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Strategic Environmental Assessment

Nottinghamshire Local Flood Risk Management Strategy (LFRMS)

Environmental Report

July 2015

Nottinghamshire County Council

Rev	Date	Details	Prepared by	Reviewed by	Approved by
1	September 2014	First draft. Interim Environmental Report for client review	Esme Portsmith Planning Consultant	Ian McCluskey Senior Sustainability Consultant	Ian McCluskey Senior Sustainability Consultant
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.

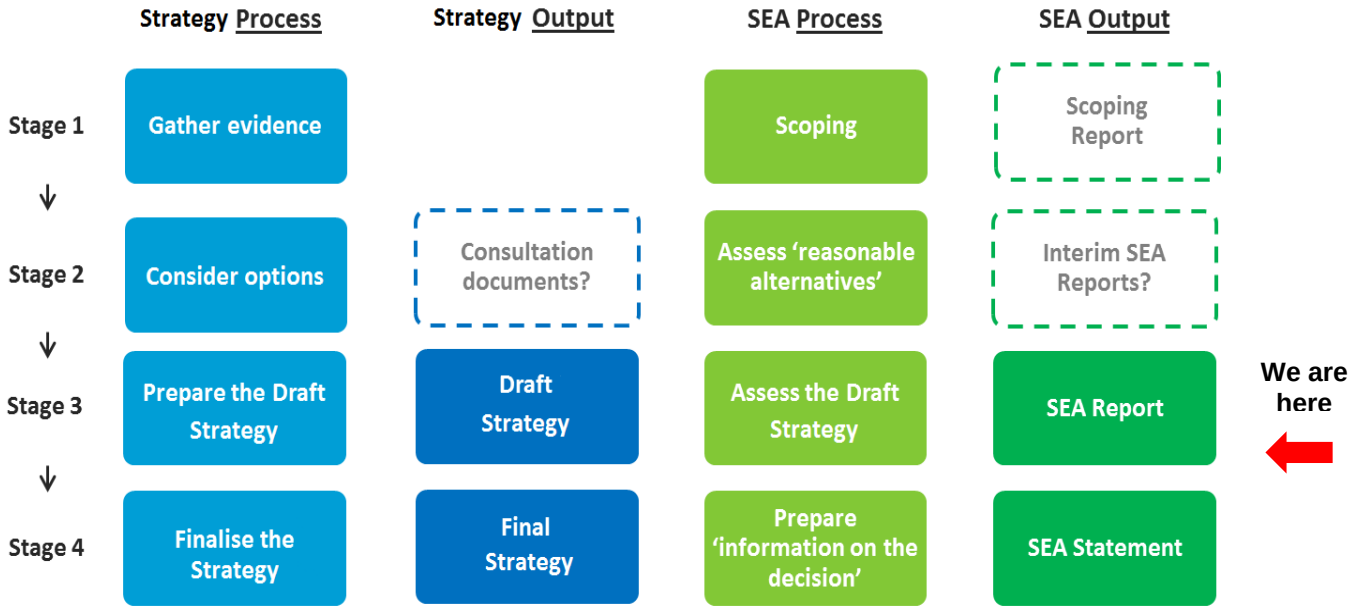
1.2.3 Although SEA can be applied flexibly, it is a legal requirement under the Environmental Assessment of Plans and Programmes Regulations 2004 (which were prepared in order to transpose into national law the EU Strategic Environmental Assessment (SEA) Directive).[1]

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	• 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	• Reductions in carbon emissions are encouraged within policy documents • Adaptation and mitigation of climate change effects is encouraged within policy
Cultural Heritage	• Protection and enhancement of historic assets is a key national objective
Landscape & Visual Amenity	• Designated areas such as AONBs and National Parks are afforded further protection within planning policies.
Material Assets	• Sustainable development is a key thread of national planning guidance
Population and Human Health	• National policy aims to deliver prosperous, healthy and sustainable communities • Suitable public access to open space is an objective of national policy
Soils	• 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	• 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	• Geology and Soils • Landscape and Visual Amenity • Biodiversity, Flora and Fauna • Land Use and Natural Resources	• Water Resources • Fisheries • Climate Change and Air Quality
Resource Management and Material Assets	• Economic Infrastructure and Material Assets	• Cultural Heritage
Population and Human Health	• Population • Deprivation	• 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.	• 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.	• 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.	• 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 Regulationss[6] 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
x	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 significant effects (and discussion of relative merits 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.	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. 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. 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. Under alternatives 2 and 3, there would be a degree of acceptance that some areas of agricultural land would remain susceptible to flooding (*which might actually be beneficial in terms of flood management through natural storage*). Management of flood risk would also be focused on minimising the most vulnerable areas at present. 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	-	✓✗	✓✗

SEA objective	Discussion of significant effects (and discussion of relative merits 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.	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.	✓	?	✓✗
3. To conserve and where possible, enhance designated sites in the County, create and increase connectivity of habitats, wildlife corridors and passages.	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. 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. 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	✓✗	✗?	✓✗

SEA objective	Discussion of significant effects (and discussion of relative merits in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
	be considered a missed opportunity. A proactive approach would be to identify opportunity areas for enhancing biodiversity though 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 Gainsborough[7]. 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 food risk from tributaries. Such an integrated approach could also help to address surface water and groundwater management.			
4. To reduce the risk of contamination from mine water during groundwater flooding events.	Throughout Nottinghamshire there are numerous sites of mining or ex-mining 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'. 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.	-	✓✗	✓✗

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

SEA objective	Discussion of significant effects (and discussion of relative merits 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.	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. 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).	✓	✓	
6.To protect and improve the water environment.	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. 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. 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). 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.	✓✗	✓	✓

SEA objective	Discussion of significant effects (and discussion of relative merits 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.	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.	✓		✓✗
8.To conserve and where possible enhance the County's historic environment and cultural/ heritage assets.	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. 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. 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.	✓✗	✗	✗

SEA objective	Discussion of significant effects (and discussion of relative merits in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
9.Support economic regeneration objectives	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. 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 (*which is unlikely given planning regulations*), 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. 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.	-	✓✗	✓
10.Reduce the risk of flooding to properties and businesses	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 *(possibly leading to greater synergistic effects across the county*). 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.	✓	✗	✗

SEA objective	Discussion of significant effects (and discussion of relative merits in more general terms)	Appraisal score		
		Alt 1	Alt 2	Alt 3
11.Conserve and protect vital infrastructure, assets and properties	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. 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. 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 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.	✗✓	✓✗	✓
12. To contribute towards reducing the risk to the health and wellbeing through increasing flood plain storage.	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. Although alternative 2 would have positive effects, there may be a need for further measures to be implemented in the longer term. 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.	-	✓?	✓?
13. To provide opportunities for increased physical fitness through flood management measures within open space and recreational areas, supporting sustainable growth.	Alternative 1 may be less likely to allow for strategic and targeted flood risk management schemes (*that could support increased recreation*) 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.	-	✓?	✓?

SEA objective	Discussion of significant effects (and discussion of relative merits 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.	There are geographical concentrations of deprivation, particularly within Mansfield and Worksop that are at risk of surface water flooding. 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. Alternative 2 would have a negligible effect, as it would not seek to address flood risk beyond current levels. . 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. 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	✓?	-	✓

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	-	✓	✓ ✗	-	✓	✓ ✗	✓	✓ ✗	-	✓	✓ ✗	-	-	✗?
Alt2: Manage flood risk at existing levels	✓ ✗	?	✗?	✓ ✗	✓	✓		✗	✓ ✗	✗	✓ ✗	✓?	✓?	-
Alt 3: Focus on areas that have historically flooded	✓ ✗	✓ ✗	✓ ✗	✓ ✗		✓	✓ ✗	✗	✓	✗	✓	✓?	✓?	✓

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 Regulations[8] 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 made[9].

[9] 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."*

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 though 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 strategic[10] 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.	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. The number of watercourses that reach/or maintain good quality under the Water Framework Directive.
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.	Number of heritage assets identified at risk of flooding. Number and % of local flood risk management group meetings where a heritage representative is present.
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.	The number of specific actions that have been delivered in deprived areas. % change in the number of dwellings in deprived areas that are at risk of flooding. The number of properties, buildings and critical infrastructure assets benefitting from a reduced risk of flooding.

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.

