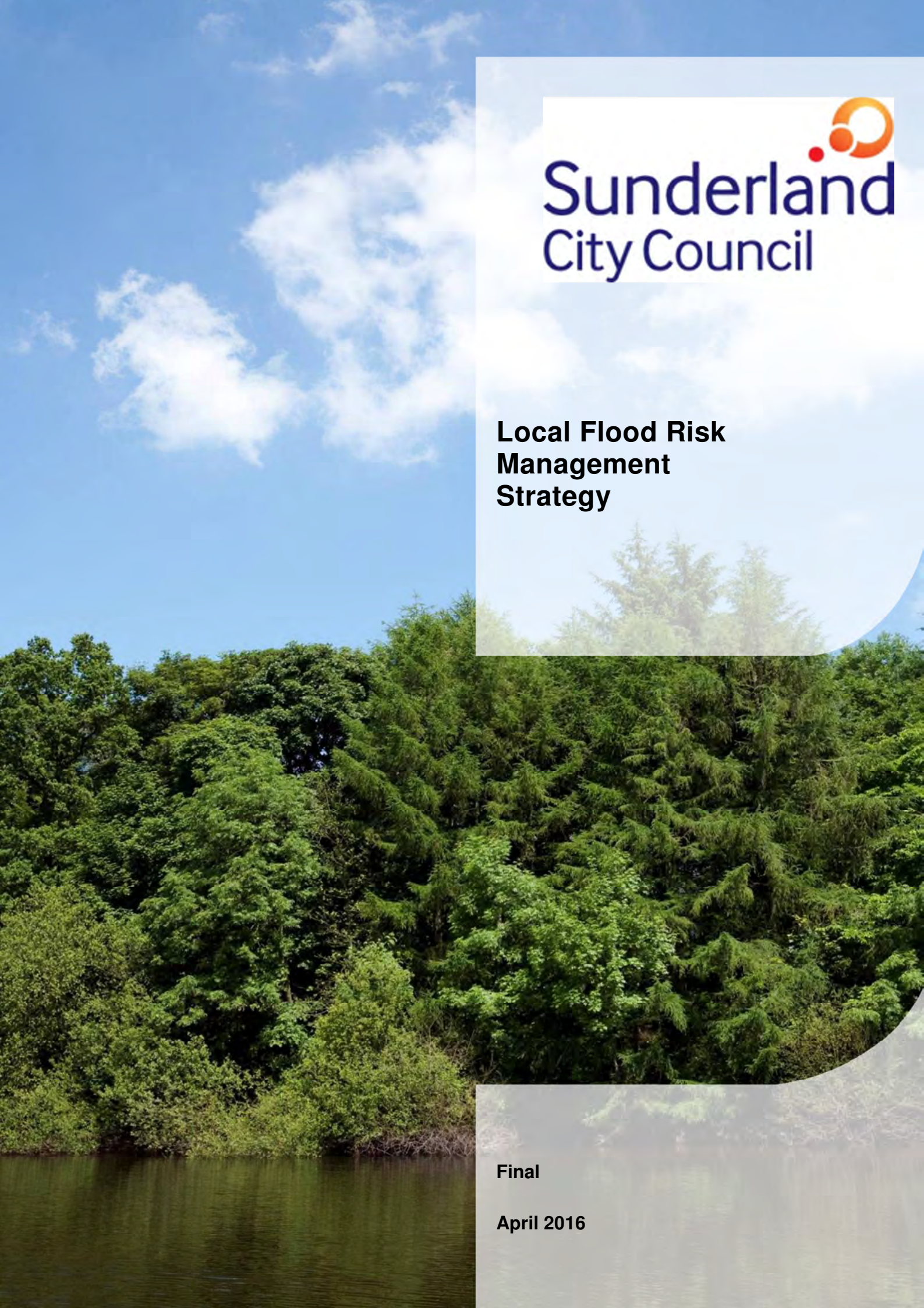

Sunderland City Council

Local Flood Risk Management Strategy

Final

April 2016

Executive Summary

Following flooding in 2007, the government commissioned a review (The Pitt Review, 2008), which recommended urgent changes in the way the country is adapting to the increased risk of flooding. A principal change was to establish greater clarity in the roles and responsibilities and an increased focus on addressing surface water flood risk through the enactment of the Flood and Water Management Act 2010 (FWMA). Under the Act, Sunderland City Council (SCC) became a Lead Local Flood Authority (LLFA).

To fulfil this function we now have new roles and responsibilities, duties and powers to enable us to manage flood risk from localised sources across Sunderland and a duty to develop, maintain, apply and monitor a Strategy for local flood risk management that encompasses all sources of flooding.

We have developed objectives for managing local flood risk. Our Local Strategy objectives are consistent with the strategic objectives and guiding principles set out in the Environment Agency's (EA) National Strategy. Our objectives also align with our corporate priorities and vision for the city as a whole.

We are responsible for local flood risk sources but Sunderland is also at risk of flooding from main rivers and the sea and as a coastal authority has responsibility for coastal protection. Flooding from the sea and main rivers is the responsibility of the EA, but over time, we will take on more of a strategic overview of all sources of flooding and coastal erosion. The Local Flood Risk Management Strategy (LFRMS) has assessed the risk from local flooding but the future investment plan includes sources of flood risk and coastal erosion so that we have a strategic overview of all forms of flooding across Sunderland.

Non-structural and structural measures will both be required to manage local flood risk in Sunderland. Non-structural measures include activities such as emergency planning, spatial planning policies to reduce flood risk on new developments and determining overarching approaches for regulating ordinary watercourses. Structural measures include activities that range from changing land management practices to building a flood defence wall.

The implementation of the LFRMS will be managed and monitored through the Action Plan. We have allocated actions to organisations and internal teams. As part of the development of this Strategy we have worked in partnership with all Risk Management Authorities who have responsibility for flood risk across the City of Sunderland and have consulted with our local communities. Regular internal meetings will monitor the progress of the Action Plan and external meetings will be held so that other stakeholders can be made aware of actions relevant to them.

This Strategy document is now available for full public consultation, following which, we will review, amend where appropriate, and finalise as the Adopted Strategy.

The Local Flood Risk Management Strategy prizes community involvement as a method through which to tackle flood risk – and we are just as keen for you to have your say on the strategy itself. Public consultation on the strategy gives you the chance to give your view on what the strategy should cover and suggest ways in which the council and its partners could help to protect the public from flooding.

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Glossary and Abbreviations

Areas Susceptible to Surface Water Flooding	Since July 2009, these maps have been available to Local Resilience Forums and Local Planning Authorities, and provided a starting point in understanding the broad areas where surface water flooding is likely to cause problems.
Catchment Flood Management Plans	Catchment Flood Management Plans have been produced by the Environment Agency and are high-level planning tools that set out objectives for flood risk management for each river catchment and estuary. They also identify flood risk management policies that are economically practical, have a potential life of 50 to 100 years, and will aid partnership working to put them in place. CFMPs consider inland risk from rivers, surface water, groundwater and tidal flooding but do not consider sewer flooding.
Climate Change	A long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. It may be a change in the average weather conditions or a change in the distribution of weather events with respect to an average, for example, greater or fewer extreme weather events. Climate change may be limited to a specific region, or may occur across the whole planet.
Critical Infrastructure	A term used to describe the assets that are essential for the functioning of a society and economy. Most commonly associated with the term are facilities for: electricity generation, transmission and distribution; gas production, transport and distribution; oil and oil products production, transport and distribution; telecommunication; water supply (drinking water, waste water/sewage, stemming of surface water (e.g. dikes and sluices)); agriculture, food production and distribution; heating (e.g. natural gas, fuel oil, district heating); public health (hospitals, ambulances); transportation systems (fuel supply, railway network, airports, harbours, inland shipping); financial services (banking, clearing); and security services (police, military).
Culvert	A closed conduit used for the conveyance of water under a roadway, railroad, canal, or other impediment.
Defence (Flood Defence)	A structure that alters the natural flow of water or flood water for the purposes of flood defence, thereby reducing the risk of flooding. A defence may be 'formal' (a structure built and maintained specifically for flood defence purposes) or 'informal'/'defacto' (a structure that provides a flood defence function but has not been built and/or maintained for this purpose).
EC Floods Directive	A European Directive that has been transposed to UK law through the Flood Risk Regulations (2009).
Environment Agency	An Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs and an Assembly Sponsored Public Body responsible to the National Assembly for Wales. The Environment Agency's principal aims are to protect and improve the environment, and to promote sustainable development. They play a central role in delivering the environmental priorities of central government and the Welsh Assembly Government through our functions and roles.
FCRM GiA	Funding for flood risk management authorities (RMAs) - that is, the Environment Agency and English local authorities and internal drainage boards (IDBs). Together, they use it to pay for a range of activities including schemes that help reduce the risk of flooding and coastal erosion.
Flood	A flood is an overflow of an expanse of water that submerges land. Both the Flood and Water Management Act (2010) and the Flood Risk Regulations (2009) state that it doesn't matter whether a flood is caused by: heavy rainfall; a river overflowing its banks of being breached; a dam overflowing or being breached; tidal waters; groundwater; or anything else including a combination of factors. However, both state that a 'flood' does not include: a flood caused from any part of a sewerage system, unless wholly or partly caused by an increase in the volume of rainwater (including snow and other precipitation) entering or otherwise affecting the system; or a flood caused by a burst water main.
Flood Maps for Surface Water	These maps followed on from the AStSWF maps and provide a more realistic representation than the AStSWF maps in many circumstances. The Environment Agency considers this to be the national source of information.
Flood Resilience	Actions taken which allow the ingress of flood water through a property but enable swift recovery after the flood event. Flood resilience measures may include (among others) flood-resistant construction materials, raised electricity sockets and water-resistant flooring.
Flood Risk	Flood risk is a combination of two components: the chance (or probability) of a

	particular flood event occurring and the impact (or consequence) that the event would cause if it took place.
Flood Risk Management Authority	Includes: (a) the Environment Agency, (b) a lead local flood authority, (c) a district council for an area for which there is no unitary authority, (d) an internal drainage board, (e) a water company, and (f) a highway authority.
Flood Risk Management (FRM)	A process to reduce the probability of occurrence through the management of land, river systems and flood defences and reduce the impact through influencing development on flood risk areas, flood warning and emergency response.
Flood Risk Management Plan	A plan for the management of a significant flood risk. The plan must include details of: objectives set by the person preparing the plan for the purpose of managing the flood risk; and the proposed measures for achieving those objectives (including measures required by any provision of an Act or subordinate legislation).
Flood Zone 1 Low Probability	Defined as an area only at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of less than 0.1% (1 in 1000). The probability of flooding occurring in this area in any one year is less than 0.1%.
Flood Zone 2 Medium Probability	Defined as an area at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of between 1% (1 in 100) and 0.1% (1 in 1000). The probability of flooding occurring in this area in any one year is between 1% and 0.1%.
Flood Zone 3a High probability	Defined as an area at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of greater than 1% (1 in 100r). The probability of flooding occurring in this area in any one year is greater than 1%.
Flood Zone 3b Functional Floodplain	Defined as land where water has to flow or be stored in times of flood. Usually defined as areas at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of greater than 5% (1 in 20) design event. The probability of flooding occurring in this area in any one year is greater than 5%.
Flood Zones	The Flood Zones refer to the probability of sea and river flooding only, ignoring the presence of existing defences. Flood Zones are divided into four categories: Flood Zone 1 (low probability), Flood Zone 2 (medium probability), Flood Zone 3a (high probability) and Flood Zone 3b (the functional floodplain).
Flood Zones	Nationally consistent delineation of ‘high’ and ‘medium’ flood risk, published on a quarterly basis by the Environment Agency
Floods and Water Management Act	Part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk in England.
Fluvial	The processes associated with rivers and streams and the deposits and landforms created by them.
Groundwater	Water located beneath the ground surface, either in soil pore spaces or fractures in rock.
Land Drainage Act 1991	The Land Drainage Act, enacted in December 1991, aimed to consolidate existing water legislation and outlined the duties and powers to manage land drainage for a number of bodies including internal drainage boards and local authorities.
Lead Local Flood Authority	Local Authority responsible for taking the lead on local flood risk management
Local Flood Risk Management Strategy	A document that describes the approach that the Lead Local Flood Authority will undertake to manage flooding within their area
Main River	All watercourses shown on the statutory main river maps held by the Environment Agency and the Department for Environment, Food and Rural Affairs. This can include any structure or for controlling or regulating the flow of water into, in or out of the channel. The Environment Agency has permissive power to carry out works of maintenance and improvement on these rivers.
National Flood and Coastal Erosion Risk Management Strategy	The Environment Agency’s National Strategy was published in May 2011 and provides an overview of how flood risk and the risk of coastal erosion will be managed across England. The aims and objectives of the National Strategy have been translated onto a local scale through this Local Strategy for the County Council.
Outcome	FCERM investment is being monitored using 6 outcome measures. These

Measures	include: the number of households receiving an improved standard of protection from flooding or coastal erosion the overall economic benefits of the investment programme important environmental outcomes, such as creating new habitats to compensate for those lost when defences are built to protect people and property
Ordinary Watercourse	Any section of watercourse not designated as a main river.
Pitt Review	Sir Michael Pitt carried out an independent review of the 2007 floods and made a number of recommendations for future flood risk management. In particular, he recommended that local authorities should play a more significant role in tackling local problems of flooding and coordinating all relevant agencies. Many of the recommendations of The Pitt Review have been enacted through the Flood and Water Management Act
Preliminary Flood Risk Assessment	The Preliminary Flood Risk Assessment is a process involving an assessment of past floods and the possible harmful consequences of future floods, leading to the identification of Areas of Significant Risk. All LLFAs must prepare a PFRA report in relation to flooding in the LLFA's area. The LLFA is not required to include information about flooding from the sea, main rivers and reservoirs unless the authority thinks that it may affect flooding from another source. The floods to be included are those which had significant harmful consequences for human health, economic activity or the environment (including cultural heritage), or which would have significant harmful consequences for those matters if they were to occur now. The report may ignore past floods of a kind that are not likely to occur now.
Ramsar	An international treaty for the conservation and sustainable utilisation of wetlands,recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971
Reservoir	Artificial lake used to store water. Reservoirs may be created in river valleys by the construction of a dam or may be built by excavation in the ground or by conventional construction techniques such a brickwork or cast concrete. Reservoirs greater than 10,000m³ are governed by the Reservoirs Act.
Risk Management Authority	A Risk Management Authority is defined in the Flood and Water Management Act (2010) as: the Environment Agency, a lead local flood authority, a district council for an area for which there is no unitary authority, an internal drainage board, a water company and a highway authority.
Sewer	A sewer is a pipe which carries and removes either rainwater (surface) or foul water (or a combination of both) from more than one property. A sewer can also be categorised as being a private of public sewer and can carry surface or foul water. A Private Sewer is solely the responsibility of the occupiers/owners of the properties that it serves. A Public Sewer is a sewer that has been adopted and maintained by a Sewerage Undertaker.
Hydraulic Sewer flooding	The consequence of sewer systems exceeding their capacity during a rainfall event.
Surface Runoff	Rainwater (including snow and other precipitation) which: is on the surface of the ground (whether or not it is moving); and has not entered a watercourse, draining system or public sewer. Areas that suffer a depth of greater than 0.1m are considered to be at risk of surface water flooding. Flooding that is greater than 0.3m deep is classed as being at risk of deep surface water flooding.
Sustainable Drainage Systems (SuDS)	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques
SUDS Approval Body	Schedule 3 of the Flood and Water Management Act (FWMA), which is yet to be fully commenced, deals with SuDS. In particular, the Act calls for the establishment of a SuDS Approving Body (SAB) to be set up within lead local flood authorities (LLFAs). The Act requires SAB approval of all new drainage systems for new and redeveloped sites and highways to be obtained before construction can commence. It also requires that the proposed drainage system meets new National Standards for Sustainable Drainage. These National Standards are concerned with the design, construction, operation and maintenance of SuDS.

The Flood Risk Regulations	The Flood Risk Regulations were enacted in December 2009 to implement the requirements of the EU Floods Directive, which aims to provide a consistent approach to managing flood risk across Europe. The regulations outline the roles and responsibilities of the various authorities consistent with the Flood and Water Management Act 2010 and provide for the delivery of the outputs required by the directive. The Directive requires Member States to develop and update a series of tools for managing all sources of flood risk.
Tidal	Processes relating to or affected by tides.
UK Climate Projections	The UK Climate Projections (UKCP09) provides climate information designed to help those needing to plan how they will adapt to a changing climate. The data is focussed on the UK.
updated Flood Map for Surface Water	The Environment Agency are currently updating national surface water mapping and will soon be releasing the Updated Flood Map for Surface Water (UFMfSW). The UFMfSW aims to provide an improvement on the representation of surface water flood risk across England and Wales.
Water Framework Directive (WFD)	A European Union directive which commits European Union member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015.
Water Resources Act 1991	The Water Resources Act 1991 (WRA) is an Act of the Parliament of the United Kingdom that regulates water resources, water quality and pollution, and flood defence. Part II of the Act provides the general structure for the management of water resources. Part III then explains the standards expected for controlled waters; and what is considered as water pollution. Part IV then provides information on mitigation through flood defence.
Abbreviations	
AStSWF CDA CFMP	Areas Susceptible to Surface Water Flooding Critical Drainage Area Catchment Flood Management Plan
Defra	Department for Food and Rural Affairs
DiA EA	Drainage Impact Assessment Environment Agency
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FDGiA	Flood Defence Grant in Aid
FRM FWMA	Flood Risk Management Floods and Water Management Act
HRA	Habitats Regulations Assessment
IDB	Internal Drainage Boards
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
National FCERM	National Flood and Coastal Erosion Risk Management Strategy
NPPF	National Planning Policy Framework
PF	Partnership Funding
PFRA	Preliminary Flood Risk Assessment
RBMP	River Basin Management Plan
RMA	Risk Management Authority
SAC	Special Area of Conservation
SAB	SUDS Approval Body
SPA	Special Protected Area
SUDS	Sustainable Drainage Systems
UKCP09	UK Climate Projections
uFMfSW	updated Flood Map for Surface Water
WFD	Water Framework Directive

1 Introduction

This chapter explains why we are preparing a Local Flood Risk Management Strategy, the legislative context and the structure of the strategy.

1.1 Context

Following widespread flooding in the summer of 2007, Sir Michael Pitt (Pitt Review) was commissioned by the Government to conduct an independent review into the events to make recommendations for future flood risk management. His final report 'Learning Lessons from the 2007 Floods' identified major limitations and called for urgent and fundamental changes in the ways the country should respond and adapt to increasing flood risk. The approach should be coordinated and consistent, incorporating communication with communities at risk and ensuring greater clarity in the roles and responsibilities of all Risk Management Authorities (RMAs). To achieve this, one of the most important recommendations from the report states that local authorities should play a major role in the management of local flood risk by taking the lead in tackling problems of local flooding and co-ordinating all relevant agencies.

The Government's response to the Pitt Review included implementing the Flood Risk Regulations (2009) and enacting the Flood and Water Management Act (2010). The FWMA led to the creation of Lead Local Flood Authorities at Unitary or County Council level. Under the FWMA (the Act), Sunderland City Council (the City Council) became a LLFA with new statutory powers and responsibilities in the management of local flood risk in Sunderland (Table 1-1).

Local flood risk can be defined as flooding arising from ordinary watercourses (those other than main rivers), surface water and groundwater. It is the responsibility of the Environment Agency (EA) to manage the risk of flooding from main rivers and the sea, however where there is an overlap between these sources and local flood risk (for example, tide locking), the responsibility to consider impacts and consequences also lies with the LLFA. Northumbrian Water manage flood risk from surface water, foul and combined sewer systems. The City Council as Highway Authority is responsible for highway drains and gulley's and there can be interaction between Northumbrian Water sewers and highway drains.

A key responsibility for the LLFA is to 'develop, maintain, apply and monitor a strategy for local flood risk management' in Sunderland. Therefore this Local Flood Risk Management Strategy (LFRMS) will identify the sources and extent of local flood risk in Sunderland, establish management priorities for these risks and demonstrate how we will work with other RMAs, local communities and any other interested parties in managing and reducing the flood risk.

The Flood Risk Regulations (the Regulations) transposes the European Floods Directive (2007) into law for England and Wales. One of the main requirements of the Regulations is for LLFAs to produce a Preliminary Flood Risk Assessment (PFRA), which is a high level screening exercise relating to local sources of flooding within the LLFA boundary. The PFRA was completed in June 2011 and as there are no nationally significant flood risk areas in Sunderland, the subsequent stages of the PFRA (mapping and Flood Risk Management Plan (FRMP)) are not required.

However, the PFRA is seen by the Department for Environment, Food and Rural Affairs (Defra) as a cornerstone for the development of LFRMS, most especially informing:

- The consideration of flood risk. The City Council PFRA included an initial prioritisation assessment based on historic and future flood risk, which this LFRMS will build upon.
- Raising awareness both internally and within LLFAs (senior management, elected members and other service areas, such as emergency and spatial planning) and also externally with other RMAs (the Environment Agency (EA), Highways Agency and Water Companies) about the new role of LLFAs. This awareness and identification of partnerships for the new responsibilities was initiated during the PFRA process.
- The 'next steps' section of a PFRA includes some recommendations for the LFRMS and Surface Water Management Plans (SWMPs).

This LFRMS will extend and build on this PFRA work, and raise the importance of managing flood risk in a proactive manner. This means focusing on managing flood risk to the areas identified in the PFRA and LFRMS, but also extending to leading on all forms of flood risk and coastal erosion.

1.1.1 Sunderland City Council's Local Flood Risk Management Strategy

This LFRMS can be seen as an all-encompassing or umbrella document for the implementation of the FWMA, which will set out how the LLFA intend to fulfil the requirements of the FWMA and who (within the council) will be responsible for the different areas. It will therefore act as a tool to deliver the benefits of well-managed and hence reduced flood risk to people, properties and the wider environment of Sunderland.

Section 9 of the FWMA states that the LFRMS must cover the areas shown in Table 1-1 below. This table also shows where the each of the areas is covered in this report.

Table 1-1: LFRMS as stated by the FWMA

Areas to cover as stated in Section 9 of the FWMA	Report reference
Who the Flood and Coastal Erosion Risk Management (FCERM) authorities are and their risk management functions, plans and programmes;	Section 2.2
How a programme of capacity building and formalising partnerships and funding will be implemented;	2.4, 2.5
Set local opportunities and objectives for managing flood risk;	Chapter 3 and Appendix A
Choose measures to meet the objectives;	Chapter 5 and Appendix E
State how and when measures will be implemented;	Section 7.2 and Appendix B
The costs, benefits of the measures and how they will be funded;	Section 5.3 and 5.4
The assessment of local flood risk;	Chapter 4
How and when the strategy is to be reviewed; and	Section 1.2
How the strategy contributes to wider environmental objectives.	Chapter 6 and section 5.6

Sunderland's LFRMS has been prepared with reference to the Local Government Group Framework[1] and is also consistent with the National Flood and Coastal Erosion Risk Management (FCERM) Strategy.

1.2 Purpose

The purpose of this LFRMS is to act as a robust guidance tool for RMAs operating in Sunderland to deliver a coordinated, improved approach in all flood risk management activities. This relates to the following RMAs; the City Council (as LLFA and Highway Authority), the EA, Northumbrian Water (NW) and Highways England. It is also intended to communicate Sunderland's local flood risks and consequences from surface water, surface water sewers, groundwater and ordinary watercourses to community groups and other interested parties. Through strong working partnerships with all relevant stakeholders, including public consultation, we will ensure the most cost-effective measures are implemented in local flood risk management.

The overriding vision for the LFRMS is for the City Council as the LLFA to take a lead role in better understanding local flood risk. Providing this information in the form of this LFRMS, will enable communities to also improve their own knowledge and understanding of the risk of flooding across Sunderland.

Increasing community awareness to these risks will facilitate a greater sense of ownership over the management of the local flood risk and hence create a better quality of life for Sunderland's residents with a much higher resilience to flooding.

Development of the LFRMS provides considerable opportunities to improve and integrate land use planning and flood risk management. It is an important tool to protect vulnerable communities and deliver sustainable regeneration and growth in the community; maximising economic, environmental and social benefits. Using effective and complementary measures in a whole-catchment approach, we will also ensure than risk is not transferred or increased elsewhere. These benefits are in line with national strategies and legislation and also help towards achieving national aims set out by these laws, such as the cleaner water environment the Water Framework Directive (2003) seeks to produce. This LFRMS for flood risk management also seeks to align with our Corporate Plan.

Unfortunately, the risk of flooding and consequent flood damages cannot be completely removed and this fact needs to be understood and accepted. Climate change will only exacerbate the unpredictability and extremity of weather conditions which can lead to flooding, whether minor or severe. However, the more prepared and well-managed Sunderland can become through the direction and coordination of this LFRMS, the more resilient its people, environment and economy will become in the face of future flood risk.

We have prepared this LFRMS based on the latest information and will keep it up to date in line with any developments in the understanding of local flood risk so that it reflects new information available on its management. Therefore this LFRMS will be reviewed in 2020 and then every five years.

[1]Framework to assist the development of the Local Strategy for Flood Risk Management 'A Living Document', 2nd Edition, LGA, November 2011

2 Roles and Responsibilities

This chapter sets out our high level responsibilities as a Lead Local Flood Authority. We outline what will be in the Strategy, the area it affects and why the Strategy is important to the City Council, other Risk Management Authorities and our local communities.

2.1 Background Legislation

This section of the report outlines the background legislation and drivers that have led to and influenced the development of this LFRMS. The LFRMS will be consistent with all current guidance, information and legislation relating to flood risk management, summaries of which can be found below. In addition to the most relevant legislation below, the LFRMS has also taken into account the following related legislation:

- Land Drainage Act 1991 (amended in Flood and Water Management Act)
- Highways Act 1980
- Civil Contingencies Act 2004

2.1.1 The Flood and Water Management Act (2010)

In April 2010, the FWMA received Royal Assent and aims to provide more comprehensive and improved flood risk management for people, homes and businesses, as well as improving how water resources are managed. The FWMA creates clearer roles and responsibilities and instils a more risk-based approach to flood risk management. This includes a new lead role for the City Council as a LLFA, who are now responsible for coordinating the local flood risk management from surface water, groundwater and ordinary watercourses.

Contained within the FWMA, the City Council as the LLFA also has new specific roles, duties and functions. These are outlined in section 2.2.1.

2.1.2 The Water Framework Directive

The Water Framework Directive (WFD) is a European Directive which came into force in December 2000 and was then transposed into UK law in 2003. It seeks to improve the water environment by introducing new strategic planning processes for its management and protection via an overarching framework with clear objectives. The water environment encompasses surface freshwater (including lakes, streams and rivers), groundwater and dependent ecosystems, estuaries and coastal waters. Therefore it covers the water involved in coastal and fluvial flood risk, as well as the local flood risk. Sunderland's LFRMS was developed in compliance with the WFD and contributes towards many of its objectives.

The EA is the authority responsible for overseeing this work and has created eleven River Basin Management Plans (RBMPs) for the major river basin districts of England and Wales, setting out environmental objectives for each body of water. Our LFRMS has been developed with regard to the Northumbria RBMP and the actions set out here will not impede the RBMP programme of works; instead the City Council will aim to aid in its delivery.

2.1.3 The National Flood and Coastal Erosion Risk Management Strategy for England (2011)

The EA's National Flood and Coastal Erosion Risk Management Strategy (National Strategy) for England became a statutory document in July 2011 with the overall aim of ensuring proper management of flooding and coastal erosion risks and consequences. This is to be achieved in a coordinated way across all

authorities using the full range of options available and will work with organisations, communities and individuals. It sets out six 'guiding principles' to assist LLFA's in their risk management activities:

1. Community focus and partnership working;
2. A catchment and coastal “cell” based approach;
3. Sustainability;
4. Proportionate, risk-based approaches;
5. Multiple benefits; and
6. Beneficiaries should be encouraged to invest in risk management.

In order to be consistent with the National Strategy, Sunderland's LFRMS will adopt these guiding principles and in doing so present a clear picture of what will be done in Sunderland to manage risk. This will help communities understand the risks they face, what they can do to manage them and how RMAs are working together to manage flood risk in the local area.

2.1.4 The National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2012 replaced all national planning guidance including Planning Policy Statement 25: Development and Flood Risk (PPS25). The new framework and practice guidance highlights the need for sustainable development and effective planning of flood risk infrastructure along with consideration of flood risk management in core planning principles to meet existing challenges and future needs. It seeks to demonstrate the need to deliver economically, socially and environmentally sustainable developments. Under the framework new developments are required to consider flood risk as part of their environmental assessments, incorporate measures to directing developments away from flood risk and reduce, mitigate or manage flood risk of existing developments. This should be achieved through the use of Sustainable Drainage Systems (SuDS), water efficiency, resistance and resilience design, drainage strategies use of tree planting and green infrastructure and most importantly not increase the flood risk elsewhere.

2.1.5 Environmental Assessment of Plans and Programmes Regulations (2004)

In accordance with the Environmental Assessment of Plans and Programmes Regulations 2004 (the Strategic Environmental Assessment (SEA) Regulations) a SEA has been undertaken to determine any significant effects (either positive or negative) on the environment. Chapter 6 summarises the SEA that has been undertaken for this strategy.

2.2 Risk Management Authorities and Responsibilities

The FWMA defines RMAs as key stakeholders which should include the following; the EA, the LLFA, Internal Drainage Boards (where they exist), Highways Authorities and water companies. These RMAs are required to act in a manner consistent with the National FCERM Strategy and in doing so effective partnerships will be formed between the LLFA and the other relevant authorities.

All RMAs have the following new responsibilities under the provisions of the FWMA:

- A duty to co-operate with and provide or share information to other RMAs; and (Section 13)
- A duty to prepare and maintain a local flood risk management strategy (Section 9)
- A duty to comply with the national strategy (Section 11)

- A duty to investigate flood events where the LLFA considers appropriate and necessary (Section 19)
- A duty to maintain a register of structures and features likely to affect the flood risk (Section 21)
- A duty to contribute to sustainable development (Section 27)
- Ability to take on flood and coastal erosion functions from another RMA when agreed by both sides (Section 13)
- A duty of role to approve, adopt and maintain sustainable drainage systems (Section 32)
- Duty to determine, or enforce on the consents of ordinary watercourses (paragraphs 32- 34 of Schedule 2)
- Duties relating to reservoirs, water use: temporary bans; under miscellaneous powers (Sections 33 and 36)

Under the FWMA, all RMAs have a responsibility to co-operate with each other and provide information when requested to do so. In particular the EA and the City Council - as the LLFA - have the power to request information from other RMAs in relation to their flood risk management duties.

The following sub-sections of the LFRMS identify which are the RMAs in Sunderland, highlighting their responsibilities to aid in the understanding of how they will cooperate with and delegate to each other. The LLFA also has a number of powers relating to the request of information, power to designate certain features, powers to undertake work that satisfy the broader risk management actions and the ability to cause flooding under certain conditions.

2.2.1 The City Council

The City Council has the following new and existing legal responsibilities, some of which are powers and some are duties.

Function

- The lead authority for planning and coordinating local flood risk management for surface runoff, groundwater, ordinary watercourses and coastal erosion.

Roles

- Strategic leadership of local RMAs.

New Duties

- To develop, maintain, apply and monitor a strategy for local flood risk management in the jurisdiction of the LLFA;
- A duty to investigate and publish reports on flooding incidents (internal flooding of 10 or more properties)in its area;
- A duty to maintain a register of structures or features which have a significant effect on flood risk in their area;
- Management responsibility for whether works on ordinary watercourses by third parties that may affect water flow can take place (ordinary watercourse consent);
- A duty to exercise flood or coastal erosion risk management functions in a manner consistent with the national strategy. Including scrutiny and oversight of risk management authorities (including Integration of FCERM Plans and Policy);

- A duty to contribute towards the achievement of sustainable development in the exercise of flood or coastal erosion risk management functions and to have regard to any Ministerial guidance on this topic.
- A duty to share information with other RMAs.
- The LLFA is a statutory consultee on all Major Planning Applications and must provide a response within 21 days.

Existing Duties and tasks

- Preparing & monitoring of programmes of planned highway maintenance works; including highway drainage.
- Responding to problems related to highway drainage and land drainage (including small scale schemes).
- Arranging & monitoring routine inspections & cleaning of culvert inlets and highway drainage locations.
- Responding to requests for land drainage information.

New Powers

- Powers to request information from any person in connection with the authority's flood and coastal erosion risk management functions.
- Power to designate 3rd party structures and features that could affect flooding and are considered to be significant when assessing local flood risk.
- Planning the external contributions to partnership funding schemes.

Existing Powers

- Maintenance of ordinary watercourses
- Power to carry out works to manage local flood risk

The City Council is a Unitary Authority and has finite resources to meet its new LLFA responsibilities. The Strategic Flood Risk Assessment (SFRA) and PFRA have highlighted that there are many potential local flooding issues in Sunderland. There is low hazard but frequent surface water flood risk to low lying communities across the City (e.g. parts of Houghton le Spring). The flooding of 2012 highlighted the extent of local flood risk across Sunderland. Many locations were affected including a number of schools.

Flood risk has significant implications for the City Council, not just risk of harm to people and damage to property, but damage to the wider economic prosperity and functioning of the city as a whole. The City Council as the LLFA is now the strategic lead for FCERM and can prioritise schemes that protect people from risk but also increase economic competitiveness and employment opportunities. The way we manage local flood risk now and into the future will be a key outcome of the LFRMS.

2.2.2 Environment Agency - Northumberland Durham and Tees

The EA has a strategic overview role for all FCERM and also takes a lead responsibility for managing flood risk from the sea, main rivers and reservoirs. Main rivers are those watercourses which appear on the Statutory Main River map held by the EA and Defra, for which the EA has permissive powers to carry out works intended to maintain, improve and defend against flooding and erosion. Figure 2.1 below shows the main rivers in Sunderland

Figure 2-1: Main rivers in Sunderland

However, riparian owners (those who own land or property next to a river) still retain the overall responsibility for maintenance of main rivers. The EA also has a key role to provide flood warnings and support to emergency responders, along with promoting sustainable development and protecting the environment.

New roles and responsibilities the EA has taken on in line with the FWMA include:

- Development of a National FCERM Strategy to cover all forms of flooding;
- The conversion of Regional Flood Defence Committees into Regional Flood and Coastal Committees with a new remit to include coastal erosion issues and greater decision making powers. The City Council is a member of the Northumbria RFCC;
- Powers to request information from any person in connection with the EA's FCERM functions;
- Power to designate 3rd party structures and features that affect flooding or coastal erosion;

- Powers to cause flooding and erosion for nature conservation and cultural heritage reasons, and people's enjoyment of these;
- A duty to have regard to FCERM in carrying out other work that may affect FCERM;
- A duty to have regard to this LFRMS;
- A duty to report to Ministers about FCERM including application of the national strategies for England and Wales; and

2.2.3 Water Company - Northumbrian Water

NW is the water company providing mains water and sewerage services to properties in the city and are responsible for managing flood risk from public sewerage systems.

New roles and responsibilities Northumbrian Water has taken on in line with the FWMA include:

- A duty to act consistently with the national strategies and to have regard to this LFRMS when carrying out their flood risk management functions;
- A duty to be subject to scrutiny from the LLFA's democratic processes in respect of their flood risk management functions; and
- Adoption of private sewers which were connected to the public sewer network prior to 1st October 2011.

2.2.4 The Highway Authority - the City Council

The City Council is the Highway Authority for the area and under the Highways Act (1980) has the responsibility for providing and managing highway drainage and roadside ditches. This is with the exception of the A19 and A194(M) for which the responsibility of management lies with the Highways Agency (North East - Area 14). In line with the FWMA, the manner in which the Highway Authority carries out its duties must be aligned with national strategies and also this LFRMS. This may include the use of SuDS for drainage of any newly constructed roads and be in accordance with the national standard for SuDS.

2.3 Other authorities with a role in flood risk management in Sunderland

Aside from those RMAs identified by the FWMA, other authorities (both internal to the City Council and also external stakeholders) have certain responsibilities in local flood risk management in areas of their own discipline. These are identified below along with a summary of their relevant objectives.

2.3.1 Riparian Owners

Riparian owners, under common law, possess a watercourse within or adjacent to any boundary of their property and retain their own duties and responsibilities under the Land Drainage Act (1991), which are as follows:

- A duty to deal with and accept flow;
- A duty to not affect the rights of others by passing on flow without obstruction, diversion or pollution; and
- A duty to maintain the banks and bed of the watercourse.

Guidance available from the EA which aims to clarify the rights and responsibilities of riparian owners:

- Living on the Edge at – http://www.environmentagency.gov.uk/homeandleisure/floods/31626.aspx

2.3.2 Wear Rivers Trust

The Wear Rivers Trust is an environmental organisation that develops projects, raises funds and works in partnerships to research the state of the river environment and undertake informed actions towards the improvement of the Wear catchment. The Wear Rivers Trust is a charity and has no statutory powers but aims to work with the appropriate authorities to best improve and manage the catchment.

The Council work alongside the Wear Rivers Trust when opportunities arise and there is the potential to build this partnership when planning local flooding schemes that have environmental benefits. The Wear Rivers Trust chair the Lower Wear Catchment Partnership, which could be an important group for developing joint working and partnership funding of schemes.

2.3.3 Northumbria Regional Flood and Coastal Committee

The Northumbria Regional Flood and Coastal Committee (RFCC) is a statutory body, established by the EA under the FWMA, which provides the vehicle for planning and managing the delivery of flood risk management priorities and investment in the Northumbria Area, stretching from the Tweed to the Tees.

