vulnerable areas at present.</p> <p>However, for alternative 2, some areas may be unprepared for more widespread or extreme events if there is no intention to increase the current level of flood protection in line with predicted changes in</p>	-	✓✗	✓✗

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
	climate.			
2. Integration of green and blue infrastructure to enhance the landscape quality.	<p>Nottinghamshire contains large areas of greenspace and water features that make-up it's green and blue infrastructure. Much of this area is also at risk of flooding, but equally presents opportunities to help tackle flooding through measures such as wetland creation, sustainable drainage systems and woodland planting. Alternative 1 would be more likely to look at addressing flood risk on a holistic basis, which would mean addressing flood risks and opportunities across the county in rural and urban areas. The measures would be likely to be smaller scale in nature and less likely to have a detrimental effect on landscape character and quality. However, it may also be more difficult to implement larger strategic improvement measures under this approach. Nevertheless, the effects are considered to be positive. Alternative 2 would seek to maintain flood risk at its current level. There would be a variety of ways this could be achieved, but it is assumed that there would be some use of natural flood management techniques, which could help to enhance the quality of the landscape. It is anticipated that in some areas, flooding may increase, which might alter the character of the landscape either for the better or the worse. Alternative 3 would focus most resources into areas that have flooded before, typically in the more urbanised areas. Therefore, there may not be a focus on linking green and blue infrastructure across the County. Nevertheless, it would still present opportunities to deliver strategic improvements to green infrastructure in areas of high risk.</p>	✓	?	✓ x
3. To conserve and where possible, enhance designated sites in the County, create and increase connectivity of habitats, wildlife corridors and passages.	<p>Impacts on wildlife habitats and species would be dependent upon the types and locations of measures that where promoted, which is not clear at this stage. For alternative 1, it is assumed that measures would be smaller scale and less targeted due to the need to address all flood risk across a wider area. This might have the effect of reducing the opportunities to protect and / or enhance biodiversity through natural flood management measures.</p> <p>It is unclear whether surface water flood risk will increase or decrease in response to climate change and changing land management / land use activities (i.e. alternative 2). However, it is possible that increases in flood events and magnitudes could have a negative effect on wildlife habitats if planning only seeks to manage flood risk based upon the current levels of protection.</p> <p>By focusing on areas that have flooded before (alternative 3), the majority of measures are likely to be concentrated upon reducing flood risk in the urban areas of Mansfield, Worksop, Newark on Trent and Retford. This could have positive implications on biodiversity if measures incorporated the enhancement of green infrastructure. However, this approach might not address flood risk (and opportunities) to wildlife sites in more 'rural' areas. For example, there is a corridor of green infrastructure between Mansfield and Worksop which contains a number of designated wildlife habitats. This could</p>	✓ x	x?	✓ x

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
	<p>be considered a missed opportunity.</p> <p>A proactive approach would be to identify opportunity areas for enhancing biodiversity through natural flood management schemes. For example, the River Trent Partnership Biodiversity Opportunity Mapping Project has identified action that could be taken to enhance biodiversity along the River Trent from Newark to Gainsborough⁷. It may be possible to achieve the objectives of wildlife enhancement and flood risk management through the implementation of certain measures to achieve catchment management of flooding. For example, the restoration of reed beds, wetland creation and tree planting in flood plains (which can slow flows and reduce infiltration rates). Whilst the LFRMS does not deal with flooding from major rivers, it could potentially contribute through management of flood risk from tributaries. Such an integrated approach could also help to address surface water and groundwater management.</p>			
4. To reduce the risk of contamination from mine water during groundwater flooding events.	<p>Throughout Nottinghamshire there are numerous sites of mining or examining infrastructure that is potentially at risk of surface water flooding. Alternative 1 which seeks to reduce the risk of flooding wherever possible ought to have a positive impact on this objective as it would promote an overall decrease in risk of contamination from mine water. However, the effects may not be significant due to 'spreading resources thinly'.</p> <p>Alternative 2 is likely to have some negative effects on the risk of contamination from mine water. Following this approach, measures might have less capacity to adapt to any changes in climate and other conditions and could therefore increase the risk of contamination (in the short term, measures ought to have some positive effects though). Alternative 3 may ease the risk of contamination on those sites where flooding has occurred before however this may have knock on effects at sites where there haven't been any past flooding events.</p>	-	✓x	✓x

⁷ Nottinghamshire Biodiversity Action Group (2013) *The Trent Valley Biodiversity Opportunity Mapping Project (DRAFT)*