APPENDIX A: DRAFT LFRMS ACTION PLAN

Nottinghamshire County Council Local Flood Risk Management Strategy Action Plan - Draft for consultation

Version: *3.0*
Revision Date: *2nd July 2015*
Next Review Date: *1st December 2015*

Measure / Scheme					Delivery		Programme				Funding			Priority	Comments
Objective	**Measure**		**Actions**		**Lead**	**Partners**	**Start**	**Finish**	**Review**	**Status**	**Est. Cost (£)**	**Source**	**Status**		
1 To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire	1.1	Develop a robust approach to the prioritisation of schemes to manage flood risk	1.1.1	Identify areas at greatest risk from local flood sources making use of best available information and develop a resource prioritisation tool.	NCC	DCs, STW, EA	2015-2016	*2016-2017*	Mar-16	In Progress	<£5000	Internal (Other)	To be confirmed	High	
			1.1.2	Identify where more disadvantaged areas overlap with highest risk from flooding	NCC	DCs	2014-2015	*2015-2016*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
			1.1.3	Ensure records from flooding in 2013 and 2014 are documented to help prioritise management	NCC ,	DCs & EA	2014-2015	*2015-2016*	Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	High	
			1.1.4	Develop a mechanism for better information sharing about flooding	NCC	DCs, IDBs, EA	2015-2016	*2016-2017*	Jun-16	Not Started	<£5000	Area Based Grant	To be confirmed	Low	
			1.1.5	Identify requirement for Surface Water Management Plans in hotspot areas	NCC	DCs, EA, parishes	2015-2016	*2017-2018*	Jun-16	Not Started	<£5000	Area Based Grant	To be confirmed	Moderate	
			1.1.6	Develop a 'pipeline' of scheme ideas to address risk in flood hotspots	NCC		2015-2016	*2021 onwards*	Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
	1.2	Seek external funding opportunities whenever possible	1.2.1	Ensure core expertise in Flood Management and Drainage Design is maintained within the Council to provide both project support to Highways , Education, Mineral and Waste sectors and bidding for external funds.	NCC		2014-2015	*2021 onwards*	Mar-16	In Progress	£25,000 - 50,000	Area Based Grant	To be confirmed	High	
			1.2.2	Allocate officer to regularly review funding sources and collaborative projects	NCC		2015-2016	*2021 onwards*	Dec-15	Not Started	<£5000	Area Based Grant	To be confirmed	Moderate	
			1.2.3	Ensure local flood evidence is collated and shared with all decision makers in local RMAs	NCC		2015-2016	*2021 onwards*	Dec-15	Not Started	<£5000	Area Based Grant	To be confirmed	Moderate	
	1.3	Collaborate with local stakeholders to achieve common goals	1.3.1	Pursue partnerships as defined in Objective 3	NCC									Moderate	
			1.3.2	Identify schemes which maximise the common benefits and regularly review	NCC		2015-2016	*2021 onwards*	Jun-16	Not Started	<£5000	Internal (Other)	To be confirmed	Low	
			1.3.3	Maintain regular liaison with local RMAs to monitor progress of their investment programmes and assess effectiveness	NCC	STW, IDBs, EA	2015-2016	*2021 onwards*	Mar-16	Not Started	<£5000	Internal (Other)	To be confirmed	Moderate	
			1.3.4	Identify where the County can contribute to the Day Brook Catchment flood alleviation project	NCiC, EA	GBC, STW, NCC	2015-2016	*2017-2018*	Dec-15	Not Started	£5000 - £25,000	Area Based Grant	To be confirmed	Moderate	
	1.4	Progress capital schemes identified for flood alleviation	1.4.1	Implement recommendations from the Hucknall Flood Investigation	NCC		2014-2015	*2016-2017*	Jun-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
			1.4.2	Commence Hucknall Town Centre FAS	NCC,	ADC, STW	2014-2015	*2015-2016*	Jun-16	In Progress	£100k - £500k	FCERM GiA	Allocated	High	
			1.4.3	Implement recommendations from the Southwell Section 19 investigation report	NCC		2014-2015	*2016-2017*	Jun-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
			1.4.4	Commence Southwell FAS	NCC, NSDC		2014-2015	*2015-2016*	Mar-16	In Progress	>£1m	FCERM GiA	Allocated	High	
			1.4.5	Maintain regular overview of IDB planned works to watercourses and pumping stations	NCC	IDBs,	2015-2016	*2015-2016*	Mar-16	Not Started	<£5000	Area Based Grant	To be confirmed	Moderate	
	1.5	Ensure flood management actions will be adaptable and responsive to future changes in the climate	1.5.1	Identify actions for Nottinghamshire following publication of the East Midlands climate change report	NCC	EA	2015-2016	*2016-2017*	Sep-16	Not Started	<£5000	Internal (Other)	To be confirmed	Low	
			1.5.2	Ensure modelled future flood scenarios are incorporated into design and planning requirements through policy.	DCs	NCC	2014-2015	*2021 onwards*	Sep-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
			1.5.3	Identify higher risk areas under climate change scenarios for people and the environment	NCC,	EA, IDBs	2015-2016	*2021 onwards*	Mar-16	Not Started	£5000 - £25,000	Area Based Grant	To be confirmed	Moderate	action from East Midlands Council report
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	2.1	Ensure effective coordination between LRF, emergency planning and highways management / land drainage	2.1.1	Jointly promote community resilience and business continuity measures	NCC & LRF		2014-2015	*2021 onwards*	Mar-16	In Progress	<£5000	Area Based Grant	To be confirmed	Low	
			2.1.2	Establish a communications plan across internal teams in the event of a flood emergency, ensuring resilience to organisational changes	NCC & LRF		2015-2016	*2021 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
	2.2	Improve sources and avenues of information dissemination to the public	2.2.1	Work in partnership across council functions to identify new community contacts	NCC,	DCs, parish councils	2015-2016	*2021 onwards*	Mar-16	Not Started	<£5000	Internal (Other)	To be confirmed	Low	
			2.2.2	Identify ways to improve communications with hard to reach communities	NCC, DCs		2015-2016	*2021 onwards*	Jun-16	Not Started	<£5000	Internal (Other)	To be confirmed	Moderate	
			2.2.3	Develop winter preparedness leaflet to help people understand how they can manage their own risk	NCC,	DCs	2015-2016	*2016-2017*	Jun-16	Not Started	<£5000	Area Based Grant	To be confirmed	Low	
	2.3	Encourage people to manage their own risk	2.3.1	Improve information provision on property level protection	NCC.	DCs	2015-2016	*2021 onwards*	Jun-16	Not Started	<£5000	Area Based Grant	To be confirmed	Low	
			2.3.2	Encourage sign up to flood warnings and weather information	NCC		2015-2016	*2021 onwards*	Mar-16	Not Started	<£5000	Area Based Grant	To be confirmed	Low	
			2.3.3	Establish local community flood wardens to monitor local risk spots working with EA Flood Resilience Team	NCC, EA	DCs	2014-2015	*2021 onwards*	Jun-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
			2.3.4	Encourage development of community flood plans in high risk areas	NCC, DCs		2016-2017	*2021 onwards*	Dec-16	Not Started	<£5000	Internal (Other)	To be confirmed	Low	
			2.3.5	Continue to communicate riparian ownership responsibilities with residents and landowners and the interaction with highways assets	NCC	DCs, IDBs	2015-2016		Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
			2.3.6	Identify need for community resilience stores	NCC	DCs	2014-2015	*2021 onwards*	Dec-15	In Progress	<£5000	Internal (Maintenance)	To be confirmed	Moderate	
	2.4	Develop more online tools and investigate new uses of social media	2.4.1	Improve online tools for flood reporting and investigate ways to capture data from submitted photos	NCC		2016-2017	*2018-2019*	Jun-16	Not Started	<£5000	Multiple	To be confirmed	Low	
			2.4.2	Ensure website contains up to date links and information from latest studies and schemes	NCC		2015-2016	*2021 onwards*	Mar-16	Not Started	<£5000	Area Based Grant	To be confirmed	Moderate	