There are twelve members of the Northumbria RFCC appointed by each of the LLFAs in the Northumbria area and six appointed by the EA, who all share the following responsibilities:

- Ensuring coherent plans are available for identifying, managing and communicating flood and coastal erosion risks across catchments and shorelines;
- Promoting investment in FCERM which is targeted, efficient and risk-based and therefore optimises value for money and local community benefits; and
- Providing a link between all relevant bodies (the EA, LLFAs, other RMAs and relevant bodies) to bring about mutual understanding of flood and coastal erosion risks in the area.

2.3.4 Durham Wildlife Trust

Durham Wildlife Trust's purpose is to protect wildlife and promote nature conservation in County Durham, the City of Sunderland and the Boroughs of Gateshead, South Tyneside and Darlington. The Trust manages nature reserves and delivers conservation projects to protect wildlife[2]. Durham Wildlife Trust are part of the Lower Wear Catchment Partnership and are potential partners in local flooding schemes that have environmental benefits.

2.3.5 North East Coastal Group

The overall aim of the North East Coastal Group (NECG) is to provide sound advice and be a strong influence in optimising strategic and sustainable policies, plans and programmes to best manage the risk from sea flooding and coastal erosion[3].

- To be a natural and chosen forum for coastal practitioners to discuss issues, problems, solutions and to share best practice; and
- To be efficient in operation and provide best value for money options.

[2] http://www.durhamwt.co.uk/about-us/our-purpose/

[3] http://www.northeastcoastalgroup.org.uk/home.htm

2.3.6 Port of Sunderland

The Port of Sunderland is a key landowner at the mouth of the River Wear. It is committed to protecting the natural environment and will promote environmental awareness and performance throughout its waterways. It states in its Port regulation and contingency planning that every effort will be made to minimise hazards to the environment and maintain effective protection and recovery measures within the River Wear and its docks system[4].

2.3.7 Emergency Planning Unit and Tyne and Wear Fire and Rescue Service

The City Council Emergency Planning Unit is responsible for coordinating emergency response and therefore have direct links to Tyne & Wear Fire and Rescue Service. There is ongoing partnership and communication with this service including coordination on flood incidents.

2.3.8 Parish / Town Councils

There is one parish council in the city, namely Hetton Town Council. We will work with the town council to build resilience into their communities where flooding has been identified as a risk.

2.3.9 Other external partners:

- English Heritage
- National Trust
- Natural England
- Heritage Coast
- Marine Fisheries Agency
- Royal Society for the Protection of Birds
- Highways Agency
- Network Rail
- University of Sunderland
- Met Office
- National Flood Forum
- Gentoo and other Housing Associations

2.4 Flood Risk Working Groups

There are a number of flood risk related groups and organisations that work with the City Council. These are:

- The City Council's Flood and Coastal Erosion Risk Management Group - set up to plan and deliver the requirements of the FWMA with representatives from departments including Emergency Planning, Finance, Planning Strategy, Planning Development Control, Highways and Transportation.
- Tyne and Wear Strategic Flood Risk Management Group – This group is made up from the five Tyne and Wear Councils. The Group meets quarterly to discuss related planning and flood risk issues.
- Northumbrian Water (NW) – the City Council has quarterly operational liaison meetings with NW to discuss local flooding and planning issues.

[4] http://www.portofsunderland.org.uk/environment.php

- Regional Inland Flooding Group - regular meetings of LLFA representatives with the EA to discuss inland flooding problems and policies
- North East Coastal Group – this group of coastal representatives meets with the EA to discuss local issues and identify how the RFCC can assist with the issues raised.
- Coastal Liaison Group (sub group of NECG) – quarterly meeting of engineers from local coastal authorities along with EA Engineers to discuss coastal issues, Shoreline Management Plans(SMPs) etc.
- Key businesses – the City Council has on going relations with major land owners, employers and organisations within the boundary including Sunderland Port.

2.5 Sunderland LLFA Structure

The City Council is building the skills and resources required to meet the requirements of the FWMA and developing a LLFA team within the council structure. The skills and resources a local authority requires to build an effective LLFA team include: leadership; communication and consultation; project management; technical knowledge and strategic planning.

The City Council is building an LLFA team which includes a lead officer for flood management. The lead officer, reports to the Head of Streetscene, and has access to staff in RLS, Planning Policy, Highways Assets and Engineering Services. Eventually, the lead officer will develop a dedicated LLFA team.

The lead officer has clear reporting lines to Streetscene management and therefore to the City Council's Cabinet for key decisions. However, it is likely that all key decisions will involve the City Council Strategic Flood Risk Management Group.

2.5.1 Governance and Scrutiny

In order to ensure the City Council remains effective and accountable, scrutiny of its actions and decision-making must take place in line with requirements of the FWMA. It is an essential process where the activity of the City Council is examined and monitored to improve the quality of public services they provide. Decision-making processes need to be transparent and accessible to the people of Sunderland, thereby enabling members of the community and councillors to take a role in service delivery and also influence policies.

The City Council Strategic Flood Risk Management Group will review and discuss key issues relating to the LLFA such as agreeing and signing off the LFRMS and accompanying Action Plan. This will ensure that all internal stakeholders are aware of decisions being made in which they have an interest (e.g. LLFA Team and Emergency Planning) and that resources are available where necessary.

The LLFA lead officer will facilitate the Strategic Flood Risk Management Group and important decisions will be sent through to the nominated Head of Service Chief Officer and Lead Member. They will decide whether certain decisions will need review and sign off through the City Council's Scrutiny Committee.

The LLFA lead officer will when necessary prepare briefings on areas that need review by the Scrutiny Committee. The briefings may lead to further in depth information that the lead officer will also need to provide, with help from the team and other relevant officers. Key areas that are likely to require review by the Scrutiny Committee are:

- The City Council's LFRMS, its progress and ability to fulfil the requirements of the FWMA.
- Future schemes, investment required and potential shortfall. Schemes to be promoted at the RFCC and the distribution of Local Levy funding.
- The City Council's relationship with NW, the EA and other partners.

3 Objectives for Managing Flood Risk

This chapter details the objectives we have developed which set out the outcomes we would like from our flood risk management work. The objectives will allow us to set targets for managing flood risk so that we can monitor progress as we implement the Strategy.

The LFRMS must set objectives for managing local flood risk. An objective can be defined as an outcome or target to be achieved. Objectives for LFRMS should be consistent with the strategic objectives and guiding principles set out in the National Strategy (see Section 3.1).

LFRMS objectives should also fit with the corporate priorities of the City Council. Aims and objectives across a range of our strategic priorities (including Sunderland's corporate vision) have been reviewed in order to build the themes that will direct the LFRMS objectives.

Managing flood risk requires a proactive, pragmatic approach to understanding between all partners, with consistent and meaningful engagement with the public. Partnership working and engagement of local communities will be essential for developing and pursuing objectives that are commonly understood and accepted.

Objective setting should initially be high level, looking at the overall aim of the LFRMS and setting objectives that will ensure the aims are met. For the City Council's LFRMS, a set of high level strategic objectives have been set as well as a series of more detailed sub objectives.

Overall, the LFRMS objectives are steered by the following overriding drivers:

- The EA's National Strategy objectives
- Specific duties, powers and responsibilities identified in the FWMA for LLFAs
- The City Council's corporate vision and overarching objectives.

3.1 National Strategy Aims and Objectives

Objectives for the LFRMS should be consistent with the strategic objectives in the National Strategy. This LFRMS has ensured that the strategic aims and objectives set out in the National Strategy are translated into a set of specific, meaningful objectives for the LFRMS. The National Strategy aims and objectives are below.

3.1.1 National Aim

- To ensure the risk of flooding and coastal erosion is properly managed by using the full range of options in a co-ordinated way.

3.1.2 National Objectives

- Understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them;
- Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks;
- Building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society;

- Increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient;
- Improving the detection, forecasting and issue of warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

3.2 LFRMS Objectives

3.2.1 Developing the objectives

High level objectives have been set by considering the impact on people, the economy and the environment (the three pillars of sustainable development).

These overarching objectives have been aligned with the future vision for Sunderland and the National Strategy by incorporating the aims and objectives from the City Council's Corporate Plan and the EA's National FRM Strategy.

Several strategic LFRMS objectives have been set for each of the social, economic and environment indicators.

Sub objectives have also been identified so that actions could be clearly linked to the objectives. The Action Plan lists all the specific LFRMS objectives alongside each of the actions that have come from the development of the LFRMS. This ensures that work done and future work is all based on the original intention of the strategy and sits within the overall direction the City Council and the EA are taking in flood risk and development.

3.2.2 Social strategic and specific LFRMS objectives

1) Reduce the risk to people by understanding current and future flood risk so that measures can be targeted at those most at risk.

1a) Assess the risk of local flooding across the city so that measures and schemes can be prioritised according to risk taking into account climate change.

1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in the City Council.

1c) Identify where assets may influence the impact of local flood risk to improve the management of drainage and flood management assets (people and economy).

2) Minimise the impact of local flooding on communities.

2a) Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk (climate change).

3) Manage the impact of new development on flood risk to communities and the economy.

3a) Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding.

4) Reduce flood risk to critical services and infrastructure.

4a) Assess the risk to critical infrastructure and services across the City Council so that measures and schemes can be prioritised where there is a need.

3.2.3 Economic strategic and specific LFRMS objectives

5) Reduce risk to the economy by understanding current and future flood risk so that measures can be targeted in the most cost beneficial way.

5a) Assess the economic impact of flooding and the cost of measures so that investment can be targeted in the most cost beneficial way taking into account climate change.

5b) Manage multiple sources of flood risk by working in close collaboration with the EA, NW and other stakeholders to deliver schemes with multiple partners and funders.

5c) Ensure the sustainability of flood risk management by making sure maintenance is properly taken into account

6) Ensure investment in FCERM does not hinder but promotes economic growth in a sustainable way.

6a) Support economic growth and regeneration through the funding of schemes and flood related activity.

3.2.4 Environmental strategic and specific LFRMS objectives

7) Promote schemes that have multiple environmental benefits.

7a) Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces.

8) Reduce the impact of flood risk on the environment and cultural heritage.

8a) Ensure FCERM schemes, maintenance and other activities do not have a detrimental effect on the environment and cultural heritage.

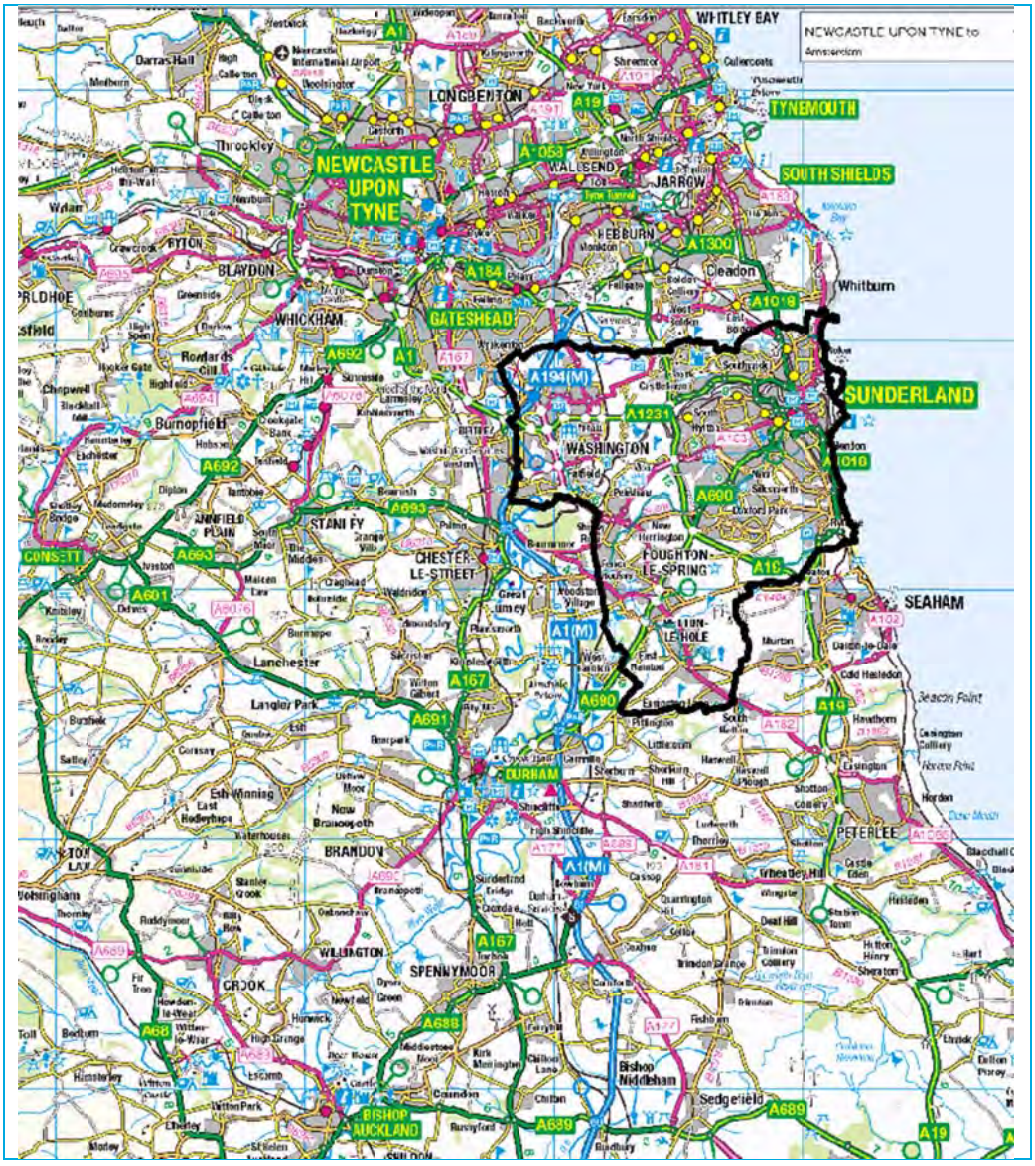
4 Flood Risk in Sunderland

This chapter discusses different types of flooding that can affect Sunderland. This predominantly describes the local flooding for which we are responsible and includes flooding from surface water and smaller watercourses. Fluvial flooding, tidal flooding and coastal erosion are also summarised so provide a general overview of all types of flooding.

4.1 Area Overview

The LFRMS area comprises the whole of Sunderland (see Figure 4-1). Which has a population of 282,000. The City covers an area of 137km² and is one of five metropolitan districts that forms the conurbation of Tyne and Wear (the others are; Newcastle, Gateshead, North Tyneside and South Tyneside).

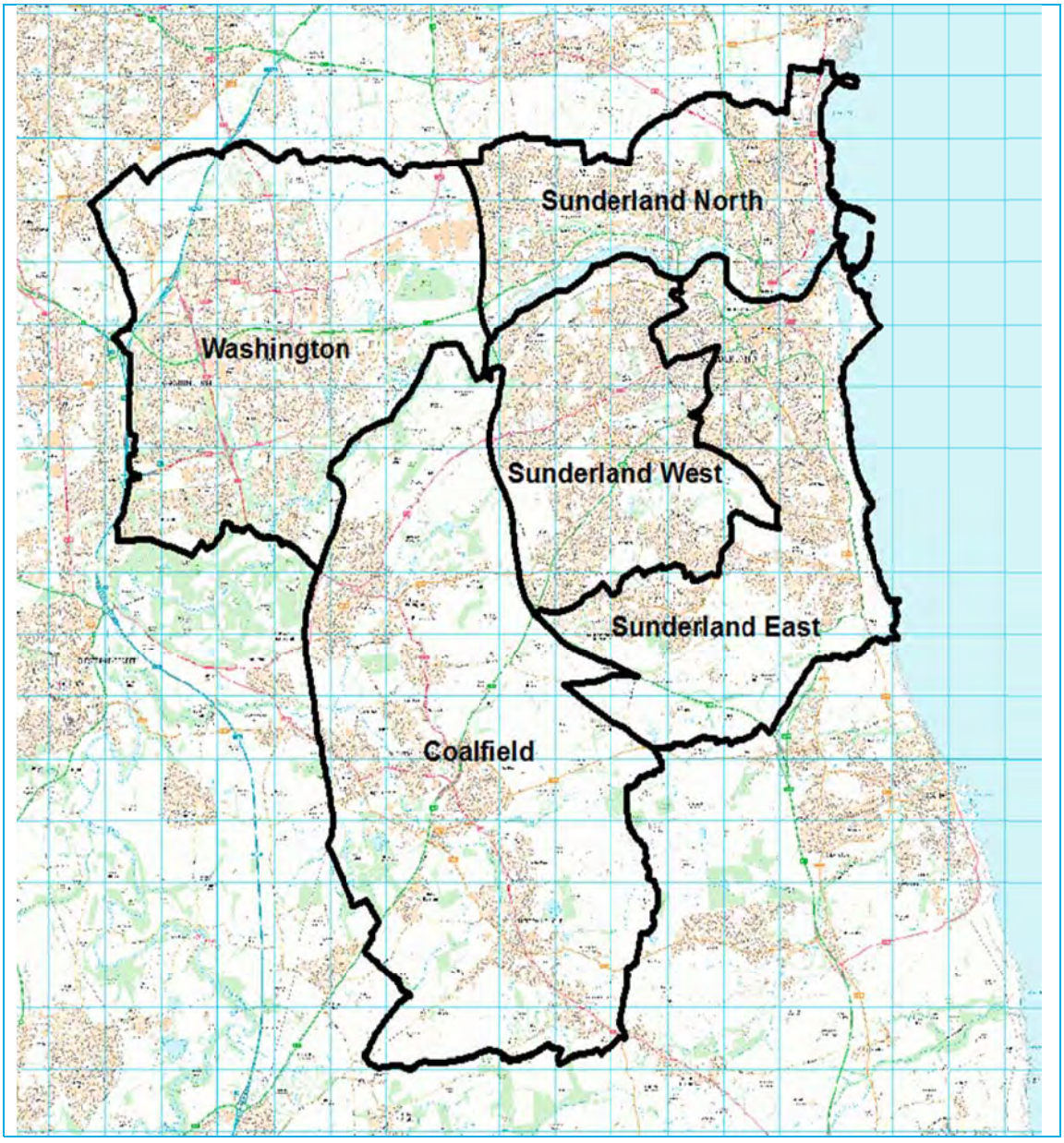
Figure 4-1: Sunderland LFRMS study extent



The city consists of five main Regeneration Areas; North, East, West, Washington and Coalfield (see Figure 4-3). The Sunderland coastline is approximately 10km and covers the length of coast from Whitburn Bay in the north at the boundary with South Tyneside Council to Ryhope in the south at the council boundary with Durham County.

Sunderland falls within the Northumbria River Basin District, is served by one water company, NW and is within the EA's Northumberland Durham and Tees area (formally North East region). We are responsible for local flooding and coastal protection (this will be explained in more detail below), but there are other RMAs that have FRM responsibilities. The EA are responsible for Main River and tidal flooding and NW are responsible for sewer flooding.

Figure 4-2: Sunderland sub areas



4.2 Existing flood risk

4.2.1 Flood History

Historical flood records can help build a picture of which catchments are susceptible to flooding. The River Wear has a long and varied flood history with significant events occurring in the 1940s, 1960s, 1990s and most recently in 2000, 2005 and 2012. Due to the differences in the catchments between the main River Wear and the tributary rivers catchment, widespread floods are rare and flooding generally occurs on either the Wear, or the tributaries, but rarely on both at the same time.

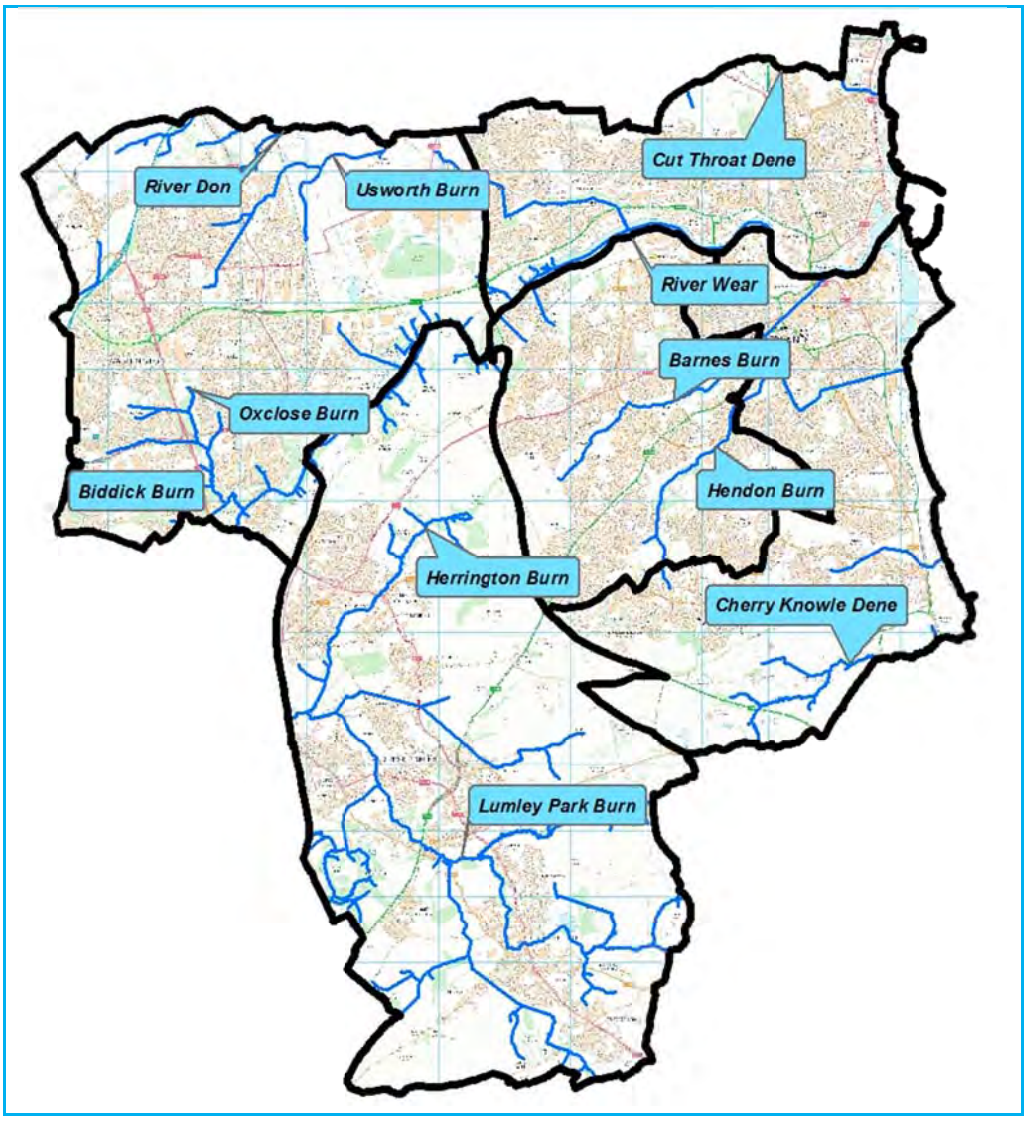
According to the Wear Catchment Flood Management Plan (CFMP), the majority of historical flooding has occurred along the Wear upstream of Chester-le-Street (Durham) and along its major tributaries. There is little evidence of flooding along the Wear through Sunderland apart from at Fatfield and the interaction with Biddick Burn.

The flooding in 2012 highlighted the extent of local flood risk across Sunderland. This was the wettest year since records began with extended intense rainfall events which did not allow the ground, drainage systems and watercourses to recover. Some of the locations affected had not flooded to this extent before and the impact on Washington in particular was significant. Similar events could happen again as climate change is expected to increase intense rainfall events.

The 2012 event was predominantly as a result of surface water runoff, combined sewer and small watercourse flooding. Approximately 40 internal flooding locations were recorded during this event. There are no definite number of properties flooded but each of the 40 flooding locations had recorded internal flooding of between one and ten properties.

This next section describes flood risk across the different Sunderland areas. Figure 4-3 below shows the key flood risk locations.

Figure 4-3: Key flood risk watercourses in Sunderland



4.2.2 Sunderland North Flood Risk Sources

Although there are a number of flooding sources within North Sunderland, the risk associated with them is low. Possible sources of flood risk are as follows:

4.2.2.1 Main River and Tidal Flooding

The River Wear presents both fluvial and tidal flood risk in North Sunderland, however as the Flood Zones are constrained mainly to the channel banks, the flood risks are low and there are relatively few properties at risk.

4.2.2.2 Coastal Flooding and Erosion

The risk of coastal flooding is low with both Flood Zone 3 and 2 mainly following the Mean High Water Spring Level due to high ground and cliff frontage. The coastline is protected by coastal defences for the majority of its coast. Whilst assets are generally in good condition overtopping often occurs, particularly when spring tides coincide with strong onshore wind and wave conditions, this leads to flooding of Marine Walk, Roker. the promenade at South Bents and Dykeland Road, Seaburn. There is a risk of increased overtopping during climate change events.

4.2.2.3 Local Flooding

Cut Throat Dene watercourse is similarly to the River Wear and presents a low flood risk to the area. There are some critical surface water flow paths surrounding Roker to the east and Town Head Farm to the west. There is also a risk of sewer flooding in the area identified by NW records and as such the area has been defined as a Critical Drainage Area (CDA) within the SFRA.

The 2010 SFRA, identified the area of North Sunderland surrounding the amusement park as at risk of groundwater flooding.

4.2.3 Sunderland East Flood Risk Sources

The River Wear in East Sunderland presents a complicated picture of flood risk originating from interactions between the extensive urban drainage network and the fluvial and tidal elements of the watercourse, according to the Wear CFMP[5]. The height of the tide level determines how much tidal locking occurs, whereby river flows are prevented from flowing downstream therefore causing a backing up of water. Backing up of the Wear could lead to flooding where the urban watercourse cannot discharge into the North Sea due to high tide levels. Specific sources of flooding include:

4.2.3.1 Main River and Tidal Flooding

Flood risk in East Sunderland is dominated by the tidal estuary of the River Wear. There is a high risk of tidal flooding along the Port; however Flood Zone 3 and 2 are constrained to the banks of the Wear. In December 2013 there was a tidal surge in the North Sea that flooded properties along the east coast of the UK. The EA regarded this as the most significant surge since the 1953 tidal flooding disaster. The surge was expected to cause the tidal Wear to burst its banks and properties were evacuated as a precaution. However, there was no significant flooding from the tidal Wear as a result of the storm surge.

4.2.3.2 Coastal Flooding and Erosion

Large areas of the Port area are currently at risk of flooding from the sea[6]. There is a risk of overtopping of coastal assets during climate change scenarios and a

[5] Wear CFMP http://cdn.environment-agency.gov.uk/gene1109brcn-e-e.pdf
[6] Sunderland City Council Level 1 Strategic Flood Risk Assessment Volume II: Technical Report (2010)

number of assets have been identified as being in poor condition. Tidal locking is also a potential issue in East Sunderland, combined with the associated backing up of surface water drains connected to the culverts which drain into the sea.

Although high sea levels were experienced on the City Council's coastline, the impact of the December 2013 tidal surge was not significant in terms of properties flooded.

Coastal Erosion is now having an impact on the undefended cliffs between Hendon Promenade and Ryhope Dene this situation is being monitored every six months. This situation will increase as climate change makes a bigger impact on sea conditions.

4.2.3.3 Local Flooding

The local flood risk associated with East Sunderland is significantly different from elsewhere in the City as Ordinary Watercourses in the coastal plain here are not hydraulically connected to the Wear catchment. The main watercourse posing a risk of flooding in East Sunderland is Hendon Burn, which has a relatively limited floodplain extent as flow volumes are small. It is located in a heavily urbanised area and is culverted in sections, which pose significant residual risk if the culverts become blocked. However the true risk associated with the burn is unknown as there is no detailed hydraulic model available. This is an area identified as being susceptible to surface water flooding by the EA Areas Susceptible to Surface Water Flooding map and together with Barnes Burn in West Sunderland, has also been identified as a CDA.

There are other minor local flooding issues in Sunderland East relating to smaller drains and runoff including Nursery Close, King George Park and Tay Road. More serious events have occurred in Craigwell Drive on the Hall Farm Estate.

4.2.4 West Sunderland Flood Risk Sources

West Sunderland contains similar flood risks to East Sunderland, with the exception of any coastal flooding or erosion. It has a medium risk of surface water flooding, with areas identified at risk being located within the natural valleys of the Ordinary Watercourses along with the key flow routes and pooled areas being located in open land.

4.2.4.1 Main River and Tidal Flooding

Only the former Pallion Shipyard has been identified at risk of tidal flooding in West Sunderland, where much of the tidal flood risk from the River Wear is constrained within its banks.

4.2.4.2 Local Flooding

The clearly defined catchment of Barnes Burn is a key area susceptible to surface water flooding identified by the EA Areas Susceptible to Surface Water Flooding map. This area, along with Hendon Burn in East Sunderland, has been identified as a CDA largely due to the urban nature of both watercourses and the contributing urban surface water drainage system or surface water runoff. Hendon Burn floods a small number of properties on a regular basis near Frinton Park, Silksworth Lane.

4.2.5 Coalfield Flood Risk Sources

The risk of flooding in some parts of the Coalfield area of Sunderland is high and can originate from a number of sources. As there is currently a significant flood risk from a number of sources which can interact further downstream at Chester-

le-Street, this area has been identified as a CDA within the SFRA. The main sources of flooding in this area are listed below:

4.2.5.1 Main River and Tidal Flooding

The Wear CFMP suggests that the main flood risk in the Coalfield area is fluvial associated with Lumley Park Burn and its tributaries, which flows through the urban areas of Hetton-le-Hole and Houghton-le-Spring. This watercourse has several restrictions in the channel, such as culverts, bridges and development along the riverside, which all restrict flows and may cause flooding if they act as debris traps. This leads to a significant number of properties identified as being at risk in Hetton-le-Hole. Further downstream around Houghton-le-Spring fluvial flooding is mainly concentrated on open greenfield land surrounding Lumley Park Burn. There is also a significant risk of fluvial flooding surrounding Sedgeletch Sewage Works from Lumley Park Burn.

4.2.5.2 Local Flooding

The catchment of Lumley Park Burn and its tributaries, including Herrington, Houghton and Hetton Burns, is a key area susceptible to surface water flooding identified by the EA Areas Susceptible to Surface Water Flooding map. Critical surface water flow paths and large areas of pooling show there is a high risk of surface water flooding, with Sedgeletch Sewage Works at significant risk. There are other minor local flooding issues in Coalfield relating to smaller drains and runoff including Borrowdale Street/Lambton Drive, Osman Terrace, Dene Street, A690 East Rainton, Dairy Lane and Sedgeletch.

4.2.6 Washington Flood Risk Sources

In Washington a CDA has been identified due to the risk of surface water flooding. Details of the flood sources are as follows:

4.2.6.1 Main River and Tidal Flooding

South Fatfield has a high risk of both tidal and fluvial flooding from the River Wear with a number of properties at risk in this area. The fluvial flood risk from Biddick and Usworth Burn in Washington is relatively low, with the majority of Flood Zones constrained to parks or rural land lining the watercourses.

4.2.6.2 Local Flooding

The NW Drainage Area of Washington Central has been identified as a CDA within the SFRA due to the level of surface water risk and high number of properties currently on Northumbrian Water's register.

The area surrounding Nissan, largely consisting of undeveloped land, has a high risk of surface water flooding and is also known to be at risk of groundwater flooding[7]. NW records identify a low risk of sewer flooding.

The Washington area was significantly affected by the 2012 local flooding event. Locations flooded by surface water drainage and runoff in 2012 include:

Albany Village Primary School

Albany Estate

Holley Park / Lambton Primary School and nearby houses

Raby Road, Oxclose

Blackfell Primary School

[7]Sunderland City Council Level 1 Strategic Flood Risk Assessment Volume II: Technical Report (2010)

Biddick Primary School

Other locations where there have been road gulley and other surface water flooding include Waskerley Road and Coach Road Estate, Usworth. There are also issues with footpath gullies in various locations throughout Washington.

4.2.7 Reservoirs and other Artificial Sources of Flooding

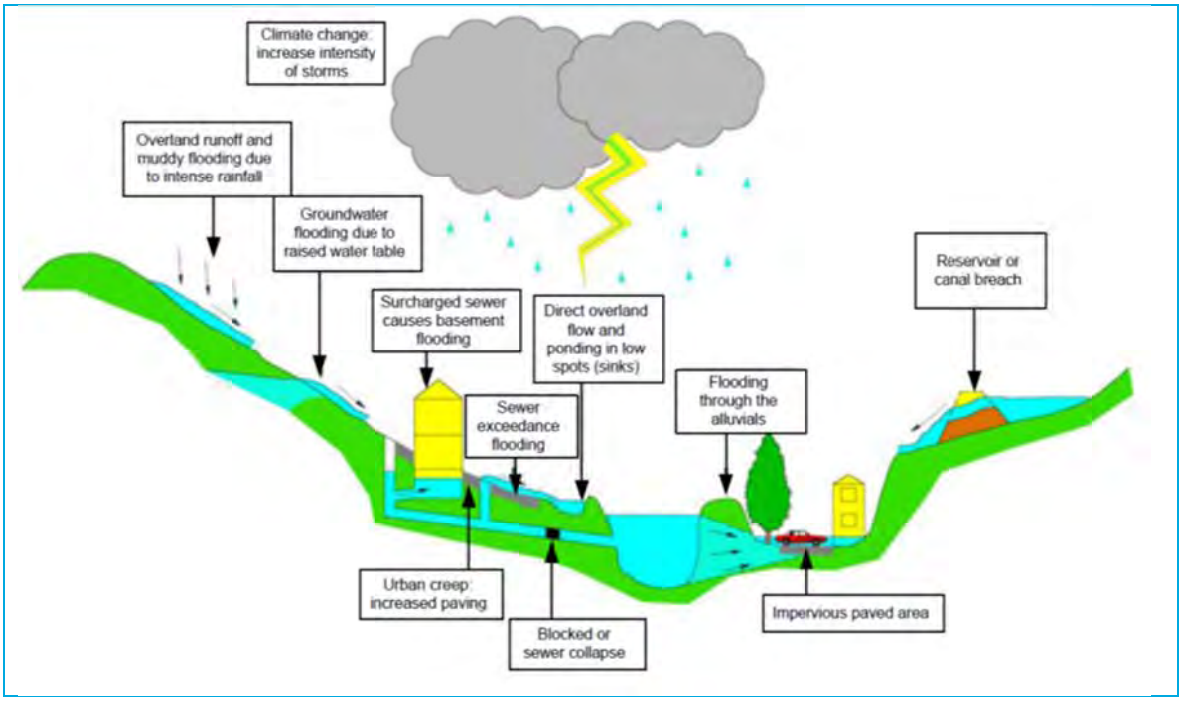
According to the EA's Register of Reservoirs, there are no 'large raised reservoirs' directly located within the boundaries of Sunderland or surrounding local authorities. There are a number of smaller water bodies within Sunderland - such as Swan Industrial Estate reservoir in Washington, Joe's Pond in Houghton-le-Hole, Lyon Lake and Blossom Pond in Hetton-le-Hole and the lakes surrounding the sports complex at Silksworth - however they pose little risk of flooding to the surrounding areas.

4.3 Overview of Local Flood Risk Sources

The council has a number of responsibilities related to local flood risk sources (highway surface water drainage, ordinary watercourses, surface water runoff and ground water); these are described below and shown in Figure 4-4.

Sunderland is also at risk of flooding from main rivers and the sea and as a coastal authority has responsibility for coastal protection. Flooding from the sea and main rivers is the responsibility of the EA, but the LLFA has an overview of all sources of flooding. The LFRMS assess the risk from local flooding but the future investment plan (Chapter 5) will include all sources of flood risk and coastal erosion.

Figure 4-4: Flood sources



4.3.1 Surface Water Flooding

Flooding of land from surface water run-off is usually caused by intense rainfall that may last less than an hour or for a prolonged period of time. The resulting water follows natural valley lines, creating flow paths along roads, through and around developments and ponds in low spots, which often coincide with fluvial floodplains in low-lying areas. Surface water runoff can also exceed the capacity of the local drainage network and affect areas not obviously susceptible to flooding from the local topography.

4.3.2 Groundwater Flooding

Groundwater flooding occurs as a result of water rising up from the underlying aquifer or from water flowing from abnormal springs. This tends to occur after prolonged periods of high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at shallow depth.

There are several mechanisms, which produce groundwater flooding including prolonged rainfall raising groundwater levels, high in-bank river levels, artificial obstructions and groundwater rebound.

4.3.3 Ordinary Watercourse Flooding

Flooding of watercourses is associated with the exceedance of channel capacity from either high flows or local factors such as online structures and obstructions.

There are 37km of ordinary watercourses in Sunderland, which come under the management of the council. Most of these watercourses are often rural in nature and include tributaries to main rivers (River Wear, Don, Lumley Park and Usworth Burn); however, those which are situated along the eastern side of Sunderland flow directly into the North Sea.

There are also a number of smaller watercourses or drains throughout Sunderland, known as Gills, which drain golf courses, ponds and woodlands surrounding the River Wear.

4.3.4 Interaction with Main Rivers

Many of the sources listed above connect to the main rivers in Sunderland, for instance ordinary watercourses and drainage systems outfall into main rivers. Flooding mechanisms associated with these interactions are often the result of flow backing up because another source (such as a river) has prevented it from discharging normally. It is recognised that the most severe flooding is often caused by a combination of different sources, which along with flooding with no obvious cause, fall under the duties of the LLFA.

4.4 Climate Change

We have sufficient confidence in large-scale climate models to know that we must plan for change. There is more uncertainty at a local scale, but model results can still help us plan to adapt. For example, we understand rainstorms may become more intense, even if we are unsure about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09) are that there could be up to three times as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance, or rarer) could increase locally by 40%.