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
5.To reduce the risk of contamination from waste facilities during flooding events.	<p>Waste disposal and management sites are located in various locations throughout Nottinghamshire, but there are clear concentrations of disposal, recycling and reprocessing facilities on the periphery of the main urban areas. These coincide with areas that are at risk of surface water flooding, and also in areas that have a history of flooding. Each alternative has the potential to improve the resilience of these areas to flood risk, but this would be to differing degrees.</p> <p>Alternative 3 would appear to be the most beneficial approach, as it would focus on the areas that have flooded before. Such a targeted approach would be more likely to achieve significant improvements to flood risk resilience, and could have real benefits in reducing the risk of contamination from waste facilities. Alternative 1 also ought to have positive effects, but the scattered approach would mean that measures might not be as comprehensive in areas that require greater investment. Alternative 2 would have a positive effect by controlling current levels of risk. However, in the longer term the risk may increase and new (unlikely given planning regulations) or additional facilities may be unprepared as a result, which could lead to a significant negative effect (longer term).</p>	✓		
6.To protect and improve the water environment.	<p>Each of the alternatives ought to have a positive effect on the quality of the water environment by reducing the risk of pollution entering watercourses as a result of flood events. Natural flood management schemes can also help to improve water quality. Therefore, measures are likely to help to contribute to the achievement of Water Framework Directive targets.</p> <p>Alternative 1 would spread resources across the County, which could help to achieve an overall improvement in the quality of water on a catchment basis. However, the lack of larger scale strategic schemes could mean that some areas would remain susceptible to flooding, which could lead to temporary adverse effects on water quality in some areas. Furthermore, periodic adverse impacts could lead to cumulative adverse impacts on chemical and ecological quality.</p> <p>Alternative 2 is likely to have positive effects by seeking to manage flood risk in-line with current levels of protection. This would also be likely to focus on areas that would benefit most from intervention / investment, and recognises that in some areas it might be better to accept that flooding is inevitable. However, in the longer term, there may be more extreme events that would result in demands for further investment (or to accept that some areas may not be defensible).</p> <p>Alternative 3 is likely to have positive effects on water quality as it would seek to ensure that potential contamination from flood events was reduced where it is known to be an issue historically.</p>	✓ x	✓	✓

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
7.To undertake flood management actions that will stand the test of time and be adaptable to future changes in the climate.	<p>At this stage, the types and locations of measures have not been identified. Therefore, it is difficult to predict how well they would stand the test of time. However, looking at the strategic approaches that could be taken, alternative 2 would be likely to have a significant negative effect. Under this approach, if an increasing number of people, properties or land became at greater risk of flooding as a result of unforeseen circumstances, this could exceed the 'current level of provision', leaving some areas unprepared to deal with the effects of flooding should it occur. Alternatives 1 and 3 would both seek to address flood risk, which is inherently positive. However, for alternative 3, some areas that have not flooded before would not be prioritised, and in the longer term, these may become more susceptible to flooding due to climate changes.</p>	✓		✓x
8.To conserve and where possible enhance the County's historic environment and cultural/ heritage assets.	<p>There are many heritage assets at risk of surface water and groundwater flooding across the county. As such, it is unlikely that any approach can conserve or enhance the whole range of assets sufficiently. Alternative 1 would be expected to cover a wider area and help to reduce flood risk on a small scale for a greater number of assets (which is a positive effect). However, it is likely that most areas would remain vulnerable to some degree of flooding under this approach.</p> <p>Alternative 2 would help to ensure that the current extent of flood risk was managed, which would take account of effects on heritage assets. However, longer term changes in climate could increase flood risk to these areas, which could put additional heritage features at risk of flooding. Changes in land use may also increase flood risk if it leads to a greater coverage of impermeable cover. Conversely, increased levels of development might actually lead to a reduction in run off rates if SUDs are fully implemented on brownfield sites for example.</p> <p>There are several 'hotspots' which represent clusters of heritage assets, which as would be expected, tend to reflect town centres and villages. As such, alternative 3 which seeks to focus on areas that have experienced past flooding would have a significant positive effect on protecting these assets. For example, the southern section of the Church Warsop Conservation Area is located within the flood plain of the River Meden. Having said this, there would be an acceptance that assets in more 'rural' areas would be at greater risk of being adversely affected due to a focus on schemes to address flooding in urban areas. Therefore, the impacts are mixed for this alternative too.</p>	✓x	x	x

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
9.Support economic regeneration objectives	<p>Alternative 1 would help to support a catchment-wide approach to managing flood risk, but might not achieve the greatest reduction in flood risk for the resources available (due to 'spreading the resources thinly'). Important to any strategy is to take account of new development, which has the potential to increase or decrease surface water flood risk. The majority of development is anticipated to occur in and around the main urban areas though.</p> <p>Under alternative 2, it is assumed that there would be measures to maintain the resilience of the existing network of critical infrastructure, taking into account future climate change. This would have a positive effect. However, should new critical infrastructure be built in areas at risk of flooding (<i>which is unlikely given planning regulations</i>), or an increased amount of critical infrastructure was to become at risk or vulnerable to the effects of flooding due to changing circumstances, this approach might lead to negative effects in the longer term.</p> <p>Alternative 3 would be most likely to help ensure that the main urban centres were better prepared for and at lower risk of surface water and groundwater flooding. This would help to reduce disruption to the economy. However, this approach might not focus as heavily on the effects of flooding on rural areas.</p>	-	✓x	✓
10.Reduce the risk of flooding to properties and businesses	<p>At this stage, the types and locations of measures have not been identified. Therefore, it is difficult to predict how effective these measures would be in protecting properties and businesses. However, assumptions can be made about the spread of flood management measures under each strategic alternative. For alternative 1, it is more likely that measures would be implemented across the whole catchment, which would have minor positive effects in many areas (<i>possibly leading to greater synergistic effects across the county</i>). However, this approach would not necessarily focus on the areas of greatest risk and where the effects of flooding could be more severe for businesses and properties (i.e. urban areas). This is considered to be a significant negative effect. Alternative 2 would help to reduce flood risk in the short to medium term, but might leave areas vulnerable to more extreme events in the future, which is a negative effect. Alternative 3 would seek to address flooding where it has occurred before, which would coincide with areas containing concentrations of properties and business activity. Therefore, this would have a significant positive effect. However, other parts of the County that have not flooded before would remain vulnerable to flooding, which could affect rural communities in particular.</p>	✓	x	x