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Measure / Scheme					Delivery		Programme				Funding			Priority	Comments
Objective		Measure		Actions	Lead	Partners	Start	Finish	Review	Status	Est. Cost (£)	Source	Status		
3	To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach	3.1	Take an active role in local flood risk management partnerships	3.1.1 Direct and lead on local flood issues within the regular meetings of the local flood risk management group.	NCC	DCs, IDBs, EA	2014-2015	*2021 onwards*	Mar-16	In Progress	<£5000	Area Based Grant	Allocated	Moderate	
				3.1.2 Ensure the aims of this strategy are showcased within the Humber Flood Risk Management Plan	NCC	EA & IDBs	2014-2015	*2021 onwards*	Mar-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				3.1.3 Support local planning authorities in delivering flood risk management through Local Plans and planning applications	NCC	DCs	2014-2015	*2021 onwards*	Jun-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				3.1.4 Identify opportunities to work with Nottingham City Council to take advantage of mutual benefits	NCC & NCiC		2014-2015	*2021 onwards*	Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	Low	
				3.1.5 Develop co-operative links with all neighbouring LLFAs to share good practice	NCC		2014-2015	*2021 onwards*	Sep-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				3.1.6 Maintain linkages with the Sherwood and River Idle catchment partnerships	NCC	NWT	2014-2015	*2021 onwards*	Mar-16	In Progress	<£5000	Area Based Grant	To be confirmed	Low	
				3.1.7 Identify opportunities to connect with flood forums and local interest groups	NCC		2014-2015	*2021 onwards*	Mar-16	Community Engagement	<£5000	Multiple	To be confirmed	Moderate	
		3.2	Continue to develop our understanding of groundwater risks in Nottinghamshire	3.2.1 Build our understanding of the future risks from groundwater rising in former mines and other industrial sites	NCC, EA		2014-2015	*2016-2017*	Mar-16	In Progress	£5000-£25000	Area Based Grant	To be confirmed	Low	
				3.2.2 Establish improved monitoring and recording of groundwater flood incidents	NCC, DCs, EA		2016-2017	*2021 onwards*	Dec-16	Not Started	£5000-£25000	Area Based Grant	To be confirmed	Low	
		3.3	Maintain effective linkages with the Isle of Axholme Flood Risk Management Strategy	3.3.1 Identify where works to ordinary watercourses may impact flood risk in Nottinghamshire.	IDBs, EA	NCC	2014-2015	*2021 onwards*	Mar-16	In Progress	<£5000	Area Based Grant	To be confirmed	High	
				3.3.2 Proactively develop a catchment wide strategy for identifying opportunities for flood risk reduction	EA	BDC, NCC, IDB	2015-2016	*2016-2017*	Mar-16	Not Started	<£5000	Multiple	To be confirmed	Low	
		3.4	Pursue joint initiatives with Severn Trent Water ,IDBs and the EA	3.4.1 Communicate with STW on a County scale to ensure consistent approach to flood investigations and mitigation.	NCC, STW/	IDB's,EA, NCiC	2014-2015	*2021 onwards*	Jun-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				3.4.2 Establish an agreed joint approach to cross boundary catchment investigations (e.g. templates and process)	NCC	All RMAs	2015-2016	*2016-2017*	Jun-16	Not Started	<£5000	Area Based Grant	To be confirmed	Moderate	
		3.5	Maintain and improve communications with farmers and landowners in rural areas to pursue multi-beneficial schemes	3.5.1 Identify contacts within landowner groups to both seek opinions of and disseminate information to the farming community	NCC, EA		2015-2016	*2021 onwards*	Mar-16	Not Started	<£5000	Internal (Other)	To be confirmed	Low	
				3.5.2 Build on work with landowners progressed through the Sherwood and River Idle Catchment partnerships	NCC	NWT, EA	2015-2016	*2018-2019*	Dec-15	Not Started	<£5000	Area Based Grant	To be confirmed	Low	
		3.6	Identify joint benefits of highways and transport schemes	3.6.1 Identify how flood management can be integrated with road improvement schemes	NCC , HA?		2014-2015	*2021 onwards*	Jun-16	In Progress	<£5000	Internal (Maintenance)	To be confirmed	Moderate	
				3.6.2 Communicate regularly with the EA about their involvement with highway schemes	NCC, EA		2014-2015	*2021 onwards*	Dec-15	In Progress	<£5000	Internal (Maintenance)	To be confirmed	Moderate	
				3.6.3 Identify how flood management can be integrated with tramway or other infrastructure improvements	NCC		2014-2015	*2021 onwards*	Mar-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
4	To integrate local flood risk management into the planning process and support sustainable growth	4.1	Encourage and promote the use of SuDS in all new developments and retrofit SuDS wherever possible	4.1.1 Work with district councils to implement SuDS specific policy within their Local Plans	NCC	DCs	2015-2016	*2016-2017*	Dec-15	Not Started	<£5000	Defra SuDS	To be confirmed	High	
				4.1.2 Develop and formalise consultee role of County Council in supporting drainage elements of planning applications	NCC	DCs	2015-2016	*2015-2016*	Dec-15	Not Started	<£5000	Defra SuDS	To be confirmed	High	
				4.1.3 Promote and develop exemplar schemes to help developers with examples of costs and opportunities for SuDS	NCC	DCs	2015-2016	*2018-2019*	Sep-16	Not Started	£5000-£25000	Multiple	To be confirmed	Moderate	
				4.1.4 Promote links to NWT advice document about how planning can contribute to WFD objectives	NCC	NWT	2015-2016	*2015-2016*	Dec-15	Not Started	<£5000	Area Based Grant	To be confirmed	Low	
				4.1.5 Investigate opportunities to use old colliery yards and spoil tips to provides SuDS for new development	NCC	EA, DCs	2014-2015	*2017-2018*	Mar-16	In Progress	£5000-£25000	Area Based Grant	To be confirmed	Moderate	Gedling and Cotgrave sites already in use
		4.2	Ensure as far as practical, local planning authorities take full account of flood risk in Local Plan policies and allocations, planning applications and supplementary planning documents	4.2.1 Ensure that Strategic Flood Risk Assessments consider the impact of surface water and information set out in the Nottinghamshire PFRA, and the LFRMS	DCs	NCC	2014-2015	*2021 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	Allocated	Moderate	
				4.2.2 Respond to consultations on draft policies in Local Plans on flood risk.	NCC		2014-2015	*2021 onwards*	Jun-16	In Progress	<£5000	Area Based Grant	To be confirmed	Low	
				4.2.3 Work with LLFAs to ensure maximum benefits through drainage in planning applications	DCs	NCC	2015-2016	*2021 onwards*	Mar-16	Not Started	<£5000	Defra SuDS	To be confirmed	Moderate	
				4.2.4 Respond to consultations on draft proposals in Supplementary Planning Documents where flood risk can be minimised or reduced	NCC		2014-2015	*2021 onwards*	Sep-16	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
		4.3	Maximise opportunities to integrate flood management with other county functions	4.3.1 Ensure consideration of flood risk in minerals and waste planning	NCC		2014-2015	*2021 onwards*	Jun-16	In Progress	<£5000	Internal (Other)	Allocated	Low	
				4.3.2 Integrate surface water management with regular highways upgrades and works programmes	NCC		2015-2016	*2021 onwards*	Mar-16	Not Started	<£5000	Internal (Maintenance)	To be confirmed	High	
		4.4	Develop a better understanding of drainage maintenance requirements on public property	4.4.1 Work with schools to address drainage maintenance and potential use of SuDS	NCC		2014-2015	*2021 onwards*	Dec-15	In Progress	<£5000	Internal (Maintenance)	Allocated	Moderate	already working with some schools
5	To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our	5.1	Improve connections between blue and green infrastructure management	5.1.1 Improve internal communications between ecology, heritage, land drainage, parks, property & flood risk managers.	NCC flood risk team		2015-2016	*2016-2017*	Jun-16	Not Started	<£5000	Internal (Other)	To be confirmed	Low	
				5.1.2 Include ecology / heritage representatives in local flood risk management group meetings	NCC		2015-2016	*2015-2016*	Dec-15	Not Started	<£5000	Internal (Other)	To be confirmed	Low	
				5.1.3 Explore routes for biodiversity enhancement through flood management	NCC ecology	NE, EA	2016-2017	*2018-2019*	Sep-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				5.1.4 Liaise with the Environment Agency about how flood management can contribute to water framework directive objectives	NCC, EA	IDBs, STW	2014-2015	*2021 onwards*	Mar-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	

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Measure / Scheme						Delivery		Programme				Funding			Priority	Comments
Objective		**Measure**		**Actions**		**Lead**	**Partners**	**Start**	**Finish**	**Review**	**Status**	**Est. Cost (£)**	**Source**	**Status**		
	cultural heritage and landscape and deliver environmental benefits	5.2	Identify improvements for existing and planned scheme development	5.2.1	Work towards incorporating best practice sustainability targets such as BREEAM / CEEQUAL assessments within project requirements	NCC		2015-2016	*2017-2018*	Mar-16	Not Started	<£5000	Area Based Grant	To be confirmed	Moderate	
				5.2.2	Identify whether any heritage assets are at risk of flooding and could benefit from existing planned schemes.	NCC heritage		2014-2015	*2021 onwards*	Jun-16	In Progress	<£5000	Internal (Other)	To be confirmed	Low	
		5.3	Investigate how we can 'make space for water' in Nottinghamshire	5.3.1	Understand the volumes of water which would need to be stored in extreme flood events.	NCC		2015-2016	*2018-2019*	Sep-16	In Progress	£25,000 - 50,000	FCERM GiA	To be confirmed	Moderate	
				5.3.2	Identify high level locations for flood storage and the positive and negative consequences of utilising them	NCC,	DCs, EA	2017-2018	*2018-2019*	Dec-16	Not Started	£5000-£25000	FCERM GiA	To be confirmed	Low	
				5.3.3	Improve our understanding of wider social, economic and environmental impacts of flood storage in open spaces.	NCC	NFU, EA, NWT	2017-2018	*2018-2019*	Dec-16	Not Started	£5000-£25000	Multiple	To be confirmed	Low	