Climatic changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability. Wetter winters and more of this rain falling in wet spells may increase river flooding in both rural and heavily urbanised catchments. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we should be prepared for the unexpected.

Rising sea or river levels may increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses. Sustainable development and drainage will help us to adapt to climate change and to manage the risk of damaging floods in the near and distant future.

4.4.1 Key climate change predictions for Northumbria River Basin District

If emissions follow a medium future scenario, UKCP09 projected changes by the 2050s relative to the recent past are:

- Winter precipitation increases of 10% (very likely to be between 0 and 23%);
- Precipitation on the wettest day in winter up by 11% (very unlikely to be more than 24%);
- Relative sea level at Wearmouth very likely to be up between 7 and 38cm from 1990 levels (not including extra potential rises from polar ice sheet loss); and
- Peak river flows in a typical catchment likely to increase between 8 and 13%.
- Increases in rain are projected to be greater near the coast than inland.

4.4.2 Climate change in the LFRMS

The impact of climate change has been taken into account in the assessment of local flood risk and the development of actions. Section 4.5.1 describes the Strategic Flood Risk Assessment (SFRA) where all potential flood risk locations were identified based on extreme weather events. The summer floods of 2012 in Sunderland revealed that if high intensity rainfall falls on an urban area, flooding can be expected in any low lying area and the flood flow pathways to those areas. The SFRA has identified all locations at risk now and in the future due to climate change. However, all locations cannot be protected and investment will be focussed on locations that have flooded in the past. One of the LLFA tasks will be to monitor locations that are potentially at risk in the future and plan around this through development planning, emergency planning and other non-structural measures where appropriate. The LFRMS Action Plan provides more details on future LLFA actions.

4.5 Local Flood Risk Assessment

One of the main outputs of the LFRMS is to identify the main local flood risk locations where measures are required to reduce the risk. Measures used to manage flood risk in Sunderland are discussed in Chapter 5. Before measures are proposed, it is necessary to find the locations of greatest risk and need.

Limited resources means that measures to manage flood risk cannot be implemented in all flood risk locations. The Investment Plan summarised in section 5.3 is one of the main outcome of this prioritisation in terms of future FRM schemes. However, locations where schemes are not possible in the short term (or at all) may still be suitable for other measures. All measures for flood risk locations and generally across the city, are in the LFRMS Action Plan (see Appendix B).

4.5.1 Strategic Local Flood Risk Assessment

A strategic assessment of local flood risk has been undertaken using the EA's updated Flood Map for Surface Water (uFMfSW). This assessment is required as the first step to a transparent approach to prioritising flood risk management measures. The criteria for identifying the strategic locations of greatest risk has been chosen based on the LFRMS objectives set out in Chapter 3.

At a high level, for the purposes of risk assessment, the objectives focus on the principle of sustainability by reducing risk to people, the economy and the environment. The risk to these indicators has been identified using the following data.

- Reduce risk to people – residential properties in National Property Dataset (NRD)
- Critical services and infrastructure[8] – used an EA approved GIS rule to extract from NRD
- Economic impact of flooding – number of properties at risk from the NRD

The risk level for each of the categories above has been aggregated to 1km square grids using the following scoring criteria:

- Risk to people – within the 1km square, residential property at risk from the 1 in 30 year event are multiplied by 2 and then added to residential properties at risk from the 1 in 100 year event. 1km squares that have a score over 100 are classed as areas where there could be a significant risk of local flooding to people.
- Risk to critical services and infrastructure – within the 1km square, critical services and infrastructure at risk from the 1 in 30 year event are multiplied by 2 and then added to critical services and infrastructure at risk from the 1 in 100 year event. 1km squares that have a score over 4 are classed as areas where there could be a significant risk to critical services and infrastructure.
- Risk to the economy – within the 1km square, all properties at risk from the 1 in 30 year event are multiplied by 2 and then added to all properties at risk from the 1 in 100 year event. 1km squares that have a score over 150 are classed as areas where there could be a significant risk to the economy.

This leaves three sets of 1km grids for SCC, showing the level of risk to people, critical services and the economy.

The risk level for each of the categories above was aggregated to 1km square grids. The 1km square grids have been ranked so that the areas of greatest risk to the economy, people and critical infrastructure could be identified. This is the first pass at identifying the locations of greatest risk in the city. But measures will not be proposed based on this information alone. Further screening based on national assessment criteria and consultation will be required; the next step in the process is adding local detail.

However, this prioritisation mapping can be used by the City Council for the future assessment of risk and the maps are available in Appendix A3.

4.5.2 Local detail - workshop

The local detail to the strategic assessment (described above) was added through data collection and a workshop with stakeholders who have on the ground knowledge of flood risk at a local level. The local data and knowledge collected during the workshop, has been used to confirm the high risk locations. Local flood risk is obviously localised in nature, so there is a need to depart from the strategic assessment at an early stage. Measures to manage local flood risk can be very specific and are often linked to one specific asset.

[8] Care homes, electricity generating stations (power stations), electricity sub-stations, gas works, hospitals, local authority depots, oil refineries, police, ambulance and fire stations, pylons, cables and pipelines, schools, sewage treatment works, telephone exchanges, village halls, water treatment works.

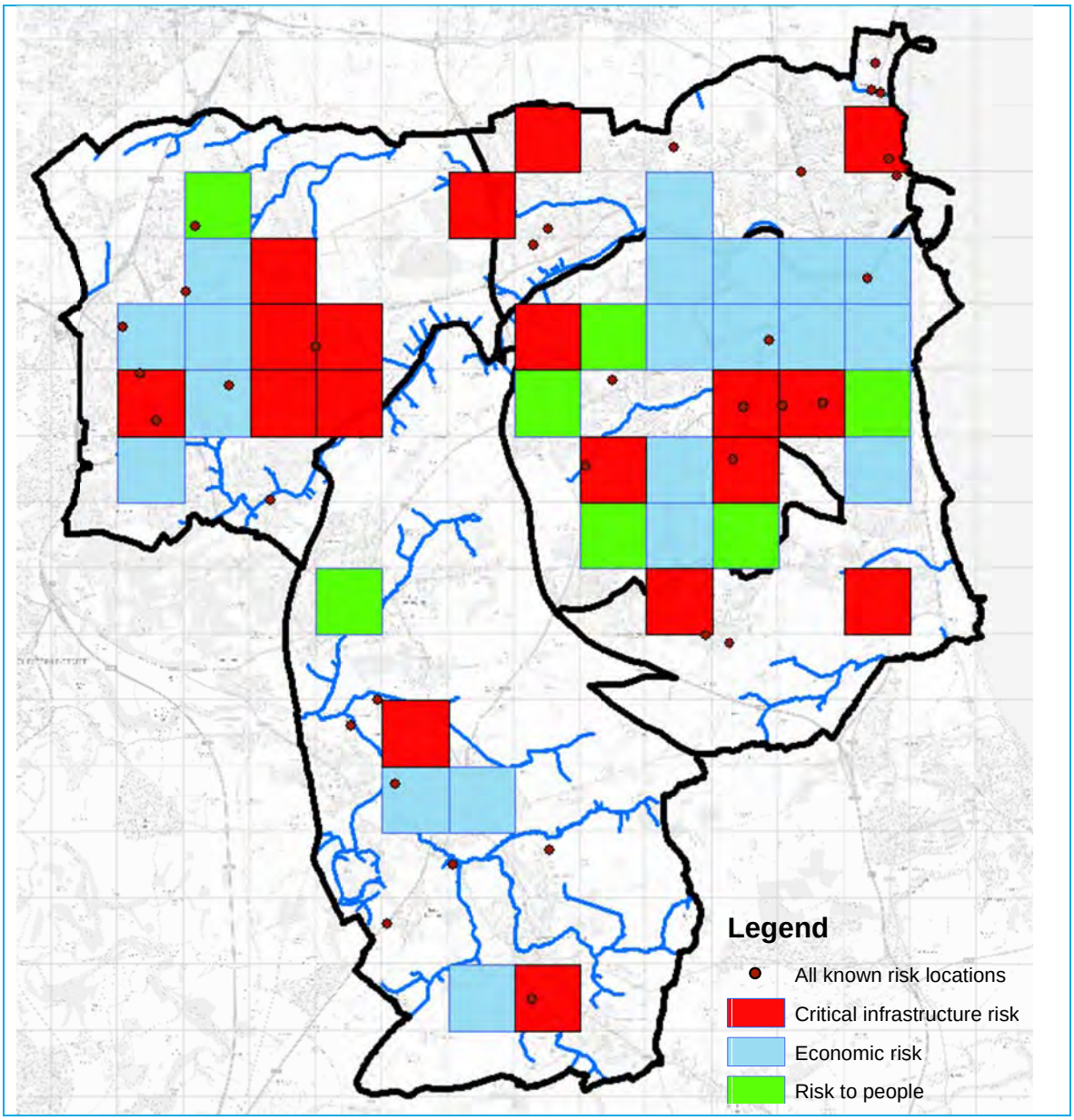
Historic risk data has been used during the LFRMS to provide further detail on where the greatest risk is in the city. The results of the risk assessment are provided in section 4.5.3. The historic risk mapping is available in Appendix A3 and example mapping is provided below.

The risk information and local knowledge was used to prioritise the locations of greatest risk. Risk locations for the LFRMS investment plan need to have a known history and high risk from the strategic assessment. For each risk location identified, one of the following responses has been confirmed:

- Potential capital scheme for the short term investment plan
- Potential scheme but not for the longer term investment plan
- Multiple benefit environmental scheme
- Development and flood risk issue
- Smaller, quick win (e.g. PLP, increased maintenance)
- Not a flood risk problem

Figure 4-5 shows the strategic flood risk assessment to critical infrastructure/services, people and the economy along with all the flood risk locations identified in the local detail workshop.

Figure 4-5: Strategic flood risk and local detail



4.5.3 Main locations of risk

Figure 4-6 and Table 4-1 show the risk locations where structural flood risk management measures may be required in the short/medium term (different types of FRM measures are discussed in Chapter 5). These are locations where the strategic assessment, workshop and further discussions have confirmed that there is a flood risk and some form of intervention is required. Full details of the identified risk locations can be seen in Appendix E. The potential schemes are presented in the LFRMS Investment Plan in Section 5.3.

Figure 4-6: Potential scheme locations with reference numbers

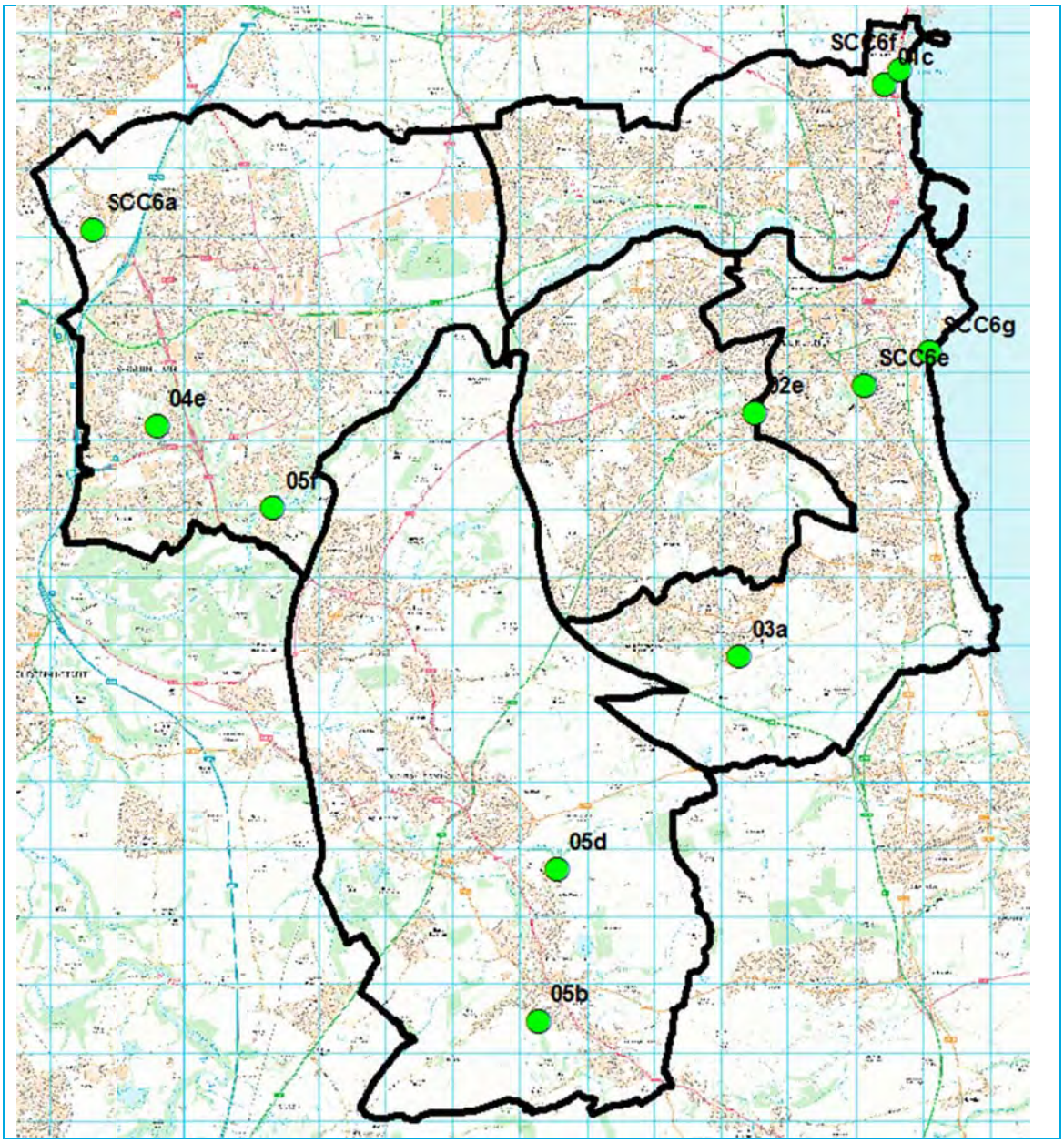


Table 4-1: Scheme locations identified for the short/medium term plan

Location		Properties at risk	Potential Measures
Cut Throat Dene	01c	10	Landscaping, drainage and flood mitigation works around 'Cut Throat Dene' watercourse in Seaburn.
Hendon Burn, Frinton Park	02e	10	Regular maintenance of culvert and widening of culvert. Better land drainage, increased gully capacity and better soakaway.
Craigwell Drive	03a	20	Field drains, land drains or flood defence systems.
Holley Park schools and houses.	04e	30	Drainage ditches need reinstating to protect property.
Borrowdale Street and Lambton Drive	05b	12	Overland flows affecting private property.
Dene Street	05d	6	Overland flows affecting private property.
Fatfield	05f	37	Larger EA flood alleviation scheme possible.
Beech Grove, Springwell Village	SCC 6a	39	Potential to divert overland flows from field away from properties.
Hendon Burn Culvert at Toward Road	SCC 6e	29	Deformed section of the brick arch culvert requires investigation and possible repair.
Strategy Frontage 1 - South Bents &Seaburn Sea Walls Overtopping Protection	SCC 6f	15	Scheme to mitigate damage to property resulting from flooding due to coastal overtopping.
Strategy Frontage 3 (Hendon Foreshore Barrier / Stonehill Wall / SW Breakwater)	SCC 6g	20	Capital works required to upgrade the existing South West Breakwater defence, extend the rock armour protection to Stonehill Wall and provide a new Hendon Foreshore Barrier defence.

Prioritising the investment plan schemes (section 5.3) will be based on a number of factors including:

- Level of actual risk to people e.g. number of houses flooded and frequency. Has a flood event significantly impacted on the community?
- Actual risk to critical services and infrastructure e.g. flooded schools in 2012.
- Impact on the economy. Damage caused by the flooding, impact of flooding on businesses.
- Deliverability i.e. is a large expensive scheme required with a poor Partnership Funding (PF) % score and little opportunity for contributions, or is there a quick win available? Section 5.3 provides more information.

Selecting a prioritised list of flood risk locations is complex, however it is still possible to be open and transparent about where funding resources should be

directed. Funding is limited, but we can prioritise based on the methods described in section 4.5.

4.5.4 Beneficiary mapping

A set of maps similar to the risk assessment maps have been developed but showing how the flood risk locations potential interact with other drivers. In summary, these maps have been developed to identify:

Beneficiaries to flood alleviation schemes.

Locations where there could be a combined scheme from multiple flood and coastal protection sources.

Potential scheme partners who could contribute funding, knowledge, data or combine a scheme.

Schemes that may have multiple beneficiaries e.g. enhanced amenity space, environmental enhancement, future development, etc.

These maps can be seen in Appendix D and their use has been described in more detail in Chapter 5.

5 Measures to Manage Flood Risk

This section of the strategy describes the measures that will be required to manage local flood risk and the scale of investment required to deliver these measures. We will work with other organisations to manage flood risk now and into the future.

5.1 Non-structural measures to manage flood risk

Non- structural and structural measures will both be required to manage local flood risk across the city. Non-structural measures have been described in this section and include activities such as emergency planning, spatial planning policies to reduce flood risk on new developments and determining overarching approaches for regulating ordinary watercourses.

5.1.1 Development control and planning policy

Planning Policy

The FWMA 2010 and National Planning Policy Framework (NPPF) 2015 have significantly changed the focus on flood risk management. The importance of sustainable development is central to both and influences flood risk, spatial planning policy and development management. The City Councils Core Strategy and supporting technical documents on the City Council's local planning policies have been taken into account in the preparation of the strategy. It identifies the need to tackle flood risk and should therefore be used to set the strategic scope and monitoring mechanisms within local planning policy. Planning can influence flood risk measures though strategic policy allocations, policy measures and requirements of SuDS, master planning, design and enforcement.

From April 2015 the LLFA became a statutory consultee for all major Planning Applications under the NPPF. A national non-statutory technical standard was issued by DEFRA to back this change to legislation.

Under these changes discharge rates from Brownfield Sites are recommended to be as close as reasonably practicable to Greenfield run off rates, but should never exceed the rate of discharge from the development prior to redevelopment for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event. To take the confusion away from what is reasonably practicable the city council will require all Brownfield Sites to discharge at Greenfield run off rates to help protect the city from future flood risk.

Greenfield sites should be design at Greenfield run off rates for the 1 in 1 year rainfall event and the 1 in 100 year rainfall events. Both Greenfield and Brownfield sites should be checked on a 6 hour rainfall duration and any flooding constrained within the development site causing no flooding to any buildings. The flood water must be able to enter back into the system.

Under the changes all major Planning Applications should also include some form of SuDS attenuation and source control.

Critical Drainage Areas

The SFRA completed in 2010 identified a number of Critical Drainage Areas (CDAs) across the city. CDAs are areas of developed land or undeveloped land that have critical drainage issues or could increase the strain upon the drainage system if developed upon. CDAs should ensure that new development is not at

risk from surface water flooding but also that it does not increase risk to existing development.

The following CDAs were identified across the City Council in consultation with NW:

- Barnes Burn & Hendon Burn
- Houghton & Hetton
- Herrington
- Seaburn & Roker
- Washington Central

The SFRA provides more details on the reasons for the CDA and specific recommendations that go with each area.

CDAs have strict guidance on how surface water drainage is taken into account in future development. The LFRMS affirms the recommendations made in the SFRA which includes site specific guidance for new development. The LLFA has the option to add local criteria to the National SUDS Standards that future development will have to adhere to. The LLFA may recommend that the CDA guidance becomes part of local supplementary planning guidance.

5.1.2 SuDS Approval Board (SAB) Role (still to be implemented by Government)

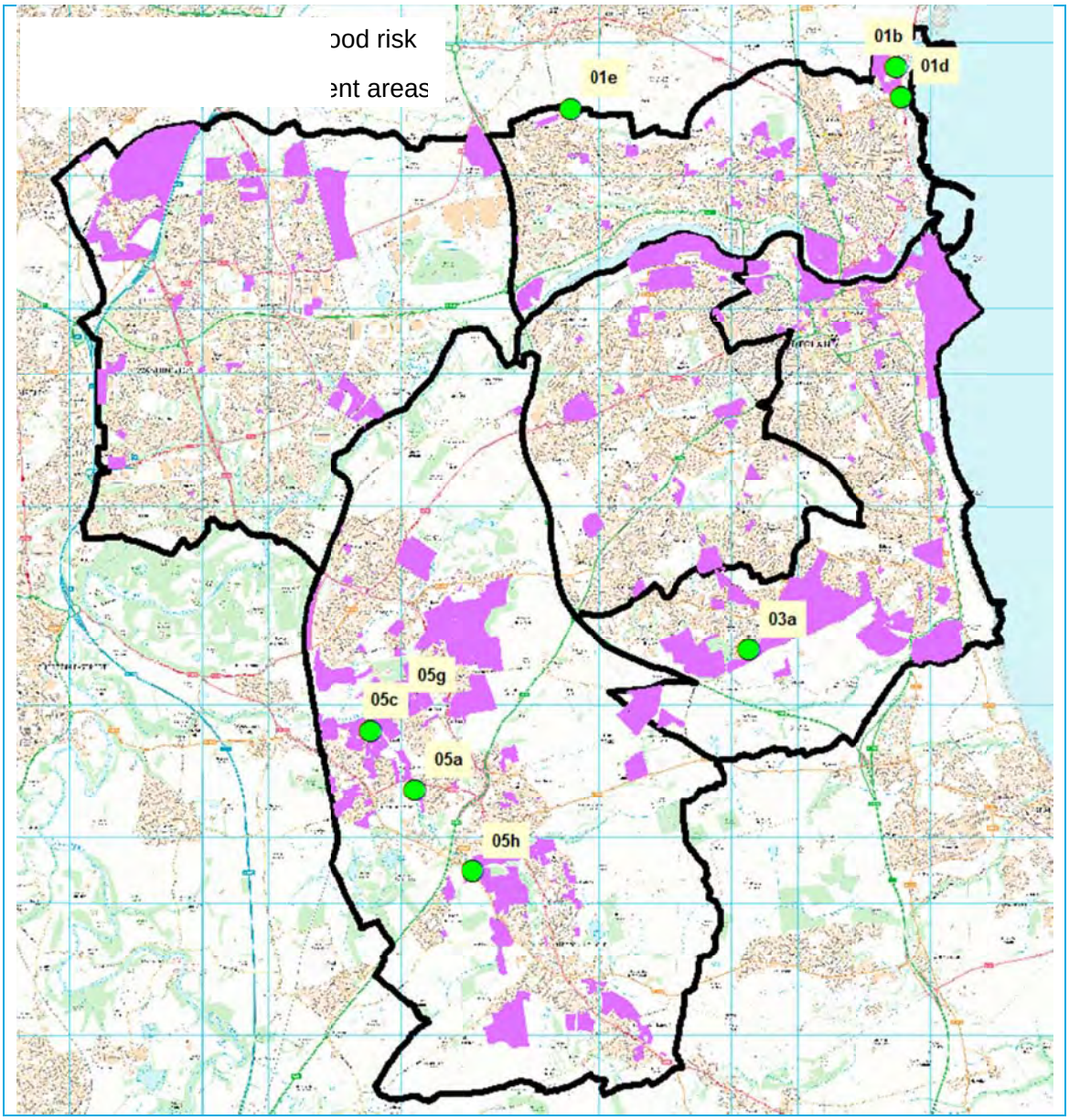
The responsibility for the approval process lies with the City Council. The SuDS approval process is integrated into the NPPF, the LLFA have a role as statutory consultee. Being at the forefront of the SuDS approval process will affect local decisions on planning and drainage and will make a significant contribution to the vision of the Local Plan Core Strategy.

Flood Risk and Development

The strategic assessment of local flood risk, subsequent workshop and the beneficiary mapping (see section 4.4) identified locations where flood risk and development conflict, or present opportunities to reduce risk and enhance future development. The Action Plan (see Appendix B) identifies specific actions relating to flood risk and development, the other flood risk locations do not present an immediate conflict with potential future development. The flood risk assessment (see Appendix C) shows specific locations where there are flood risk and development issues that need to be addressed by the LLFA and Strategic Flood Risk Group (incorporating planning and development control functions). These locations are listed below and shown in Figure 5-1:

- 01b – Seaburn Camp, Sunderland North
- 01d - Whitburn Road end of Dykelands Road, Sunderland North
- 01e - Downhill Pond, Sunderland North
- 3a – Craigwell Drive, Sunderland East
- 05a - Dairy Lane, Longacre, Aireys Close, Dunelm Drive, Coalfield
- 05c - Osman Terrace, Coalfield
- 05g – Sedgeletch Road (Beehive), Coalfield
- 05h - Mill Terrace/Red Burn Row, Coalfield

Figure 5-1: Locations where flood risk and development potentially conflict



The LLFA and Strategic Flood Risk Group may choose to recommend one of the following actions for these locations:

Formalise areas to be left as open space in order to make space for water within the future development plans. These will often be combined blue/green corridors that can be used for flood management and SuDS.

Surface Water Management Plan –to understand surface water flood risk in a specific location and identify solutions to the existing flood risk and recommendations for future development.

Update location specific Level 2 SFRA – where there are strategic flood risk issues related to a larger development area. Either update the existing assessment or new areas may need to be assessed.

Drainage Impact Assessment – produced by a developer for larger sites, recommendations may include a strategic SuDS solution.

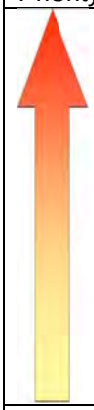
5.1.3 Flood investigations

As LLFA the council has a duty to investigate flood incidents. Key points for this new duty are provided below. In summary, the process involves:

- recording incident details
- post incident review
- determining level of investigation
- agreeing criteria for undertaking an investigation
- collecting information
- agree procedures for publishing investigation reports
- recording of flood information, incident reports, investigation reports and map related data.

Not all flood incidents will justify a fully reported investigation but there is no provision in the FWMA on the criteria for deciding whether a flood incident should be investigated. Flood investigations can require substantial resources in terms of time and money; incidents should only be investigated if it is deemed important enough based on an agreed threshold. Despite this, where a formal investigation is not required information on all flood incidents maybe collected. Table 5.1 below shows the trigger for when a local flooding incident will require an investigation.

Table 5-1: Criteria for flood investigations

Priority	Incident	Formal Investigation and Reporting
	Internal flooding >10 properties in one location	Always
	Flooding to priority highways making the road impassable for over 24 hours	Discretionary
	Flooding that has led to a risk to life	Discretion – depending on the nature of the incident
	Flooding to critical and vulnerable services e.g. schools, electricity sub station	Discretion – depending on the severity of the impact
Depending on the nature and severity of the event, the council will investigate other flooding incidents at its discretion.		

Investigating flood incidents will help in the management of flood risk. Initially, agreement can be made within the City Council's Strategic Flood Risk Group on how the response to the flood incident can be improved and if there are vulnerable receptors that need special attention. The initial investigations should allow us to prioritise and assess possible solutions to manage the risk.

Investigating flood incidents is also an important part of engaging the communities affected by the flooding. Residents and community representatives should be interviewed to find out how the flooding has impacted them, why they think the flooding happened and the type of protection they could benefit from if a scheme is feasible. The investigation of flood incidents should include a follow up with the community affected and the response fed back to the LLFA contact.

5.1.4 Emergency response

Our Emergency Planning team has a key role to play in the management of flood risk. The Emergency Planning Unit provides the link between the City Council and the emergency services. There should be clear lines of communication, positive partnership working and an agreed joint strategy between the LLFA and Emergency Planning Unit. The duplication of initiatives should be avoided. Representatives from the Emergency Planning Unit will be members of the Strategic Flood Risk Group. Key flood risk responsibilities for our Emergency Planning Unit include:

- Coordinating emergency support following a flood incident and working with the other Category 1 and 2 responders as part of the multi-agency response to floods.
- Provide and coordinate emergency assistance and recovery during and immediately after a flood including: rest centres, managing traffic networks, etc.
- Liaising with critical service providers.
- Deal with and manage environmental health issues following a flood, such as contamination and pollution.
- Provide advice and support to the public and businesses. This should include assisting in business continuity plans and emergency response plans.

The LFRMS includes a strategic assessment of flood risk across the city (see Section 4.5). This should be reviewed along with other emergency planning data to agree upon a list of the most vulnerable locations following heavy rainfall, based on the vulnerability of the residents, critical infrastructure and the physical flood hazard. Other actions linked to Emergency Planning can be found in the Action Plan.

5.1.5 Register of flood risk features

The LLFA is required to establish and maintain a flood asset register. The flooding asset register should include all key assets (i.e. structures and features) that influence flooding of properties and critical infrastructure and record where the asset is not functioning to an adequate level.

The flooding asset register will be in the form of a database, it should be used to:

- Inform the public of key flooding assets in their area;
- Inform the City Council LFRMS;
- Assist in the investigation of flood events; and
- Assist in formulating maintenance regimes.

By collecting and recording this information, we will be able to manage flood risk by:

- Developing a prioritised programme of maintenance regime based on the assets that present the greatest risk to people, property and the environment.
- Being able to quickly identify who is responsible for a flood incident/asset.
- Producing guidance for others on how to maintain their assets.

5.1.6 Designation of features

The FWMA provides flood authorities with powers to designate 3rd party structures and features that affect flooding or coastal erosion, which are not directly maintained by them. The powers are intended to overcome the risk of a person damaging or removing a structure or feature that is on private land and which is relied on for flood or coastal erosion risk management. Once a feature is designated, the owner must seek consent for the authority to alter, remove or replace it. If someone does make a change to a designated feature, then the authority may issue an 'enforcement notice' which will set out any steps that must be taken to restore a feature.

Designating features will help us manage flooding by ensuring that owners do not inadvertently alter structures and other features and potentially increase flood risk to themselves, their neighbours and the wider community.

The Council will designate structures and features that affect flooding and coastal erosion. This is one of the actions presented in the Action Plan (see Appendix B).

5.1.7 Enforcement and consenting

The FWMA transferred the Section 23 powers of the Land Drainage Act 1991 to LLFAs. The new legislation underpins the regulation of ordinary watercourses.

As part of this updated legislation, we must preserve, enhance and promote conservation, recreation and public access in its regulation of Ordinary Watercourses. Case law has interpreted preserve to mean not harmed. Conserve and enhance has been interpreted to be avoidance of harm and enhance.

By consenting or rejecting works on Ordinary Watercourses, we will have another tool to manage flood risk. We can do this by ensuring that works on or near to a watercourse do not increase flood risk. We will also be able to reduce the negative impact works and development has on the environmental and amenity value of the watercourse in question.

The council will consent and enforce works that will impact on Ordinary Watercourses. This is one of the actions presented in the Action Plan (see Appendix B).

5.2 Structural measures to manage flood risk

This section describes the structural measures that may be needed to manage flood risk. As LLFA, we have powers to undertake works to manage flood risk from all local flooding sources, surface water, ordinary watercourses and groundwater flooding. We already have powers to undertake works on ordinary watercourses; under the amendments of the Land Drainage Act 1991 by FWMA 2010 this role stays with either district or unitary authorities. All FRM works undertaken must be consistent with this LFRMS.

Structural measures could include activities that range from changing land management practices to building a flood defence wall. Examples of structural response to flood risk are listed below. Within Sunderland's LFRMS, there has been an attempt to promote schemes that deliver multiple benefits including environmental improvement.

Structural responses within a settlement and close to the risk location include:

- Large capital schemes e.g. culvert upgrade and raised defence
- Strategic large scale SUDS for new development and drainage design
- Allowing for flood storage space in new development

- Managing overland flows and use of blue/green corridors and green space to redirect flood flow paths through e.g. kerb raising
- River restoration including daylighting problem culvert watercourses
- Property level protection
- Increased maintenance

Structural responses within a catchment and upstream from the risk location include:

- Land management
- Local attenuation through: small scale strategic wetlands, woody debris in streams, etc.
- Large scale upstream attenuation wetlands and basins

The rest of this chapter explains how the LFRMS has identified locations where structural measure to manage flood risk may be required. The chapter also looks at the financial viability of delivering a package of schemes.

5.3 Investment planning

Defra introduced Resilience Partnership Funding for FCERM in May 2011. The new partnership policy means that Government money (Flood Risk Management Grant in Aid – FRM GiA) is potentially available to meet the costs, partially or in full, of any worthwhile scheme, instead of meeting the full costs of just a limited number of schemes. The level of funding is now based on the desired Outcome Measures being delivered.

In developing the LFRMS, there is an opportunity to align stakeholders, particularly funding partners, with those who would benefit from further investment in flood risk management. Within this process, developing options for investment will need to test the local appetite for reducing the risk against willingness to meet any additional costs not covered by central government support via GiA.

We will need to develop a Strategic Investment Plan as part of this LFRMS to ensure funding will be available to support the management of flood and coastal risks. The purpose of an Investment Plan is to assess the challenges of funding local FCERM projects, balancing the benefits of tackling each source of risk over time against the national and local costs of doing so. In explicitly trading-off appetite for risk against investment costs and affordability, it is hoped that the resulting local Investment Plan will create:

- Good engagement amongst key decision makers, partners, communities and other stakeholders.
- More effective and transparent prioritisation between competing projects throughout the council and also between projects tackling different sources of risk (e.g. EA vs. LLFA).
- A compelling business case for external contributions and other local investment, by showing that relatively small amounts of local investment over time may have a big impact in terms of long-term residual risk for each sector and area, with implications for property and land values, and insurability.

The LFRMS has started the investment plan process by identifying schemes that are most likely to come forward in the short to medium term (see section 5.3.2). This includes the estimated PF% score and potential funding shortfall. The Council will need to plan how many of these schemes they intend to deliver and where the contributions are likely to come from.

LLFAs (and other flood RMAs) are required to submit a list of potential schemes, referred to as the Medium Term Plan (MTP), to the EA on an annual basis. The submitted list also provides the key information needed for the EA to assess what, if any, level of GiA support is possible. This assessment includes the performance of the scheme in delivering against Defra Outcome Measures. A "Sanctioned List" is then published for each region confirming the allocations. This includes a list of schemes that have GIA allocated to them, or are likely to have GiA allocated to them, for the next 5 years

The LLFA have an important role to play in this process; along with the EA and RFCC, the council are important decision makers in terms of support for the MTP and influencing which schemes within the region are allocated GiA.

Therefore, the priority is to find local funds to support bids for GiA by using the incentive of GiA to lever in local contributions. Political and community engagement is also required. Local priorities need to be established, communicated and adhered to. Also, where schemes are not likely to be supported by RFCC and therefore GiA is unlikely to be allocated, this needs to be clearly communicated to the local community and relevant authority. With technical support from the City Council, this enables partners to take local ownership of the specific flood risk issue.

The process of developing an Investment Plan requires managing the following:

Number of properties and level of risk – the investment plan can be based singularly on risk. However, in reality, other factors will be forced upon this plan.

Political and community priority – certain locations may have a higher profile due to recent flooding and other priorities outside of the risk assessment.

Availability of partnership funding and deliverability – is a scheme more achievable due to the PF score and contributions, even if it is not a high priority risk location?

Many small schemes or one large scheme – one large scheme may deliver more GiA and more benefits than many small ones. However, this approach would put a lot of funds in one location and may not be acceptable across communities.

5.3.1 Funding for flood risk management

The majority of the funding for FCERM is through grants from Defra to the EA. In recent years, large numbers of applications for this funding led to an increase in the priority for eligibility, so that only high-priority investments were likely to be successful. However, recent changes in the allocation of Defra funds mean that any worthwhile project is eligible for at least some funding based on the benefits being delivered in each case. This is known as Flood and Coastal Resilience Partnership Funding to provide FCERM GiA.

Local authorities can apply for a grant for capital investment from the EA to create new or improved flood risk and coastal erosion management infrastructure and tackle groundwater and surface water issues. Other sources of funding should now be sought to supplement FCERM GiA. The most common sources are summarised below and Table 5.2 presents the main funding opportunities in Sunderland.

- FCERM GiA - Funding raised through general taxation for FCERM projects.
- Regional Flood and Coastal Committee (RFCC) Local Levy - Money raised from LLFAs for additional flood risk and coastal erosion management priorities not funded by FCERM GiA.

- Council Reserves and existing budgets – Internal funding for drainage and flood defence works.
- Private beneficiary investment ('beneficiary pays') - Voluntary contributions from private beneficiaries of flood risk management. Could include local businesses, landlords, etc.
- Water company investment - Funds raised through the price review process. Water companies are able to invest in some types of surface water management, and increased resilience for their assets.
- S106 (Town and Country Planning Act 1990) - Contributions from developers, linked to specific developments and the infrastructure required to make them acceptable in planning terms.

5.3.2 Partnership funding

Defra Flood and Coastal Resilience Partnership Funding nationally is estimated to be around £259 million/year[9]. Clearly it is very likely that a large proportion of the funding for individual schemes will need to come from alternative / local sources.

The following are key aspects of developing a Plan:

- What funding do we have available that can be directed to a scheme of their choice? This type of funding is very useful as it can be used to "top up" schemes to lever in funds such as GiA or can be used to fully fund strong local priorities. Local Levy is currently the best example of this. Decisions on how to use such funds are a key responsibility for the LLFA and local FCRM partnership.
- Could more flexible funding be found if communities and their political representatives were consulted and engaged? What impact would this have?
- Understand what GiA may be forthcoming for each scheme and in total. And how allocating more (or less) Partnership Funding affects the amount and probability of obtaining GiA.
- What impact would changes in the general economic / funding picture have?

Based on discussions and through data gathering, the following table has been produced as an estimate of the partnership funding that may be available for future schemes.