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
11. Conserve and protect vital infrastructure, assets and properties	<p>Strategic emergency network services are located mainly in the urban centres of Mansfield, Worksop, Retford and Newark on Trent (as well as within the City of Nottingham). Other strategic infrastructure is more widespread and crosses 'rural' areas such as electricity networks, and strategic road networks. As some emergency services cross boundaries, there is a need for the LFRMSs to complement one another and for agencies to work in partnership.</p> <p>Alternative 1 would take more of a catchment-wide approach which would help to tackle flood risk across the county, but the effects would be likely to be of a lower magnitude. Therefore, certain elements of infrastructure and emergency assets may remain at some risk of flooding. However, cumulative and synergistic effects of catchment wide schemes could help to improve the overall level of resilience to flood risk.</p> <p>Seeking to manage flood risk at 'current levels' (alternative 2) is likely to have some positive effects in the short to medium term. However, in the longer term, it might leave a greater number of properties, infrastructure and land at risk of flooding</p> <p>Alternative 3 would focus development on areas with records of historic flooding, which mainly covers the urban areas identified above. Therefore, there would be good opportunities to improve the resilience of emergency networks in these areas.</p>	x✓	✓x	✓
12. To contribute towards reducing the risk to the health and wellbeing through increasing flood plain storage.	<p>Each of the alternatives has the potential to contribute to increased opportunities for recreation through natural management schemes such as flood plain storage. However, alternative 1 might be less likely to allow for targeted approaches to identify strategic opportunities.</p> <p>Although alternative 2 would have positive effects, there may be a need for further measures to be implemented in the longer term.</p> <p>Alternative 3 might also lead to a greater focus on measures to reduce surface water flooding in urban areas, which might not necessarily involve natural measures in the flood plain.</p>	-	✓?	✓?
13. To provide opportunities for increased physical fitness through flood management measures within open space and recreational areas, supporting sustainable growth.	<p>Alternative 1 may be less likely to allow for strategic and targeted flood risk management schemes (<i>that could support increased recreation</i>) due to the need to spread resources thinly across all areas that are at risk of flooding. Alternatives 2 and 3 could both involve improvements to open space as part of targeted flood management measures. However, it is uncertain at this stage as to where or what these measures would be.</p>	-	✓?	✓?

SEA objective	Discussion of <u>significant effects</u> (and discussion of <u>relative merits</u> in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
14. Ensure the inequalities gap does not widen and increase levels of awareness within local communities.	<p>There are geographical concentrations of deprivation, particularly within Mansfield and Worksop that are at risk of surface water flooding.</p> <p>Alternative 1 would be likely to result in a more evenly spread allocation of flood management resources, that might inadvertently reduce flood risk in areas where people are better prepared/less vulnerable. Whilst there may be positive effects in some areas, it does not necessarily target resources in areas of greatest need.</p> <p>Alternative 2 would have a negligible effect, as it would not seek to address flood risk beyond current levels.</p> <p>Alternative 3 would be likely to support improved resilience in areas that have historically flooded (including these urban areas), this could have positive effects in helping vulnerable communities to become better prepared for and more resilient to flooding.</p> <p>Although there are some slight differences in the effects for each of these alternatives, it is unlikely that any of the three would lead to a significant increase in the inequality gap between these areas and more affluent and perhaps resilient communities</p>	x?	-	✓

7.4 Summary of Effects

	SEA Objectives													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Alt1: Focus on reducing risk wherever possible	-	✓	✓ x	-	✓	✓ x	✓	✓ x	-	✓	✓ x	-	-	x?
Alt2: Manage flood risk at existing levels	✓ x	?	x?	✓ x	✓	✓	✓	x	✓ x	x	✓ x	✓?	✓?	-
Alt 3: Focus on areas that have historically flooded	✓ x	✓ x	✓ x	✓ x	✓	✓	✓ x	x	✓	x	✓	✓?	✓?	✓

7.4.1 Alternative 1 promotes an approach that is likely to have some positive effects across the range of sustainability factors. For example, there would be overall improvements in flood management across both rural and urban areas. However, the lack of a targeted approach might mean that some areas that are at greater risk of flooding (and its effects) would not be as well prepared as they ought to be. Conversely, this approach might promote measures to reduce flood risk in areas where it may be more appropriate (and cost effective) to accept the current level of risk. Therefore this would be considered an ineffective and unsustainable approach.