APPENDIX B: OBJECTIVES COMPATABILITY ASSESSMENT

LFRMS and SEA Objective compatibility matrix		Draft LFRMS Objectives							
		1. Flood Risk	2. Population and Health	3. Partnership Working	4. Critical Infrastructure	5. Planning Process	6. Biodiversity	7. Climate Change	8. Heritage
SEA Objectives	**Environmental Resource Objectives**								
	To protect the nature of the high quality agricultural land of the County.	?	✓✓	✓	-	-	✗	✓	?
	Integration of green and blue infrastructure to enhance the landscape quality.	✓	✓	✓	-	✓	✓✓✓	✓	✓✓
	To conserve and where possible, enhance designated sites in the County, create and increase connectivity of habitats, wildlife corridors and passages.	✓	✓	✓	-	-	✓✓✓	✓	✓✓
	To reduce the risk of contamination from mine water during groundwater flooding events.	✓✓	✓	✓	-	-	✓✓✓	✓	✓✓
	To reduce the risk of contamination from waste facilities during flooding events.	✓✓	✓	✓	-	-	✓✓✓	✓	✓✓
	To protect and improve the water environment.	✓✓	✓✓	✓✓	-	✓	✓✓✓	✓	✓✓
	To undertake flood management actions that will stand the test of time and be adaptable to future changes in the climate.	✓✓	✓	✓	-	✓	✓✓	✓✓✓	✓

Material Asset Objectives								
To conserve and where possible enhance the County's historic environment and cultural/heritage assets	✓✓✓	✓	✓	-	✓	✓	✓	✓✓✓
Support economic regeneration objectives	✓✓	✓	✓	-	✓	✓	✓	✓
Reduce the risk of flooding to properties and businesses	✓✓✓	✓✓✓	✓✓	-	-	✓	✓	✓✓
Conserve and protect vital infrastructure, assets and properties	✓✓✓	✓	✓✓	-	✓	✓	✓	✓✓
Population and Health Objectives								
To contribute towards reducing the risk to the health and wellbeing through increasing flood plain storage.	✓✓	✓	✓	-	-	✓	✓✓	✓
To provide opportunities for increased physical fitness through flood management measures within open space and recreational areas, supporting sustainable growth.	✓✓	✓	✓	-	-	✓✓	✓✓	✓
Ensure the inequalities gap does not widen and increase levels of awareness within local communities.	✓✓✓	✓	✓	-	-	-	✓	-

APPENDIX C: RELEVANT PLANS, PROGRAMMES AND ENVIRONMENTAL PROTECTION OBJECTIVES

Key European Legislation, Plans and Policies

Legislation	Relevance to flood risk management	Primary SEA Directive Topic
EU Birds Directive, 2009/147/EC /409/EEC on the conservation of wild birds	Provides for the protection of all naturally occurring wild bird species and their habitats, with particular protection afforded to rare species. The Directive requires, measures taken to preserve, maintain or re-establish a diversity of habitats for all the birds listed in Annex I.	• Biodiversity; • Flora and Fauna
EU Floods Directive, 2007/60/EC on the assessment and management of flood risks	Requires all Member States to assess whether all water courses and coast lines are at risk from flooding. It requires a six-year cycle of flood risk assessment, mapping and planning, including considering the impact of flooding to people, the economy and the environment.	• Water; • Material Assets; and • Population
EU Water Framework Directive, 2000/60/EC establishing a framework for the community action in the field of water policy	Introduces a new strategic planning process to manage, protect and enhance the water environment, including; surface freshwater (including lakes, streams and rivers), groundwater's, groundwater dependant ecosystems, estuaries and coastal waters out to one mile from low-water.	• Water; • Soil; • Biodiversity; • Flora and Fauna
EU Habitats Directive, 92/43/EEC on the conservation of natural habitats and of wild flora	This directive requires the protection of species and habitats of EU nature conservation designations. Due to the potential for the LFRMS to have significant effects on sites of European importance in the Nottinghamshire area. Habitats Regulation Assessment's (HRA) are required for sites of European significance. HRA will need to be undertaken for individual schemes to determine potentially significant effects on European sites.	• Biodiversity; • Flora and Fauna
The EU Nitrates Directives 1991	Objective of this directive is to reduce and prevent water pollution caused or induced by nitrates from agricultural sources. This directive requires the identification of waters, either actually or potentially affected by nitrate pollution or designate all areas draining into such waters as vulnerable. The LFRMS must be aware of designated zones. The majority of Nottinghamshire is identified as Surface Water Nitrate Vulnerable Zone (NVZ), with Groundwater NVZ's and Eutrophic NVZ's scattered throughout[11].	• Water

[11] Data from EA map resource available at: http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=453500.0&y=361500.0&topic=nvz&ep=map&scale=5&location=Mansfield, Nottinghamshire&lang=_e&layerGroups=default&distance=&textonly=off

Key National Legislation, Plans and Policies

Legislation	Relevance to flood risk management	Primary SEA Directive Topic
National Planning Policy Framework (NPPF), 2012 Technical Guidance to the NPPF[12]	National policy in terms of development and flood risk is set out in the NPPF and accompanying documents. The NPPF; • Directs development to the lowest flood risk areas and ensure that where development does go ahead, that it has taken into account the flood risk both to and from that development for the lifetime of that development (hence the development should be resilient to the effects of climate change). • Supports the concepts of Sustainable Drainage Systems (SUDS) and green infrastructure;	• Water; • Biodiversity, Flora and Fauna; • Material Assets; • Climate Change; • Cultural Heritage; • Human Health and population • Landscape
Flood and Water Management Act (2010)	This Act provides for the role of Lead Local Flood Authorities. The Act establishes a SUDS Approving Body at County or Unitary Local Authority levels, who would have responsibility for the approval of proposed drainage systems in new developments and redevelopments.	• Water
Foresight Future Flooding Report (Office of Science and Technology, 2004); Future Water - The Government's Water Strategy for England (Defra, 2008); Water for people and the environment: Water Resources Strategy for England and Wales (Environment Agency, 2009); and The National Flood and Coastal Erosion Risk Management Strategy (2011).	These national legislative documents set out objectives to provide guidance for the protection, improvement, sustainable management and the use of the water environment in terms of quantity and quality for the benefit of the human and natural environment.	• Water
Securing the Future: Delivering the Sustainable Development Strategy (Defra, 2005);	This document aims to enable people to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations.	• All topics (inter-related sustainability issues)

[12] National Planning Policy Framework Document (2012) and Technical Guidance. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Key Local Legislation, Plans and Policies

A summary of the key County Level plans is included below.

- ***Nottinghamshire Minerals Local Plan[13] (draft)***

  The new Minerals Local Plan will set out our overall approach to future minerals provision in Nottinghamshire up to 2030. Key issues will include the amount of mineral we will need to produce to meet demand, the location of future sites and the social and environmental impacts of mineral working. The preferred approach document was published for public consultation from October through December 2013.

- ***Nottinghamshire and Nottingham Waste Core Strategy – Replacement Waste Local Plan Part 1[14]***

  This document sets out the approach to future waste management, including estimates of waste capacity over the next 20 years and what types of sites are suitable. The first part of the new plan was adopted on 10th December 2013. The second part will be made up of the site specific allocations and the development management policies. Preparation of these documents is at an early stage; the minerals and waste development scheme suggests an indicative adoption date of August 2015.

- ***Nottinghamshire Third Local Transport Plan 2011 -2026***

  The Local Transport Plan (LTP) consists of firstly the LTP Strategy 2011 - 2026 which sets out the Councils vision and the strategy to achieve the vision; and secondly the LTP Implementation Plan which details the funding allocations and proposed transport measures to be funded over the next three financial years. The relevant objective of the Nottinghamshire LTP3 to the LFRMS is to provide a reliable, resilient transport system to support growth;

[13] Nottinghamshire County Council, Mineral Local Plan Consultation Jan – March 2012. Available at: http://www.nottinghamshire.gov.uk/thecouncil/democracy/planning/local-development-framework/mineralsdevplandocuments/minerals/

[14] Further information on the Draft Nottinghamshire and Nottingham Waste Core Strategy is available on the Nottinghamshire County Council public website.