Table 5-2: Potential partnership funding sources

Source of funding	Per year or lump sum	Estimates over 5 years Min	Max	Scheme/location tied or felxible
Known sources:				
Defra LLFA grant	£120k/year. From a third to a half of this could be available for capital projects	£0k	£100k	Fully flexible
Local Levy	£200k/year. From half to all of this could be available for capital projects. Non-specific studies will not count towards a specific capital project (e.g. Sunderland culverts).	£100k	£1,000k	Fully flexible
Streetscene/Highways capital budget	£500k/year for 2 years predicted. From half to all of this could be available for the specific projects	£500k	£1,000k	Flexible but on in land flooding schemes

[9] Report by the Comptroller and Auditor General, Department for Environment, Food and Rural Affairs and
Environment Agency, Flood Risk Management in England, HC 1521, October 2011, p 13

	identified.			
Streetscene/Coastal protection capital budget	Approximately £500k available over 3-5 years. From half to all of this should be available for coastal schemes.	£500k	£2000k	Flexible but on coastal schemes.
DCLG coastal communities fund	£500k one off	£500k	£500k	Seaburn master plan area for coastal and inland flooding schemes (e.g. Cut Throat Dene)
Potential sources:				
NW	£100k if the scheme is in AMP.	£30k	£100k	Possible for joint schemes and upland multi benefit schemes. Must align with NWs plans though. Only small amounts of funding can be diverted to schemes not on the AMP.
Section106, Section 38 & 278s etc.	£100k	£100k	£200k	This is the most likely source of private funding for schemes. This will be available when linked to development and the development is in the vicinity of a flood risk locations.
Catchment sensitive farming/stewardship grants	Land donations	£0k	£20k	This is possible for upland attenuation schemes where there are also environmental benefits. The landowner would receive the grant.
Large private businesses e.g. Network Rail	£100k possibly £millions if a significant asset is at risk of erosion (e.g. railway)	£0k	£500k	Only likely along the coastal frontage where the larger businesses are direct beneficiaries. Inland locations are predominantly within residential areas. Sunderland Port is owned by the City Council so this would not count as additional private funding.
Small local businesses	£100k (cumulative)	£0k	£100k	Only likely in the coastal frontage areas as direct beneficiaries (combined contributions).
Landowners and residents	£10k	£0k	£20k	Possible for upland management schemes. Residents would bring in very little. Increasing council tax will be difficult to pass for these smaller schemes.
Potential partnership funding over 5 years (min and max)		£2,415k	£6,140k	

5.4 Capital schemes for the short/medium term

This section aims to fulfil the following LFRMS sub-objectives (see chapter 3.2.2) through the identification and prioritisation of FCERM schemes. The relevant sub objectives are summarised below:

- Measures and schemes to be prioritised according to risk people, the economy and critical services/infrastructure.
- Protect the most vulnerable communities.
- Reduce the impact development has on flood risk to people and the economy.
- Support economic growth and regeneration through the funding of schemes and flood related activity.
- Investment can be targeted in the most cost beneficial way.
- Deliver schemes with multiple partners and funders.
- Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces.

5.4.1 Identification of schemes and measures

Section 4.4 described the process for identifying locations where a scheme is required in the short to medium term. These locations are shown with more details in Table 5-3. Appendix E provides a full description of the risk, where the information has come from and the potential solutions.

The next step will be to prioritise actions for the schemes including which should be promoted for the MTP and what supporting evidence is required to progress the scheme through the MTP gateways. The City Council and the Strategic Flood Risk Group should prioritise schemes based on the objectives developed for the LFRMS. It will not always be possible to progress with the scheme with the best cost benefit ratio of location of greatest flood risk. Other factors such as deliverability, partnership funding and political pressure will have a part to play.

Although locations have been identified where a scheme may be required, the type of scheme has not yet been confirmed. A wide range of measures should be considered and should include structural and non-structural approaches. Measures which will achieve multiple benefits, such as water quality, biodiversity and amenity benefits are encouraged and should be promoted where possible. The implementation of the Water Framework Directive will make this a significant consideration (potential funding) as will the ability to increase the PF% score by providing environmental benefits.

The next step for most schemes shown in Table 5-3 is likely to be investigations to gain a greater understanding of the risk which will then inform the identification of solutions (see Section 5.5).

Table 5-3: Short/medium term schemes for the investment plan

Scheme ref	Project Cost	Benefits	Raw PF Score	Contributions	Adjusted PF Score	FDGiA	Shortfall	No. of benefitting households	Level of deprivation of area (IMD)	Short scheme name / description (one / two words)
01c	£500k	£843k	20%	£300k	80%	£98k	£102k	10	Affluent	Cut Throat Dene
02e	£282k	£1,409k	46%	£k	46%	£129k	£153k	10	Affluent	Hendon Burn. Frinton Park
03a	£62k	£276k	41%	£k	41%	£25k	£37k	20	Affluent	Craigwell Drive
04e	£654k	£2,529k	30%	£k	30%	£192k	£462k	30	Moderate	Holley Park schools and houses.
05b	£300k	£1,656k	87%	£k	87%	£261k	£39k	12	Deprived	Borrowdale Street and Lambton Drive
05d	£51k	£828k	193%	£k	193%	£51k	£k	6	Moderate	Dene Street
05f	£975k	£1,554k	31%	£66k	33%	£234k	£675k	37	Affluent	Fatfield
SCC 6a	£432k	£1,628k	68%	£k	68%	£291k	£141k	39	Affluent	Beech Grove, Springwell Village
SCC 6e	£286k	£1,210k	167%	£k	167%	£286k	£k	29	Deprived	Hendon Burn Culvert at Toward Road
The City Council 6f	£652k	£4,300k	49%	£k	49%	£316k	£336k	15	Affluent	Strategy Frontage 1 - South Bents &Seaburn Sea Walls Overtopping Protection
SCC 6g	£3,400k	£20,000k	33%	£k	33%	£1,110k	£2,290k	20	Deprived	Strategy Frontage 3 (Hendon Foreshore Barrier / Stonehill Wall / SW Breakwater)
TOTAL						£2,993k	£4,235k			

5.4.2 Scheme costs, benefits and economic deliverability

Following the strategic assessment of risk, risk assessment workshop and scheme identification, there was a need to estimate the outline costs and benefits of the list of scheme. This is needed so that a Partnership Funding (PF) score could be estimated. The PF score will enable us to understand if schemes are likely to secure GiA or if scheme cost savings and/or contributions are required. This will help us plan schemes and the funding of feasibility studies. We have made initial estimates on scheme costs and the benefits delivered, using an EA tool and local knowledge. These initial estimates have been improved during the LFRMS by using Weighted Annual Average Damages values (WAAD – Multi-Coloured Manual[10]) based on the current level of risk (not just an average as used in the EA tool). The cost estimates were improved by using a spreadsheet tool developed in partnership with several case study partners involved in Defra R&D project FD2656 (Strategic Approach to FCERM Investment).

Table 5-3 shows that the 11 scheme locations identified would bring in nearly £3 million of GiA. However, £4.2 million of PF would need to be found to release the GiA for all schemes. Current PF predictions shown in Table 5-2 shows that we could raise between £2.7 million and £6.2 million from internal and external sources. With an optimistic outlook on funding availability and the required PF threshold, we should be able to fund the above schemes over the next five years. However, even the minimum predicted funding will require partnership funding from external sources. This minimum amount is not guaranteed and we will need to work hard with partners to secure funding and deliver successful applications for GiA.

There is particular financial pressure in delivering coastal schemes. Coastal erosion schemes are generally more expensive than in-land flood alleviation schemes meaning the shortfall will be much harder to meet than a smaller surface water scheme. We will need to raise significant sums if all the schemes identified in the Coastal Strategy are to be delivered. Unfortunately, significant sums of private funding along the city's coastline are unlikely so we will need to contribute larger sums or reduce expectations on the schemes that can be delivered.

The above assessment is also based on needing the required 100% PF score to gain GiA. However, in recent years, demand for the available GiA has been high, which means the required threshold has been much higher. A qualifying score of over 200% is not unrealistic. In order to reach a higher PF score schemes costs will need to be reduced, benefits increased or more partnership funding secured.

5.4.3 Quick win smaller schemes

The strategic risk assessment and workshops also identified locations where smaller quick win schemes or increased maintenance may be required. This is different from the schemes identified in Table 5-3, as these larger schemes will require a more detailed understanding of risk in a Project Appraisal Report (PAR) to apply for Flood Defence Grant in Aid (FDGiA) funding.

Some of these locations could get small schemes funded from existing internal (capital and maintenance) budgets without the need for a detailed study. Other

[10]Flood and Coastal Erosion Risk Management: A Manual for Economic Appraisal (Multi-Coloured Manual 2013)

RMAs e.g. NW may also have smaller budgets available for small scale schemes like the ones listed below. Opportunities should be identified and discussed through partnerships with existing groups and lines of communication. Small scale intervention like this can often make a big difference. These quick win schemes are listed below:

- 01a – Marine Walk
- 01f – Castletown Cemetery
- 01g – Rear of Almond Drive
- 01h – Rear of Helmsley
- 01i – Roker Ravine
- 02a – Noble Quay
- 04d – Albany Village Primary School
- 04g – Raby Road, Oxclose, Washington
- 04i – Blackfell Primary School
- 04j – Biddick Primary School
- SCC6b – Weardale Avenue, South Bents
- SCC6c – B1284 North Road, Hetton
- SCC6d – A19/A690 Interchange

5.5 Studies

5.5.1 PARs and Feasibility Studies

Successful GiA schemes are not always those which achieve the highest PF score. We will need to show that we have a viable scheme and robust information on scheme costs, benefits, deliverability with a contractor and firm commitments to PF. In order to get this information and increase the chances of securing GiA and external funding, we will need to undertake scheme specific studies for the locations identified in Table 5-3

A feasibility study would normally be the first step when a greater understanding of flood risk for a location is required. Hydraulic modelling of watercourses or sewer modelling may be required if the mechanism of flooding is not understood. However, in simpler cases, less complex surface water flow routing models can be used to estimate risk and identify solutions.

When a feasibility study has been undertaken or when a short list of scheme options are known, we will need to undertake a Project Appraisal Report (PAR). A PAR is a business case justifying the need for a scheme on social, economic and environmental grounds. The preferred option for a scheme should be economically viable, with a strong cost/benefit ratio, reduce risk to people and property to an agreed standard and be undertaken in an environmentally sensitive way with opportunities taken to enhance the natural environment.

Once a PAR has been completed, it will need to be approved by the EA. The large Project Review Group (LPRG) assures projects that cost more than £10 million (or if there are significant environmental impacts). Projects that cost between £100,000 and £10 million are assured by EA National Project Assurance Service (NPAS).

If the project needs assurance from LPRG, the council's project executive/manager will need to present the proposed project to a LPRG monthly meeting. If the project needs assurance from NPAS, a meeting is usually not needed but the project executive/manager may need to answer technical

questions through correspondence or teleconferences. If approved, EA will recommend the project for financial approval.

The schemes that look most immediately deliverable due to high PF scores are listed below. It may be worth focussing feasibility and/or PAR studies on these schemes first:

- 01c – Cut Throat Dene
- 05b – Borrowdale Street and Lambton Drive
- 05d – Dene Street
- 06e – Hendon Burn Culvert at Toward Road.

5.5.2 Studies the City Council are currently undertaking

We have already started, or plan to undertake a number of flood risk related studies, these are summarised below.

5.5.2.1 City wide culverts assessment (yet to start)

We have 20km of charted culvert throughout the city. An estimated 850 properties are located adjacent to culverted watercourses, any of which could potentially be at risk from culvert failure. A significant length of the culverted watercourse which has been identified requires structural inspection and assessment in order to establish base data of structural condition. From this data, a programme of maintenance, repair or replacement will be developed, depending on the condition encountered, and works commissioned.

The above work should provide us with good base data that will inform our improved maintenance strategy and asset register.

5.5.2.2 Whitburn Bay to Ryhope Coast Protection Strategy – further works

Following a public consultation on Phase 2 of the Coastal Strategy in Spring 2013 Natural England identified additional work related to the Strategy involving field survey work in Spring/Summer 2014. Recovery of these costs for these studies is being sought through the MTP GiA application process.

5.5.2.3 Houghton and Hetton Sustainable Drainage Study 2015

Working in partnership with NW and the EA, a study has been commissioned to collect , collate and analyse drainage/flooding information to identify locations of potential dependency and interaction between drainage systems in the Houghton and Hetton Drainage Area.

5.5.2.4 Washington North and Central

Working in partnership with NW and the EA, a study area has been identified to see what dependency and interaction there are between drainage systems and flooding in the Washington Area.

5.5.3 Development and flood risk studies

Section 5.1.1 (under the subheading of Development Control and Planning Policy) identified the locations where development and flood risk interact (see Figure 5-1). For these locations it may be appropriate to undertake a SWMP, SFRA update or a developer led Drainage Impact Assessment (DiA). These studies will allow a greater understanding of the impacts that development may have on flood risk and identify solutions integrated into future development.

SWMPs do not have to be related to future development. A SWMP may be undertaken where there is a need to understand and mitigate risk to an area of existing development. If there is a lack of knowledge of the surface water drainage system, connections, hydraulics etc., a SWMP is a good first step to identifying scheme solutions.

5.6 Multiple benefit schemes

As shown in the objectives, part of our corporate vision for the city is to 'become a clean, green city with a strong culture of sustainability, protecting and nurturing both its built heritage and future development and ensuring that both the built and natural environments will be welcoming, accessible, attractive and of high quality.'[11] This led to the following City Council LFRMS sub objective:

7a) Identify schemes and activities that fulfil WFD objectives and those that increase the use and safeguarding of green spaces.

The LFRMS and subsequent implementation offers an opportunity to work with the natural environment to deliver schemes that reduce flood risk and enhance the environment (Natural Flood Management – NFM). We intend to use the LFRMS to further promote these opportunities. One way in which we can do this, is in the planning and delivery of FCERM schemes.

FRM is just one benefit of managing catchment in an environmentally sensitive way. For example using blue and green corridors for flood flow pathways, upstream attenuation and land management can deliver other environmental amenity and economic benefits.

Examples of potential partners and funding sources for schemes that offer multiple benefits are below:

- Multiple sources of flood risk (partner with different RMAs)
- Improving water quality (NW and other private businesses that benefit)
- Increasing and improving water resources (NW)
- Increasing biodiversity through new habitat creation (Wildlife Trust, Natural England, EA, other environmental groups)
- Increasing amenity value (Local Authority, communities)
- Good place making and releasing development through sustainable flood risk management (LPA, developers)
- Meeting WFD objectives (WFD funding, EA partners).

Examples of schemes that offer multiple benefits in catchments upstream of problem location include NFM through:

- Upland attenuation through: small wetlands, farmland management, woody debris;
- Large scale upstream wetlands and attenuation basins.

Examples of schemes that offer multiple benefits in urban areas close to a problem location include:

[11] International Strategy for Sunderland 2008-2025, Sunderland Partnership

- Strategic large scale SuDS for new development;
- Use of blue/green corridors for flood flow pathways;
- Use of urban green space to redirect flood flow paths and for storage;
- Allowing space for surface water flood flows (and SuDS) during development planning; and
- River restoration, daylighting problem culvert watercourses.

5.6.1 Potential funding sources

If we are to deliver schemes that involve working with others to deliver more than just FRM, there may be other funding sources available. Having Partnership Funding contributions will help the business case when applying forGiA. Some potential sources and joint funding opportunities are listed below:

Water Framework Directive (WFD)GiA – Specific funding has been made available measures needed to improve waterbodies that are failing WFD objectives. These are shown in the latest River Basin Management Plan (RBMP). Some of these locations may align with flood risk locations in the City Council.

SuDS for Schools and Communities – This project is active in Northumbria and the City Council could be a good candidate, especially after the experiences of flooded schools in 2012.

Living Waterways - EA initiative delivered through the Durham, Northumberland and Tees Valley Wildlife Trusts to reduce diffuse pollution in urban areas and integrate improvements to wildlife habitats through community involvement, education and practical habitat management.

The City Council Strategic Investment Budget for Health and Well Being.

Woodland for Water, Forestry Commission - initially mapping to identify where woodland creation could be better targeted within catchments to identify locations where it would contribute most to maximising water and other benefits, while minimising risks, followed by targeted planting.

- Heritage Lottery Fund.
- European Social Fund.

5.6.2 Schemes with multiple benefit potential

Locations have been identified where there may be the opportunity for schemes that have multiple benefits including environmental enhancement. Many of these opportunities will require partnership working with environmental partners including:

- Wear Rivers Trust
- Durham Wildlife Trust
- Environment Agency (Fisheries Recreation and Biodiversity and Catchment Management (WFD, River Basin Management))
- Northumbrian Water

This partnership working and collaboration will likely be implemented through the Lower Wear Catchment Partnership. It will important to work with closely with this group and attend meetings regularly in order to plan and identify opportunities. Locations that could deliver multiple benefits and will be considered in the future include:

- Oxclose Burn Wear Rivers Trust environmental improvements linked with risk location 04e - Holley Park schools and houses.
- Oxclose Burn Wear Rivers Trust environmental improvements linked with risk location 05f - Fatfield.

Upstream storage combined with environmental improvement on Lumley Park Burn with Wear Rivers Trust may reduce downstream at 05a Dairy Lane, 05c Osman Terrace and 05g Sedgeletch Beehive Public House.

6 SEA

This section of the strategy summarises the Strategic Environmental Assessment (SEA). The SEA should ensure that the LFRMS will not negatively impact on the environment and will seek to enhance the environment where possible. The SEA Screening, Scoping and Environmental Reports have been sent out for consultation.

6.1 SEA Summary

Strategic Environmental Assessment (SEA) Screening, Scoping and Environmental Reports have been completed and sent out to statutory consultees with feedback from the consultees incorporated into the completed reports. The SEA Environmental Report has been sent out for statutory, stakeholders and public consultation along with the LFRMS.

This Environmental Report sets out the findings of the SEA. It has been produced in conjunction with The Environmental Assessment of Plans and Programmes Regulations 2004 (The SEA Regulations) and follows the guidance contained within A Practical Guide to the Strategic Environmental Assessment Directive (ODPM, 2005).

The full range of environmental receptors has been considered through the SEA. This meets the requirements of the SEA Directive, which requires that an assessment identifies the potentially significant environmental impacts on 'biodiversity, population, human health, fauna, flora, soil, water, air, climatic, material assets including architectural and archaeological heritage, landscape and the interrelationship between the above factors.'

Assessment of the SEA objectives against three management options ('do nothing', 'maintain current flood risk management regime' and 'manage and reduce local flood risk') was undertaken. This identified the potential impacts on the environment associated with these different management actions.

The 'do nothing' option is likely to result in a number of significant adverse impacts, particularly in relation to people and property and other environmental assets including historic sites and biodiversity, where increased flooding may create new pathways for the spread of invasive, non-native species. Surface water and groundwater quality could also be adversely affected, with increased flooding of contaminated sites leading to greater impacts on water resources. Conversely, increased flood risk may result in greater connectivity between watercourses and their floodplains, offering opportunities for habitat creation of benefit to a range of protected and notable species.

The option to 'manage and reduce local flood risk' has the potential to provide a range of environmental benefits. FRM initiatives, if designed and implemented in an appropriate manner, could have multiple benefits including reducing flood risk to people, providing new opportunities for habitat creation and the provision of recreation and amenity assets.

Therefore, it is evident that doing nothing or maintaining current levels of FRM, there are likely to be significant adverse effects on the environment, which are likely to be prevented by carrying out active FRM as proposed by the LFRMS.

At present some of the LFRMS actions have an unknown effect on the SEA objectives as the location, nature and scale is currently uncertain. The assessment of the objectives and actions has identified a number of areas where the LFRMS could be strengthened to promote a more sustainable approach.

The SEA Regulations require the City Council to monitor the significant environmental effects (positive and negative) upon the implementation of the LFRMS. Key potential environmental effects that require monitoring have been identified together with the monitoring indicators that can be applied to track whether such effects occur.

6.2 Habitats Regulations Assessment - Test of Likely Significance

A Test of Likely Significant Effect (screening assessment) has been prepared in accordance with the requirements of the Habitats Regulations to determine whether the LFRMS is likely to adversely affect the integrity of a European site (alone or in combination).

All European sites lying partially or wholly within 15km of the district boundary have been included in the assessment:

- Northumbria Coast Ramsar and Special Protection Area (SPA)
- Durham Coast Special Area of Conservation (SAC)
- Castle Eden Dene SAC
- Thrislington SAC
- Teesmouth and Cleveland Coast Ramsar and SPA

The outcome of this revised screening assessment is documented in Appendix 6.2 of the SEA report[12].

The screening assessment concludes that a small number of LFRMS measures (i.e. those relating to coastal defences/protection) have been identified as having the potential for likely significant effects on the following sites:

- Northumbria Coast Ramsar and SPA
- Durham Coast SAC

These measures are included within the Whitburn to Ryhope Coast Protection Strategy 2013 which has been subject to a Habitats Regulations Assessment (HRA). The HRA of the Coast Protection Strategy determined that the potential effects of Strategy Frontage 1 and 3 on the Northumbria Coast SPA and Ramsar and Durham Coast SAC could be reduced to negligible, and the potential for long term significant effects avoided, through the adoption of project and strategy level best practice mitigation measures.

Coastal defence options within Strategy Frontage 1 and Strategy Frontage 3 will be subject to further screening at the project design/planning consent stage to determine whether based on the provision of additional information the options could have a likely significant effect and require a full Appropriate Assessment. Any option which fails to demonstrate no adverse significant effect on the integrity of a European Site will not be permitted as it will not comply with the Habitats Directive or the LFRMS.

[12]Sunderland City Council, Local Flood Risk Management Strategy Strategic Environmental Assessment, Environmental Report, June 2014

7 Implementation

The Action Plan will be the primary tool for implementing the Local Strategy. The Local Flood Risk Management Strategy is a 'living' document we intend to monitor and update the Strategy moving forward.

The FWMA demands and imposes additional duties and responsibilities on the City Council. One of the main duties is for LLFAs to produce a LFRMS. The LFRMS requires us to set out how we will manage local flood risk and have strategic leadership of FCERM within the City of Sunderland.

We have developed this LFRMS to identify the specific challenges that the City has and how these challenges can be met through a realistic plan of action. The Action Plan identifies how we will meet the LFRMS objectives which include the new FWMA responsibilities, the EA's National FCERM Strategy objectives and our corporate objectives for the development of the City.

The LFRMS has shown that the scale of flood risk and the levels of investment required mean we will need to develop a team that is capable of developing partnerships which including drawing in PF. We also recognise the increasing skills and resources needs to meet the new responsibilities.

We have a number of new responsibilities identified in the FWMA, but the most important role is our strategic leadership of local flooding and an oversight for all sources of flood risk. The schemes and funding summary in the LFRMS is the first step in giving us this oversight and making plans for what is important to all stakeholders including communities, businesses, all the RMAs and environmental organisations.

Implementing the Action Plan will mean that we have a clear strategy for managing local flood risk over the long-term and will be able to provide leadership for all sources of flooding. Opportunities will be identified for partnership working and funding leading to a reduced risk to people and property and an increase in the economic competitiveness of Sunderland.

7.1 The Action Plan

The implementation of the LFRMS will predominantly be managed and monitored through the Action Plan (see Appendix B). It will be important for us to allocate actions to organisations and internal teams, with timescales for completion of actions. The council's Strategic FRM Group regular meetings will follow up the progress of the Action Plan. External stakeholders should be made aware of actions relevant to them to facilitate engagement and buy-in.

An ongoing action for us will be the development of a LLFA team with a dedicated LLFA Lead Officer. A Lead Officer has now been appointed and a support team is being developed.

The main actions coming from the LFRMS can be summarised as follows:

- Fulfilling the specific responsibilities set out in the FWMA e.g. an asset register, flood investigations etc.
- Adoption of SUDS features and statutory consultee to the SAB
- Development planning and flood risk interactions.
- Information and data management.
- Developing feasibility studies and PARs for schemes to progress through the MTP stages.

- Partnership funding and partnerships for schemes.
- Community resilience and emergency planning.
- Flood risk and environmental enhancement opportunities or risk to the environment.
- Quick win schemes and improving the maintenance regime.

7.2 Communication and public engagement

The LFRMS strategy will require full public consultation. Public engagement in future FRM is a key element of the FWMA and is integrated into the strategy objectives. Consultation offers a good opportunity to identify and consult potential scheme partners. Section 7.2 below provides more details on public consultation.

Part of our vision and strategy is to engage more with the communities that they serve. This is driven in part by Community Leadership Programme (CLP), which is about improving the way in which the council engages Councillors, employees and partners with the local community. Community engagement is also a key element of the FWMA so the development of a LFRMS provides a good opportunity to align with this vision.

The CLP intends to:

- engage elected members more effectively as community leaders and create the processes and structures necessary to empower them at the community front-line;
- reorganise public services so that they are locally responsive and are accountable to communities; and
- harnesses the power of people, place and the City Council to achieve sustainable growth at a time of political and economic flux.

We have been developing more locally responsive services, which is reshaping the way frontline teams are organised, and the way they interact with communities. We currently focus on environmental services through response teams covering five areas, who deal with problems such as litter, graffiti, fly-tipping and dog-fouling. These teams have also been responding to flooding, especially after the 2012 floods that impacted Sunderland. The intention is for these teams to have the authority to make quick decisions across a range of service areas with team members embedded within communities.

We are attempting to make local council services more responsive to the people by having ‘total place’ responsibility for one of the five areas of the city and pulling together functions from a range of individual service areas.

This structure and vision aligns well with the government’s intention for LLFAs set out in the FWMA. We will use this existing structure to promote and consult on the LFRMS. Longer term, the City Council should engage communities on areas such as:

- FRM scheme selection;
- flood risk and the impact on the community; and
- flood resilience and education.

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Appendices

A Objectives

	Strategic, overarching sustainability objective	Compliance with EA National FCERM Strategy and Sunderland CC corporate objectives	Strategic LFRMS objective/aim	Specific LFRMS Objective
Social	Reduce risk to people	Understand the risk	**1) Reduce risk to people by understanding current and future flood risk so that measures can be targeted at those most at risk.**	1a) Assess the risk of local flooding across the city so that measures and schemes can be prioritised according to risk, taking into account climate change.
		Risk based investment		1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.
		Impact of climate change on risk and climate change adaptability of schemes		1c) Identify where assets may influence the impact of local flood risk to improve the management of Council owned drainage and flood management assets (people and economy).
		Community focus and partnership working	**2) Minimise the impact of local flooding on communities.**	2a) Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk (climate change).
		Engaging with communities - realistic expectations and consultation		
		Engaging with communities - flood awareness and emergency response		
		Our communities, residents and businesses are at the centre of everything we do.		
		Planning and development control as flood risk management	**3) Manage the impact of new development on flood risk to communities and the economy.**	3a) Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding.
	Reduce risk to critical services and infrastructure	Supporting infrastructure, such as utilities, transport, schools, health, leisure services and energy enable thriving, healthy and sustainable communities	**4) Reduce flood risk to critical services and infrastructure.**	1a) Assess the risk to critical infrastructure and services across Sunderland CC so that measures and schemes can be prioritised where there is a need.
Economic	Reduce the economic impact of flooding	Undertaking schemes and maintenance in a proportionate, economically sustainable way.	**5) Reduce risk to the economy by understanding current and future flood risk so that measures can be targeted at the most cost beneficial way.**	5a) Assess the economic impact of flooding and the cost of measures so that investment can be targeted in the most cost beneficial way taking into account climate change.
		Catchment/multi flood source integrated into scheme planning. Seeking opportunities for packaging work		5b) Manage multiple sources of flood risk by working in close collaboration with the Environment Agency and other stakeholders to deliver schemes with multiple partners and funders.
		Identifying multiple benefits that go with schemes		5c) Ensure the sustainability of flood risk management by ensuring maintenance is properly taken into account

	Increase economic growth	Sustainable Economic Growth - productive global city with a strong and diverse economy. creating the conditions in which businesses can establish and thrive.	**6) Ensure investment in FCERM does not hinder but promotes economic growth** in a sustainable way.	6a) Support economic growth and regeneration through the funding of schemes and flood related activity.
		Well connected waterfront city centre		
Environmental	Take opportunities to enhance the environment and work with natural processes.	Seeking to provide environmental benefit, including those required by the Habitats, Birds and Water Framework Directive.	**7) Promote schemes that have multiple environmental benefits.**	7a) Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces
		Maintain high ecological quality of River Wear, maintain bathing beaches, improve groundwater quality,		
		Attractive city		
		Provide access to safe, green open spaces,		
	Reduce the impact of flooding on the environment and enhance where possible.	welfare of the city's environment as a key priority - green city with a strong culture of sustainability, protecting and nurturing both its built heritage and future development and ensuring that both the built and natural environments will be welcoming, accessible, attractive and of high quality.	**8) Reduce the impact of flood risk on the environment and cultural heritage**	8a) Ensure FCERM schemes, maintenance and other activities do not have a detrimental affect on the environment and cultural heritage taking into account climate change.
	Reduce the impact of flooding on the cultural heritage.	Safeguarding and enhancing Sunderland's environmental infrastructure (enhance biodiversity, protect designated sites, habitats and species, reverse decline of SSSIs and ensure recovering condition, protect and maintain Green Belt and GI, protect heritage coast).		
		Attractive city		
		Provide access to safe, green open spaces,		
		Promoting, enhancing and respecting Sunderland's culture and heritage. listed buildings, conservation areas of city's landscape		

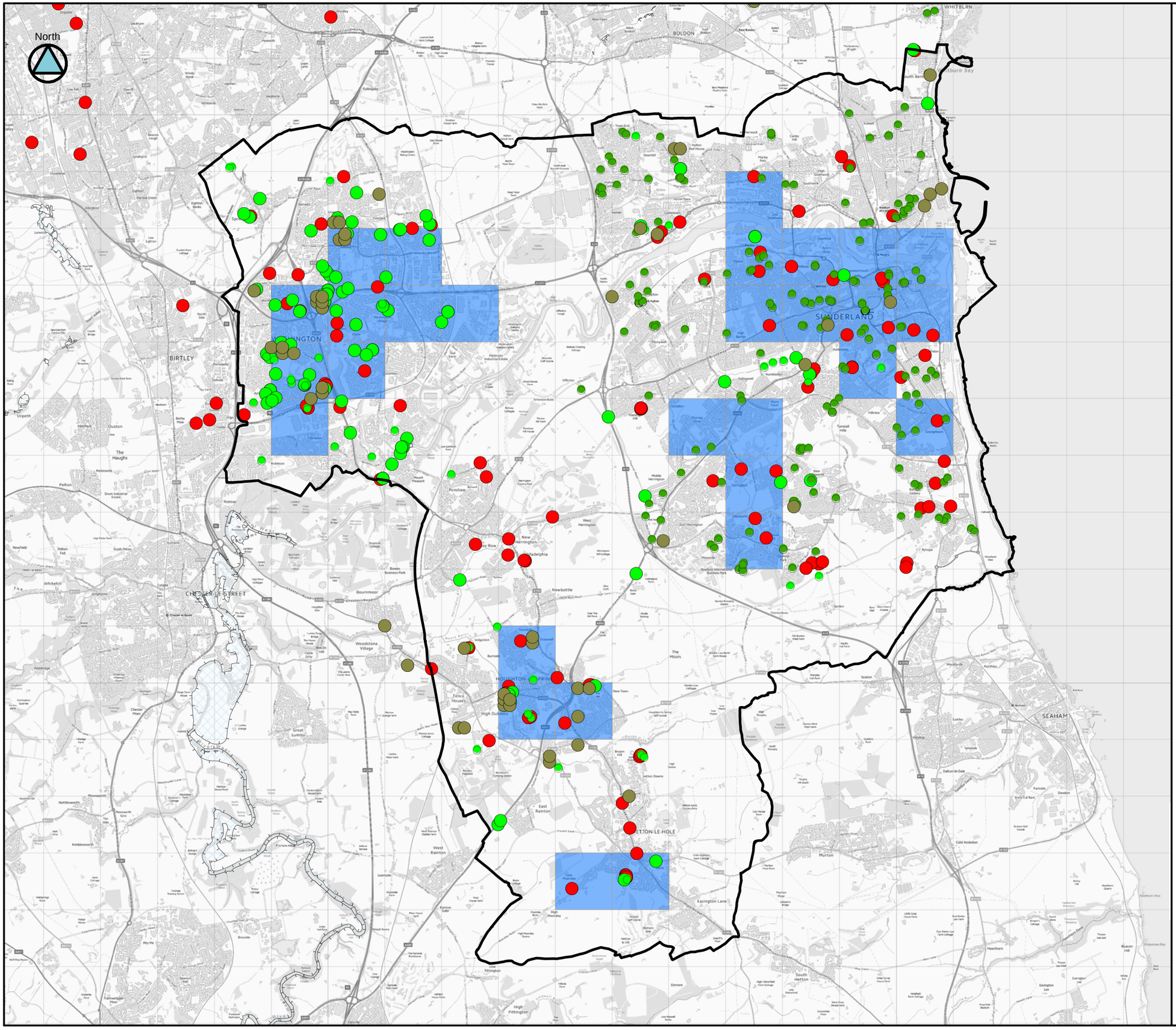
B Action Plan

LOCAL FLOOD RISK MANAGEMENT STRATEGY ACTION PLAN

Action ID	Link to specific LFRMS Objective	Action	LFRMS Reference (for detail)	Action lead and partners	Timescale	Consequence of no action
INCREASING CAPACITY AND MANAGEMENT OF THE LLFA						
LFRMS-1	1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Consultation, approval and implementation of the LFRMS.** Establishment of LLFA within the council and clear lines of authority to Streetscene leadership and Elected Member. The local strategy should also go out to public consultation	LFRMS Section 7.3	LLFA and internal flood group	shot term	The Local FRM Strategy will be the overarching document that will show how SCC are going to deliver their responsibilities under the FWMA. Without this strategic plan, SCC will lack direction, resourcing things that may not be necessary and neglecting more important issues. Other risk management authorities must act consistently with the local strategy in respect to FCERM. Without a plan in place, SCC will struggle to have a voice and influence over local FRM and coastal erosion.
LFRMS-2	1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**LLFA Team with lead officer -** The main recommendation for SCC is to build a LLFA team to include a lead officer for flood management. This lead officer should answer to the head/assistant head of Streetscene and should have access to staff in RLS, Planning Policy, Highways Assets and Engineering Services. Eventually, the lead officer should have a dedicated LLFA team of a junior and more senior chartered civil engineer. The first step should be the submission of a briefing note for the elected member followed by questions/scrutiny.	Capacity Building 5.2.1, 5.2.2 and 5.2.3.	LLFA and internal flood group	medium term	There would be reputational consequences to a lack of action through public perception and the media, especially if SCC are seen as failing in its role of LLFA after a high profile flood event. Leadership, direction and having a clear plan of action is key for delivering the new requirements. Unaccountable decision making and clear priorities, potential to result in conflicting decision making, unclear roles and responsibilities, result in wasted resources e.g. not implementing strategic plans such as SMWP properly, not supporting climate adaptation, missed opportunities e.g. improvement of flood management infrastructure.
LFRMS-3	1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Increased LLFA team budget -** Over time, the team will require an increased budget not only for staff but also for FCERM schemes and ongoing watercourse maintenance. Other LLFA responsibilities will need resourcing including asset capture, flood investigations and consenting/SAB.	Capacity Building 6.2	LLFA and internal flood group	shot term	**Staff** Current staff have insufficient capacity and skills to deal with all arising tasks. Duties will not be undertaken to a satisfactory standard and important tasks maybe missed; lack of strategic coordination and management of staff activity resulting from ad hoc/uncoordinated structures, nebulous roles and responsibilities and lack of prioritisation of work also contribute to resourcing problems; poor morale. **Spend budget** If there are no plans to increase spending on maintenance and schemes, the public will be exposed to a greater level of risk. A new LLFA team with a strategy for action, but with no means to make things happen on the ground will be demoralising and will severely restrict the effectiveness of the team.
LFRMS-4	1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Sunderland SCC Strategic Flood Risk Management Group -** The SCC Strategic Flood Risk Management Group should be re-engaged and the membership of the group reviewed. The group should include core SCC members from planning policy, RLS, emergency planning, development control, planning implementation, Highways Assets, Engineering Services. Once the internal group has been established with a clear purpose and objectives, other RMAs (EA, NWL) should be invited. The group would also benefit from answering directly to the head/assistant head of Streetscene through the LLFA lead officer. This group should also set up/formalise an executive programme board to review and sign off decisions that are being made and ensure that resources are available. Access to an elected member and cabinet scrutiny will therefore be important. In addition to agreeing aims and objectives for this group, links to the group members and related groups should be made through a communications plan.	Capacity Building 6.1.2	LLFA and internal flood group	shot term	Partnership working is a key element of the FWMA. Without involving others, stakeholder relationships and delivery of flood management may deteriorate. EA may raise concerns that the council is not meeting new statutory responsibility. Joint working and scrutiny of actions taken by stakeholders such as NWL may be jeopardized.
INTERNAL PROCESSES TO MEET LLFA RESPONSIBILITIES						
LFRMS-5	1a) Assess the risk of local flooding across Sunderland CC so that measures and schemes can be prioritised according to risk. 2a) Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk. 1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Investigating Flooding Incidents -** When flood events occur, SCC must investigate the incident to identify which authorities have relevant FRM functions and what they have done or intend to do. SCC will need to publish the results of any investigation.	LFRMS 5.1.2 and internal process document	LLFA and Emergency Planning	shot term	LLFA is required to publish the results of any flood investigation, and notify any relevant authorities. There will be reputational and possible legal consequences if they do not.
LFRMS-6	1b) Identify where assets may influence the impact of local flood risk on to improve the management of Council owned drainage and flood management assets (people and economy). 1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Asset Register -** Undertake an asset survey and condition assessment. In order to prioritise, SCC should identify which assets could cause the most damage (e.g. through the use of software such as Jscreen).	LFRMS 5.1.4 and internal process document	LLFA and Highways	shot term	The asset register must be available for inspection and the secretary of state will be able to make regulations about the content of the register and records. If this register does not exist, there may be consequences on funding accountability etc. In the long-term, not having a register of structures that can influence flood risk, could lead to a lack of understanding of the mechanisms of flooding especially when people with existing knowledge move on or retire.
LFRMS-7	1b) Identify where assets may influence the impact of local flood risk on to improve the management of Council owned drainage and flood management assets (people and economy). 1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Designation of structures and 3rd party assets -** An internal process document has been produced which describes how SCC will designate structures and features that affect flooding and coastal erosion. This should form one of the actions for the Strategic Flood Risk Group.	LFRMS 5.1.5 and internal process document	LLFA and Planning	shot term	If this power is not enforced there is a risk of a person damaging or removing a structure or feature that is relied on for flood or coastal erosion risk management.
LFRMS-8	3a) Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding. 1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Consenting Ordinary Watercourses -** A procedure for the regulation of ordinary water courses has been developed recommending how this will be dealt with and who should be responsible. This needs to be agreed upon and implemented including the approval of elected members.	LFRMS 5.1.6 and internal process document	LLFA and Planning	shot term	Unregulated construction near to or over Ordinary Watercourses will lead to increased flood risk to new and existing property.
LFRMS-9	3a) Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding. 5c) Ensure the sustainability of flood risk management by ensuring maintenance is properly taken into account. 1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**SUDS Approval Body (SAB)** - Formalise policy and procedure for a new SAB. Develop a process for approving SUDs and support in establishing the SUDs approving body. Agree on local criteria for SUDS, which may include: Flood risk • Water quality • Encouraging multiple benefits from the use of land • Climate change • Amenity • Conserving and enhancing the natural environment	LFRMS 5.1.1 and internal process document	LLFA, Highways and Planning	shot term	SUDS should be designed to the new National Standards (currently being consulted on). If SCC do not have a strategy for ensuring SUDS are meeting this standard, systems could be designed that are under capacity, leading to property flooding the potential for residents to make compensation claims. As the SAB will also be responsible for adopting and maintaining SUDS which serve more than one property, where they have been approved, funds should be collected for this. If the maintenance of the SAB is not organised, SCC may be left with maintenance issues i.e. developers leaving a legacy of SUDS maintenance costs from SCC not collecting fees. Future development does not plan for critical drainage areas. Long term drainage problems from new development.
LFRMS-10	3a) Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding. 6a) Support economic growth and regeneration through the funding of schemes and flood related activity. 8a) Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces	**Planning and Policy -** 1) JBA's review SCC's planning processes (in light of FWMA). 2) Update SFRAs when new data is available and/or when a new allocations are being assessed. This should include safeguarding land which is needed for current and future flood management. The risk assessment has identified locations where there is a local flood risk and future development. Review these locations and plan action in the SFRM Group. 3)Look for opportunities where funding from development can be used to reduce flood risk (identified in the risk assessment). 4)Over time, there should be a clear and continuous link between the LLFA team and development control.	LFRMS 5.1.1 and internal process document	LLFA and Planning	shot term	If local flood risk is not incorporated into planning at an early stage, it will become increasingly difficult and costly to mitigate the risk and deliver the required housing numbers. Not integrating local flood risk into development planning could leave a legacy of housing that has ongoing flood problems that struggle to get insurance.
LFRMS-11	1b) Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in SCC.	**Information and data** Identify a data coordinator to collate, store and maintain all flood related information within the council and co-ordinate data sharing across internal departments and external organisations. This will include for example deciding what information should be provided to strategic planners, Development Management, emergency planning. SCC should also consider improving local knowledge through recording of flooding incidents by setting up a system for public reporting flooding that can be converted into GIS.	Capacity Building 4.1.6	LLFA and internal flood group	shot term	SCC will have increasing amounts of data to deal with and will be responsible for sharing and obtaining data from others. Without a well organised data storage method and register it will be difficult to access data quickly, identify the source and share data with others. Some key data sets may also get lost. If data is poorly managed, there may also be licensing implications e.g. if SCC mistakenly shares confidential information from a third party.
DELIVERY OF SCHEMES AND OTHER MEASURES						