7.4.2 Alternative 2 is likely to have significant adverse effects as there is a possibility that a greater amount of people, land and / or properties may become at risk to flooding in the future. Setting a benchmark for managing flooding at 'current levels' (which is assumed to account for climate change) is inflexible, and might exclude some areas that are not currently deemed 'high risk', but which may become so in the future due to other reasons (e.g. changing land use, population growth etc...). However, these adverse effects would be tempered somewhat by the fact that future development will need to be delivered with

flooding receiving full consideration, and planning policies and good development management should help to guide sustainable development.

- 7.4.3 Alternative 3 focuses on areas that have flooded in the past. This essentially reflects the benefits of a more targeted approach, particularly within the more urbanised areas. By focusing on these areas, it is likely that a higher number of properties, buildings and people would be at less risk and / or better prepared for the effects of flooding. Significant positive effects are predicted in this respect. However, this approach might not address flood risk in some rural areas, which could result in negative effects on agricultural land, communities and biodiversity.

7.5 Further discussion and recommendations (mitigation and enhancement)

- 7.5.1 There are multiple benefits to be realised by seeking to address flood risk in the main urban areas of Mansfield, Worksop, Retford and Newark on Trent (which also happen to be areas containing sensitive receptors). Measures here would help to protect emergency infrastructure and a greater number of properties and business at risk, and would also focus on those areas that have the greatest amount of historical flooding.
- 7.5.2 To compliment this approach and promote a whole catchment approach to management, green infrastructure could be enhanced on the edges of settlements, through the urban centres and between urban areas, where there are also habitats at risk of flooding and opportunities to improve connectivity (e.g. between Mansfield and Workshop and along the River Trent between Newark on Trent and Gainsborough). This approach is broadly in-line with alternative 3 (focus on areas that have flooded before), but it is also recommended that some targeted measures might be necessary to protect rural communities in areas that do not have historic records of flooding, yet are still at risk (For example parts of Rushcliffe such as East Leake and Cotgrave). It is also important to ensure that the strategy includes consideration of flood risk in the City of Nottingham, which could mean focusing on reducing flood risk around the urban areas which may not be at 'high-risk' of flooding in themselves but contribute to the flood flow. These apparent inconsistencies ought to be expected when considering a catchment approach to flood management.

7.6 The preferred approach

- 7.6.1 The draft LFRMS promotes an approach to flood management that draws upon all three alternatives discussed above to varying extents.
- 7.6.2 It is not possible to prevent all flooding, and with limited resources and funding, flood risk management work will need to be prioritised. The approach must be proportionate and risk based as recommended by The National Flood and Coastal Erosion Risk Management Strategy and should take environmental and other consequences into account.
- 7.6.3 Overall, the priority is to target areas that are most at risk; as keeping people safe and protecting life is always the priority for flood management. Beyond this there are a number of measures that can be taken to manage the risk and impacts of flooding on local communities, businesses, infrastructure, heritage and the environment. This is demonstrated by taking a holistic catchment wide approach to flood management.
- 7.6.4 The preferred approach reflects Alternative 3 in that it will inevitably target areas that have historically flooded and remain at risk of flooding; and could therefore benefit the most. However, there is recognition in the preferred approach that this may not always be the most appropriate plan of action.

7.6.5 Alternative 1 is somewhat inappropriate as an overall strategic approach as it would spread resources more thinly, rather than taking a priority based approach. However, the LFRMS does seek to address flood risk wherever it arises by promoting improved collective action by communities, businesses and other organisations such as Parish and Town Councils, conservation organisations and RMAs.

8 APPRAISAL OF THE LFRMS

8.1 Introduction and methodology

8.1.1 The following chapters present an assessment of the LFRMS against each of the 14 objectives in the SEA Framework (In Table 5.1). The assessment takes account of the actions and objectives, which are linked together to make-up the LFRMS (see Appendix A).

8.1.2 Effects have been forecast taking into account the criteria presented within Schedule 2 of the SEA Regulations⁸ and current levels of knowledge. Hence, account has been taken of the probability, duration, scale, frequency and reversibility of effects as far as possible.

8.1.3 These factors have helped to form an opinion on the extent of the effects, as represented by one of the following symbols.

- Positive ✓✓
- Minor positive ✓
- No effect -
- Minor negative ✗
- Negative ✗✗

8.1.4 The effects have been recorded in a table (see example below in table 8.1) for each of the five objectives proposed in the LFRMS. The assessment presented is reflective of the specific actions that are proposed under each of the LFRMS Objectives (as presented in Appendix A).

Table 8.1: Presenting effects for the LFRMS Objectives

LFRMS Objectives		Effects on SEA Objective 1
1.)	To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire.	✓
2.)	To increase levels of awareness within local organisations and communities so they can become more resilient to flooding and understand their land drainage responsibilities.	...
3.)	To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach.	...
4.)	To integrate local flood risk management into the planning process and support sustainable growth.	...
5.)	To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our cultural heritage and landscape and deliver environmental benefits.	...