Local Planning Authority Policy Framework

Within Nottinghamshire the District and Borough Councils are Local Planning Authorities for the majority of development types. The below sets out the key development proposals for Nottinghamshire relevant to the LFRMS

Policy/Reference	Relevance to the LFRMS
Ashfield District Council Local Plan[15]	
SPH4: Hucknall Town Centre Improvement Scheme	Improvements to the town centre include construction of relief road close to the Baker Lane Brook.
Council-wide housing allocation	Ashfield District Council has a housing allocation for 6,748 new homes
Bassetlaw District Council Core Strategy[16]	
CS2: Worksop	Enhancements to the built and natural environment. Promote mixed-use canal and riverside development sites, increasing their usage.
CS3: Retford	Encourage the protection of the sensitive environmental sites that surround the town. Increase the amount of open space. Support proposal for a Marina on the Chesterfield Canal and flood alleviation measures in relation to Retford Beck.
Council wide housing allocation	Bassetlaw District Council has a housing allocation for 6,384 homes
Newark and Sherwood District Council Core Strategy[17]	
NAP 2A: Land South of Newark	Provision of Green Infrastructure framework to include; creation of open spaces, improvements to existing spaces, links to countryside, enhancements to existing habitats and local landscape, measures to mitigate any detrimental impact on environmental and heritage features on or adjacent to the site and the retention of the Middle Beck as an open watercourse. Provision of flood mitigation necessary to the south of Middle Beck. Flood Zone 2 and 3.
NAP 2B: Land East of Newark	Provision of green infrastructure including: creation of open spaces, improvements to existing space, links to the countryside, enhancements to existing habitats and the local landscape, retention of important landscape features including mature hedgerows and wooded slopes Flood Zone 2 and 3 within areas, provision of flood mitigation
NAP 2C: Land around Fernwood	Provision of green infrastructure including: safeguarding and enhancement of protected habitat of Shire Dyke (SINC), creation of open spaces and improvements to existing open spaces, enhancements to habitats. Site contains flood zone 2 and 3 areas therefore provision of flood mitigation and incorporation of SUDS.
Council wide housing allocation	Newark and Sherwood District has a housing allocation for 9,913 homes

[15] Ashfield District Council, Local Plan (2002), available: http://www.ashfield-dc.gov.uk/residents/planning,-property-and-housing/forward-planning/the-adopted-local-plan-2002.aspx
[16] Bassetlaw District Council, Core Strategy (2011), available: http://www.bassetlaw.gov.uk/planning_and_building/planning_policy/local_development_framework/core_strategy.aspx
[17] Newark and Sherwood District Council, Core Strategy (2011), available: http://www.newark-sherwooddc.gov.uk/corestrategy/

Mansfield District Council Local Plan[18]	
Lindhurst Urban Extension	Major (170 ha) mixed use development including housing, employment, retail, commercial, community use facilities a new local centre and community park. Habitat creation and enhancement is promoted in the scheme, new road infrastructure and SUDS.
Council wide housing allocation	Mansfield District Council has a housing allocation for [19] 7,820 homes
Rushcliffe Borough Council Core Strategy[20]	
Clifton Sustainable Urban Extension	Mixed-use(20ha) housing and employment scheme including sewage and off-site drainage improvements; appropriate SUDS, creation and enhancement of open space and green infrastructure and green corridors, retention of area to the south for surface water balancing.
Edwalton Sustainable Urban Extension	Mixed use urban extension to include housing, employment and community facilities consisting of a community park and outdoor sports/open space and enhanced Green Infrastructure (Sharphill Wood)
North of Bingham	Mixed-use (15.5 ha) housing and employment scheme with commitments to include off site drainage improvements, SUE, flood mitigation scheme for Car Dyke, creation of open space and landscape buffers.
Policy 6: Regeneration Former RAF Newton Former Cotgrave Colliery	RAF Newton: Regeneration site 6.5 ha mixed-use scheme including housing employment and enhanced green infrastructure, protection, enhancement and creation of natural habitats and exploitation of the riverside and water corridor. Cotgrave Colliery: Regeneration site mixed use residential and employment scheme; conserving the existing nature conservation features and improving accessibility links between new and existing neighbourhoods.
Council wide housing allocation	Rushcliffe Core Strategy allocates 9,400 housing units from 2011- 2026.
Greater Nottingham Aligned Core Strategies[21]; Broxtowe, Gedling and Nottingham City	
Policy 7: Regeneration The Boots Campus on the border of Nottingham City and Broxtowe Gedling Colliery	Boots Campus: mixed use development on a currently underused site. Gedling Colliery: housing development on brownfield requiring construction of Gedling Access Road.
Council wide housing allocation	Broxtowe Borough Council area has a housing allocation for 6,150 homes; and Gedling Borough Council an allocation for 7,250.

[18] Mansfield District Local Plan 2011-2031, available: http://www.mansfield.gov.uk/index.aspx?articleid=527
[19] Figure from Mansfield housing monitoring report, 2013: http://www.mansfield.gov.uk/CHttpHandler.ashx?id=5356&p=0&bcsi_scan_E956BCBE8ADBC89F=Ud4HgQzUbBVuOWevTnBHlMBgAfkqAQAAgx7p+w==&bcsi_scan_filename=CHttpHandler.ashx
[20] Rushcliffe Borough Council, Core Strategy, 2012. Available at: http://www.rushcliffe.gov.uk/media/rushcliffe/media/documents/pdf/strategiesandpolicies/localdevelopmentframework/1_RBC%20Core%20Strategy%20Publication_Final_23_3_12.pdf
[21] Greater Nottingham Aligned Core Strategies, 2012. Available at: http://www.broxtowe.gov.uk/CHttpHandler.ashx?id=24852&p=0&bcsi_scan_AB11CAA0E2721250=CtZYCNuj2isN+kK+ePovBwCgVngMAQAAnKaN6w==&bcsi_scan_filename=CHttpHandler.ashx

Flood Risk/Alleviation Policies in Nottinghamshire

Throughout Nottinghamshire there is a requirement for the implementation of SUDS within new development set out within the various authority DPDs.

Local Authority	Policy Guidance
Ashfield District LDF publication document	Policy SP2: (Overall Strategy for Growth): Seeks to ensure that where appropriate, development will integrate measures for water and flood management, including; • Improving the quality of water resources and the natural features of the Districts Rivers, streams, ponds and associated habitats • Applying sequential approach to minimise flood risk • Taking opportunities to protect and enhance the water environment through the design process Achieving Greenfield runoff rates within the catchment of the River Leen to minimise the risk of flooding to the City of Nottingham. Policy CC3: (Flood Risk), requires development proposals to take account of flood risk, promoting SUDS to be incorporated with all new developments furthermore any development in Hucknall or the catchment of River Leen should be designed to reduce surface water flows and water quality within the District is further promoted within Policy SD6: (Contaminated Land and Unstable Land) which seeks to ensure proposals avoid causing contamination of any watercourse, water body, groundwater or aquifer.
Greater Nottingham Aligned Core Strategy	Policy 1: (Climate Change): Seeks to increase the amount of SUDS implemented within Gedling and Broxtowe
Rushcliffe's Core Strategy	Policy 1 emphasises the requirement for SUDS with all new development schemes
Mansfield District Local Plan	Policy U5: restricts development on sites where the discharge of additional surface water could exacerbate existing flooding problems or create new flooding problems, unless infrastructure improvements are provided.
Bassetlaw Core Strategy	Policy DM12: (Flood Risk, Sewerage and Drainage) seeks to ensure site specific FRA are prepared for all proposals for development within flood risk areas. DM12 also requires all new development (other than minor extensions) to incorporate SUDS.
Newark and Sherwood Core Strategy	Core Policy 9: (Sustainable Design) promotes the use of SUDS with all new development.
The Nottinghamshire and Nottingham Waste Core Strategy	Section 5 deals with future challenges including flood risk; it highlights the importance of locating new waste infrastructure only within lower risk areas. Policy WCS3 – Broad Locations for Waste Treatment Facilities, states large-scale waste treatment facilities will be supported in or close to the built-up areas of Nottingham, Mansfield and Ashfield, whilst smaller facilities around Newark, Retford and Worksop and small scale facilities will be supported in all locations where there is a local need.