LFRMS-12	1a) Assess the risk of local flooding across Sunderland CC so that measures and schemes can be prioritised according to risk. 2a) Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk. 6a) Support economic growth and regeneration through the funding of schemes and flood related activity. 8a) Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces	**Investment Strategy and scheme prioritisation -** Consult the flood partnerships (internal group, neighbouring RMAs and external partners) on the schemes list and LFRMS as a first step to formalising these relationships and consulting on the potential schemes and proposed activities. Promote buy-in by stakeholders/partners by consulting on the Strategy The priorities are focussed on risk to people and the economy but also deliverability. Multiple sources of flood risk have been taken into account to identify joint schemes and joint funding. Through further beneficiary mapping and workshops, the schemes list has included locations where economic growth interacts with flood risk. These locations will be prioritised if partner funds can be drawn in. Scheme prioritisation will include identifying communities that are at flood risk and have high deprivation, as this aligns with the objectives and increases GiA opportunities.	LFRMS 5.4.1	LLFA, internal flood group and external stakeholders	shot term	Budgets are limited and without prioritisation, locations of greatest need may get missed. In addition, without an investment plan, partnership funding opportunities may be missed as will FDGiA availability. These will lead to fewer schemes being funded. If there are no plans to undertake schemes, the public will be exposed to a greater level of risk e.g. permitting unsafe/inappropriate development/land uses; removal of flood assets; poor maintenance regimes; less resilient homes, businesses and communities.
LFRMS-13	4b) Manage multiple sources of flood risk by working in close collaboration with the Environment Agency and other stakeholders to deliver schemes with multiple partners and funders.	**Partnerships and Funding** - 1) Potential partnership funding sources have been identified in the investment plan. Investigate and follow up the potential for scheme specific partnership funding	LFRMS 5.3.1	LLFA, internal flood group and external stakeholders	shot term	The new partnership approach to Flood Defence Grant in Aid (FDGiA) allocation means that to obtain government funding, the majority of schemes will need to identify and secure funding from other sources. Without a strategy in place to meet the funding gap, SCC will struggle to get any schemes and improvements funded. The FDGiA allocation will go to other, better organised LLLFAs and opportunities to obtain funding from others will be lost. Maintenance of existing assets and small schemes will come from SCC existing budget and as climate change/flood risk increases, the drain on SCC's resources will escalate.
LFRMS-14	1a) Assess the risk of local flooding across Sunderland CC so that measures and schemes can be prioritised according to risk. 1a) Assess the economic impact of flooding and the cost of measures so that investment can be targeted in the most cost beneficial way. 1b) Manage multiple sources of flood risk by working in close collaboration with the Environment Agency and other stakeholders to deliver schemes with multiple partners and funders.	**Feasibility Studies and PARs** (individual recommendations in the Scheme Level Action Plan) Before schemes are taken further, some flood risk locations will require feasibility studies so that more details on the risk, solution and cost/benefits can be found. If applying for FDGiA, SCC will need to commission a PAR for the location in question. Locations for these studies should be prioritised and funding found (internal or local levy) to pay for them.	LFRMS 5.5	LLFA and internal flood group	shot term	Internal expertise or the use of consultants will be required to develop feasibility studies/PRAs which form the business case for FDGiA. These studies are required so that the most sustainable option can be identified, inferior options may be chosen if this is not undertaken. Without producing a robust business cases, SCC will find it hard to get any FDGiA.
LFRMS-15	2a) Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk. 3b) Assess the risk to critical infrastructure and services across Sunderland CC so that measures and schemes can be prioritised where there is a need.	**Community Resilience and Emergency Planning** - 1) Establish the link between Flood Risk Management and Emergency Planning in order to coordinate procedures. 2) Develop and agree upon a list of the most vulnerable locations following heavy rainfall, based on the vulnerability of the residents, critical infrastructure and the physical flood hazard. 3) Critical services and infrastructure - Flood risk assessment has included critical services and infrastructure. But further workshops and assessments should be undertaken to identify other critical services, in coordination with Emergency Planning. 4) Provide clear and useful information for communities/schools that are at regular risk of flooding to enhance local preparedness and resilience to local flood risk potentially through a plan to help communities respond to flooding	LFRMS 5.1.3	LLFA and Emergency Planning	shot term	If emergency plans and responses to flood incidents are are not effective, communities will not be able to respond properly to flood warnings or prepare for flooding. This can lead to a danger to life and increase damage to property.
LFRMS-16	8a) Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces 9a) Ensure FCERM schemes, maintenance and other activities do not have a detrimental affect on the environment and cultural heritage.	**Flood risk and the environment - 1)** Workshops have taken place with key stakeholders to identify schemes that have multiple benefits, including environmental and amenity benefits. These scheme opportunities should be followed up and pursued by the LLFA. Planning may need to safeguard land which is needed for current and future flood management and combined environment/amenity opportunities. 2) A review of the potential SCC schemes and environmental designations has been undertaken. Once scheme details are known, a further review should be undertaken to identify schemes that could potentially fulfil WFD objectives. These environmental benefits are valued under PF policy and there is more chance of getting GiA if WFD habitat can be created/enhanced.	LFRMS 5.6 and Chapter 6	LLFA, SCC Environment and external stakeholders	shot term	Environmental enhancement is part of the Sunderland Corporate Strategy. Not looking for schemes that have flood risk and environmental benefits could lead to missed opportunities and missing other funding sources.
LFRMS-17	1a) Assess the risk of local flooding across Sunderland CC so that measures and schemes can be prioritised according to risk. 2a) Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk.	**Smaller quick win measures and maintenance issues** . 1) Review these locations highlighted in the risk assessment spreadsheet. Work with RLS to update the maintenance strategy e.g. More focus on certain areas, preparedness for another 2012 event, vulnerable locations, minor works that could be done outside of GiA (budget?). Work with and consult the communities affected.	LFRMS 5.4.3	LLFA, Highways and NWL.	shot term	Not having a transparent plan of action following the floods of 2012 (and where there have been ongoing problems) may negatively affect the public's perception of the council.

C Risk Assessment Mapping



Sunderland City Council

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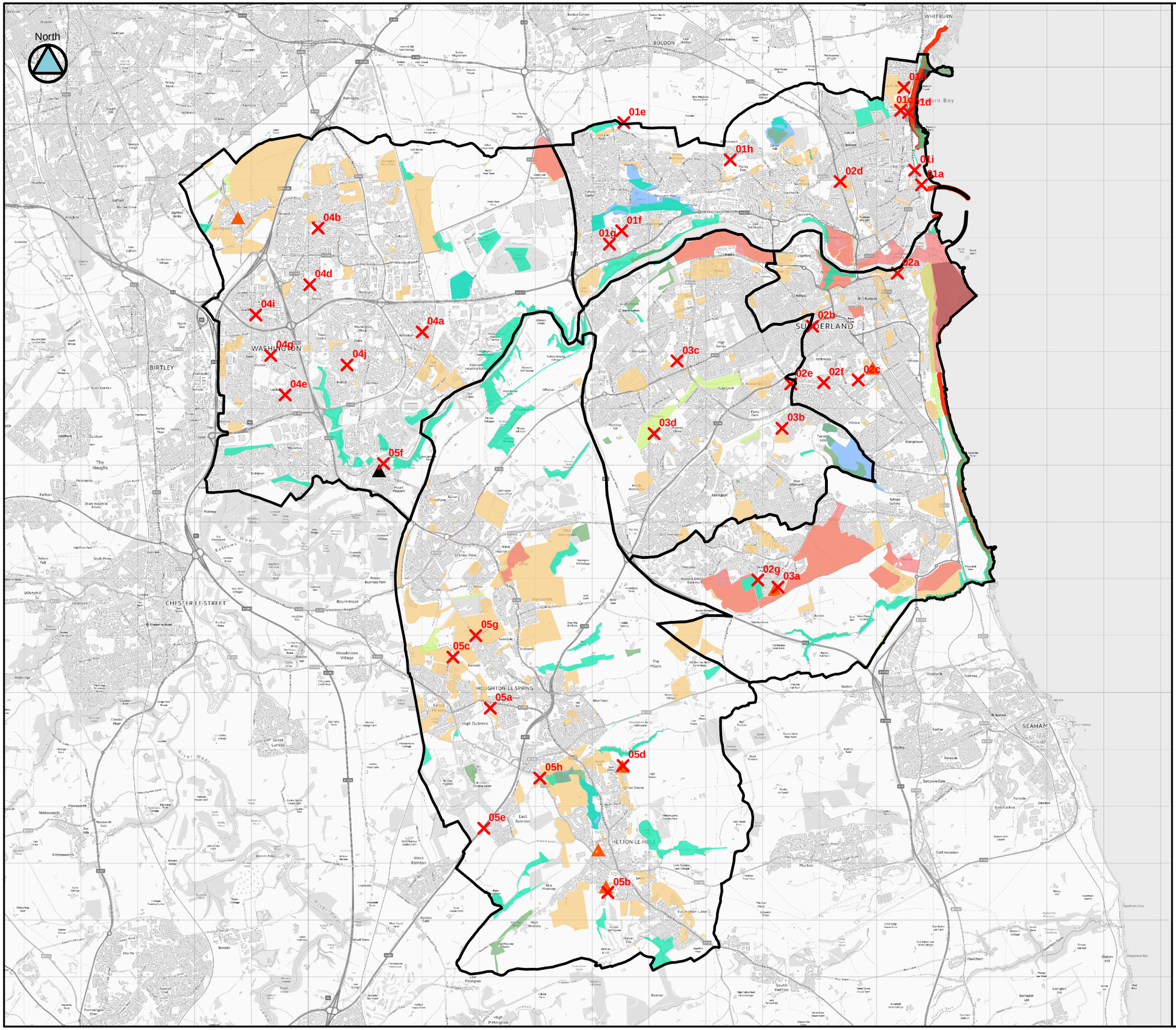
Local FRM Strategy - Risk maps overview

V1 - 05/12/2013

D Beneficiary Mapping



- [x] Sunderland City Council boundary
- [x] Risk Locations 150114

Environment and wildlife

- [x] SSSIs
- [x] PLWS
- [x] LWS
- [x] LNR

Development

- [x] Major development areas
- [x] SHLAA sites 2012-13

All RMA Schemes

- [x] Coastal strategy extents
- [x] EA MTP Schemes
- [x] EA MTP
- [x] LLFA schemes

0 1 2 Kilometres

Click on the check boxes above to turn groups or individual layers on or off.

Mouse click on the map within the Sunderland City Council boundary to open local scale maps.

Scale: 1:65,000 @ A3

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Local FRM Strategy - Beneficiary maps overview

V1 - 13/03/2014

E Risk location details

Ref	Name_Location	Local_Fld_Hotspot	Description	Easting	Northing	Prop_AtRsk	Flood_Freq	PossibleScheme	Opportunities	JBA comments / response for LFRMS	SCC Highway Assets Comments	SCC Highway Operations Comments	Outcome	Specific Action?
01a	Marine Walk Risk map 17	Coastal Flood Zone	Marine Walk, north of pier. Wave overtopping.	440786	558935	6	3-6 times per year	Increase height of seawall	Efficiencies in cleanups	Short term quick win	Increase height of seawall not practical solution for this popular public amenity area. Property level protection ??		Smaller, quick win (e.g. Plp, increased maintenance)	
01b	Seaburn Camp RM 9	No	Seaburn camp – surface water flooding	440477	560650	0	6 times per year	Improve culvert and drainage on pitches	Allow potential development to progress	Development planning. Should this area be set aside as green/blue infrastructure/SUDS area for future development. Critical Drainage Area?	Further info required. Where does the watercourse/culvert outfall ??	Culvert outfalls onto the beach, manholes are buried in the seaburn camp field for safety, and the pitches flood regular during heavy rains, both pitches and camp belong to property services	Development and flood risk issue	
01c	Cut Throat Dene. Ocean Park - RM 9	Main River Flood Zone	Ocean Park and Cuthtract Dene – culvert blocks	440417	560248	29	Flood risk 3	Planned works- 500k available for an improvement scheme. Clear debris. Strim banks.	Region of Ocean Park for leisure led development. Green infrastructure/habitat improvement.	Find out more information about the potential scheme. Where is the £500k from, is it an EA main river scheme or a joint LLFA/EA. Put the scheme on the list, potential funding from development?	Previous known history of culvert under Whitburn Rd blocking causing overspill onto Dykelands Rd. Due to debris washed downstream onto grill	?? Would like to know more about this scheme	Investment Plan Schemes	
01d	RM 9	Flood Zone	Whitburn Road end of Dykelands Road	440558	560209	12 (Queens Parade)	1 in 10 in severe weather	Cost – 60k. Scheme to take place - Secondary sea defence wall. 01/04/2014	Protect existing businesses and regeneration benefits	Is this a coastal scheme or main river and is it linked to the potential scheme above. If these scheme has not started, could it be a combined GiA bid. Potenting funding from existing businesses and devlopers (S105).	Previous issues relating to adjacent NWL pumping station / sewer network (now resolved) & the above		Development and flood risk issue	
01e	Downhill Pond - RM 7	Yes	Downhill Pond	435548	560033	0	When rains heavily	Unknown	Leisure	Need more explnation for this. Is it a potential development area. If so, development planning advice.	More info req'd regarding pond & problem	6" outlet goes back into farmers ditch and has some tree roots in the drain.	Development and flood risk issue	
01f	Castletown Cemetery - RM 15	No	Castletown Cemetery	435509	558128	41335	When rains heavily	Possible field drain -> Need expert advice	Operational use of cemetery. Grave subsidence.	Minor drainage issue related to the cementary, put on quick win/maintenance list (additional maintenance costs?). Not a scheme location. Could be a culverted watercourse issue into Banqy Quar Road watercourse.	Highways Ops to advise	flooding to the rear gardens of St Margarets Ave, field drain installed some years ago but grassed over, advised parks to remove the grass and seems to have worked so far. Field drain piped into house drains so cannot upgrade any further	Smaller, quick win (e.g. Plp, increased maintenance)	
01g	Rear of Almond Drive - RM 15	No	Rear of Almond Drive	435293	557894	0	When rains heavily	Field drains	Allow grounds maintenance and improved appearance	No major historic incidents here of surface water flood map coverage. Maintenance/quick win issue unless future development planned (additional maintenance costs?)	Highways Ops to advise	no reports received through drainers, although a field drain was installed here about 15 years ago I have not been back there since.	Smaller, quick win (e.g. Plp, increased maintenance)	
01h	Rear of Helmsley Court - RM 8	No	Rear of Helmsley Court	437420	559376	1	1-2 per year	Field drain		No major historic incidents here of surface water flood map coverage. Maintenance/quick win issue unless future development planned.	Steve Taylor has already investigated this problem & offered solution to L&P to prevent further discharge from cemetery	field drain required along fence line and connect to existing highway drainage	Smaller, quick win (e.g. Plp, increased maintenance)	
01i	Roker Ravine - RM 17	Yes	Roker Ravine	440665	559195	0	In times of med-heavy rainfall	?	Access Roker Park/Marine Walk improved	Looks ot be a culverted ordinary watercourse that outfalls into the sea. Not historic records and few properties at risk. Does not look like it should be part of the investment plan unless maintenance would improve highway flooding.	Recent issue with NWL apparatus adjacent to PS, surcharge lifting the bitmac f/path in Park	this is not a watercourse and does not outfall into the sea any longer, it was picked up by NWL and dropped into their big trunk sewer, investigated after the last flooding damage and had Keith Moreland check with legal and was advised it did belong to NWL	Smaller, quick win (e.g. Plp, increased maintenance)	
02a	Noble Quay near Fish Quay. (Location unknown).	Main River/tidal Flood Zone	Tidal surge or River flooding	440362	557384	Business x 4	Rare occasions	Flood defence. Gates to properties.		Main river tidal flooding issue. Too few properties for a full scheme. PLP could be the way forward but the businesses would need to contributue. Could it link to any surface water flooding in the area for a joint scheme?	Report in local press Sambuca 1st floor restaurant flooded, (poss. car park).		Smaller, quick win (e.g. Plp, increased maintenance)	
02b	Burn Park and Burn Park Road	Yes	Park liable to flood from excess water through burn	438868	556448	None	Yearly	Increase culvert size		This looks to be a positive existing blue/green corridor which will provide some flood storage. Increasing the culvert size could increase flooding downstream. If the frequency of flooding is becoming a nuisance could formalise the flood management function by intrducing environmental features, e.g. reed beds.	No known previous issues with culvert flooding in Burn Park. More info req'd	Never been reported as a flooding issue. And not on our maintenancelists for grill cleaning ??	Not a flood risk problem	
02c	Backhouse Park and Hendon Burn	Yes	Culvert flooding, excess water through burn	439671	555503	None	Yearly	Increase culvert size		This looks to be a positive existing blue/green corridor which will provide some flood storage. Increasing the culvert size could increase flooding downstream. There is downstream and upstream flood risk at school/college. This area could be utilised further to reduce risk downstream. E.g. environmental features could be integrated into an excavted storage area along the river, that would be deigend to flood a few times a year.	Previous problems due to culvert grill being blocked with leaves. Parks aware of this issue		Not a flood risk problem	
02d	A1018	No	Flood and surface water	439354	558995	None	Yearly	Increased camber and investigate gullies		Surface water map shows the highway to be at flood risk. Is this hospital also at risk. If not, this is a highway maintenance issue and not a scheme for the investment strategy.	No previous known problems with highway flooding Newcastle Rd, adjacent hospital. More info req'd	no reports	Not a flood risk problem	

02e	Hendon Burn Watercourse Frinton Park and Blakeney Woods	Yes	Hendon Burn - Culvert to rear of properties often blocked resulting in flooding to adjacent properties. B Woods - Run off from woodland into road and surrounding properties	438484 437905	555434 551985	Several	Bi-annually, each heavy rainfall	Regular maintenance of culvert and widening of culvert. Better land drainage, increased gully capacity and better soakaway.	Environmental attenuation	Historic incidents, looks to be a flood model here and properties at risk (not a significant number though). School potentially at risk downstream. This could potentially be a scheme for the investment plan but the number ofm properties at risk may not make a scheme cost beneficial. B-Woods - Surface water flood map picks up the watercourse that passes under the road. This could be a good opportunity for small scale attenuation in the wood e.g. Woody debris. Rather than imporving the drainage which would increase downstream flows, the drainage could be impeded in the undeveloped park/wood as this flow path contributes to the downstream 02_e Frinton Park and the Woodland Rise area between.	Problems due to poor maintenance of watercourse & culvert grill by landowner. Shop basement main flood risk, other properties at higher level. B Woods - Issue with water discharging down old track during heavy rain & washing debris, etc, onto Hall Farm Rd rbt and then down to Doxford Park Way	Highway Operations now maintain grill on behalf of Land Agent KPS-monthly schedule. B Woods - need help with this one as we have carried out small amounts of work here but nothing helps, I am concerned that redirecting any flows toward the existing watercourse will definitely flood houses rather than just the highway	Investment Plan Schemes	
02f	Fairholme Road/Alexandra Road	Yes	Excess surface water	439066	555457	Several	Following heavy rain	Gully inspection, land drainage and increased camber		Surface water map shows the highway to be at flood risk. This looks to be a highway maintenance issue and not a scheme for the investment strategy.	No previous reports or flooding problems believed likely at this location		Not a flood risk problem	
03a	Craigwell Road	No	Run off from farmland. Private land, private treebelt. Flooding from Burden Lane flows down into Craigwell Drive and neighbouring estates. Flooding of residential properties	438259	551859	4, would suspect more	With heavy rain, generally more than once a year	Field drains, land drains or flood defence systems. Study currently being undertaken on behalf of the council by URS. They will be making suggestions	Environmental attenuation. roposals for 2800 – 3300 houses over the next 20 years. Development of SUDS as part of the resi schemes could overcome some flooding areas	Historic flood incidents here, but the sheet runoff is not picked up by the surface water flood map. Only a small number of properties at risk, so PLP would be an option or small scale attenuation. But there also appears to be incidents further along to Lodgeside Meadows and Yardley Close. Could possible raise kerbs at Burdon Lane to stop surface runoff and pass it down to the agri land at Nettles Road. Or small bund along the bottom of the fields (tree lined boundary) to hold the sheet runoff back in the fields. If there are enough properties at risk, this could form a scheme for the investment plan. However, if development goes ahead, this option will be defunct. Significant drainage and flooding issues if development goes ahead here.This should possibly be a CDA and the Local FRM Strategy could confirm this. Any development should see surface water flood risk as a significant constraint or will need to be much better than greenfield runoff rates. The only way this is posisible is through a scheme and significant attenuation.	Details already documented relating to overland flows affecting private property. URS flood study commission to investigate		Investment Plan Schemes	
03b	Nursery Close	*Yes, critical infrastructure	*Rear gardens flooding, not threatening properties but does have implications for the cul-de-sac road in the winter when the water freezes. Flood water comes from council owned land	438330	554654	No dots, but 10/12 properties at risk	During heavy rain			If 10-12 properties at risk, then a small scheme may be warrented (needs to be confirmed). PLP seems like the most likely approach. There is a significant surface water flow path to the east, is this theoretical or is there evidence of this?	Works programmed to be carried out		Scheme but not for the investment plan	
03c	King George Park and Hampstead Road	*No	*Flooding back gardens. There is a pond within park – but during heavy rain can absorb all the rain	436484	555841	Approx 30	Once/twice a year	Provision of additional drainage. O SUDS within the park		The flow path is potentiall a tributary from Barnes Burn which links to the pond. This flow pathn shows properties at risk along its path, is this accurate/possible. If the properties have not flooded, just a maintenance issue/ pond could be bunded to increase capacity.	No previous history. more info req'd regarding the problem & pond ??	field drain required as there is an existing connection into house drainage just needs some funding to carry out	Smaller, quick win (e.g. Plp, increased maintenance)	
03d	Tay Road	Yes	*Flooding of Tay Road. Surface water. Passable, but can be quite high.	436079	554559	None	Once/twice a year			Barnes Burn passes under Tay Road. Minor highway maintenance issue (culvert inspection/increase capacity.)	More info req'd	no information held about flooding at this location	Not a flood risk problem	
04a (W05c)	320 Waskerley Road	Yes	Road gulleys unable to cope with surface water	431999	556349	2-3	1 in 5 years	Samll schemes works include improved drainage in this area		Only a small number of properties at risk meaning economic justification for a scheme will be low. However, the surface water flood map shows more properties at risk on Horsley Road, is this accurate? If so, a larger drainage study may be required.	Works carried out including additional gully installation & weep holes to allow surplus flows drain away	works already carried out	Scheme but not for the investment plan	
04b	227 Coach Road Estate, Usworth	Yes	NWL drains	430167	558177	School				The mapping shows a watercourse being culverted just before it becomes Main River. This also shows more propertiea t risk along its path. A scheme may be necessary here if there is more at risk, if not, PLP. Are the NWL drains backing up from the watercourse?	SCC have carried out new drainage works & NWL propose new storage tank installation	works already carried out	Scheme but not for the investment plan	
04d	Albany Village Primary School	Yes	School closed due to flooding. Surface water of Ayton Road, field drain problems.	430021	557180	1 school	Flooded in 2012	An old drainage ditch needs reinstating		The school looks to be set in a low area which makes it difficult to drain. Is this linked to the culverted watercourse at Washington School? There are lots of historic incidents to the south of the school around Rosegill. Is there a need for a drainage study for this area?	Details already documented relating to overland flows affecting school property. Martin Wright Ass. flood study commissioned to investigate.**Further study to be commissioned**	awaiting flood study with suggestions	Smaller, quick win (e.g. Plp, increased maintenance)	
04e	Holley Park schools and houses.	Yes	Three locations combined, surface water drainage and field gutter. Lambton Village Primary School, Holley Park School, Holley Park (problem area 30 yards to the north of 12 Glenorrin Close). Schools closed. Houses	429587	555243	3 schools and 15-20 houses	Flooded in 2012	An old drainage ditch needs reinstating		Historic incidents, known flooding with several schools and houses at risk means this should potentially be a scheme for the investment plan. The incidents follow a watercourse and surface water flooding line going west to east. This watercourse flows into Oxclose Burn after passing under the A182, but there are incidents to the south around Cambrian Way, meaning the flood flow path could go this way towards the A195 and Biddick Burn. Options could include daylighting of the culvert within Holley Oark for flood and river restoration.	Details already documented relating to overland flows affecting school property. Martin Wright Ass. flood study commissioned to investigate.**Further study to be commissioned**	awaiting flood study with suggestions	Investment Plan Schemes. Possible joint environmental scheme with Wear Rivers Trust.	
04g	Raby Road, Oxclose, Washington	Yes	Oxclose Community Nursery, Brancepeth Road/Roby Road.Surface water from Roby/Brancepeth road flooded into nursary to the north and school to the south.Field gutter problems	429334	555936	School, nursary and several properties	Flooded in 2012	Drainage needs improving. Drain needs work, possible redirecting		The surface water flood map shows the flow path of the drain on Roby/Brancepeth Rd. This drain appears to flow into Oxclose Burn. Action is needed here as a school and nursary is at risk. This is just north of the Holley Park problem area. A detailed drainage study may be required to understand this area and propose solutions.	This location part of the Martin Wright Ass. flood study area. NWL have started construction of new flow attenuation tank at Oxclose Village	no reports received through drainers	Smaller, quick win (e.g. Plp, increased maintenance)	

04i	Blackfell Primary School.	Yes	Includes many other incidents of nonspecific flooding of roads and properties nearby within 400m (Craggyknowe, Thirlmoore and Stridingedge). All appear to be linked to a small watercourse or drain that is picked up by the ufmfsw.	429069	556649	school, several properties and roads. Many locatinos in this area identified.	Flooded in 2012			A surface water flood flow path is shown along with historic incidents along its path (incident locations names in the description). There is possible a culverted watercourse here, but it is unclear where it outfalls (possibly to the head of Oxclose Burn, via the A182. As properties and a school are affected, this requires further investigation and possibly a scheme. Maybe linking with the locations to the south for a combined drainage study.	More info requested, John Walvin not aware of flooding issues at this school	no reports received through drainers	Smaller, quick win (e.g. Plp, increased maintenance)	
04j	Biddick Primary School	Yes	No details	430676	555768	School	Flooded twice including 2012			The school appears to be in a low spot above a tributary to Oxclose Burn. A small watercourse could originate in this area. As the risk is not extensive, a scheme is unlikely, PLP for the school is the most likely option.	More info requested, John Walvin not aware of flooding issues at this school		Smaller, quick win (e.g. Plp, increased maintenance)	
05a	Dairy Lane, Longacre, Aireys Close, Dunelm Drive	Yes and main river flood zone	Many historic flood risk locations	433196	549730				Potential housing sites upstream (multiple)	Main River flood zone from Moors Burn at converging of ordinary watercourse (Red Burn). Possible EA.LLFA joint scheme if there are enough peropties at risk. Downstream proposed defvelopment looks very unwise unless set well back from the watercourse (reducing development space) and minimal runoff rates. Future development could be sued to contribuute to a scheme. Use of the upstream	Already have a flood bank here apparently. Details already documented regarding combined work of SCC, NWL & EA to prevent further flood risk		Development and flood risk issue. Upstream storage combined with environmental imporvement on Lumley Park Burn with Wear Rivers Trust may reduce downstream risk here.	
05b	Borrowdale Street and Lambton Drive	Yes	Many historic flood risk locations	435265	546488				Golf course alterations?	The risk appears to be linked to the upstream pond in the golf course. Watercourses flow into this pont and a surface water flow path form this links to the properties and historic incidents. Due to the regular risk to houses, this could be a scheme for tyhe investment plan The flow should stay in a culverted watercours (from the pond) and flow east to west. Could this watercourse from the pond be opened up through the golf course. It could be culverted under Moorsley Rd before coming out again and into Pittington Beck?	Details already documented relating to overland flows affecting private property. URS flood study commission to investigate		Investment Plan Schemes	
05c	Osman Terrace	Yes and main river flood zone	Some historic flood risk locations	432540	550627				Housing at Sedgeletch Ind. Estate	Main river flood zone of Moors Burn around a complex interaction of ordinary watercourse, but limited properties at risk as it is currently sparsley populated. Development could increase the risk to existing and new properties. A drainage study should be undertaken and development should be set back from the river and flood zone, (providing a green corridor). SUDS should attenuate surface runoff. Flood risk could be a significant constraint to development here. This is downstream from Dairly Lane locatino (05_a).	Highways Ops to advise	Highway drain repair carried out to the front of Osman, also additional gully installed. And field drain installed opposite to catch any flows from the field and directed to the burn	Development and flood risk issue. Upstream storage combined with environmental imporvement on Lumley Park Burn with Wear Rivers Trust may reduce downstream risk here.	
05d	Dene Street	No	Surface water flood risk, many historic incidents	435535	548720				New housing within Hatton Downs regeneration NE of Broomhill	This location looks to be near the headwater of a small watercourse/drain that flows during times of flood from Hetton Dwons. The surface water flow path goes down a publick footpath/track and flows into Rough Dene Burn. Simple redirecting of this flood flow, into the fields, through burms, kerb raising etc, looks to be the most cost efficient option. Small quick win? Future development would need to leave space for this flow pth, allocated green space within the development plans.	Details already documented relating to overland flows affecting private property. URS flood study commission to investigate		Investment Plan Schemes	
05e	A690 East Rainton	No	Highway at risk, a couple of historic incidents	433082	547618					Highway maintenance issue. Culvert under the highway. Part of additional maintenance funding programme?	More info req'd		Not a flood risk problem	
05f	Fatfield. Alice Well, East Bridge St	Yes and main river flood zone	Main river flood risk, scheme on the MTP, lots of historic flooding from the main river. Fatfield flood alleviation scheme, low PF score.	431318	554032	37				Fatfield South River, EA flood alleviation scheme	Poss EA scheme		Investment Plan Schemes. Possible joint environmental scheme with Wear Rivers Trust.	
05g	Sedgeletch Beehive PH	No	Just a pub at risk from drain as it crosses the road.	432941	551007	1 pub			Potential housing interest behind Beehive PH and East of Holmelands	Risk to the pub from a culverted watercourse. Future development in this area could seek to open up the watercourse allowing for space either side (combined with SUDS). This is linked to the development at 5c Osman Terrace and future development should integrate attenuation of this watercourse rather than increasing runoff to it.	Land ownership checked, monitor situation		Development and flood risk issue. Upstream storage combined with environmental imporvement on Lumley Park Burn with Wear Rivers Trust may reduce downstream risk here.	
05h	Mill Terrace/Red Burn Row (Persimmon)	No main river	Main river flooding location with some historic flooding.	434068	548499				100 houses proposed	Several watercourse combine here before the river becomes Main (Rainton Burn). Only a small number of properties at risk here, so PLP or a small bund may be the most cost effective option. Future development should allow sapce either side of the watercourses for flood risk and environmental/amenity purposes.			Development and flood risk issue	
SCC6a	Beech Grove, Springwell Village	Yes	Surface water flood risk, many historic incidents	428625	558119	Approx 16 properties affected	Regular with heavy rain	Divert overland flows from field away from properties					Investment Plan Schemes	
SCC6b	95, 97, 99 Weardale Avenue, South Bents	Identified by SCC Highways separate to the risk assessment	Overland flows from field into rear of properties	440326	561126	3nr ??	Heavy rain	Prevent overland flow from field					Smaller, quick win (e.g. Plp, increased maintenance)	
SCC6c	B1284	Identified by SCC Highways separate to the risk assessment	Redburn watercourse blocked grill under B1284, road closure due flood water	432627	549327	B1284 Road closure	Heavy rain	Increase frequency of grill inspections & check flow upstream					Smaller, quick win (e.g. Plp, increased maintenance)	

SCC6d	A19/A690 interchange	Identified by SCC Highways separate to the risk assessment	Slip road, A19 flooding from overland flow from field	435686	552250	A19/A690 interchange road closure	Heavy rain						Smaller, quick win (e.g. Plp, increased maintenance)	
SCC6e	Hendon Burn Culvert at Toward Road	Identified by SCC Highways separate to the risk assessment	Approximately 40 metre length of the brick arch culvert structure (extending beneath Toward Road) shows signs of structural deformation. Collapse of the culvert along the section of concern could potentially have a structural impact on up to 7 residential properties and 2 businesses and lead to flooding of a further 22 residential properties.	440120	555841	29 residential and 2 businesses	Risk of collapse	Monitoring and recording of any movement within this section is proposed followed by capital maintenance of the culvert, as required, to provide structural stability to the deformed section of the brick arch culvert and in order to mitigate a collapse of this section of the culvert.					Investment Plan Schemes	
SCC6f	Strategy Frontage 1 - South Bents & Seaburn Sea Walls Overtopping Protection. Schemes shp file FID-0	Identified by SCC caostal engineers separate to the risk assessment	Damage to property resulting from flooding due to coastal overtopping. Carry out study to predict the potential magnitude and frequency of overtopping and appraisal and selection of option to mitigate.	440633	560480								Investment Plan Schemes	
SCC6g	Strategy Frontage 3 (Hendon Foreshore Barrier / Stonehill Wall / SW Breakwater). Schemes shp file FID-6	Identified by SCC caostal engineers separate to the risk assessment	Proposal is to undertake capital works to upgrade the existing South West Breakwater defence, extend the rock armour protection to Stonehill Wall and provide a new Hendon Foreshore Barrier defence in order to mitigate loss of assets through coastal erosion. Capital maintenance works envisaged to include provision of rock armour revetments and repair of steel sheet piling & concrete walls.	441082	556315								Investment Plan Schemes	

F SEA

Sunderland City Council Local Flood Risk Management Strategy

Strategic Environmental Assessment

Environmental Report
June 2014

Sunderland City Council

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Revision history

Revision Ref / Date Issued	Amendments	Issued to
Draft v1-1	JBA review	Laura Thomas
Draft v1-2	JBA review	Sam Wingfield
Draft v1-3	Minor amendments	Sam Wingfield

Contract

This report describes work commissioned by Sunderland City Council. Jonathan Harrison, Rachel Drabble, David Revill and Rachael Brady of JBA Consulting carried out this work.