⁸ Environmental Assessment of Plans and Programmes Regulations, 2004

- 8.1.5 It is important to note that these assessment scores are not necessarily indicative of 'significant effects' (in terms of affecting the baseline position) but are to provide an indication of the broad implications of each of the LFRMS Objectives.
- 8.1.6 However, further discussion of the significance of effects is presented for each sustainability objective to illustrate the effects of all the LFRMS actions and objectives when considered together 'as a whole' (i.e. the cumulative effects).
- 8.1.7 Where relevant and appropriate, this discussion also includes recommendations for enhancement or mitigation (of significant effects) that are likely to occur as a result of adopting the draft LFRMS.

Limitations

- 8.1.8 The ability to forecast effects is limited by understanding of the baseline and (in particular) the future baseline and also the challenge of relating policy to the effects that result from its implementation. In light of this, where likely significant effects are forecast this will be supported by explanation of the assumptions made⁹.

⁹ As stated by Government Guidance (The Plan Making Manual, see <http://www.pas.gov.uk/pas/core/page.do?pagelId=156210>):
"Ultimately, the significance of an effect is a matter of judgment and should require no more than a clear and reasonable justification."

8.2 Environmental Resources

8.2.1 This section outlines the effects of the LFRMS on the baseline relating to ‘environmental resources’, which includes consideration of soil, landscape, wildlife sites, waste, water quality and flooding. The appraisal has been guided by the following SEA Objectives.

1. To protect the nature of the high quality agricultural land of the County.
2. Integration of green and blue infrastructure to enhance the landscape quality.
3. To conserve and where possible, enhance designated sites in the County, create and increase connectivity of habitats, wildlife corridors and passages.
4. To reduce the risk of contamination from mine water during groundwater flooding events.
5. To reduce the risk of contamination from waste facilities during flooding events.
6. To protect and improve the water environment.
7. To undertake flood management actions that will stand the test of time and be adaptable to future changes in the climate.

LFRMS Objective	SEA 1	SEA 2	SEA 3	SEA 4	SEA 5	SEA 6	SEA 7
1. To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire.	-	-	-	✓	✓	-	✓
2. To increase levels of awareness within local organisations and communities so they can become more resilient to flooding and understand their land drainage responsibilities.	-	-	-	-	-	-	✓
3. To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach.	✓	-	-	✓	✓	-	✓
4. To integrate local flood risk management into the planning process and support sustainable growth.	-	✓	-	✓	✓	✓	✓
5. To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our cultural heritage and landscape and deliver environmental benefits.	-	✓	✓	-	-	✓	✓

Discussion of effects

8.2.2 The measures and actions associated with LFRMS Objective 1 are mainly procedural in nature, so it is difficult to determine a direct effect on environmental factors. However, it is reasonable to assume that measures to alleviate flood risk would help to reduce the risk of contamination from waste facilities and mines; which should have a positive effect in terms of SEA objectives 4 and 5. There are also specific actions that seek to ensure that the effects of climate change are incorporated into design and planning requirements, which is a positive effect under SEA objective 7.

8.2.3 LFRMS Objective 2 and the associated measures and actions are focused upon strengthening community resilience. Therefore, it is unlikely that this aspect of the LFRMS would have a significant effect on the baseline position associated with environmental resources.

- 8.2.4 The supporting actions for LFRMS Objective 3 are focused upon maintaining and strengthening partnership working. There are specific actions seeking to work with the farming community, which should contribute towards changing behaviours and land use practices so that high quality agricultural land is better protected from the effects of flooding. Improving understanding of groundwater flooding from mines and industrial areas should help to reduce the likelihood of contamination from these sources during flood events. Taking a catchment management approach to flooding, should also ensure that actions are well coordinated and integrated to help to achieve wider benefits.
- 8.2.5 LFRMS Objective 4 and the supporting measures and actions promote the use of SuDS in new development, with specific actions that could provide opportunities for developers to implement them. For example, action 4.1.5 will explore how old colliery yards and spoil tips could provide drainage solutions for new development. These measures would be likely to make use of natural techniques that promote enhancement of green and blue infrastructure, and support a healthy water environment.
- 8.2.6 In combination, the actions supporting LFRMS Objective 5 are likely to have a positive effect on wildlife habitats and green infrastructure by 'exploring routes/ opportunities for biodiversity enhancement'. Including ecology representatives in local flood risk management group meetings should also help to ensure that flood schemes make the most of opportunities for ecological enhancement. Alongside actions to implement SuDS (LFRMS Objective 4), it is considered that there would be a significant positive effect on the baseline associated with SEA Objective 3.
- 8.2.7 A Habitats Regulations Assessment Screening exercise has been undertaken alongside the SEA, and this confirms that there is unlikely to be a significant effect upon the Birklands and Bilhaugh SAC or Sherwood Forest proposed SPA.
- 8.2.8 Overall, the LFRMS is likely to have a positive effect on 'environmental resources'. Particular benefits are likely to be realised in terms of enhancement of wildlife habitats and a reduced risk of contamination (during flood events) from mine water and waste facilities.