Flood risk management and drainage infrastructure needs are part of the evidence base needed to inform the development of strategic planning policies and allocations in Core Strategies and the more detailed Site Allocation and Development Management Policy documents, all of which form or will form part of an adopted Local Plan. All of the Districts and Boroughs have produced Strategic Flood Risk Assessments (SFRAs) that are of relevance to the LFRMS, although some are now dated and do not reflect the most up-to-date data on flood risk. The following SFRAs exist in Nottinghamshire:

Ashfield SFRA 2009[22]

- Although areas of Ashfield have flooded in the past, flood risk in the District of Ashfield is relatively low compared to other districts.
- The main rivers in Ashfield are River Erewash, River Leen and Baker Lane Brook. Both the main rivers and a number of small water courses are associated with Flood Zones 2 and 3.
- Any future development needs to take into account the potential risk of flooding to areas outside of the District. Additional water into the **River Leen at Hucknall** will have major implications for flooding in Nottingham.
- Climate change is perceived to be a contributor to flooding in the District. There is not currently a significant risk of groundwater flooding in Ashfield.
- The SFRA supports the promotion of SUDS with all new development schemes.

Bassetlaw 2009[23]

- Fluvial flood risk within Bassetlaw is high
- Urban areas of **Retford and Worksop have minimal defence protection** and fluvial channels have a limited capacity. The majority of flooding affects open ground although in more extreme flood events, existing buildings are affected.
- The risk of pluvial flooding and surface water run-off is considered to be medium in Bassetlaw, however it is expected that during moderate rainfall events the drainage system capacity is likely to be exceeded in some areas and further development in these areas will exacerbate this problem.
- The topography of the district results in **Sturton Le Steeple and Beckingham** and other villages located on heavy clay soils to be more prone to surface run-off problems.

Broxtowe, Gedling, Rushcliffe (and also Erewash and Nottingham City) as part of the Greater Nottingham SFRA. 2008, 2010

[22] Ashfield SFRA: http://www.ashfield-dc.gov.uk/ccm/cms-service/stream/asset/?asset_id=8118001&
[23] Bassetlaw District Council SFRA, 2009. JBA Consulting: http://www.bassetlaw.gov.uk/pdf/Strategic%20Flood%20Risk%20Assessment%20Vol%201.pdf?bcsi_scan_E956BCBE8ADBC89F=0&bcsi_scan_filename=Strategic%20Flood%20Risk%20Assessment%20Vol%201.pdf

- Within the urban extent there are **20,000 properties at risk of flooding, on the east and west of the River Trent** from a 1 in 100 year event.
- Broxtowe: the flooding of the River Trent would likely impact Beeston, Toton, Stapleford and Ryland's. Some limited locations adjacent to Boundary and Beauvale Brooks (previously modelled by BBC using HECRAS) are at risk of flooding in a 1 in 100 year (1% AEP) event. These locations include around the cricket pitch and upstream of Mansfield Road (Boundary Brook), and at Devonshire Drive and Roehampton Drive (Beauvale Brook). Flooding along Beauvale Brook is affected by the flap valve under the River Erewash defences
- Rushcliffe: **Fairham Brook** was modelled by ISIS, the 1 in 100 annual flood events are considered likely to affect many properties in Wilford and Clifton Boulevard.
- Grantham Canal Adbolton, Gamston and Polser Brooks are likely to cause additional flooding behind the River Trent defences.

River Leen and Day Brook SFRA[24] 2008

- This study predicts flooding of major roads and infrastructure.
- One of the main aims of this SFRA was to establish the risk of flooding on 5 key regeneration sites in the River Leen and Day Brook corridor (Bulwell Town Centre, Vernon Road, PZ Cussons, Bobbers Mill South and Leengate) and to appraise mitigation measures. Although within the City area these measures included assessing catchment wide mitigation.

Mansfield 2008

- Mansfield District is considered to be at low risk of flooding.
- There are specific locations where flooding is a concern and should be addressed through the LDF process and water management practices.
- Implementation of SUDS and soak-aways should be more widely used which would alleviate conditions at **Vicar Water, Foul Evil Brook and Wainworth Water.**
- There is sufficient land availability to avoid future development on areas of Flood Zone 2 or 3.

Newark and Sherwood[25] 2009, 2010, 2012

- The Rivers Trent, Meden, Maun and Greet run through the area along with a number of tributaries and streams, brooks, dykes and drains. The fluvial flood risk from these watercourses is managed through allowing floodplain to flood in areas where it has no effect on the built environment;
- The level 1 assessment reviewed existing data including that from existing models from the EA, Halcrow and JBA consulting;
- The level 2 assessment focussed on three strategic sites centred on Newark's Growth Point. **The key finding of the Level 2 SFRA was that the majority of the land fell within areas of low fluvial flood risk.**

Nottinghamshire County Council and Nottingham City Council Waste and Minerals SFRA[26] 2011

[24] River Leen and Day Brook SFRA, EA, 2008: http://www.nottingham.gov.uk/CHttpHandler.ashx?id=4805&p=0
[25] Newark and Sherwood, SFRA phase 2 report: http://www.newark-sherwooddc.gov.uk/media/newarkandsherwood/imagesandfiles/planningpolicy/pdfs/floodingandwaterinfrastructure/strategicfloodriskassessmentlevel2part2/Main%20Text.pdf
[26] Nottinghamshire County Council and Nottingham City Council, Level 1 Minerals & Waste SFRA, 2011. Available: http://cms.nottinghamshire.gov.uk/sfra.pdf

- Nottinghamshire falls within one major river catchment, the River Trent. Major tributaries include the River Soar, Erewash, Leen, Devon and Idle.
- **The predominant risk of flooding in Nottinghamshire is fluvial flooding** from the overtopping of surface watercourses including rivers, streams and drainage channels.
- The use of SUDS is promoted on sites taking into account the local geology EA aquifer designation, groundwater vulnerability and GW SPZs into account as well as any local ground contamination to avoid mobilising pollutants that could pollute the watercourses or groundwater.

Regional Management Plans

In the UK, there are a number of high level management plans which guide the development of flood risk management strategies either directly by setting higher level flood risk management or coastal erosion management policy, or indirectly, by setting regional water quality, nature conservation or landscape management policies and plans. The regional plans relevant to the LFRMS are listed in Appendix A4 and those of particular relevance are summarised below.

Catchment Flood Management Plans (River Trent, 2010[27], River Witham, 2008 and River Don, 2008). Plans that set the strategic direction for flood risk management over the next 50-100 years but in many cases because of the data available at the time and organisational arrangements did not consider localised flooding in great detail.

River Basin Management Plans (Humber, 2009)[28]. River Basin Management Plans deal with the pressures facing the water environment (and in particular water quality) and the actions that will address them. River Basin Management Plans are reproduced every 6 years, the next round of River Basin Management Plans are currently being prepared, and following consultation they will be updated and reissued in 2015. This plan provides key actions for improving the water quality of waterbodies in the various catchment areas within the plan area.

Catchment Area	Key Actions for the Area
Idle and Torne (Humber River Basin Management Plan)	• Improve sewage works throughout the catchment to reduce inputs of nutrients and improve water quality. • Work to reduce diffuse pollution from agriculture through the Natural England Catchment Sensitive Farming • Sensitive Farming Delivery Initiative. • Partnership project to address diffuse and point source pollution in the River Poulter catchment. • Positive intervention to translocate native crayfish from their current limited population back to their former habitat.
Lower Trent and Erewash (Humber River Basin Management Plan)	• Phosphate removal to be applied to qualifying sewage treatment works in the catchment under the Urban Waste Water Treatment Directive Sensitive Areas (eutrophic). • Works with Severn Trent Water Ltd to reduce the number of misconnections within the catchment. • Address barriers to fish passage.
Soar	• Working with British Waterways, Leicester County Council, Angling clubs and Inlands Waterways Association to remove floating Pennywort from the River Soar.

[27] http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/gemi1109brdz-e-e.pdf
[28] River Basin Management Plan, Humber River Basin District, EA: 2009. http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/gene0910bsqr-e-e.pdf

(Humber River Basin Management Plan)	• Investigate and assess water quality issues within Cropston Reservoir catchment, including the Bradgate Brook which has been nominated as a Candidate Water Protection Zone. • Improve sewage works at locations throughout the catchment to reduce the input of nutrients and improve water quality. • Work with Severn Trent Water Ltd to reduce the number of misconnections within the catchment.
Witham (Anglian River Basin Management Plan)	• The River Witham rises south of Grantham, passes through Lincoln and drains at the Wash at Boston. Other rivers include Rivers Brant, Till and Slea. • Extensively rural area with good agricultural land. Drainage has had a significant historical effect on the catchment with the IDB controlling water levels through a network of drains. • Lincolnshire Marsh Water Vole Project • A 94ha site at Frampton has been changed from intensive arable production to freshwater wetland grazing marsh. The land replaces habitat being affected by coastal change elsewhere in the river basin district. • Habitat enhancement work at Great Ponton and Syston.

Source: River Basin Management Plan, Humber River Basin District

Catchment Abstraction Management Strategies (CAMS)

Idle and Torne, Lower Trent and Erewash, Witham, Don and Rother (2013)[29]. These set out how the Environment Agency will contribute to implementing the Water Framework Directive and manage water resources within a catchment (further details at 4.2.8).