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Purpose

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Non-technical summary

Sunderland City Council is currently preparing a Local Flood Risk Management Strategy (LFRMS). As part of this process, Sunderland City Council is also carrying out a Strategic Environmental Assessment (SEA), which considered the potential significant environmental impacts of the LFRMS. This Environmental Report sets out the findings of the SEA. It has been produced in conjunction with *The Environmental Assessment of Plans and Programmes Regulations 2004* (The SEA Regulations) and follows the guidance contained within *A Practical Guide to the Strategic Environmental Assessment Directive* (ODPM, 2005).

The full range of environmental receptors has been considered through the SEA. This meets the requirements of the SEA Directive, which requires that an assessment identifies the potentially significant environmental impacts on *'biodiversity, population, human health, fauna, flora, soil, water, air, climatic, material assets including architectural and archaeological heritage, landscape and the interrelationship between the above factors.'*

An SEA Scoping Report for the LFRMS was previously prepared and issued to the statutory consultation bodies in March 2014. A number of comments were received on the scope of the assessment and the assessment framework, which were incorporated into the preparation of this Environmental Report.

Assessment of the SEA objectives against three management options ('do nothing', 'maintain current flood risk management regime' and 'manage and reduce local flood risk') was undertaken. This identified the potential impacts on the environment associated with these different management actions.

The 'do nothing' option is likely to result in a number of significant adverse impacts, particularly in relation to people and property and other environmental assets including historic sites and biodiversity, where increased flooding may create new pathways for the spread of invasive non-native species. Surface water and groundwater quality could also be adversely affected, with increased flooding of contaminated sites leading to greater impacts on water resources. Conversely, increased flood risk may result in greater connectivity between watercourses and their floodplains, offering opportunities for habitat creation of benefit to a range of protected and notable species.

The option to 'manage and reduce local flood risk' has the potential to provide a range of environmental benefits. Flood risk management initiatives, if designed and implemented in an appropriate manner, could have multiple benefits including reducing flood risk to people and providing new opportunities for habitat creation and the provision of recreation and amenity assets.

Therefore, it is evident that doing nothing or maintaining current levels of flood risk management, there are likely to be significant adverse effects on the environment, which are likely to be prevented by carrying out active flood risk management as proposed by the LFRMS.

Many of the proposed measures as detailed in the LFRMS have the potential for direct and indirect environmental benefits. The cross-check assessment of the LFRMS objectives and actions against the SEA objectives highlights positive impacts particularly on SEA objectives 5, 7 and 8. By actively managing the flood risk and taking actions and initiatives to improve and adapt the way flooding is managed in the area, there will be obvious benefits to communities, material assets and adapting to climate change. Through promoting a greater understanding of the risks, more collaboration and the sharing of resources, communities and responsible parties will be better placed to effectively minimise the risk of flooding in the Sunderland City Council area. For certain measures within the LFRMS, there is also the potential to benefit other environmental receptors, for example through habitat creation measures through the use of Sustainable urban drainage systems (SuDS) and through the delivery of Water Framework Directive (WFD) actions. Also, there will be reduced flood risk to vulnerable historic environment assets.

At present some of the LFRMS actions have an unknown effect on the SEA objectives as the location, nature and scale is currently uncertain. Without specific methodology for the implementation of these actions, a precautionary approach must be taken, as there is a potential for a negative impact if appropriate mitigation is not put in place.

The assessment of the objectives and actions has identified a number of areas where the LFRMS could be strengthened to promote a more sustainable approach.

The SEA Regulations require Sunderland City Council to monitor the significant environmental effects (positive and negative) upon the implementation of the LFRMS. Key potential environmental effects that require monitoring have been identified together with the monitoring indicators that can be applied to track whether such effects occur. Some of these are outside the remit of Sunderland City Council and therefore officers will have to work closely with partners in order to keep up to date with these outputs.

This Environmental Report will be subject to public consultation for 12 weeks alongside the draft Sunderland City Council Flood Risk Management Strategy. All consultation response received will be reviewed and taken into consideration for the next stage of the appraisal process. This will involve the preparation of a Statement of Environmental Particulars (SoEP), which will set out how the findings of the Environmental Report and the views expressed during the consultation period have been taken into account as the LFRMS has been finalised and formally approved. The SoEP will also set out any additional monitoring requirements needed to track the significant environmental effects of the strategy.

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Abbreviations

AONB ..... Area of Outstanding Natural Beauty
AQMA ..... Air Quality Management Area
AQO ..... Air Quality Objectives
BAP ..... Biodiversity Action Plan
CAMS ..... Catchment Abstraction Management Strategy
cWHS ..... Candidate World Heritage Site
CWS ..... County Wildlife Site
DBAP ..... Durham Biodiversity Action Plan
EfW ..... Energy from Waste
FCERM ..... Flood and Coastal Erosion Risk Management
GI ..... Green Infrastructure
HAP ..... Habitat Action Plan
HMWB ..... Heavily Modified Water Body
HRA ..... Habitats Regulations Assessment
JBA ..... Jeremy Benn Associates
LAQM ..... Local Air Quality Management
LBAP ..... Local Biodiversity Action Plan
LCA ..... Landscape Character Area
LFRMS ..... Local Flood Risk Management Strategy
LGA ..... Local Government Association
LLFA ..... Lead Local Flood Authority
LNR ..... Local Nature Reserve
LWS ..... Local Wildlife Site
NCA ..... National Character Area
NNR ..... National Nature Reserve
ODPM ..... Office of the Deputy Prime Minister
OUV ..... Outstanding Universal Value
PAWS ..... Planted Ancient Woodland Sites
PFRA ..... Preliminary Flood Risk Assessment
RBMP ..... River Basin Management Plan
RMA ..... Risk Management Authority
SAB ..... SuDS Approval Body
SAP ..... Species Action Plan
SAC ..... Special Area of Conservation
SAM ..... Scheduled Ancient Monument
SEA ..... Strategic Environmental Assessment
SOA ..... Super Output Area
SPA ..... Special Protection Area

SSSI ..... Site of Special Scientific Interest

STW ..... Sewage Treatment Works

SuDS ..... Sustainable urban Drainage Systems

WCS ..... Water Cycle Strategy

WFD ..... Water Framework Directive

1 Introduction

1.1 Background

Sunderland City Council (the Council) is currently preparing a Local Flood Risk Management Strategy (LFRMS). As part of this process, the Council is also carrying out a Strategic Environmental Assessment (SEA), which considers the potential significant environmental impacts of the LFRMS. This Environmental Report sets out findings of the SEA. It has been produced in conjunction with *The Environmental Assessment of Plans and Programmes Regulations 2004* (hereafter referred to as the 'SEA Regulations') and follows the guidance contained within *A Practical Guide to the Strategic Environmental Assessment Directive* (Office of the Deputy Prime Minister (ODPM), 2005).

The ODPM guidance sets out a five stage process (A to E) to be followed (see Table 1-1). This report addresses stages B and C of the SEA process wherein LFRMS options and alternatives are identified and the predicted environmental effects of the LFRMS are assessed.

Consultation (Stage D) on this Environmental Report will be conducted as outlined in Section 7.1 of this document, whilst monitoring of the significant effects of the LFRMS (Stage E) will be undertaken in accordance with the outline monitoring programme included in Section 6.3.

Table 1-1: Stages in the SEA process

SEA stage	Purpose
Stage A:	Setting the context and objectives, establishing the baseline and deciding on the scope
Stage B:	Developing and refining alternatives and assessing effects
Stage C:	Preparing the Environmental Report
Stage D:	Consulting on the draft plan or programme and the Environmental Report
Stage E:	Monitoring the significant effects of implementing the plan or programme on the environment.

1.2 Strategic Environmental Assessment (SEA)

SEA is a statutory assessment process required under European Directive 2001/42/EC *on the assessment of the effects of certain plans and programmes on the environment* (the 'SEA Directive')[1]. The Directive requires formal assessment of plans and programmes that are likely to have significant effects (either positive or negative) on the environment. It applies to all plans and programmes which are *'subject to preparation and/or adoption by an authority at national, regional or local level'* or are *'required by legislative, regulatory or administrative provisions'*[2]. The requirements of the Directive are transposed into UK law through the SEA Regulations.

Local Government Association (LGA) guidance[3] on the production of the LFRMS identifies the likely requirement for an SEA, stating that *'the Local* [Flood Risk Management] *FRM Strategy is likely to require statutory SEA, but this requirement is something the* [Lead Local Flood Authority] *LLFA must consider'*. A SEA screening process was therefore undertaken and the Council has confirmed the requirement for its LFRMS to undergo SEA.

SEA involves the systematic identification and evaluation of the potential environmental impacts of the LFRMS. This information is then used to aid the selection of a preferred option(s) for the strategy, which are those that best meet its economic, environmental and social objectives, and legal requirements.

The full range of environmental receptors has been considered through the SEA. This meets the requirements of the SEA Directive, which requires that an assessment identifies the potentially significant environmental impacts on *'biodiversity, population, human health, fauna, flora, soil, water,*

[1] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment

[2] Office of the Deputy Prime Minister (2004), Environmental Assessment of Plans and Programmes Regulations 2004 (No. 1633)

[3] Local Government Association (2011), Framework to Assist the Development of the Local Strategy for Flood Risk Management

air, climatic, material assets including architectural and archaeological heritage, landscape and the interrelationship between the above factors[1].

Annex I of the SEA Directive sets out the scope of information to be provided by the SEA. This is described in Table 1-2 below, which also identifies where in the SEA process for the LFRMS that the relevant requirement will be met.

Table 1-2: Stages in the SEA process as identified within Annex I of the SEA Directive

SEA Directive requirements	Where covered in the SEA
(a) an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes;	SEA Scoping Report (Section 3)
(b) the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme;	SEA Scoping Report (Section 4)
(c) the environmental characteristics of areas likely to be significantly affected;	SEA Scoping Report (Section 4)
(d) any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC;	SEA Scoping Report (Section 4)
(e) the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation;	SEA Scoping Report (Sections 3 and 4)
(f) the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors;	SEA Environmental Report (to be prepared)
(g) the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme;	SEA Environmental Report (to be prepared)
(h) an outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information;	SEA Environmental Report (to be prepared)
(i) a description of the measures envisaged concerning monitoring in accordance with Article 10;	SEA Environmental Report (to be prepared)
(j) a non-technical summary of the information provided under the above headings.	SEA Environmental Report (to be prepared)

The first output from the SEA process is the production of a Scoping Report[4], which outlines the scope and methodology of the assessment. A proportionate approach was adopted towards establishing the scope of the SEA, reflecting the high-level nature of the LFRMS. Consultation with the statutory consultees (English Heritage, Natural England and the Environment Agency) was undertaken in March 2014 to confirm the baseline environment of the study area and the assessment framework (see Section 1.5 for further information).

This Environmental Report has now been prepared to set out the likely significant impacts on the environment of implementing the LFRMS.

1.3 The Local Flood Risk Management Strategy (LFRMS)

The Flood and Water Management Act (FWMA) was passed in April 2010. It aims to improve both flood risk management and the way we manage our water resources. The FWMA creates clearer roles and responsibilities and instils a more risk-based approach to flood risk management. This includes a new lead role for the Council as a Lead Local Flood Authority (LLFA) in managing and leading on local flood risk management from surface water, groundwater and ordinary watercourses.

Under the requirements of the FWMA, the Council must develop, maintain, apply and monitor a LFRMS for local flood risk management in its area. The LFRMS provides a delivery vehicle for improved flood risk management and supports the development of partnership funding and strategic investment programme.

[4] JBA Consulting (2013), Sunderland City Council Local Flood Risk Management Strategy, Strategic Environmental Assessment (SEA) Scoping Report (24 October 2013)

The LFRMS will set out:

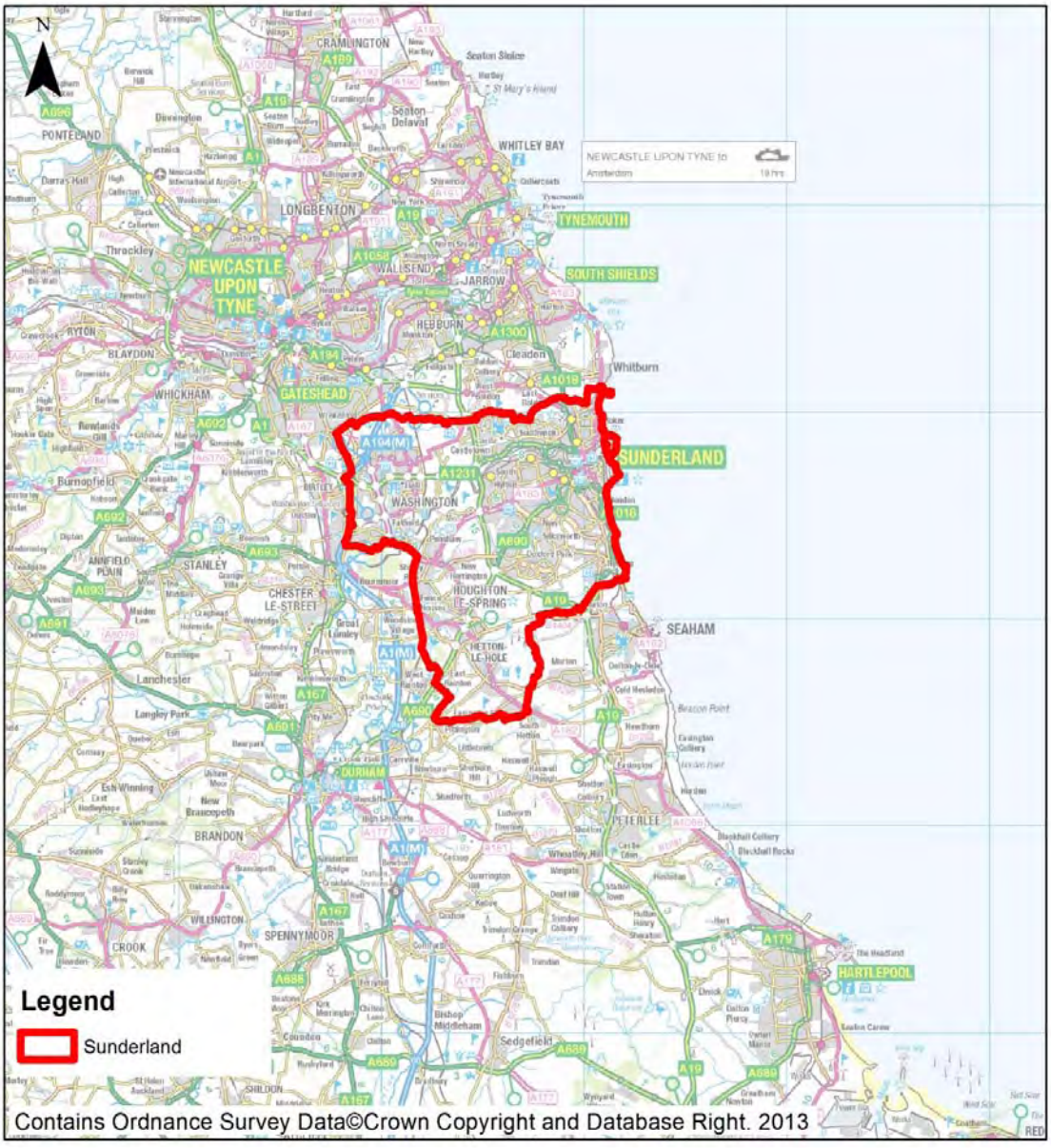
- The roles and responsibilities for each Risk Management Authority (RMA) and their flood risk management functions; and
- Opportunities, objectives and measures for flood risk reduction of existing communities, including ways to minimise the risk from future growth.

Development of the LFRMS provides considerable opportunities to improve and integrate land use planning and flood risk management. It is an important tool to protect vulnerable communities and deliver sustainable regeneration and growth.

1.4 The study area

The City of Sunderland is a Metropolitan District in the metropolitan county of Tyne and Wear in North East England (see Figure 1-1). It is named after its largest settlement, Sunderland, but also includes the towns of Washington, Houghton-le-Spring and Hetton-le-Hole. It covers an area of approximately 13,900 hectares and has a population of approximately 275,000 people.

Figure 1-1: Extent of the study area



1.5 SEA scoping

The SEA Scoping Report for the LFRMS was issued to the statutory consultation bodies in March 2014. A number of comments were received on the scope of the assessment and assessment framework. Table 1-3below summarises the comments received and how they have been addressed within this Environmental Report.

Table 1-3: SEA scoping consultation responses

Consultee	Comment received	Action taken
Natural England (29th April 2014)	Change SEA objective 2 to: *'Protect and enhance designated sites, protected species and BAP habitats and species.'*	The indicators for SEA objective 2 have been amended to distinguish between statutory and non-statutory designated sites.
	Some of the SEA indicators do not show a clear negative or positive result. Some of the indicators are methods for monitoring changes rather than indicators themselves. Landscape: *'changes in the condition and extent of existing characteristic elements of the landscape'* – additional wording: *'changes could be beneficial, adverse or neutral'*. Suggest replacing second indicator with: *'Positive or negative effect of the introduction of landscape features related to flood management'.*	Comments noted and appropriate changes made to SEA indicators.
	Amend SEA indicators for biodiversity to: *'Area of designated site/ BAP habitat adversely affected by flooding (e.g. through contamination or infrastructure failure). Area of designated site/ BAP habitat adversely affected by flood management measures (e.g. through reduction in water supply). Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat) Number of barriers to the migration of riparian species removed.'*	Comments noted and appropriate changes made to SEA indicators.
	In the environmental topics to be covered by the SEA (Scoping Report Table 3), the climate section needs to include sea level rise.	Comments noted.
	We welcome the various references to potential to support green infrastructure initiatives within the plan.	Comments noted.
English Heritage (1st April 2014)	English Heritage recommends that our updated guidance (2013) on Strategic Environmental Assessment (SEA) / Sustainability Appraisal (SA) and the Historic Environment is used to inform the environmental assessment.	Comment noted.
	Makes recommendations for the review of several national and local level plans and programmes within the SEA.	These plans have already been assessed within the Scoping Report.
	English Heritage recommends that the SEA framework includes a headline objective such as : *'Conserve and enhance the historic environment, and heritage assets and their settings.'*	Comment noted and SEA objective amended to: *'Preserve and where possible enhance important historic and cultural sites in the district and their settings'*.
	With respect to specific indicators for the strategy additional, topic specific indicators might include: • Number of heritage assets, including areas, at risk of flooding. • The number of flood management measures implemented that conserve and/or enhance heritage assets. • Number of designated and non-designated heritage assets harmed by flood risk management measures, including impacts on their settings.	Comments noted and additional SEA indicators included in SEA framework.

1.6 Habitats Regulations Assessment

The European Council Directive on *the Conservation of Natural Habitats and of Wild Fauna and Flora* (92/43/EEC, 'the Habitats Directive') as implemented through the Conservation of Habitats and Species Regulation 2010 (as amended) ('the Habitats Regulations') requires a competent authority to carry out a Habitats Regulations Assessment (HRA) of a plan or project to establish whether it will have a 'likely significant effect' on sites designated for their nature conservation interest at an international level (known as European sites, which include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and by UK Government policy, Ramsar sites). The LFRMS for Sunderland, as a statutory plan, is subject to the requirements of the Habitats Directive.

Assessing the impacts of a plan under the Habitats Regulations is a separate process to SEA. However, there is overlap between these two types of assessment. A Test of Likely Significant Effect (Screening Assessment) has been undertaken in accordance with the requirements of the Habitats Regulations to determine whether the LFRMS would be likely to adversely affect the integrity of a European site (alone or in combination with other plans, policies and projects). The outcome of this assessment is documented in Appendix A of this report and a summary of its outcomes is provided in Section 6.4. Consultation with Natural England on the outcomes of this assessment will be undertaken as part of the consultation process outlined in Section 7.

2 Environmental baseline

2.1 Introduction

The following section presents the findings of the SEA Scoping Report, which identified the context and objectives of the LFRMS and identified the scope of the assessment.

2.2 Other relevant plans, programmes and environmental protection objectives

As part of the SEA process, an assessment of the integration of existing policies, plans and programmes on the proposed LFRMS is required. This is to address the requirement within the SEA Directive to determine the *'relationship [of the plan or programme] with other relevant plans and programmes'* (Annex I (a)), including, *'environmental protection objectives, established at international, [European] community or [national] level'* (Annex I (e)).

Identifying these relationships enables potential synergies to be determined, strengthening the benefits that can be gained from implementation of the LFRMS. This information is also used to inform the development of the environmental baseline and the identification of key issues and problems. In addition, any inconsistencies or constraints can be identified, which could hinder the achievement of the environmental protection objectives or those of the LFRMS, and therefore providing a broad appraisal of the strategy's compliance with international, national and local considerations.

The ODPM SEA guidance recognises that no list of plans or programmes can be definitive and as a result this report describes only the key documents that may influence the LFRMS. These documents are shown in Table 2-1 and the assessment is included in Appendix B.

Table 2-1: Policies, plans and programmes reviewed through this SEA process

Plan, Policy or Programme
International
EU Sustainable Development Strategy (revised 2006)
European Biodiversity Strategy to 2020
EC Birds Directive – Council Directive 2009/147/EEC on the conservation of wild birds
EU Floods Directive – Directive 2007/60/EC on the assessment and management of flood risks
EU Groundwater Directive – Directive 2006/118/EC on the protection of groundwater against pollution and deterioration
EC Habitats Directive – Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
Urban Wastewater Treatment Directive – Directive 91/271/EEC concerning urban waste water treatment
EU Water Framework Directive – Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy
National
Securing the Future – the UK Government Sustainable Development Strategy (2005)
Flood and Water Management Act (2010)
Flood Risk Regulations (2009)
Water for People and the Environment, Water Resources Strategy for England and Wales (2009)
Future Water, The Government's water strategy for England (2008)
Making Space for Water – taking forward a new Government strategy for flood and coastal erosion risk management in England (2005)
The National Flood and Coastal Erosion Risk Management Strategy for England (2011)
Water Act (2003)
Draft Water Bill (2012)
The National Flood Emergency Framework for England (2011)
The Carbon Plan (2011)
Building a Low Carbon Economy – the UK's Contribution to Tackling Climate Change (2008)
Climate Change Act (2008)
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystems (2011)

Plan, Policy or Programme
England Biodiversity Framework (2008)
UK Biodiversity Action Plan (1994)
National Wetland Vision (2008)
Wildlife and Countryside Act (as amended) (1981)
Natural Environment and Rural Communities (NERC) Act (2006)
Salmon and Freshwater Fisheries Act (1975)
Contaminated Land (England) Regulations (2006)
Heritage Protection for the 21st Century, White Paper (2007)
National Planning Policy Framework (2012)
Regional / Local
River Basin Management Plan, Northumbria River Basin District (2009)
Northumbrian Water, Water Resource Plan (2009)
Tyne and Wear Integrated Transport Authority, 2011, The Third Local Transport Plan for Tyne and Wear Delivery Plan (2011)
Durham Biodiversity Action Plan (2013)
Environment Agency, Wear Catchment Flood Management Plan (2009)
North East Coastal Authorities Group, Shoreline Management Plan 2: River Tyne to Flamborough Head (2007)
Northumbrian Coastal Authority Group, Northumberland and North Tyneside Shoreline Management Plan 2 (2009)
Sunderland City Council: Local Air Quality Management Progress Report. (2011)
Sunderland Partnership. The Sunderland Strategy 2008 - 2025 (2008)
Sunderland City Council, The Sunderland Economic Masterplan (2013)
Public Health England Health Profile 2012 for Sunderland (2012)
Sunderland City Council Infrastructure Delivery Plan (2013)
Sunderland County Council: Core Strategy (2013)
City of Sunderland Unitary Development Plan (1998)
Sunderland City Council: Sunderland Green Infrastructure Strategy Framework (2011)
Sunderland City Council Topic Paper 1.12 Climate Change (2009)
Sunderland City Council, Strategic Flood Risk Assessment (2010)
Sunderland City Council, Sunderland Greenspace Audit and Report 2012
Sunderland City Council, Habitat Regulations Appraisal: Screening Report (2013)
Sunderland City Council, UDP Alteration No. 2 (Central Sunderland) Sustainability Appraisal Report (2007)

2.3 Environmental characteristics and key issues

A search of baseline environmental information was undertaken to identify the key environmental characteristics of the district. This included details of the environmental status and condition of notable environmental features; current and future predicted trends in the evolution of the environment; and issues and problems currently affecting the environment. The baseline information is used as the basis for predicting and monitoring the effects of the LFRMS implementation.

The information obtained through this desk study is broadly strategic in nature and reflects the high-level objectives of the LFRMS. It has been obtained from a broad range of sources and no new investigations or surveys were undertaken as part of the scoping process. The baseline may require updating throughout the duration of the SEA process as the LFRMS is developed further and new information becomes available.

2.4 Landscape and visual amenity

Sunderland is predominantly a highly industrial and urban area focused on the city of Sunderland itself and extending along the corridor of the River Wear. However, the district also comprises extensive rural areas covering 5,700 hectares (ha). Approximately 57% of the district is classed as open countryside and approximately 30% of this is Green Belt, which separates the main urban

areas. The Council's Greenspace Audit in 2009 recorded a total of 1,770 greenspace sites within Sunderland, totalling and area of 3,800ha[5].

The Sunderland Green Infrastructure Strategy Framework uses this data and sets out a number of objectives for green infrastructure in the city. The key objective of the scheme is to set residential and employment areas within a network of greenspaces. The network aims to link the main urban areas, coast, river and countryside together[6]. The North Sea coast and River Wear are identified as key landscape assets for the city, and maintaining and improving links to these areas are a priority in the district.

The district comprises a number of towns and villages, which have over the years become increasingly linked by extensions of the urban fabric. The current Local Plan for Sunderland indicates that the majority of open breaks between urban areas will be retained in order to develop green infrastructure and focus development on urban areas in order to retain the characteristics of each local area. There are six inter-district green infrastructure corridors within the city (see Figure 2-1). These corridors seek to broaden the range and quality of functions that green infrastructure can bring to the city.

The topography of the district varies, with several points over 150mAOD in the west and south. The rural landscape is made up of several distinct areas. The Don Valley is intensively farmed with pastoral and arable farmland to the north of Nissan. It is generally flat and has limited tree cover. The Wear Valley is an area of contrasts with the deeply incised and well wooded river valley, which opens out as it runs westwards, generally taking on a gentler, more arable appearance; west of the district boundary are the extensive woodlands of the Lambton Estate. South Sunderland is a relatively small area of gently undulating farmland fringing the built-up area of Sunderland City[7].

Sunderland falls within two National Landscape Character Areas (LCA): the Durham Magnesian Limestone Escarpment (LCA 15)[8] and Tyne and Wear Lowlands (LCA 14)[9]. The Durham Magnesian Limestone Escarpment LCA is afforded protection and management by the Limestone Landscape Partnership, which has developed descriptions for a series of different landscapes within the area (see Figure 2-2). Durham's Limestone Landscapes project has also identified six different landscape types. The region is underlain by distinctive Magnesian Limestone rock that has formed a gently undulating central plateau of limestone and clay with an open agricultural landscape, which is bound to the west by a steep escarpment and to the east by dramatic limestone coastal cliffs. These landscapes are not only important for visual amenity but also for wildlife, geodiversity, cultural and historic and built heritage.

Overall, Sunderland city has a low level of mature tree cover totalling approximately 7.5%, compared to 12.09% for the North East of England as a whole. This is partly due to current financial restraints on the tree-planting budget; in the past street trees have been replaced when they have become too large and this is no longer the case. Initiatives are underway to increase woodland cover in the wider district; in particular the Woodland Trust is developing a 200 acre extension to Elemore Woods near Houghton, comprising 90,000 new trees[10].

[5] Sunderland City Council (2013), Sunderland Greenspace Audit and Report 2012

[6] Sunderland City Council (2011), Sunderland Green Infrastructure Strategy Framework

[7] Sunderland City Council (2013), Local Development Framework Core Strategy Consultation http://sunderland-consult.objective.co.uk/portal/chief_executives_1/sppm/economy_and_place/core_strat_cons?

[8] Natural England (2013), NCA Profile: 15: Durham Magnesian Limestone Plateau

[9] Natural England (2013), NCA Profile: 14: Tyne and Wear Lowlands

[10] Durham Times (2009), First trees to be planted in woods, News article http://www.durhamtimes.co.uk/news/4016326.print/

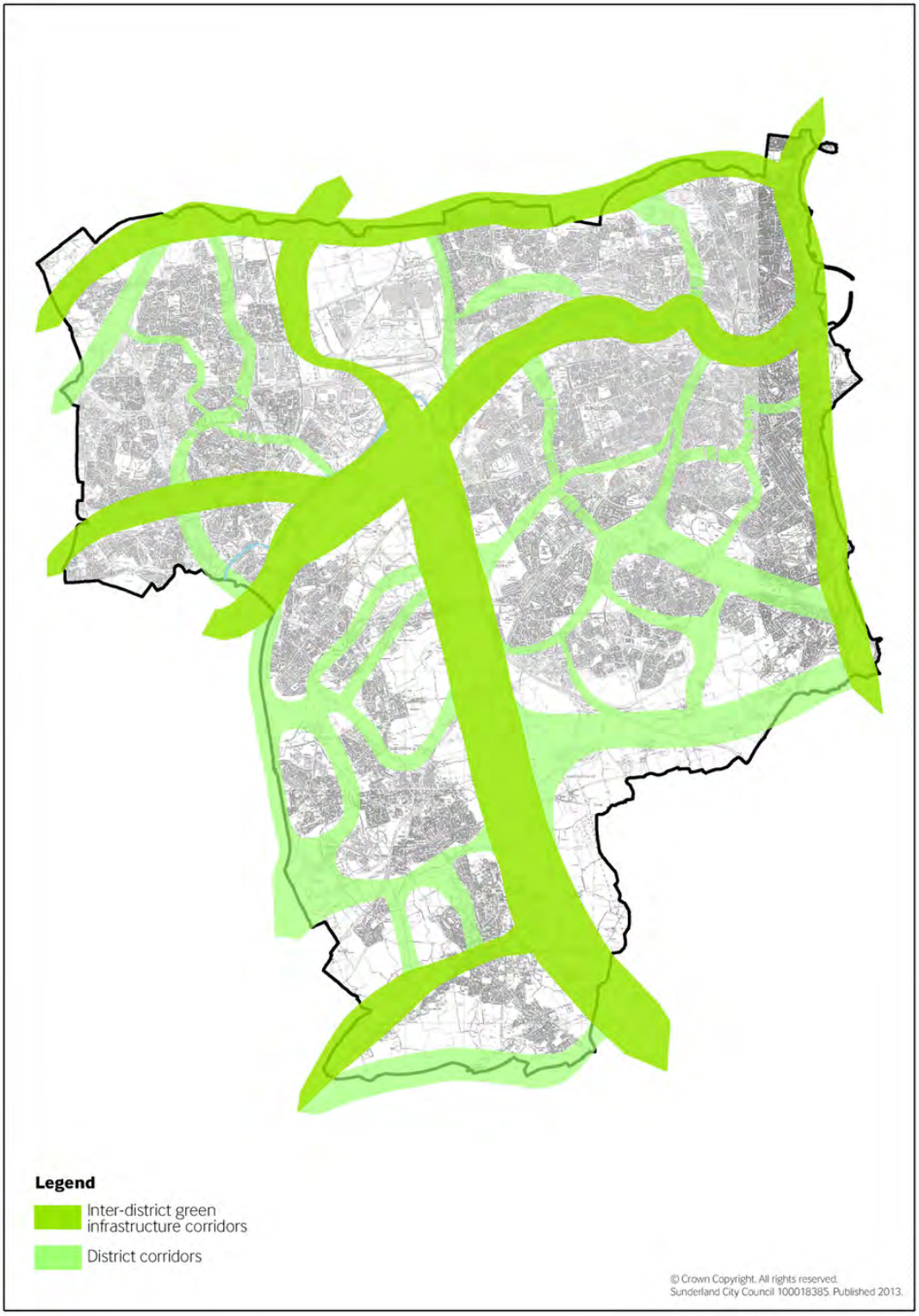


Figure 2-1: Green Corridor Network (source: Sunderland City Council, 2013)

There are no Areas of Outstanding Natural Beauty (AONB) designated within the district. The closest is the North Pennines AONB located approximately 30km to the east.

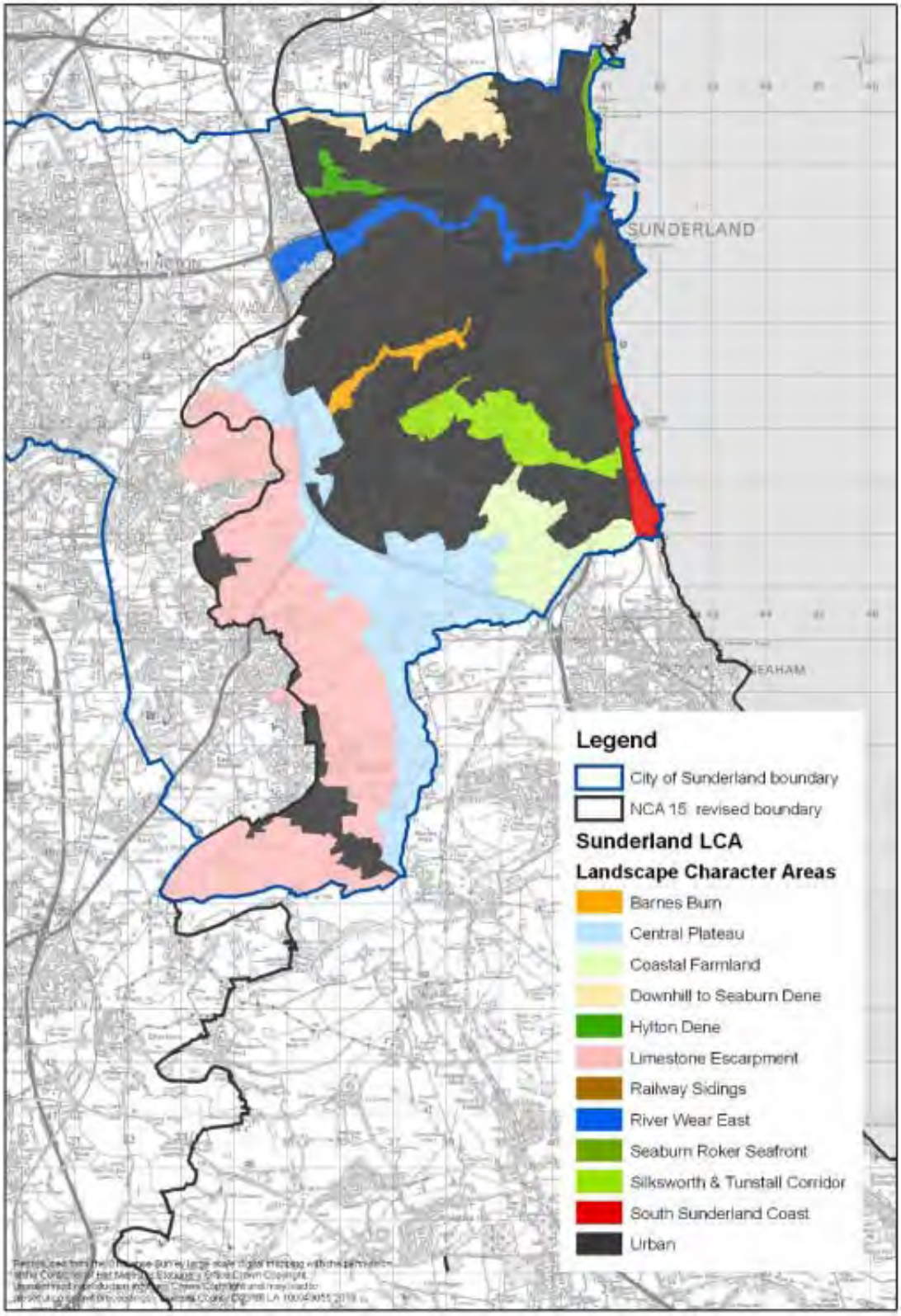


Figure 2-2: Landscape Character Areas (source: Sunderland City Council, 2013)

Key environmental issues:

Pressure from new development and associated infrastructure are likely to present significant challenges as the area responds to an increasing population and the demands of economic development and climate change. Green Belt land in the centre of the district restricts building development in the area, which places greater pressure on smaller open spaces in the urban areas in the west of the district.

Flood risk management measures have the potential to affect the landscape characteristics in the City. This includes changes to the river corridors, impacts on existing open spaces, and impacts on the setting of local landmarks and landscape features. Many of these aspects are protected through regional and local policies, which could restrict implementation of LFRMS objectives if they are shown to present a risk to the quality of the landscape. In addition, soft drainage management measures, such as the use of sustainable urban drainage systems (SuDS), can contribute to improvements to the landscape character, particularly in urban landscapes, and offer opportunities for new green infrastructure that would also benefit biodiversity and local amenity.

2.5 Biodiversity, flora and fauna

A variety of habitat types are present within the district including agricultural land, grasslands, coastal habitats, hedgerows, watercourses and other waterbodies, and woodlands. Despite being a major urban centre, Sunderland retains numerous sites of international, national and local nature conservation interest. The district's rural and urban areas have a number of sites of botanical interest and a variety of habitats of value to wildlife, most notably connected to its river network, coastline and Magnesian Limestone landscape.

Overall, the district has a low level of mature tree cover (3.7%)[11]. However, landscaping initiatives on larger reclamation schemes is greatly contributing to the overall level of woodland cover, including a significant proportion of native shrubs and trees.