8.3 Material Assets

8.3.1 This section outlines the effects of the LFRMS on the baseline relating to ‘material assets’ which includes consideration of heritage assets, buildings and infrastructure. The appraisal has been guided by the following SEA Objectives.

8. To conserve and where possible enhance the County’s historic environment and cultural/heritage assets.
9. Support economic regeneration objectives.
10. Reduce the risk of flooding to properties and businesses.
11. Conserve and protect vital infrastructure, assets and properties.

LFRMS Objective	SEA 8	SEA 9	SEA 10	SEA 11
1. To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire.	-	✓	✓	✓
2. To increase levels of awareness within local organisations and communities so they can become more resilient to flooding and understand their land drainage responsibilities.	-	-	✓	-
3. To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach.	-	✓	✓	✓
4. To integrate local flood risk management into the planning process and support sustainable growth.	-	✓	✓	✓
5. To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our cultural heritage and landscape and deliver environmental benefits.	✓✓	-	-	-

Discussion of effects

8.3.2 The measures and actions associated with LFRMS Objective 1 are mainly procedural in nature, so it is difficult to determine any specific effects there could be on material assets. However, it is reasonable to assume that measures to alleviate flood risk (such as seeking to implement schemes to address surface water flooding hotspots) would broadly help to better protect property and infrastructure from flooding; which would have knock-on of positive effects in terms of supporting economic activity.

8.3.3 LFRMS Objective 2 is likely to have a positive effect by improving community and business resilience to flooding and supporting improved self-reliance. Whilst these measures would help to protect people and property, in isolation they would be unlikely to have a significant effect on the baseline position relating to ‘material assets’.

8.3.4 The measures and actions supporting LFRMS Objective 3 are focused on partnership working, and consideration of catchment wide and cross-boundary issues and opportunities. Together, these measures would help to improve flood risk management, thus reducing the risk of flooding to property, business and infrastructure. Actions that seek to achieve mutual benefits between transport schemes and flood risk management would also have a positive effect with regards to SEA objective 11.

8.3.5 LFRMS Objective 4 seeks to support sustainable economic growth by ensuring that new development does not contribute to, and where possible reduces flood risk. The use of SuDs would play a key role in reducing flood risk to people, properties and infrastructure.

- 8.3.6 LFRMS Objective 5.1 and 5.2 are considered likely to have a **significant positive effect** on the baseline position associated with SEA Objective 8. This would be achieved through specific actions to identify heritage assets at risk of flooding and to improve consideration of heritage in flood risk management planning.
- 8.3.7 Overall, the LFRMS is likely to have a positive effect on ‘material assets’ such as property and infrastructure by implementing measures that will improve resilience to flooding as well as reducing flood risk (for example, through measures such as SuDS).

8.4 Population and Health

8.4.1 This section outlines the effects of the LFRMS on the baseline relating to ‘material assets’ which includes consideration of health and wellbeing, open space and recreation and community development. The appraisal has been guided by the following SEA Objectives.

12. To contribute towards reducing the risk to the health and wellbeing through increasing flood plain storage.
13. To provide opportunities for increased physical fitness through flood management measures within open space and recreational areas, supporting sustainable growth.
14. Ensure the inequalities gap does not widen and increase levels of awareness within local communities.

LFRMS Objective	SEA 12	SEA 13	SEA 14
1. To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire.	-	-	✓✓
2. To increase levels of awareness within local organisations and communities so they can become more resilient to flooding and understand their land drainage responsibilities.	-	-	✓
3. To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach.	✓	✓	-
4. To integrate local flood risk management into the planning process and support sustainable growth.	-	-	-
5. To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our cultural heritage and landscape and deliver environmental benefits.	✓	✓	-

Discussion of effects

- 8.4.2 The measures and actions supporting LFRMS Objective 1 seek to prioritise flood risk management in areas of greatest need. In particular, action 1.1.2 (as detailed in Appendix A) would have a positive effect in reducing inequalities by seeking to ‘identify where more disadvantaged areas overlap with highest risk of flooding’.
- 8.4.3 LFRMS objective 2 is likely to have a positive effect with regards to community resilience, as there are measures that seek to increase awareness, and preparedness for flooding. In particular, action 2.2.2 (See Appendix A) should have a positive effect on disadvantaged communities by seeking to identify better ways to engage with ‘hard-to-reach groups’. For task 2.2.3, it will be important to ensure that information on winter preparedness is given in appropriate languages and formats (i.e. as alternatives to leaflets) so that such hard-to-reach groups can also be engaged effectively.

- 8.4.4 Taking a catchment management / partnership approach (as supported through LFRMS Objective 3) should help to ensure that flood management measures have multiple benefits. This approach is likely to support measures that reduce flood risk through natural management schemes that make use of open space.
- 8.4.5 The measures and actions supporting LFRMS Objective 4 should help to reduce flood risk in urban areas in particular through the implementation of SuDS in new development.
- 8.4.6 Measure 5.3 Appendix A seeks to investigate how Nottinghamshire can make space for water, which would involve gaining a better understanding of how extreme events would need to be planned for. This would also involve identification of high level locations for flood storage and the use of open space. Together, these actions would help to reduce flood risk through increased flood plain storage; with knock on benefits for health and wellbeing and recreation.
- 8.4.7 Overall, it is considered that the LFRMS would have a **significant positive effect** on health and wellbeing by improving community resilience, and helping to reduce flood risk in urban areas. In particular, there is a focus on tackling flood risk in areas of greatest need and deprivation, which will help to reduce social inequalities.