Habitat and Landscape Management Plans

UK Post-2010 Biodiversity Framework' (2012)
The 'UK Post-2010 Biodiversity Framework' succeeds the previous UK Biodiversity Action Plan. It sets out how work in the UK contributes to meeting international targets and identifies activities required to complement the country biodiversity strategies in achieving the targets. The LFRMS will need to take into account the presence of any protected species and nature conservation sites and where practicable, contribute to enhancing ecology.

The Nottinghamshire [Local] Biodiversity Action Plan (2008)
The Nottinghamshire Local Biodiversity Action Plan (LBAP) sets targets for key species and habitats and guidance for how these are to be achieved. The plan currently contains 19 Habitat Action Plans (HAPs) and 11 Species Action Plans (SAPs), details of these are included in Appendix E. The main water concerns in the County highlighted within the Nottinghamshire LBAP are[30];

- Loss of and damage to wetland habitat and species diversity due to over abstraction of water;
- Loss of species diversity due to pollution arising from sources such as sewage works, run-off of agricultural or industrial processes; and
- The loss of wetland habitats through drainage and flood alleviation schemes and the straightening and canalisation of watercourses.

The Nottinghamshire LBAP suggests the main opportunities for enhancing biodiversity include:

- Preventing over-abstraction from boreholes and above ground sources where this will result in damage to wetland habitats;
- Further reducing pollution;
- Encouraging water conservation by industrial, agricultural and domestic consumers to reduce demand;
- Avoiding development in floodplains, and designing biodiversity friendly flood alleviation schemes where these are necessary;
- Restoring flooded gravel pits to maximise their value for biodiversity; and
- Integration of Green Infrastructure.

[29] Don and Rother, Catchment Abstraction Management Strategy, 2013. Available at: http://www.environment-agency.gov.uk/business/topics/water/119943.aspx
[30] Local Biodiversity Action Plan, Available at: http://www.nottsbag.org.uk/pdfs/4ISSUES.DOC

RSPB Futurescapes Project

The aim of the Futurescapes Project is the conservation of bird species on a landscape scale to counteract the failure to achieve the biodiversity targets set in various previous policy documents. It aims to do this by coordinating nature conservation projects over target areas, liaising with all land owners and providing funding for this work. Two of the projects are located completely or partially within Nottinghamshire, these are;

- The Sherwood Forest Futurescapes area – described as an internationally-renowned landscape and legend popular with visitors, a mosaic of woodland, lowland heath and farmland that is important for plants, insects and birds; and

- The Trent and Tame River Valleys Futurescapes area – described as a broad corridor for wildlife from the heartland of England to the Humberhead Levels, providing resilience to climate change and creating new wetlands and reed beds for waders, marsh harriers and bitterns.

APPENDIX D: HIGH LEVEL WATER FRAMEWORK DIRECTIVE ASSESSMENT

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Water Framework Directive: Links to Local Flood Risk Management in Nottinghamshire

1 The Water Framework Directive

1.1 Introduction

Planning for the future of flood risk management must take into account impacts on the wider environment. The Strategic Environment Assessment and consequent Environmental Report have reviewed a wide range of potential impacts from the Nottinghamshire Local Flood Risk Management Strategy (LFRMS).

In relation to the Water Environment in particular, where physical measures are planned to alter or control water bodies, there is particular risk of impact to the status of the water bodies as defined by the Water Framework Directive (WFD)[1]. In addition, measures to manage flood risk can also contribute towards improvements of water body status (such as water quality improvements in surface water discharge). The following chapter reviews how actions within the Nottinghamshire LFRMS can link to the water environment and aspects of the Water Framework Directive

1.2 What is the WFD?

The Water Framework Directive (WFD) establishes a legal framework *to "protect and restore clean water across Europe and ensure its long-term, sustainable use*"[2]. It aims to establish an integrated approach to the management of all freshwater surface water bodies, groundwaters, transitional (estuarine) and coastal waters (TraC).

The overall requirement of the Directive is that all waterbodies must achieve "Good Status"[3] by 2027 unless there are grounds for derogation. It also requires that environmental objectives be set for all waterbodies to either maintain Good Status, or to move towards Good Status if a waterbody is currently failing its target. River Basin Management Plans (RBMPs) developed for each River Basin District (RBD) set out the current status classification of all waterbodies within that District, as well as the objectives and measures required to maintain or improve the current Status of each waterbody.

The Environmental Objectives taken from Article 4 of the Water Framework Directive (WFD) are listed below;

- All surface water bodies to achieve good ecological and chemical status by 2015. This covers inland waters, transitional waters (estuaries) and coastal waters.
- All groundwater bodies to achieve good groundwater quantitative and chemical status by 2015.
- Heavily-modified water bodies and artificial water bodies to achieve good ecological potential and good surface water chemical status by 2015.
- No water bodies to experience deterioration in status from one class to another.
- Protected Areas to achieve the requirements made under their designation in relation to the water environment.

There is also a duty to enhance and restore waterbodies where possible and by implication there is a need to ensure that actions do not prevent currently failing waterbodies from reaching a Good Status or Potential.

1.3 Surface water body objectives

The WFD contains surface water Environmental Objectives, which aim to prevent a negative change to the status of the waterbody. There are two status classifications which are commonly reported; ecological and chemical.

[1] *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy*
[2] WISE, Water Note 1: Joining Forces for Europe's Shared Waters: Coordination in international river basin districts. http://ec.europa.eu/environment/water/participation/pdf/waternotes/water_note1_joining_forces.pdf [accessed 01.07.15]
[3] Or Good Potential for heavily modified or artificial water bodies

Chemical Status is assessed for compliance with environmental standards for 33 priority substances originally listed in Annex X of the WFD, now superseded by the Environmental Quality Standards Directive (2008/105/EC)[4]. Chemical status is recorded as 'good' or 'fail' and is determined by the worst scoring chemical.

Ecological status classification assesses a range of biological, physico-chemical or hydromorphological Quality Elements as listed in Annex V of the WFD. The categories are summarised in Table 1-1.Ecological status is recorded as high, good, moderate, poor or bad

Table 1-1: Biological, physico-chemical or hydromorphological Quality Elements

Quality Elements	*Description*
Biological assessment	Uses numeric measures of communities of plants and animals (for example fish and rooted plants)
Physico-chemical assessment	Looks at elements such as temperature and the level of nutrients, which support the biology as well as specific pollutants.
Hydromorphological	Looks at water flow, sediment compositions and movement, continuity (in rivers) and the structure of physical habitat

Overall Status looks at both ecological status and chemical status taking into account all the assessments. A water body must have good or better ecological status and good chemical status to achieve good overall status.

1.4 Groundwater quality objectives

The WFD contains a number of environmental objectives for groundwater quality;

- to implement measures to prevent or limit the input of pollutants into groundwater;
- to prevent deterioration of groundwater;
- achieve 'good groundwater status' within 15 years of the Directive coming into force, except under certain special circumstances;
- to implement measures to reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce the pollution of groundwater; and,
- to ensure compliance with the relevant standards and objectives for Protected areas (Drinking Water Protected Areas and Nitrate Vulnerable Zones) within 15 years of Directive implementation.

Groundwater bodies are classified according to both their quantitative and chemical status, but have only two status classes (good or poor).Good status for groundwater involves meeting a series of conditions defined in Annex V of the WFD. These are described in more detail in the UKTAG Environmental Standards and Programme of Measures[5]

The "parameters" to be used in classification are:

- groundwater level regime for quantitative status; and,
- conductivity and the concentrations of pollutants for chemical status.