The Tyne and Wear Nature Conservation Strategy introduced the concept of Wildlife Corridors with the aim of maintaining or creating 'corridors' along which wildlife movement and colonisation can take place. Such links include Strategic Wildlife Corridors (connecting towns with major rural areas) and Local Wildlife Corridors (which run largely within the urban areas). Certain rivers and streams and disused railway lines in the district also have an important function in this respect. These habitats and the species they support have the potential to be adversely affected by flooding events.

A large number of priority habitats are listed as part of the The Durham Biodiversity Partnership (which covers the City of Sunderland) and Durham Biodiversity Action Plan (DBAP) (2007) and each habitat has an independent Habitat Action Plan (HAP). Key habitats of relevance to the Sunderland LFRMS are listed below:

- Woodland and Scrub (Ancient Semi-Natural Woodland and Planted Ancient Woodland Sites (PAWS) and other Broadleaved Woodland, Wet Woodland and Scrub)
- Ponds, Lakes and Reservoirs
- Lowland Fen and Reedbed habitats
- Rivers and Streams (Floodplain Grazing Marsh, Exposed Riverine Sediments)
- Blanket Bog and Upland Wet Heath
- Coastal Habitats (Maritime Grassland, Coastal Soft Cliffs and Slopes, Strandline)
- Lowland Meadows & Pasture
- Magnesian Limestone Grassland
- Transport Corridors.

The following priority species are listed as part of the Durham BAP and each species has an independent Species Action Plan (SAP):

- Coastal Birds (Sanderling, Purple Sandpiper, Little Tern, Roseate Tern)
- Freshwater Fish (Eel, Salmon, Wild Brown Trout)
- Grass Snake
- Great Crested Newt
- White Clawed Crayfish
- Otter
- Water Vole
- Water Shrew.

[11] Sunderland City Council (2007), Sunderland Unitary Development Plan, http://www.cartogold.co.uk/sunderland/

2.5.1 Designated nature conservation sites

The Northumbria Coast SPA and Ramsar sites, as well as its underlying Site of Special Scientific Interest (SSSI), cover approximately 40km of the north east coastline, with approximately 3km falling within the Sunderland boundary. Qualifying features include a breeding little tern *Sterna albifrons* colony and over-wintering turnstone *Arenaria interpres* and purple sandpiper *Calidris maritima*. The SPA and Ramsar are geographically fragmented, comprising discrete portions of the coast north and south of the Wear Estuary.

The Durham Coast SAC and its underlying SSSI extends northwards and covers approximately 3.5km of the Sunderland coastline. It is the only example of vegetated sea cliffs on Magnesian limestone exposures in the UK[12].

A further three SACs lie within 25km of the Sunderland district boundary. Thrislington SAC is located within the Durham County boundary approximately 12km from the southern edge of Sunderland and is designated for its calcareous grassland. Castle Eden Dene SAC is located within Durham County approximately 8km from the southern edge of the Sunderland and is designated for its broad leaved mixed and yew woodland. Teesmouth and Cleveland Coast SPA lies approximately 23km from the district boundary and is particularly important for its breeding sandwich tern *Sterna sandvicensis* and little tern *Sterna albifrons* populations and its over-wintering wader populations.

There are 17 SSSIs located within Sunderland, which comprises almost half of the total number found in the wider Tyne and Wear region. All are in a favourable with the exception of four, which are in a recovering condition. There are five Local Nature Reserves (LNR) and 68 Local Wildlife Sites (LWS) in the district and the Council is currently considering the potential to designate a further 14 LWS across the area.

Since 1986, when the last major review was undertaken, two SSSIs and eight LWSs have been adversely affected or lost completely. The majority of these are generally located in open space or Green Belt locations. The reason for this loss is likely to be a result of change in land use.

2.5.2 Invasive non-native species

Invasive non-native plant and animal species recorded within the district include American mink *Neovison vison*, Signal Crayfish *Pacifastacus leniusculus*, Giant Hogweed *Heracleum mantegazzianum* and Japanese Knotweed *Fallopia japonica*. Sunderland City Council has implemented measures to control and reduce the spread of these species, particularly in relation to Giant Hogweed *Heracleum mantegazzianum* in the River Wear Catchment. However, to date, these initiatives have been partially successful and invasive species continue to present a problem across the district[13].

2.5.3 Fisheries

The Wear and Tees catchments support important stocks of migratory salmon and trout. In recent years the number of fish returning to spawn in these catchments has been found to be increasing. The Wear and Tees catchments also have diverse non-migratory fish communities including brown trout, grayling, lamprey and a range of coarse fish species including dace, chub, gudgeon, bream, eel, stone loach, minnow and bullhead[14].

Key environmental issues:

There are a number of important nature conservation sites and other wetland sites within the district and these sites support a variety of habitats and species including woodland, ponds, fen and reedbeds meadows, maritime grassland and coastal soft cliffs which act as wildlife corridors linking wetland habitat within the district. These habitats are largely dependent upon the underlying hydrological conditions and are therefore vulnerable to flooding and changes in underlying soils, hydrology and habitat. The district also supports a number of species, particularly bird species that are reliant on high quality coastal habitats and subsequently are at risk from flooding events, poor water quality and habitat changes.

Threats to rivers and streams in Sunderland include land drainage and flood defence works, which can affect in-stream and riparian habitat and isolate watercourses from floodplains. In addition,

[12] JNCC (2013), http://jncc.defra.gov.uk/default.aspx?page=1997

[13] Sunderland City Council (2013), http://www.durhambiodiversity.org.uk/rivers-and-streams-action-plan/

[14] Durham Biodiversity Action Plan (2013), http://www.durhambiodiversity.org.uk/biodiversity-action-plan

storm sewage overflows are known to affect water quality and environmental quality at locations across the district, and affects important wildlife sites including Hetton Bogs SSSI from invasive species can be spread by flooding events. Poor or inappropriate land management can result in exacerbated erosion rates, loss of riparian vegetation, sedimentation and nutrient enrichment. Coastal habitats are threatened by flood defence works, land drainage and coastal erosion. These can affect areas of habitat for important wildlife and plant species, as well as water quality.

2.6 Water environment

2.6.1 Water resources

Much of the Sunderland district lies within the catchment of the River Wear. The River Wear originates in the Pennine Hills and flows through the city of Durham and then Sunderland before discharging into the North Sea. Eastern areas of the catchment, closer to the coast, have a long history of coal mining, which continues to this day and are consequently more densely populated.

In terms of water resources, Sunderland lies wholly within the Kielder Water Resource Zone, which extends from Berwick-upon-Tweed in the north to Middlesbrough in the south, and incorporates the eastern half of the Pennine Ranges. The Kielder Water Resource Zone provides water to more than 99% of households in the district, supplied by Northumbrian Water[15]. Climate change modelling suggests that future climate change impacts on rainfall will have little impact on water availability within this Resource Zone and even when population change is taken into consideration, there will still be a surplus of supply in 2025. During times of water shortages, the Kielder Water Resource Zone is capable of being supported directly, or by substituting river compensation flows, with water derived from Kielder Reservoir and distributed via the Tyne-Tees tunnel (Northumbrian Water, 2010).

The Magnesian Limestone aquifer, which extends in a relatively thin band from Sunderland in the north past Ripon in the south, is a regionally important source of potable water for the City of Sunderland. As of 1995, the aquifer provided 30% of potable water to the city. Average consumption in 2007/08 was 146 litres per person per day (pp/pd) in Sunderland and is predicted to fall slightly to 140 pp/pd by 2034/35. These figures are slightly below the current England average of around 150 pp/pd[16].

2.6.2 Water Framework Directive

The district is covered by the Northumbria River Basin Management Plan (RBMP)[17], which identifies the current quality of water bodies in the district and sets objectives for making further improvements to their ecological and chemical quality.

One of the key objectives under the Water Framework Directive (WFD) is the requirement to prevent deterioration in the current status of the water bodies. If an activity, such as flooding, has the potential to impact on the ecology or morphology of the waterbody (as defined by the biological, physio-chemical and hydromorphological Quality Elements of the WFD) the risk of causing deterioration in the status of a water body needs to be assessed.

Within the catchment there are 68 river water bodies and 16 lakes, 32 of which are classified as Artificial or Heavily Modified. Table 2-2 lists the percentage of water bodies with a good or high ecological or chemical status and the percentage of water bodies expected to be at good or high status in 2015.

Four watercourses of note within the Sunderland district are the River Wear, River Don, Herrington and Lumley Park Burns[18].

- The River Wear is classified as a Heavily Modified Water Body (HMWB) with a moderate ecological status and good chemical status. There is no predicted change in current status in 2015. The River Wear is recognised as having good populations of fish, including salmon, trout and coarse fish in the lower and middle reaches.

[15] Northumbrian Water (2010), Final Water Resources Management Plan 2010-2035
[16] Environment Agency (2013), http://www.environment-agency.gov.uk/homeandleisure/beinggreen/117266.aspx
[17] Environment Agency (2009), River Basin Management Plan, Northumbria River Basin District
[18] Environment Agency (2013). https//maps. environmentagency.gov.uk

- The River Don, located at the northern boundary of the district is also a HMWB and has been classified as having good ecological potential. Despite this, the overall biological quality of the river is classified as poor.
- The Herrington Burn is a designated HMWB with poor ecological and chemical status. There is no predicted change in current status in 2015.
- The Lumley Park Burn is a HMWB with a moderate ecological status and good chemical status. There is no predicted change in current status in 2015.

Failure to meet WFD objectives is primarily due to physical assets on the watercourses, which impede fish passage in upstream areas, and water storage and abstraction issues. The key reasons for chemical status failures are point source releases from Sewage Treatment Works (STW) and combined sewage outfalls. There are eight STW in the Sunderland district and a further 36 sewage pumping stations[19]. Of particular note are the water quality pressures applied on the Lumley Park and Herrington Burns[20].

Table 2-2: Key WFD water body statistics – Wear Catchment 2009 and 2015

River and lake water bodies	2009	2015
% at good ecological status or potential	24	29
% assessed at good or high biological status (49 water bodies assessed)	22	31
% assessed at good chemical status (3 water bodies assessed)	75	75
% at good status overall (chemical and ecological)	24	29
% improving for one or more element in rivers	-	22

2.6.3 Groundwater quality

Groundwater sources in the Sunderland district provide vital resources for public water supply, industry, agriculture, feed rivers and support wetlands. Groundwater quality has been assessed under the WFD and is currently classified as poor for quantitative quality (predicted to remain as poor in 2015) and poor for current chemical quality (predicted to remain as poor in 2015). Overall, groundwater in the district is classed to be 'at risk' and is a protected area[21].

Old mine workings within the district have the potential to release heavy metals into the groundwater aquifers. A well documented case in the Durham coalfields just to the south of the district is detailed by the British Geological Survey[22], where it is reported that high concentrations of sulphate, sodium and nitrates are found. In areas along the coast, over-pumping of the aquifer has resulted in saline intrusions. Increased use of fertilizers in the catchment by the agricultural industry is resulting in increasing nitrite concentrations[23].

Landfills in the district may also affect groundwater quality. Halliwell Banks landfill (also known as Ryhope landfill) located three miles south of Sunderland is considered to present a high risk to groundwater as well as coastal waters due to coastal erosion. Other landfills identified as having the potential to affect groundwater include Houghton Quarry, Field House Quarry and Springwell Quarry.

Sunderland lies within a high Groundwater Vulnerability Zone, and southern parts of the district around Houghton-le-Spring lies within a Groundwater Source Protection Zone, which highlights the importance of the groundwater resources in the area.

2.6.4 Flooding

Environment Agency flood zones indicate that only small areas within Sunderland district are currently at risk from flooding from main rivers or the sea[24]. Urban areas along the coast within the district are well protected by the existing coastal cliffs and sea defences. Along the River Wear, there is minimal flooding, which is largely restricted to small areas in the centre of Sunderland and

[19] ClimateNE (Association of North East Councils (2013), http://www.climatenortheast.com

[20] Environment Agency (2009), River Basin Management Plan, Northumbria River Basin District

[21] Environment Agency (2013), https//maps.environmentagency.gov.uk

[22] British Geological Society (2009), Baseline groundwater chemistry in the Magnesian Limestone of County Durham and North Yorkshire

[23] Environment Agency (2009), River Basin Management Plan, Northumbria River Basin District

[24] Environment Agency (2013), http://www.environment-agency.gov.uk/homeandleisure/37837.aspx

around Fatfield. There are some river flood defences provided within the district, with approximately 1.6km of flood embankments and almost 300m of flood walls provided on minor watercourses near Castletown and around Fence Houses.

Recent fluvial flooding events within the district include in Sedgeletch (1965 and 1975), Fatfield (1968 and 2000), Houghton-le-Spring (1978) and Sunderland (2004 and 2012).

Climate change is predicted to lead to higher intensity and greater magnitude rainfall events within Sunderland, leading to more severe storms during summer periods. Along with sea level rise, this is predicted to create more tidal and fluvial flooding within Sunderland.

Key environmental issues:

Climate change modelling suggests that future climate change impacts on rainfall will have little impact on water availability within the Kielder Water Resource Zone and even when population change is taken into consideration, there will still be a surplus of supply in 2025.

Groundwater is heavily used for drinking water supply and industrial abstraction. Groundwater quality is adversely impacted by contaminated minewaters originating from the Durham coalfield and saline intrusions along the coast. There is also an increasing trend of nitrites within groundwaters due to increased use of fertilizers in agricultural areas.

Almost half of the waterbodies within the Wear Catchment are classified as Artificial or Heavily Modified. In addition, a large percentage of waterbodies currently fail to meet good or high ecological, biological or chemical potential under the WFD. The LFRMS will need to consider whether any flood risk management measures will lead to adverse impacts on the waterbodies within the City and whether the LFRMS can help contribute to achieving WFD objectives and improving water quality in the City. Point source releases from sewage works and combined sewage outfalls are key factors for water quality failures in the River Wear catchment. Ecological status is adversely impacted by physical fish barriers and abstractions.

2.7 Soils and geology

The solid geology of Sunderland consists of late Permian limestones, dolomites, marls and evaporates, which reflect the fact that these rocks were laid down as sediments in a shallow tropical sea[25]. The aquifers within these Permian limestones form an important water resource for Sunderland.

Of particular note in the district is the Tunstall Hills and Ryhope Cutting geological SSSI. This site lies on the southern edge of the district between New Silksworth and Ryhope, and provides exposure through part of the Magnesian Limestone succession of Permian age. Well preserved reef and limestone fossils are present at the site.

Resource extraction is now limited within Sunderland[26] but has a long history stretching back several centuries. In particular, coal mining has an extensive history in Sunderland and many of the past and present residents served the coal industry. There are no operation coal mines remaining in the Sunderland district since Herrington open cast ceased operation. The only operational resource extraction industries are small sand and gravel, and crush rock operations at Eppleton and Hetton Moor House Farm.

Soils within the Sunderland area are predominately loamy, with a moderate fertility and impeded drainage[27]. Grade 3 agricultural areas surround the built up urban centres of Sunderland[28] and primarily supports hay and silage fields and grazing paddocks. The overuse of nitrates has been reported as leading to groundwater contamination in the district.

Soil and ground contamination is a major concern in the City of Sunderland given the past history of mineral extraction and processing there. Since 1974 over 1,000 hectares of derelict land have been remediated and large areas of the city are likely to retain potentially contaminating wastes to some

[25] British Geological Society (2009), Baseline groundwater chemistry in the Magnesian Limestone of County Durham and North Yorkshire

[26] Sunderland City Council (2009), Topic Paper 1.14 Minerals

[27] National Soil Resources Institute (2013), www.landis.org.uk (Accessed 16/09/13).

[28] Natural England (2013), http://www.naturalengland.org.uk/freedom_of_information/class6.aspx

degree[29]. All the city's major derelict sites have had at least a minimum level of reclamation or have reclamation underway at present, and in total over 100 sites of all sizes have been treated. However, in some older schemes de-contamination was carried out only to a basic level, although in keeping with best practice at the time.

Key environmental issues:

Groundwater contamination in the Magnesian Limestone aquifer due to past mining activities (particularly around the Durham Coalfields) and saline intrusions along the coast due to overpumping are major issues.

The low drainage potential of the loamy soils found in the Sunderland district has implications for the infiltration of floodwaters. Flooding events could alter the extent or duration of flooding and therefore the LFRMP will need to consider implications for soil quality, or mobilisation of pollutants within contaminated soils into surrounding soils and the underlying geology. Impacts on soil quality could affect other environmental receptors, such as nature conservation sites that are reliant on the underlying soil characteristics. There is a need for the protection and maintenance of the integrity of the designated geological SSSI.

2.8 Historic environment

There are a number of historically and culturally valuable sites in the district. These include Listed Buildings, Scheduled Monuments and Conservation Areas:

- Ten Scheduled Ancient Monuments (SAMs), including Bronze and Iron Age archaeology at Hastings Hill, Copt Hill and Humbledon Hill, Hylton Castle, Bowes Railway and the First World War early warning acoustic mirror at Fulwell.
- 692 Listed Buildings, of which nine are listed Grade I, 16 Grade II* and the remaining as Grade II.
- 14 Conservation Areas (see Figure 2-3), ranging from City Centre and riverside areas to pre-conquest villages and the Victorian suburb of Ashbrooke; each is described as having their own unique character and local distinctiveness. Designation in Sunderland is dependent on the overall quality and interest of an area, rather than individual buildings.
- A candidate World Heritage Site (cWHS) comprising the 7th century monastic site of St Peters (this is one half of the cWHS together St Paul's monastic site in Jarrow). The twin monastic site is considered to be globally important by virtue of having Outstanding Universal Value (OUV). The estuarine setting of the site is also mentioned in the management plan of the site.

The district's Heritage at Risk Register (2012) highlights five Listed Buildings, three Scheduled Monuments and two Conservation Areas at risk. The number of buildings at risk has increased by one since 2011. Scheduled monuments are listed as very bad, stable and declining. Buildings are listed as poor or very bad and the Conservation Areas at risk are listed as improving (Old Sunderland) and deteriorating significantly (Old Sunderland Riverside). Flooding has not been identified as a threat to any of these sites.

The two Conservation Areas cover the original settlement of Sunderland and the late 18th/early 19th century expansion of Sunderland as it developed towards Bishopwearmouth in the west. Old Sunderland has been on the Heritage at Risk Register since 2009 and Old Sunderland Riverside was added in 2010.

[29] Sunderland City Council (2009), Topic Paper 1.16 Pollution

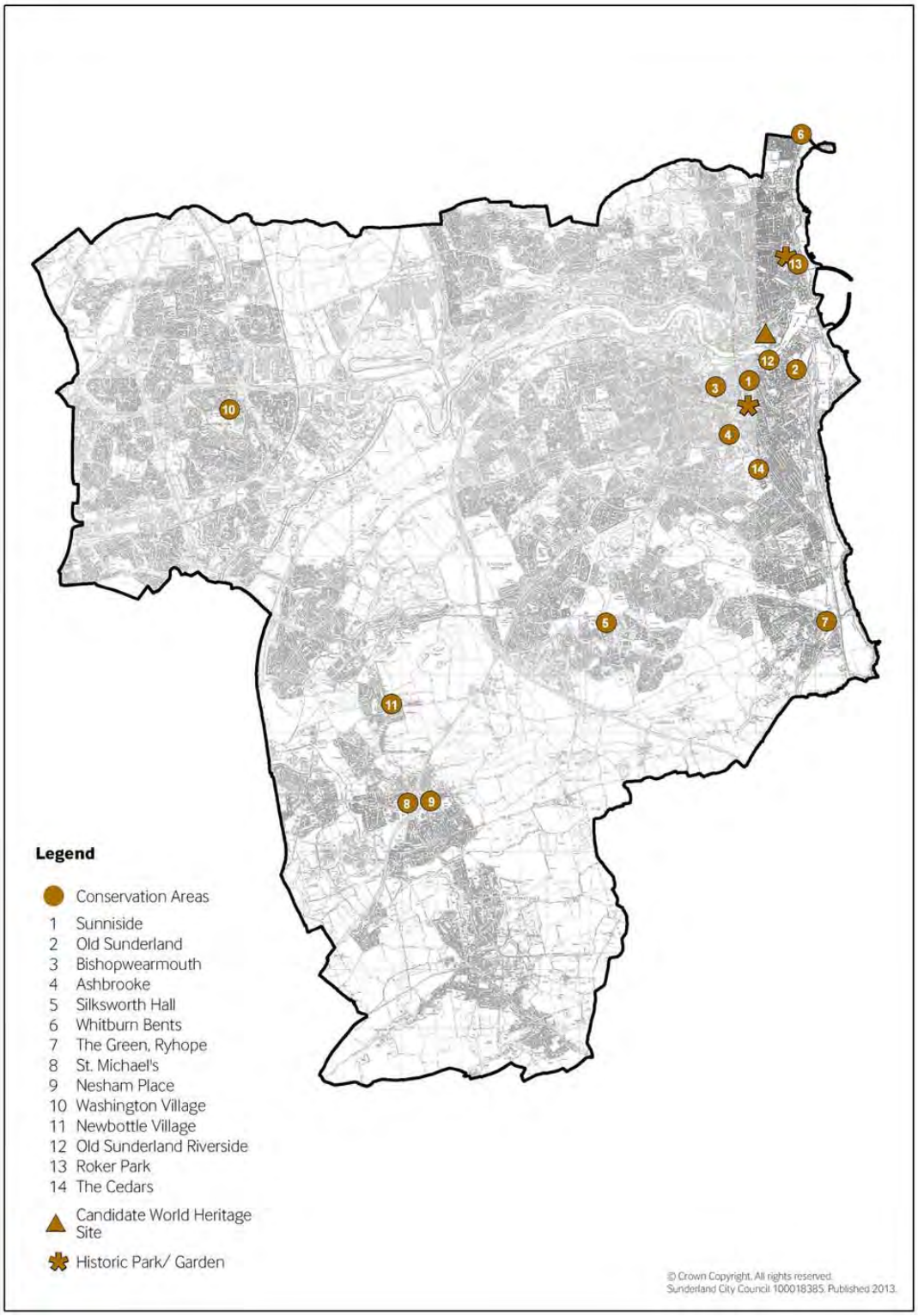


Figure 2-3: Conservation Areas within Sunderland (source: Sunderland City Council, 2013)

Key environmental issues:

Sunderland contains a wealth of historic sites. However, a number of the most important of these sites are currently assessed as being under threat. There is a risk that adverse impacts upon aspects of the district's cultural heritage could arise from flooding and increased flood risk in the future, whilst the construction and implementation of the flood risk management options selected by the LFRMS could also have adverse effects. Potential benefits may also arise from reduced flood risk to assets as a result of implementation of the LFRMS. However, it should be noted that some archaeological assets require waterlogged conditions to preserve them.

2.9 Population

Sunderland is the largest centre of population within Tyne and Wear, with an estimated population of 275,500[30]. However, there has been a significant decline (approximately 20,000 people) in population since the 1980s (see Figure 2-4), which has been attributed to several causes including the decline of traditional industries such as coal mining (with the city losing 25% of all jobs between 1975 and 1989), an ageing population and migration away from the city and region.[31] The mean age of the population is slightly higher than the England average: 40.4 years old compared to the England average of 39.3.

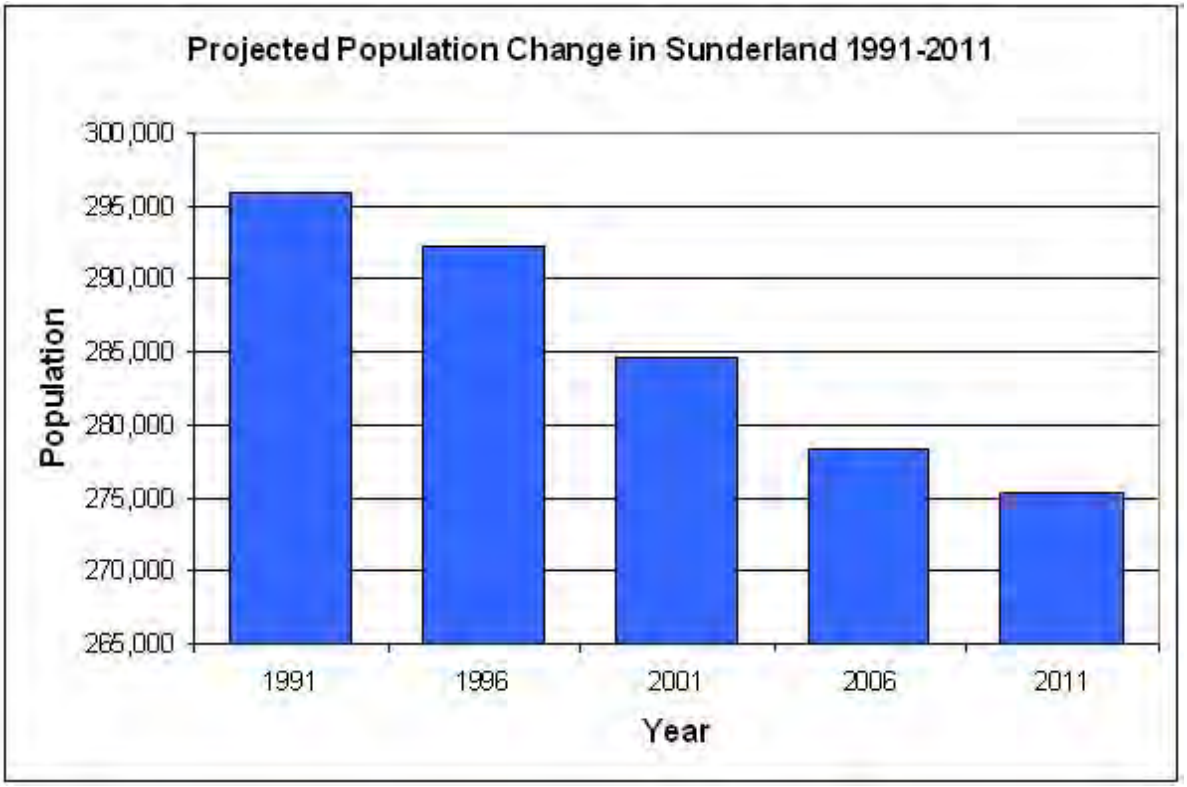


Figure 2-4: Population change in Sunderland (1991 to 2011) (Source: Sunderland City Council)

In the past 10 years traditional industrial sectors have been replaced with industries such as automotive manufacturing following the location of Nissan in Washington, as a result the office of National Statistics predict that the population will increase over the next few years, with the structure also changing with an increase in older age groups.

The majority of the population in Sunderland is predominately located in the urban centres with few people living in close vicinity to rural areas, and many parts of the city are classified as being in the worst 10% of England with regards to having access to nature[32].

2.9.1 Deprivation

The North East has a large proportion of areas amongst the most deprived in England[33]. Table 2-3 demonstrates this with key figures used by the Office of National Statistics to indicate economic deprivation. Despite many improvements, parts of the city still suffer from deprivation, with 70 of the 188 Census Localities (called Super Output Areas or SOAs) in Sunderland are ranked among the 20% most deprived in England.

[30] Sunderland County Council (2013), Local Development Framework Core Strategy

[31] Sunderland City Council (2009), Topic Paper 1.15 Socio-demographic profile

[32] Natural England (2008), State of the natural environment in the North East

[33] Department for Communities and Local Government (2011), The English Indices of Deprivation 2010

Table 2-3: Key figures for economic deprivation in the Sunderland district

Variable	Measure	Sunderland	North East	England
All People of Working Age Claiming a Key Benefit (Persons, Aug10)	%	21	20	15
Jobseeker's Allowance Claimants (Persons, Aug10)	%	5	5	4
Incapacity Benefits Claimants (Persons, Aug10)	%	10	9	7
New Personal Insolvencies (Cases, Jan11-Dec11)	Rate per 10,000	38.4	35.2	26.7

Sunderland has a higher proportion of children in poverty than the England average, but the gap is slowly reducing. Public Health England reports that levels of deprivation, early death and child obesity are all lower than the national average. However, life expectancy is also lower than the national average. Employment rates also fluctuate significantly, and there are a significantly higher percentage of public employees compared to the national average.

Life expectancy for both males and females is lower than the England average, with deaths from heart disease and cancer higher than the average. The health of the Sunderland population is not evenly distributed with both men and women from the least deprived areas of Sunderland living approximately seven years longer than those from the most deprived areas. However death rates from all causes have gradually decreased in Sunderland.

The percentage of individuals in very good health in Sunderland is lower than the England average (42.9% compared to 47.2% in England) and the percentage of individuals in very bad health is higher than the England average (2% compared to 1.2% in England)[34].

Key environmental issues:

The population of Sunderland is predicted to increase in the future with a larger proportion of older people in the population. The general health of the population is lower than the England average, with lower life expectancy. Health levels do vary across the district, with poorer health linked to areas of higher deprivation.

This growing population will place increased demand on a range of resources and the district's water and sewerage infrastructure, which could be exacerbated by the effects of climate change. Linked to this may be increased demands for development and pressure on the existing housing provision, which may result in greater need for development in areas at risk of flooding.

There are significant deprivation, obesity and health issues facing the community, which increases the vulnerability of these people to the impacts of flooding.

2.10 Material assets

Sunderland City Council's Infrastructure Delivery Plan (2013)[35] provides information on the proposed growth of the city. The Council expects that there will be an additional 15,000 dwellings and 81ha of industrial land required by 2032. At present housing in Sunderland are predominantly terraces and semi-detached properties, with a shortage of detached dwellings.

Whilst congestion into the city is not at the same levels as other major cities in the region, congestion exists on a number of key routes. A Congestion Strategy has been implemented as part of the Tyne and Wear Local Transport Plan (LTP), which includes the provision and regeneration to a number of key routes such as the planned Coalfield Regeneration Route and Sunderland Strategic Transport Corridor, which includes a river crossing.

The congestion in region has increased as car ownership has increased, growing by 11% between 2000 and 2006; this is expected to continue to grow by a predicted 2% each year.

In the larger Tyne and Wear area it is predicted that there will be a 24% increase in traffic mileage between 2007 and 2021 accompanied by a decline in public transport, with a drop of 3.5% between 2003 and 2011[36]. This is a trend that is mirrored across the Sunderland region.

[34] Office of National Statistics (2013), Local Profiles, April 2013 Update.

[35] Sunderland City Council (2013), Infrastructure Delivery Plan

[36] Tyne and Wear Integrated Transport Authority (2011), The Third Local Transport Plan for Tyne and Wear Delivery Plan 2011 - 2014

There is a network 225km of public rights of way and cycle routes, including the national C2C route. The LDF and LTP recognise the benefits of cycling and plan to encourage the uptake of cycling through the further provision of cycle routes and schemes.

There are three rail operating companies in the city, Northern Rail, the Grand Central service to London and the freight line to the port, as well as the Metro operated by Nexus. There are plans to significantly upgrade the Metro provision in the city.

Waste management within the district is undergoing significant changes, with the aim of significantly reducing waste generated. In order to attempt to meet targets for waste reduction, recovery, recycling and composting new facilities and technologies will be invested in. An Energy from Waste (EfW) Facility is being constructed at Teeside in order to process waste from three local authorities that is not recycled. To support the facility three Bulking Facilities will also be developed.

2.10.1 Economy

Following a decline in traditional heavy industry in the district, such as coal mining, there has been a large-scale shift to industries such as automotive manufacturing and customer service based call centres, with the opening of developments such as the Nissan production factory and Doxford International, which created in the region of 8,000 jobs[37]. As a result, employment rates in the region have either been reducing or remaining stable. However, these rates remain higher than the England Average (9.3% compared to 7.8% for the period from April 2012 to March 2013)[38].

With the development of 'out of town' employment centres in the region, Sunderland city centre has suffered, with only 16.6% of the district's employment located within this area, which is significantly lower than the 33% in neighbouring Newcastle. This has the result of reducing the money spent within the city centre by office workers and this has reduced the number of shops and leisure facilities within the city.

The waterfront position of the city is seen as a major asset and it is planned that the 'attractive' location is given more prominence and is better connected to the rest of the city to help attract new businesses[39].

2.10.2 Green infrastructure

There are a total of 1,770 greenspace sites within Sunderland, totalling 3,850ha, or 27.5% of the district area. When combined with the open countryside in the district, there is over 8,000ha of 'undeveloped' green land in the area, equating to 57% of the overall area of the district. Approximately 65% of the greenspace sites are considered amenity sites, which comprise less than 20% of the overall greenspace area. There are no distinct differences between areas in Sunderland regarding the quantity of greenspace available. However, the more deprived areas in Sunderland generally have the lowest quality greenspace sites.

Key environmental issues:

Predicted population increases and an ageing population will place greater pressure on the transport network, which could be exacerbated by a strong local pattern of private car usage and increased future development pressure. In addition, development and commercial pressures are set to place increased demand on land availability, which will in turn affect the existing transport network.

Flooding of transport assets has the potential to cause disruption to movement of residents, commuters and emergency services. This could have short-term impacts on the local and regional economies, and longer-term impacts on transport planning, utilities provision and social mobility.

Flood risk management measures, such as flood defences, have the potential to impact upon cycle routes and footpaths along river corridors, and the amenity and landscape value of these areas. Softer management measures, such as the implementation of SuDS schemes has the potential to achieve a number of benefits including biodiversity gain and provision of new areas of amenity value.

[37] Sunderland Partnership (2008), The Sunderland Strategy 2008 - 2025
[38] Office of National Statistics (2013), Local Profiles, April 2013 Update
[39] Sunderland City Council (2013), The Sunderland Economic Masterplan http://www.sunderland.gov.uk/CHttpHandler.ashx?id=9657&p=0

2.11 Air quality

Sunderland City Council undertakes periodic reviews of air quality for a range of potentially harmful substances. This is required to meet the targets set by the Government's Air Quality Strategy. National air quality objectives (AQOs) have been designated for the following contaminants: ground level ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), particulates, Benzene, 1,3-Butadiene and Lead. To help meet this requirement it is the role of the local authority to identify those areas where levels of these substances are likely to be exceeded. Areas identified are usually dealt with using a Local Air Quality Management (LAQM) Scheme.

Nitrogen dioxide has been measured using passive diffusion tubes for several years throughout Sunderland with the majority of these tubes being located on busy road areas. No Air Quality Management Areas (AQMA) have been designated in the City of Sunderland. However, there are several hotspot locations identified where levels are close to the threshold for nitrogen dioxide[40].

Key environmental issues:

Generally, air quality in the city meets the targets set by the government in the AQO. However, greater pressures on air quality may occur in the future through increases in the population, greater development and increased traffic congestion. This could lead to the designation of AQMAs to address local impacts on air quality. The LFRMS is not likely to impact on air quality in the city, with any impacts, such as through increased flood risk management activity, unlikely to be significant.

2.12 Climate

The UK Climate Projection (UKCP09) provides probability-based projections of key climate variables, such as temperature and rainfall at a higher geographic resolution than has previously been available. Projections are based on the Intergovernmental Panel on Climate Change's 'business as usual' emissions scenario.

Sunderland experiences relatively stable temperatures and significant precipitation in all months. Precipitation totals vary throughout the year, with average annual totals of 600mm, making the region one of the driest parts of the UK[41]. Temperatures in winter tend to be mild, while summer temperatures are moderate. The average temperature in the district is 9.3°C. The warmest month on average is July, with an average temperature of 15.5°C. The coldest month on average is December, with an average temperature of 4°C. Maximum and minimum temperatures recorded in the district range between 31°C and -12°C[42].

Current predictions towards 2050 indicate significant changes in rainfall patterns in the River Wear Catchment, with a reduction in overall rainfall levels and a 20% increase in winter rainfall. Average temperatures are predicted to increase by up to 3^{o}C, whilst sea levels are predicted to rise along the coast[43].

Sunderland is aiming to become a 'clean, green city with a strong culture of sustainability', a key objective of which is to reduce greenhouse gas emissions. In 2007 Sunderland produced approximately 2,100,000 tonnes of greenhouse gas emissions each year (of which approximately 1,860,000 tonnes were of CO_2). Of this total, 31% was from housing, 40% from public and commercial organisations, 20% from road transport and 9% (as methane) from waste. These levels are 4.5% lower than 2006 and 5.6% below 2005 levels.

Key environmental issues:

With rainfall frequency and intensity set to significantly increase in the coming decades, the likelihood of river flooding and overwhelming of drains and sewers will rise due to increased surface runoff. This in turn will lead to localised flood events and increased erosion. To accommodate the increased likelihood of such events the LFRMS must implement measures aimed at coping with them.

If such climate change projections are realised, the adverse risk and impact toward Sunderland's infrastructure, public health and the natural environment has the potential to be great. With regard to

[40] Sunderland City Council (2011), Local Air Quality Management Progress Report

[41] Met Office (2013), North East England: climate website. http://www.metoffice.gov.uk/climate/uk/ne/print.html

[42] Weatherbase (2013), www.weatherbase.com

[43] Sunderland City Council (2009), Topic Paper 1.12, Climate Change

the natural environment changing climate, mainly that of changing temperatures poses the biggest threat. Species and habitat abundance and richness will become threatened as a result of changing habitats, drier soils and increased competition from invasive species throughout the district's watercourses.

Flooding derived from increased rainfall and storm events of greater severity is expected to result in significant adverse impacts on utility, residential and transport infrastructure with subsequent economic consequences. Damage to infrastructure at the forecasted extent will inevitably incur large economic costs as well as social and public health implications as a result of the distress and risk to disruption caused.

The LFRMS options, could potentially, both directly and indirectly, lead to an increase in greenhouse gas emissions as a result of construction and maintenance activities. Emissions could be reduced by selecting sustainable building practices and materials that benefit flood risk and carbon emissions.