9 MITIGATION AND ENHANCEMENT

9.1 Influencing the draft strategy

- 9.1.1 At an early stage of making the strategy, the SEA tested three strategic alternatives. The SEA recommended that the main focus of the strategy to be taken forward should be to prioritise areas at most risk of flooding (i.e. urban areas). It was also recommended that a whole catchment approach should be taken by enhancing green infrastructure within and between settlements.
- 9.1.2 Also flagged as important was to ensure that the strategy includes consideration of flood risk in the City of Nottingham, which could mean focusing on reducing flood risk around the urban areas which may not be at 'high-risk' of flooding in themselves.
- 9.1.3 These factors were in the minds of strategy makers already, but the SEA served to reiterate the importance of these issues, and as the LFRMS was developed, the strategy and action plan took account of these recommendations. In particular, there is a focus on prioritising flood risk to areas that will have the most benefits across a range of environmental, social and economic factors. Also a key element of the LFRMS is a catchment management and partnership approach to managing flood risk proactively.

9.2 Influencing the draft LFRMS

- 9.2.1 The SEA considered the effects of the draft LFRMS. Part of this process involved identifying mitigation measures (for any negative effects) and enhancement measures (to maximise positive effects). No significant negative effects were identified, and thus it was not deemed necessary to propose mitigation measures. In terms of enhancement, no further strategic¹⁰ measures were identified, as the draft LFRMS ought to lead to several significant positive effects, and already takes account of recommendations made earlier in the SEA process.

¹⁰ Enhancement measures should be appropriate to the strategic nature of the LFRMS, and thus specific actions were not identified. It is assumed that detailed measures would be identified at the operational level guided by the LFRMS Action Plan.

10 SUMMARY OF EFFECTS

10.1.1 The LFRMS is unlikely to have any significant adverse effects. This is in large part due to the fact that in seeking to manage flood risk, the LFRMS is inherently positive. At this strategic level, no specific flood risk schemes have been identified either, so it is not possible to assess the effects of the strategy on specific environmental assets. Nevertheless, the measures and actions in the LFRMS are considered likely to lead to a number of significant positive effects.

10.1.2 Table 10-1 below summarises the significant effects of the LFRMS considered ‘as a whole’.

Table 10-1: Summary of LFRMS effects

SEA Topic	Summary of effects	Monitoring measures
1) Environmental Resources	Overall, the LFRMS is likely to have a positive effect on ‘environmental resources’. In particular, there is likely to be a significant positive effect on wildlife habitats through actions that seek to enhance green infrastructure, implement SuDS and explore opportunities for biodiversity enhancement in flood management schemes.	<p>Monitor the number/area of designated sites that will benefit from flood risk management actions, the number of schemes where flood management measures have created habitat, increased or restored connectivity.</p> <p>The number of watercourses that reach/or maintain good quality under the Water Framework Directive.</p>
2) Material Assets	The LFRMS is likely to have a significant positive effect on heritage assets through specific actions to identify heritage assets at risk of flooding and to improve consideration of heritage in flood risk management planning.	<p>Number of heritage assets identified at risk of flooding.</p> <p>Number and % of local flood risk management group meetings where a heritage representative is present.</p>
3) Population and health	Overall, it is considered that the LFRMS would have a significant positive effect on health and wellbeing by improving community resilience, and helping to reduce flood risk in urban areas. In particular, there is a focus on tackling flood risk in areas of greatest need and deprivation, which will help to reduce social inequalities.	<p>The number of specific actions that have been delivered in deprived areas.</p> <p>% change in the number of dwellings in deprived areas that are at risk of flooding.</p> <p>The number of properties, buildings and critical infrastructure assets benefitting from a reduced risk of flooding.</p>

10.2 Cross Boundary Effects

- 10.2.1 The draft LFRMS acknowledges that there is a need to consider cross-boundary effects as well as taking opportunities to deliver wider benefits across local authority borders. In specific, the draft Action Plan sets out measures to *'Identify opportunities to work with Nottingham City Council to take advantage of mutual benefits'* and to *'Develop co-operative links with all neighbouring LLFAs to share good practice'*.
- 10.2.2 Other measures in the Action Plan will also promote a catchment management approach to flood management, which may include measures where the management train crosses borders. This would help to generate a positive effect in neighboring authorities such as Nottingham City by helping to manage surface water and groundwater flooding downstream. It would also potentially help to deliver enhancements to biodiversity over wildlife corridors that cross borders.

11 NEXT STAGES

11.1 Introduction

11.1.1 This Part of the Environmental Report explains the next steps that will be taken as part of the strategy-making / SEA process.