[4] Priority substances under the Water Framework Directive http://ec.europa.eu/environment/water/water-dangersub/pri_substances.htm

[5] UK Technical Advisory Group (UKTAG) on the Water Framework Directive (2005) Environmental Standards for use in classification of Measures for the Water Framework Directive (Public Working Draft)

2 Water bodies in Nottinghamshire

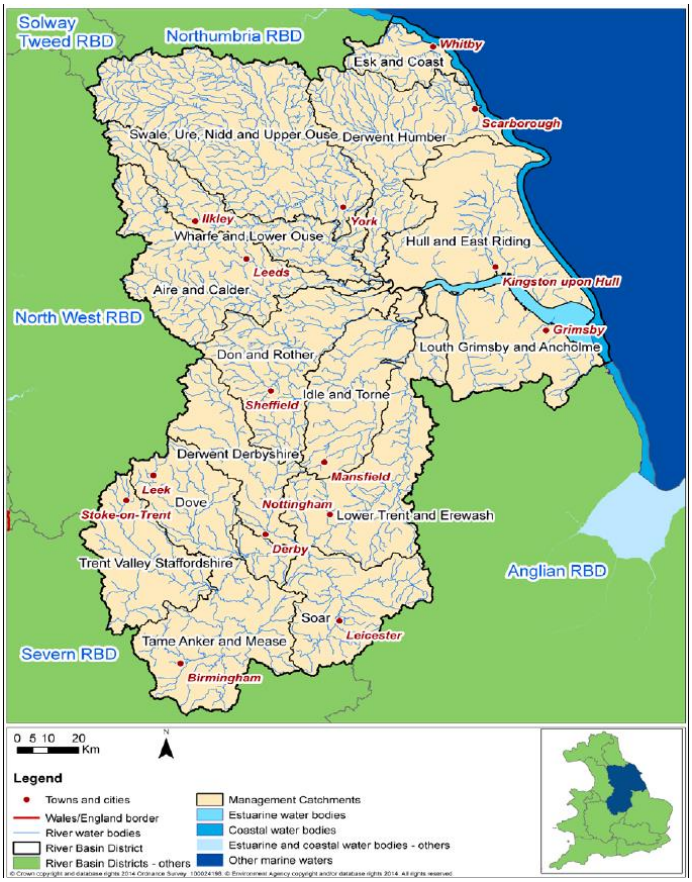
2.1 Humber River Basin Management Plan

Nottinghamshire falls within the Humber River Basin District. The first Humber RBMP was published in 2009[6]. It classifies the Current Ecological Quality of all water bodies within the catchment which have been designated under the WFD[7]. The Environment Agency have consulted on a review of all RBMPs to be published later in 2015[8] in line with the required 6 year review cycle. It should be noted that improvements have been made to the way water bodies are defined and classified since 2009 and the most up to date data should be used when carrying out individual WFD assessments.

2.1.1 Management catchments

The Humber RBD is made up of management catchments as mapped in **Figure 2-1**. A number of catchments fall in part within the boundary of Nottinghamshire although the *Idle and Torne* and *Lower Trent and Erewash* are the main catchments within the county.

Figure 2-1: Map of the Humber river basin district and the management catchments within it (Extract from Environment Agency (2014)[9])



[6] Environment Agency (2009) River Basin Management Plan: Humber River Basin District https://www.gov.uk/government/publications/river-basin-management-plan-humber-district

[7] EC (2003) Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 2: Identification of Water Bodies https://circabc.europa.eu/sd/a/655e3e31-3b5d-4053-be19-15bd22b15ba9/Guidance%20No%202%20-%20Identification%20of%20water%20bodies.pdf

[8] Update to the Draft River Bain Managemetn Plans consultation https://www.gov.uk/government/consultations/update-to-the-draft-river-basin-management-plans

[9] Environment Agency (2014) The Idle and Torne Management Catchment: A summary of information about the water environment in the Idle and Torne management catchment

2.2 Surface water bodies: Rivers

82 rivers which pass through Nottinghamshire were assessed under the WFD for the Humber RBMP (2009). Table 2-1 summarises the number of classified rivers within Nottinghamshire by catchment and their overall status. The status of these water bodies has been reviewed to feed into the 2015 round of RBMPs, although the reports were not published at the time of producing this chapter. Up to date data for individual water bodies is available through the Catchment data explorer[10] prior to the publication of the 2015 RBMPs and should be consulted for individual WFD assessments.

Table 2-1: numbers of classified rivers within Nottinghamshire by catchment and their 2009 status.

Catchment	Current overall status				
	Good	**Moderate**	**Poor**	**Bad**	**Grand Total**
Lower Trent and Erewash	1	29	19		49
Idle and Torne		15	8	1	24
Soar		3	3		6
Don and Rother			1		1
Derwent Derbyshire			1		1
Witham		1			1
Grand Total	1	48	32	1	82

2.3 Surface water bodies: Lakes

There are six classified lakes within the Idle and Torne catchment and five within the Lower Trent and Erewash catchment. The current overall potential of the waterbodies from the 2009 RBMP are detailed in Table 2-2. Many are not considered likely to reach good status by 2015, either because it would be disproportionately expensive or technically infeasible to do so. In these cases, the lakes have a target of good status by 2027.

Table 2-2 Current overall potential and status objectives of lakes in Nottinghamshire classified under the WFD

Waterbody ID	Lake name	Catchment	Current overall potential	Status objective
GB30432240	Misson Line Bank	Idle and Torne	Good	Good by 2015
GB30433056	Clumber Lake	Idle and Torne	Moderate	Good by 2027
GB30433100	Welbeck Great Lake	Idle and Torne	Bad	Good by 2027
GB30433316	Thoresby Lake	Idle and Torne	Moderate	Good by 2027
GB30433908	L Lake	Idle and Torne	Moderate	Good by 2027
GB30447020	Clumber Park Lake West	Idle and Torne	Good	Good by 2015
GB30434381	Sledder Wood Pond	Lower Trent and Erewash	Moderate	Good by 2027
GB30434401	Bulwell Wood Ponds	Lower Trent and Erewash	Good	Good by 2015
GB30434977	Attenborough Nature Reserve - Beeston Pond	Lower Trent and Erewash	Good	Good by 2015
GB30435060	Attenborough Nature Reserve - Coneries Pond	Lower Trent and Erewash	Poor	Good by 2027
GB30434995	Attenborough Nature Reserve - Main Pond	Lower Trent and Erewash	Poor	Good by 2027

[10] Environment Agency Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/

2.4 Surface water bodies: Coastal and transitional

The WFD classifies coastal and transitional (estuarine) waterbodies which do not occur within Nottinghamshire due to its distance from the coast. However, flood management activities within the county have the potential to impact downstream waterbodies, which would need to be considered on a case by case basis at scheme level.

2.5 Groundwater bodies

The status of groundwater bodies which underlay Nottinghamshire in part are summarised in Table 2-3.

Table 2-3 Current overall Status and quantitative status of groundwater bodies in Nottinghamshire

Waterbody ID	Groundwater body name	Current overall status	Current quantitative status
GB40401G300600	Idle Torne - Magnesian Limestone	Poor	Good
GB40401G301400	Lower Trent Erewash - PT Sandstone Wollaton	Poor	Poor
GB40401G301500	Idle Torne - PT Sandstone Nottinghamshire&Doncaster	Poor	Poor
GB40401G301800	Lower Trent Erewash - Magnesian Limestone	Poor	Poor
GB40402G303200	Lower Trent Erewash - Coal Measures	Good	Good
GB40402G990300	Lower Trent Erewash - Secondary Combined	Poor	Good
GB40402G992200	Idle Torne - Secondary Mudrocks	Poor	Poor
GB40401G300600	Idle Torne - Magnesian Limestone	Poor	Good

3 Conducting WFD assessments of flood management schemes

3.1 What does a WFD assessment aim to achieve?

A WFD Assessment reviews proposed activities against their potential impacts on nearby waterbodies. Where relevant, all activities must be assessed for potential impacts from priority substances as well biological, physico-chemical or hydromorphological impacts on surface water bodies, and their potential to influence pollution of, or levels within groundwater bodies. As a minimum, activities must not lead to a deterioration of current status. Where the assessment identifies a potential negative impact, suitable mitigation must be proposed.

3.2 Assessing the Nottinghamshire Local Flood Risk Management Strategy

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 WFD assessment cannot be carried out at this stage of the Strategy**. In addition, the LFRMS Action Plan covers a broad spectrum of approaches to flood risk management, not solely physical works directly to water bodies. A move away from focussing on physical works can support WFD Environmental Objectives through encouraging better education and more 'natural' solutions of sustainable drainage.

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.

3.2.1 How can Local Flood Risk Management help to achieve WFD objectives in Nottinghamshire?

Engineered schemes

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 hydromorphology 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.

Sustainable Drainage Systems

The recent emphasis on implementing Sustainable Drainage Systems (SuDS) through changes in the planning system has focussed 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 providing layers of filtration to remove pollutants from urban or agricultural run-off before reaching a watercourse. Consequently this can contribute to improved physic-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.

Community engagement

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.

4 Next Steps

It is recognised that future actions that may arise from the LFRMS could have specific implications for WFD compliance (for example, the delivery of a specific flood management scheme). These would therefore need to be assessed at a project level as appropriate.

4.1 Assessment methodology for specific schemes

The methodology which should be followed for a full WFD assessment of specific flood risk management schemes has been established by the Environment Agency in *'Assessing new modifications for compliance with WFD: detailed supplementary guidance, Environment Agency, 2010'*. This follows an eight step process which is illustrated below in Figure 4-1.

Figure 4-1 : Overview of eight step assessment process