11.2 Consultation

11.2.1 The Council is currently engaging with a range of stakeholders to seek their input and feedback on the LFRMS. The formal consultation will take place in Autumn 2015.

11.2.2 This Environmental Report will also be made available alongside the LFRMS to enable stakeholders to understand the sustainability implications of the LFRMS. In-line with the requirements of the SEA Regulations. The Environmental Report has also been sent directly to the three 'statutory bodies', which are:

- Historic England
- Natural England
- The Environment Agency

11.3 Finalising the strategy

11.3.1 Following the consultation period, the Council will work alongside partners to finalise the LFRMS, taking into account consultation responses, new evidence and the findings of the SEA (as appropriate).

11.3.2 An Environmental Report will also be prepared to present the assessment findings relating to the final LFRMS. The final Environmental Report will essentially be an update of this current Environmental Report; and as such, major changes are not anticipated at this stage.

11.4 Strategy adoption and monitoring

11.4.1 At the time of Adoption a 'Statement' must be published that sets out (amongst other things):

- How the Environmental Report and responses received as part of the current consultation have been taken into account when finalising the strategy; and
- Measures decided concerning **monitoring**.

11.4.2 At the current stage (i.e. within the Environmental Report), there is a need to present 'measures envisaged concerning monitoring' only. As such, table 10.1 sets out measures that might be taken to monitor the **significant effects** that have been identified in the SEA.

11.5 Habitats Regulations Assessment

- 11.5.1 The Environmental Report has been prepared taking account of the findings from a Habitats Regulations Assessment screening assessment that has been undertaken alongside the SEA process. The conclusions from the HRA screening report are reproduced below.
- 11.5.2 The Actions within the Local Flood Risk Management Strategy for Nottinghamshire have been screened out as having no Likely Significant Effects on any European sites.
- 11.5.3 The Strategic Objectives and Action Plans within the document all promote measures to avoid or reduce flooding events that arise on land not normally subject to natural flooding. Although a number of sites exist both within Nottinghamshire and within 10km of Nottinghamshire, the Action Plans of the LFRMS for Nottinghamshire do not detail any prescription which at this point can be identified to have a Likely Significant Effect upon a European designated site. Moreover, the only two European sites within Nottinghamshire (Birklands and Bilhaugh SAC and Sherwood Forest ppSPA) are not dependent on a high water table or flooding.
- 11.5.4 The document promotes collaboration between relevant organisations with responsibility for the management of flood risk, and the co-ordinated approach outlined means that the potential for any unforeseen effects of flood management on European sites is negligible, either alone or in combination with other plans and projects.
- 11.5.5 It is therefore concluded that the Nottinghamshire Local Flood Risk Management Strategy will not lead to a likely significant effect on any European sites, or the Sherwood Forest ppSPA, either alone or in combination with other plans or projects.

11.6 Water Framework Directive Assessment

- 11.6.1 The Nottinghamshire LFRMS is a strategic document and therefore does not contain the project-level detail required to assess potential effects on the quality elements of water bodies through specific actions. Therefore a full Water Framework Directive assessment cannot be carried out at this stage of the Strategy.
- 11.6.2 Nevertheless, a high level assessment has been undertaken to establish the quality status of waterbodies within Nottinghamshire and identify some high level recommendations for improvements that can be achieved through the LFRMS.
- 11.6.3 There are also multiple ways that flood risk management actions can support the achievement of WFD objectives when the water environment is viewed holistically. The Lower Trent and Erewash catchment has a significant number of rivers at moderate status. Implementing schemes which address improvements in water quality as well as flood risk should be prioritised where they can contribute to achieving the target Good status.
- 11.6.4 Engineered flood alleviation schemes have the potential to alter the shape or depth of a surface waterbody often with the aim of increasing capacity, holding back or altering flow routes. It is important to understand how this can impact on the hydro-morphology (i.e.the physical characteristics of the shape, boundaries and content of a water body). and potentially alter interaction with groundwater. When the catchment is considered holistically, engineered schemes can improve hydro-morphology or provide suitable mitigation as well as improving biodiversity by returning catchments to a more 'natural' state.

- 11.6.5 The recent emphasis on implementing Sustainable Drainage Systems (SuDS) through changes in the planning system has focused on managing and mitigating the risk of surface water flooding, particularly in urban environments where natural drainage into the ground is minimal. SuDS also provide excellent opportunity to improve water quality through a variety of measures in the treatment train to remove pollutants from urban or agricultural run-off before reaching a watercourse. Consequently this can contribute to improved physico-chemical status of nearby water bodies. Where a groundwater body has poor qualitative status, encouraging infiltration SuDS can also help work towards improved status. Additionally, green planting for SuDS can enhance biodiversity through encouraging fauna and more varied plant species.
- 11.6.6 Educating and improving awareness with communities about their local water bodies and how the drainage network links to the water environment can help prevent contaminants and potential blockages from entering the system in the first place. Household waste and pollutants from vehicles can often end up in the surface water drains as they are perceived as part of the foul drainage system or an outlet for waste.
- 11.6.7 The full high level WFD Assessment is attached as Appendix D to this Environmental Report.