2.13 Scoping conclusions

Following a review of this environmental baseline data it was possible to scope out air quality as an SEA issue as it is unlikely that there will be a significant environmental impact on air quality in the district from implementation of the LFRMS. A summary of the scoping conclusions is given in Table 2-4 below.

Table 2-4: SEA scoping assessment summary

Receptor	Scoped In	Scoped Out	Conclusion
Landscape and visual amenity	Yes	No	The landscape qualities and integrity of the district and its Green Belt could be affected by changes to flood risk or land use/management, including new development, whilst increased flood risk could impact on locally important urban landscapes and landscape features.
Biodiversity, flora and fauna	Yes	No	Future incidences of flooding could potentially change the underlying nature of habitats and the LFRMS policies may present opportunities for biodiversity gain, particularly in relation to the district's aquatic habitats. LFRMS measures could improve the river channel by removal of blockages, which would be of benefit to fish passage.
Water environment	Yes	No	Flooding has the potential to impact on the level of water availability, the quality of the watercourses within the district and achievement of WFD objectives. There is the potential for indirect impacts on water dependent designated sites/species. Flood risk management measures could potentially affect the water environment both positively and negatively. The LFRMS could give rise to changes in flood risk and water quality, and could affect provision of water resources. The LFRMS needs to be assessed to determine compliance with the objectives of the WFD.
Soils and geology	Yes	No	Sunderland contains a significant percentage of high grade agricultural land. Changes to flood risk could affect soil quality and underlying geology, which supports a number of geological and hydrogeological resources. Subsequent erosion of these lands could give rise to pollution pathways, increasing the risk of an adverse effect on other environmental receptors.
Historic environment	Yes	No	There are a large number of historic sites in the district that could be affected by changes to flooding and flood risk management measures. Changes could have positive and negative impacts on historic sites. This includes damage to the fabric of the structures through waterlogging or drought and impacts on their historic value. Opportunities may exist to protect important sites or negative impacts could occur due to increased flood risk to vulnerable sites.
Population	Yes	No	Flood risk can influence a range of socio-economic characteristics of the district including social deprivation levels, health and wellbeing, access and recreation, and employment opportunities. The LFRMS has the potential to provide significant positive benefits to the population of the district.

Receptor	Scoped In	Scoped Out	Conclusion
Material assets	Yes	No	Critical infrastructure including the transport network, waste sites, utilities services and emergency services, could benefit from reduced flood risk. Conversely, increased flood risk to these sites could cause significant disruption to the district, impacting on human and economic activity and the environment.
Air quality	No	Yes	The LFRMS is not likely to have a significant effect on air quality in the district due to the localised nature of any potential impacts.
Climate	Yes	No	Changes in flood risk could affect resilience to the potential impacts of future climate change. This could have knock-on effects on a range of environmental aspects including biodiversity, water resources and the local landscape. Flood risk management measures could also result in increased carbon emissions associated with new development or increased management activities. The LFRMS may include mitigation, resilience and adaption responses and measures that could contribute to addressing the future impacts of climate change effects. Opportunities to improve climate change adaptation will be considered in the SEA.

3 SEA assessment framework

3.1 Introduction

The SEA framework is used to identify and evaluate the potential environmental issues associated with the implementation of the LFRMS. The framework comprises a set of SEA objectives that have been developed to reflect the key environmental issues identified through the baseline information review. These objectives are supported by a series of indicators, which are used as a means to measure the potential significance of the environmental issues and can also be used to monitor implementation of the LFRMS objectives. These LFRMS objectives are tested against the SEA framework to identify whether each option will support or inhibit achievement of each objective.

Table 3-1 below summarises the purpose and requirements of the SEA objectives and indicators.

Table 3-1: Definition of SEA objectives and indicators

	Purpose
Objective	Provide a benchmark 'intention' against which environmental effects of the plan can be tested. They need to be fit-for-purpose.
Indicator	Provide a means of measuring the progress towards achieving the environmental objectives over time. They need to be measurable and relevant and ideally rely on existing monitoring networks.

3.2 SEA objectives and indicators

SEA objectives and indicators have been compiled for each of the environmental receptors (or groups of environmental receptors) scoped into the study (see Table 2-3). The SEA objectives used to assess the LFRMS are given in Table 3-2 below.

Table 3-2: SEA objectives and indicators

Receptor	Objective		Indicator
Landscape	1	Protect the integrity of the district's urban and rural landscapes, and promote the key characteristics of the Green Belt and river corridors.	Changes in the condition and extent of existing characteristic elements of the landscape (changes could be beneficial, adverse or neutral).
Biodiversity, flora and fauna	2	Protect and enhance designated sites, protected species and BAP habitats and species.	Area of statutory designated nature conservation sites affected by flooding or flood risk management measures. Area of non-statutory designated nature conservation sites affected by flooding or flood risk management measures. Area of BAP habitat adversely affected by flooding or flood risk management measures. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat). Number of barriers to migration of riparian species removed/modified. Length of river de-culverted.
	3	Maintain and enhance habitat connectivity and wildlife corridors within the district.	
	4	Maintain existing, and where possible create new, riverine habitat to benefit aquatic species and fisheries, and maintain upstream access.	
Water environment	5	Improve the quality and quantity of the water in the district's rivers.	Number of SuDS schemes installed as part of the LFRMS. Numbers of sites with high pollution potential (e.g. landfill sites, waste water treatment works) at risk from flooding.
	6	Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.	Percentage of river lengths achieving 'Good' ecological status or an improvement on existing status. Assessment of FRM options and their impact (e.g. disconnection/ reconnection with floodplain, in-channel works/dredging, barriers to fish movement, reinstatement/ removal of natural morphology).
Soils and geology	7	Reduce the risk of soil erosion and pollution.	Area of agricultural, rural and greenfield land affected by flooding or flood risk management measures. Areas of ALC Grade 1-3 land at risk of flooding. Areas of ALC Grade 4-5 land at risk of flooding.
Historic environment	8	Preserve and where possible enhance important historic and cultural sites in the district and their settings.	Number of heritage assets at risk from flooding. Proportion of conservation areas at risk from flooding. Number of flood risk management measures implemented that conserve and enhance heritage assets.
Population	9	Minimise the risk of flooding to communities.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc) at risk from flooding.

Receptor	Objective		Indicator
	10	Increase the use of sustainable drainage systems (SuDS), particularly in all new developments.	Number of sites with SuDS schemes installed.
Material assets	11	Minimise the impacts of flooding to the district's transport network.	Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets (e.g. power stations, sub-stations) at risk from flooding.
Climate	12	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc) at risk from flooding. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat). Number of barriers to migration of riparian species removed/modified.

4 Plan issues and alternatives

4.1 Developing alternatives

The SEA Directive requires an assessment of the plan and its 'reasonable alternatives'. In order to assess reasonable alternatives, different strategy options for delivering the LFRMS have been assessed at a strategic level against the SEA objectives, and the environmental baseline as detailed in Section 2. The results of this assessment will be used to inform the decision-making process in choosing a preferred way of delivering the LFRMS.

4.2 Appraisal of actions to improve flood risk

The LFRMS has the purpose of managing and reducing local flood risk in Sunderland. The strategy objectives have been assessed against the SEA objectives for each of the following options as shown in Table 4-1.

1. **Do nothing**: where no action is taken and existing assets and ordinary watercourses are abandoned.
2. **Maintain current flood risk**: where existing assets and watercourses are maintained as present in line with current levels of flood risk. Existing infrastructure is not improved over time and the effects of climate change are not taken into account; and
3. **Manage and reduce local flood risk**: take action to reduce the social, economic and environmental impact due to flooding.

Table 4-1: Assessment of the strategy and alternative options against the SEA objectives

		Options and Effects		
SEA Objective		**Do Nothing**	**Maintain current flood risk strategy**	**Manage and reduce local flood risk**
1	Protect the integrity of the district's urban and rural landscapes, and promote the key characteristics of the Green Belt and river corridors.	Potential negative effect resulting from no management that could adversely impact on sensitive urban landscape character. However, abandonment of assets may allow for the development of a more natural watercourse, which may enhance the local landscape character, particularly in rural areas.	Little/no change to the baseline in the short to medium term. However, with increasing flood risk, negative effects could occur on sensitive urban landscape character, whilst positive effects may occur in rural areas as the district's watercourses increasingly reconnect to their floodplain.	Potential for managing and promoting this objective through sensitively designed flood risk management schemes, which enhance local landscape character, historic sites and the Green Belt. Conversely, inappropriate management schemes could damage key landscape features and characteristics.
2	Protect and enhance designated sites, protected species and BAP habitats and species.	Potential for both adverse and beneficial impacts. For example, abandonment of assets may allow for the development of a more natural watercourse (enhancing certain notable species and habitats). However, there would be an increased risk of spreading non-native invasive species and potential impacts on water quality through increased flooding.	Little/no change to baseline in the short to medium term. Increased flooding in the future may provide opportunities for new habitat creation, but may also result in the spread non-native invasive species or adversely impact on habitats intolerant of increased inundation or changes in water quality.	Potential for both adverse and beneficial impacts as a result of active management. Opportunities may arise to enhance habitats and species through the implementation of multi-functional flood risk management measures, such as the provision of new green infrastructure.
3	Maintain and enhance habitat connectivity and wildlife corridors within the district.	Potential for both adverse and beneficial impacts. Abandonment of assets would allow for corridors to develop that would be unrestricted by flood risk assets. However, the increased risk of spreading non-native invasive species would inhibit the biodiversity value of wildlife corridors.	Little/no change to baseline in the short to medium term. Increased flooding in the future may provide opportunities for new habitat creation, but may also result in the spread non-native invasive species or adversely impact on habitats intolerant of increased inundation or changes in water quality.	Potential for both adverse and beneficial impacts as a result of active management. Opportunities may arise to enhance habitats and species through the implementation of multi-functional flood risk management measures, such as the provision of new green infrastructure.

		Options and Effects		
SEA Objective		**Do Nothing**	**Maintain current flood risk strategy**	**Manage and reduce local flood risk**
4	Maintain existing, and where possible create new, riverine habitat to benefit aquatic species and fisheries, and maintain upstream access.	Potential for both adverse and beneficial impacts. For example, existing habitat may deteriorate as a result of increased flooding (however, this will often depend on what the site is designated for) and blockages may occur due to the movement of sediment and boulders. However, abandonment of assets may allow a more natural riverine system to develop.	Little/no change to baseline. However as a result of increased flooding in the future due to climate change new habitats may be created or existing wetland habitats enhanced. However, habitats intolerant of increased inundation or changes in water quality may be adversely affected.	Potential for both adverse and beneficial impacts as a result of active management. Significant opportunities may exist for habitat creation as a result of implementing measures to reduce local flood risk. Conversely, the introduction of new assets may damage riverine habitat and introduce blockages for fish access to upstream watercourses if not implemented appropriately.
5	Improve the quality and quantity of the water in the district's rivers.	Potential for both adverse and beneficial impacts. For example, abandonment of assets may allow for the development of a more natural watercourse and fewer assets are likely to reduce constrictions on water flow and hence water availability and quantity. However, there would be no management of water quality issues such as run-off, whilst flood risk to contaminated sites may increase, leading to increased surface and groundwater contamination.	Little/no change to baseline levels in the short to medium term. However, increased flood risk in the future may result in a reduction in surface water and groundwater quality due to contamination from surface water runoff or from contaminated sites.	Management of watercourses allows water quality to be monitored and potentially improved. Taking further action to reduce local flood risk may also improve water quality through reduced flood risk to potentially contaminated sites. However, the introduction of further flood risk assets to watercourses may result in constrictions to water flow, reducing water availability. Careful management of the implementation of such assets can prevent these adverse effects.
6	Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.	Potential for both adverse and beneficial impacts. For example, abandonment of assets may allow for the development of more natural watercourses. However, there would be an increased risk of spreading non-native, invasive species through flooding and pollution to watercourses could become more widespread.	Little/no change to current measures to meet WFD objectives.	Potential for both adverse and beneficial impacts depending upon the specific statuses and objectives of the waterbody as identified in the RBMP. Opportunities for achieving WFD objectives may arise through the implementation of measures to reduce local flood risk.
7	Reduce the risk of soil erosion and pollution.	Potential negative effect on soil quality, particularly in areas of high land quality, resulting from increased erosion of soils from flooding and no management of land contamination risks and subsequent effects.	Little/no change to baseline. However, in the future, as a result of climate change, adverse impacts may arise through erosion and land contamination from increased flooding.	Potential for managing and promoting this objective through reduced flood risk.
8	Preserve and where possible enhance important historic and cultural sites in the district and their settings.	Potential for both adverse and beneficial impacts. Historic environment assets and cultural heritage sites may be exposed to greater damage and deterioration through increased flood risk. Conversely, increased water inundation may help preserve some assets dependent on waterlogging, whilst the declining condition of flood risk management assets from no management and greater connectivity to the floodplain could improve the setting of historic sites.	Little/no change to baseline. However, in the future historic environment assets and cultural heritage may be exposed to increased flooding and damage due to climate change.	Potential for both adverse and beneficial impacts as a result of active management, for example through increased protection to vulnerable historic environment assets or improvements to their settings.

		Options and Effects		
SEA Objective		**Do Nothing**	**Maintain current flood risk strategy**	**Manage and reduce local flood risk**
9	Minimise the risk of flooding to communities.	Increased exposure to flood risk from a combination of no management and climate change. This could lead to a greater number of people and their properties at risk of flooding, causing greater damage and disruption, and increases in social exclusion, deprivation and health risks.	Some improvements to health and well-being likely in the short term due to reduced flood risk as a result of existing programme of flood risk management measures. However, flood risk likely to increase in the future as a result of climate change, leading to greater impacts on people and property.	Active management to reduce local flood risk should help to protect residential properties and key social infrastructure services from flooding. This has the potential to create a range of social benefits including reducing associated health impacts and social deprivation.
10	Increase the use of sustainable drainage systems (SuDS), particularly in all new developments.	This option would result in no increase in the use of SuDS in the future. Surface runoff volumes would be likely to increase, further exacerbating flood risk events. In addition, the declining condition from no management of existing SuDS schemes and lack of additional schemes may reduce the ability to manage future impacts of climate change.	Little/no change to the baseline in the short to medium term. However, with increasing flood risk, the lack of additional SuDS schemes may reduce the ability to manage future impacts of climate change.	Active management to reduce flood risk may incorporate the greater use of SuDS schemes to reduce the rate and volume of surface water runoff. This will contribute to climate change mitigation and adaptation initiatives and can provide a range of other environmental benefits, including biodiversity enhancements and the provision of new recreation and amenity opportunities.
11	Minimise the impacts of flooding to the district's transport network and critical infrastructure.	This option is likely to result in increased flood risk to key infrastructure, which would cause significant disruption to the City, impacting on human and economic activity and the environment.	This option would maintain the current risk levels, although risk may increase in the future as a result of climate change.	Flood risk management options may reduce flood risk to key critical infrastructure, reducing disruption during flood events and enabling a more effective response.
12	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	This option would result in no active adaptation or response to climate change (specifically, flood risk management). This would lead to a risk of adverse impacts to all receptors in the short, medium and long-term. However, the loss of existing flood risk management assets may result in a greater reconnection of the river to its floodplain, which could benefit a range of habitats and species.	Existing programme of flood risk management measures likely to reduce flood risk in the short term and include measures to manage future changes due to climate change. However, high risk of impacts in the medium to long term as flood risk increases due to climate change and flood risk management measures not sufficient to manage risk. .	The LFRMS includes full consideration of climate change adaptation in terms of flood risk management. This will reduce the overall risk of flooding and the potential for flood damages in the short, medium and long-term future, benefiting both people and property.

The assessment described in Table 4-1indicates that Option 1 (do nothing) is likely to result in a number of significant adverse impacts, particularly in relation to people and property, and other environmental assets including historic sites and biodiversity, where increased flooding may create new pathways for the spread of invasive non-native species. Surface water and groundwater quality could also be adversely affected, with increased flooding of contaminated sites leading to greater impacts on water resources. Conversely, increased flood risk may result in greater connectivity between watercourse and their floodplains, offering opportunities for habitat creation of benefit to a range of protected and notable species.

Option 2 (maintain current flood risk strategy) is likely to result in some benefits realised in the short term as existing programme of flood risk management measures are implemented to reduce flood risk. However, in the medium to long term, as climate change impacts take effect, the flood risk management regime will be unable to maintain flood risk at existing levels, resulting in many of the impacts identified under Option 1, although potentially to a lesser extent and significance. Option 3 (manage and reduce local flood risk) has the potential to provide a range of environmental benefits. Flood risk management initiatives, if designed and implemented in an appropriate manner, could have multiple benefits. This could include reducing flood risk to people and property, contributing to

the protection of heritage assets and improvements in water quality, and providing new opportunities for habitat creation and the provision of recreation and amenity assets. Conversely, flood risk management initiatives, if implemented in an inappropriate manner, could result in adverse effects on a range of environmental features. However, this risk is managed through the preparation of this SEA and through the planning and consenting process, which is likely to require consideration of the sustainability of a project prior to its implementation. Therefore, it is evident that by doing nothing or maintaining current levels of management, there are likely to be detrimental effects on the SEA objectives, which are likely to be prevented by carrying out active flood risk management as proposed by the LFRMS.

4.3 Strategy objectives and measures

The following draft LFRMS objectives and underpinning actions have been developed. The SEA appraises these objectives and measures to determine whether they would inhibit achievement of the SEA objectives, or conversely, contribute to their delivery.

Table 4-2: LFRMS objectives and actions.

Objective No.	LFRMS Objective	LFRMS Actions
1	Reduce risk to people by understanding current and future flood risk so that measures can be targeted at those most at risk.	Assess the risk of local flooding across Sunderland City Council so that measures and schemes can be prioritised according to risk.
		Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in Sunderland City Council.
		Identify where assets may influence the impact of local flood risk on to improve the management of Council owned drainage and flood management assets (people and economy).
2	Minimise the impact of local flooding on communities.	Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk.
3	Manage the impact of new development on flood risk to communities and the economy.	Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding.
4	Reduce flood risk to critical service and infrastructure.	Assess the risk to critical infrastructure and services across SCC so that measures and schemes can be prioritised where there is a need.
5	Reduce risk to the economy by understanding current and future flood risk so that measures can be targeted at the most cost beneficial way.	Assess the economic impact of flooding and the cost of measures so that investment can be targeted in the most cost beneficial way.
		Manage multiple sources of flood risk by working in close collaboration with the Environment Agency and other stakeholders to deliver schemes with multiple partners and funders.
		Ensure the sustainability of flood risk management by ensuring maintenance is properly taken into account
6	Ensure investment in Flood and Coastal Erosion Risk Management (FCERM) does not hinder but promotes economic growth in a sustainable way.	Support economic growth and regeneration through the funding of schemes and flood related activity.
7	Promote schemes that have multiple environmental benefits.	Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces
8	Reduce the impact of flood risk on the environment and cultural heritage	Ensure FCERM schemes, maintenance and other activities do not have a detrimental effect on the environment and cultural heritage.

5 Appraisal of LFRMS Objectives to improve flood risk

5.1 Impact significance

The unmitigated impacts of the LFRMS objectives on achieving the SEA objectives were identified through the analysis of the baseline environmental conditions and use of professional judgement. The significance of effects was scored using the five point scale summarised in Table 5-1. If a high level of uncertainty regarding the likelihood and potential significance of an impact (either positive or negative) was identified, it was scored as uncertain.

Table 5-1: SEA appraisal codes

Impact significance	Impact symbol
Significant positive impact	++
Minor positive impact	+
Neutral impact	0
Minor negative impact	-
Significant negative impact	--
Uncertain impact	?

Throughout the assessment the following approach was applied:

- Positive, neutral and negative impacts are assessed, with uncertain impacts highlighted.
- The duration of the impact are considered over the short, medium and long term.
- The reversibility and permanence of the impact are assessed (e.g. temporary construction impacts, impacts which can be mitigated against/restored over time or completely irreversible changes to the environment).
- In-combination effects are also considered.

The significance of effects upon each of the SEA objectives are then evaluated and used to inform option selection.

Table 5-2 provides a summary of the outcomes of the environmental assessment of the draft LFRMS objectives and measures. Table 5-3 shows the results of the assessment of cumulative effects of the LFRMS objectives on achievement of the SEA objectives. An overall summary of these assessments is shown in Table 5-4.

Table 5-2: Assessment of LFRMS objectives against SEA objectives

LFRMS Objectives	LFRMS Actions	SEA Objectives												Comments
		1	2	3	4	5	6	7	8	9	10	11	12	
Objective 1: Reduce risk to people by understanding current and future flood risk so that measures can be targeted at those most at risk.	Assess the risk of local flooding across Sunderland City Council so that measures and schemes can be prioritised according to risk.	0	0	0	0	0	0	0	0	+	0	+	+	Improving the understanding of local flood risk issues across the district has the potential to contribute to objectives 9, 11 and 12, which focus on the reduction of flood risk to people and property, and adaptation to climate change effects. In addition, establishment of the LLFA will lead to better identification, management and maintenance of flood risk management assets, and will contribute towards the implementation of a SuDS Approval Body (SAB).
	Manage flood risk to people and property by establishing the LLFA with strategic leadership of flood risk in Sunderland City Council.	0	0	0	0	0	0	0	0	+	0	+	+	
	Identify where assets may influence the impact of local flood risk on to improve the management of Council owned drainage and flood management assets (people and economy).	0	0	0	0	0	0	0	0	+	0	+	+	
Objective 2: Minimise the impact of local flooding on communities.	Protect the most vulnerable communities and increase the resilience of communities to current and future flood risk.	0	0	0	0	0	0	0	0	+	0	+	+	This objective aims to increase protection to the most vulnerable communities. It is likely to involve prioritisation of flood risk management actions and schemes and development of a partnership approach to the prioritisation and delivery of these measures. It may also involve investigation of flood events to inform future flood risk management activities. This objective may benefit people and property in the most vulnerable areas and therefore contribute to SEA objectives 9, 11 and 12. The objective is not likely to directly result in physical interventions, which would require other approvals before being permitted and therefore other SEA objectives are not likely to be affected.
Objective 3: Manage the impact of new development on flood risk to communities and the economy.	Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding.	?	?	?	?	?	?	?	?	+	++	+	+	This objective could deliver significant environmental benefits and contribute to the achievement of all SEA objectives. In particular, it could contribute to objectives 9, 11 and 12, which focus on the reduction of flood risk to the built environment and communities, and adaptation to climate change effects. A reduction in the impact of flooding from new developments and the promotion of SuDS schemes could also contribute towards specific SuDS and water-related SEA objectives (objectives 6, 7 and 10). There may also be future benefits to the natural environment receptors (landscape, biodiversity, flora and fauna) as SuDS become more commonplace, better designed and with more effective maintenance regimes, with potential important benefits to biodiversity through the creation of new habitats and the linking of existing habitats. However, this objective is largely focused on people and the economy and it is not clear how it may influence development with regard to other environmental aspects. There is a risk that the LFRMS could support the allocation of land on flood risk grounds, which could result in adverse impacts on other environmental feature i.e., biodiversity or landscape. It is therefore not possible to determine at this stage what overall impact this objective may have on the majority of SEA objectives focused upon the natural environment. Impacts will depend upon the specific constraints and opportunities associated with each development site and there is a risk that this objective could influence development of sites with significant natural environment constraints because such development would contribute to reducing flood risk to people and the economy. Site specific assessment would be required.
Objective 4: Reduce flood risk to critical service and infrastructure.	Assess the risk to critical infrastructure and services across SCC so that measures and schemes can be prioritised where there is a need.	0	0	0	0	0	0	0	0	+	0	++	+	This objective will lead to a better understanding of flood risk to critical infrastructure in the district and will inform the development of schemes and measures designed to reduce these risks. This is likely to deliver significant benefits for critical infrastructure, which will provide associated benefits for people and communities, and will contribute towards achieving resilience to the impacts of climate change. As the objective is not likely to directly result in physical interventions, which would require other approvals before being permitted, other SEA objectives are not likely to be affected.
Objective 5: Reduce risk to the economy by understanding current and future flood risk so that measures can be targeted at the most cost beneficial way.	Assess the economic impact of flooding and the cost of measures so that investment can be targeted in the most cost beneficial way.	0	0	0	0	0	0	0	0	+	0	+	+	Improving the understanding of local flood risk issues across the City has the potential to contribute to objectives 9, 11 and 12, which focus on the reduction of flood risk to the built environment and communities, and adaptation to climate change effects. There is likely to be a neutral impact in relation to all other SEA objectives,
	Manage multiple sources of flood risk by working in close collaboration with the Environment Agency and other stakeholders to deliver schemes with multiple partners and funders.	+	+	+	+	+	+	+	+	+	+	+	+	The objective aim to promote partnership working amongst multiple agencies to deliver flood risk benefits. By taking into account the objectives of a range of partner organisations, the strategy objective offers opportunities to deliver a range of environmental benefits through flood risk management actions.
	Ensure the sustainability of flood risk management by ensuring maintenance is properly taken into account	?	?	?	?	?	?	?	?	+	?	+	+	Management and maintenance of existing drainage and flood risk management assets could potentially have a range of environmental effects, both positive and negative, depending upon the asset type and location, and the type of maintenance to be undertaken. Given the lack of information at this stage as to what works could be undertaken as part of this measure, it is assessed as having an uncertain impact for several of the SEA objectives. However, given that the LFRMS is seeking to achieve a range of environmental benefits (see objectives 7 and 8), it is likely that such interventions would be delivered in a more sustainable manner and could have a range of positive effects.
Objective 6: Ensure investment in FCERM does not hinder but promotes economic growth in a sustainable way.	Support economic growth and regeneration through the funding of schemes and flood related activity.	?	?	?	?	?	?	?	?	+	?	+	+	This measure could deliver physical interventions to improve flood risk. If implemented in a sustainable manner that includes consideration of wider environmental issues, these measures could potentially contribute towards many of the SEA objectives. However, depending on the protection measures implemented, there is the risk of negatively impacting the natural environment, especially if inappropriate geo-engineering options are used. This risk is likely to be low as such effects would conflict with several strategy objectives (see objectives 7 and 8). This will depend upon the specific constraints and opportunities associated with each intervention, which will require site specific assessment.

LFRMS Objectives	LFRMS Actions	SEA Objectives												Comments
		1	2	3	4	5	6	7	8	9	10	11	12	
Objective 7: Promote schemes that have multiple environmental benefits.	Identify schemes and activities that fulfil WFD objectives and those that increase the use of and safeguarding of green spaces	+	++	++	++	++	++	+	+	+	+	+	++	The RBMP aims to deliver improvements to the water environment that will contribute to the achievement of many of the SEA objectives. In particular, the RBMP will deliver improvements to biodiversity, water quality and quantity. In turn, these impacts will add to the quality of landscapes and soil and contribute to the reduction of flood risk to the human environment. Improvements to designated sites are also likely to occur through the delivery of European biodiversity objectives, whilst delivery of local environmental policies will further contribute to the achievement of the SEA objectives.
Objective 8: Reduce the impact of flood risk on the environment and cultural heritage	Ensure FCERM schemes, maintenance and other activities do not have a detrimental effect on the environment and cultural heritage.	+	++	++	++	++	++	+	++	+	+	+	++	This objective provides significant opportunities to deliver a range of benefits for all SEA objectives. In particular, flood risk is reduced and managed in a sustainable way that offers an approach to support improvements to the historic environment, biodiversity, water quality and quantity.

Table 5-3: Cumulative effects of the actions of the LFRMS on SEA objectives

	SEA Objectives											
LFRMS Objectives	1	2	3	4	5	6	7	8	9	10	11	12
1	0	0	0	0	0	0	0	0	+	0	+	+
2	0	0	0	0	0	0	0	0	+	0	+	+
3	?	?	?	?	?	?	?	?	+	++	+	+
4	0	0	0	0	0	0	0	0	+	0	++	+
5	0	0	0	0	0	0	0	0	++	0	++	++
6	?	?	?	?	?	?	?	?	++	+	+	+
7	+	++	++	++	++	++	+	+	++	++	+	++
8	+	++	++	++	++	++	+	++	++	++	+	++

Table 5-4: Summary of Effects of LFRMS objectives/actions on SEA objectives

Receptor	SEA Objective		Summary of effects	Mitigation requirement
Landscape	**1**	Protect the integrity of the district's urban and rural landscapes, and promote the key characteristics of the Green Belt and river corridors.	No negative effects identified. Positive effects from LFRMS objectives 7 and 8, which seek to ensure a sustainable approach to flood risk management, with specific action on the protection of environmental features and the safeguarding of green spaces. Uncertain effects are identified from LFRMS objectives 3 and 6 due to a lack of information at this stage on how these measures will be implemented.	None required, although the implementation of LFRMS objectives 3 and 6, specifically actions related to influencing land allocations in order to manage flood risk to people and property could potentially have positive or negative impacts on other aspects of the environment depending upon the scope of these actions and the type, scale and location of development and flood protection measures. The LFRMS should put in place measures to ensure that these actions do not have a negative impact on this objective. This would involve ensuring that the wider sustainability of specific land allocations and development applications is considered when influencing decision making and that flood risk management advice also seeks to deliver wider environmental benefits i.e., the promotion of SuDS schemes that also deliver improvements to biodiversity, landscape, amenity and water quality.
Biodiversity, flora and fauna	**2**	Protect and enhance designated sites, protected species and BAP habitats and species.	No negative effects identified. Major positive contributions to these objectives from LFRMS objectives 7 and 8, which seek a sustainable approach to flood risk management and delivery of wider environmental benefits. Uncertainties have been identified largely from a dependency on the location, nature and scale of implementation measures to reduce flood risk under LFRMS objectives 3 and 6.	
	3	Maintain and enhance habitat connectivity and wildlife corridors within the district.		
	4	Maintain existing, and where possible create new, riverine habitat to benefit aquatic species and fisheries, and maintain upstream access.		
Water environment	**5**	Improve the quality and quantity of the water in the district's rivers.	No negative effects identified. Some significant positive effects may arise from strategy objectives 7 and 8, which seek to deliver wider environmental benefits through sustainable flood risk management. LFRMS objective 7 in particular, which seeks to deliver EFD actions, may result in significant improvements to the aquatic environment and could make a direct contribution to these SEA objectives. Some uncertainty relates to LFRMS objectives 3 and 6 due to a lack of information regarding how these actions may be implemented and whether they may deliver physical interventions that could adversely affect environmental features of deliver benefits, depending upon how and where they are implemented.	
	6	Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.		
Soils and geology	**7**	Reduce the risk of soil erosion and pollution.	No negative effects identified. Some positive effects may arise from understanding flood risk and actively managing flood risk from new and re-development as this measure is likely to reduce the overall risk of surface water flooding, thereby reducing pollution incidents and soil erosion. Management of flood risk from new and re-development is likely to have a similar level of impact. There is uncertainty surrounding the LFRMS objectives 3 and 6. This is due to the lack of detail on the specific nature of the interventions that would be implemented as part of this objective.	
Historic environment	**8**	Preserve and where possible enhance important historic and cultural sites in the district and their settings.	No negative effects identified. Objective 8 offers an opportunity to deliver significant benefits to the historic environment by reducing the impact of flood risk flood risk management actions to the historic environment. There is uncertainty surrounding the LFRMS objectives 3 and 6. This is due to the lack of detail on the specific nature of the interventions that would be implemented as part of this objective.	

Receptor	SEA Objective		Summary of effects	Mitigation requirement
Population	**9**	Minimise the risk of flooding to communities.	As expected of a strategy for managing flood risk, none of the measures are considered to have negative effects on this objective and the majority of actions within the strategy are likely to help achievement of this SEA objective.	None required.
	10	Increase the use of sustainable drainage systems (SuDS), particularly in all new developments.	No negative impacts on this objective. LFRMS objective 3 is likely to make a significant positive contribution to the use of SuDs through the establishment of the SAB and related policy and guidance, in addition to using SuDS to create habitat. Objectives 5, 7 and 8 are also likely to have a positive effect on this SEA objective.	None required.
Material assets	**11**	Minimise the impacts of flooding to the district's transport network.	As expected of a strategy for managing flood risk, none of the measures are considered to have negative effects on this objective and the majority of actions within the strategy are likely to help achievement of this SEA objective.	None required.
Climate	**12**	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	As expected of a strategy for managing flood risk, none of the measures are considered to have negative effects on this objective and the majority of actions within the strategy are likely to help achievement of this SEA objective.	None required.

6 Conclusion and recommendations

6.1 Conclusions

The LFRMS aims to promote flood risk management options that are technically, economically, socially and environmentally appropriate. The intention of the strategy is to set out the roles and responsibilities and to improve local flood risk management so as to minimise the impact of flooding on infrastructure, businesses and properties.

It is foreseen that the 'Do Nothing' approach would be likely to cause conflict with all of the SEA objectives. Abandoning current flood risk management practices would lead to increased flood risk, which in turn could have a range of largely negative impacts including increasing flooding to sensitive habitats and historic sites, creating new pathways for invasive species, and impacting upon surface and groundwater quality. . These impacts would be likely to increase over time as responsible bodies will be unable to incorporate precautionary measures in existing or new developments in a response to climate change pressures. The mid-way option 'Maintain Current Flood Risk Strategy' may have limited benefits in the short term as the existing programme of flood risk management measures is delivered, but is likely to result in a number of significant adverse effects in the longer term as new measures are not delivered to meet the increasing effects of climate change. By not fully considering adaptation to climate change pressures, the current level of flood risk management may be insufficient to prevent detrimental impacts on the environment, including social and ecological receptors, in the future. The only realistic approach to be employed by Sunderland City Council is the 'Manage and Reduce Flood Risk' option, which offers more beneficial outcomes and a pro-active approach to managing flood risk.

Many of the proposed measures as detailed in the LFRMS have the potential for direct and indirect environmental benefits. The cross-check assessment of the LFRMS objectives and actions against the SEA objectives highlights positive impacts particularly on SEA objectives 5, 7 and 8. By actively managing the flood risk and taking actions and initiatives to improve and adapt the way flooding is managed in the area, there will be obvious benefits to communities, material assets and adapting to climate change. Through promoting a greater understanding of the risks, more collaboration and the sharing of resources, communities and responsible parties will be better placed to effectively minimise the risk of flooding in the Council area. For certain measures within the LFRMS, there is also the potential to benefit other environmental receptors, for example through habitat creation measures through the use of SuDS and through the delivery of WFD actions. Also, there will be reduced flood risk to vulnerable historic environment assets.

For other LFRMS objectives, the potential environmental impacts are less clear and are more closely related to how the objectives are implemented. Objectives 3 and 6 seek to improve flood risk to benefit people and the economy. It is possible that these objectives could also contribute to other SEA objectives if they are implemented in a manner that seeks to ensure the delivery of sustainable development. However, if their focus remains on people and the economy, there is a risk that this could result in impacts on the natural environment. For example, LFRMS objective 3 seeks to influence land allocation and development approvals to better manage flood risk due to new development. There is a risk that the LFRMS could influence and support the allocation or development of land in areas of high value for the natural environment, because such development meets the strategy objective of better managing flood risk to people and the economy. However, it is also possible that objective 3 could promote a range of natural environment benefits if the wider sustainability of development is taken into account when influencing decision-making i.e., by promoting the incorporation of SuDS schemes that deliver wider environmental benefits. Appropriate checks need to be in place to ensure these objectives do not compromise other LFRMS objectives that seek to deliver environmental benefits. Therefore, these objectives have been identified as having uncertain impacts because without more specific information regarding the implementation of these objectives a precautionary approach must be taken, and therefore there is a potential for a negative impact if appropriate mitigation is not put in place.

6.2 Recommendations

The assessment of the objectives and actions has identified a number of areas where the LFRMS could be strengthened to promote a more sustainable approach.

- Take necessary measures to ensure that impacts of the action, 'Reduce the impact development has on flood risk to people and the economy, when allocating land (and permitting development) and by ensuring development reduces the causes and impacts of flooding' outlined in LFRMS Objective 3 does not have a negative impact on SEA objectives 1 to 8, and that all possible environmental opportunities are pursued. The uncertainty of the impacts in this assessment arises from unknown specific information relating to how the LFRMS will influence land allocations; however, there is potential to negate these impacts if the LFRMS also seeks to influence land allocations so that they are prioritised based on their lowest possible impact to the environmental receptors under SEA objectives 1 to 8, and development is managed by ensuring that, where necessary, proposals contain appropriate mitigation measures.
- Take necessary measures to ensure that the specific action outlined in LFRMS Objective 6 ('Support economic growth and regeneration through the funding of schemes and flood related activity') does not have a negative impact on SEA objectives 1 to 8, and that all possible environmental opportunities are pursued. The uncertainty of the impact under this measure arises from unknown specific information relating to location and scale of the flood protection measures to be pursued; however, there is significant potential for positive impacts to arise if measures are also selected based on their contribution to habitat creation and are located in areas away from sensitive receptors, such as notable species and historic sites and artefacts. Development and implementation of these schemes should also be managed by ensuring that, where necessary, proposals contain appropriate mitigation measures.
- Ensure that the action 'Manage multiple sources of flood risk by working in close collaboration with the Environment Agency and other stakeholders to deliver schemes with multiple partners and funders' under LFRMS Objective 5 is applied in the context of achieving all other objectives and considers the most sustainable approaches to pursue in managing flood risk.
- Ensure that in the implementation of the SuDS-related actions under LFRMS Objective 3 address the potential for environmental effects (depending on their locations) and promotes environmental opportunities.
- Ensure that climatic factors are fully accounted for in developments (existing and new) to ensure that flood risk management is appropriate and adaptable for the future.

6.3 Monitoring

The SEA Regulations require Sunderland City Council to monitor the significant environmental effects (positive and negative) upon the implementation of the LFRMS. Key potential environmental effects that require monitoring are listed in **Error! Reference source not found.**. Several of these monitoring requirements are likely to require a partnership approach to effectively track the effects of the strategy. Possible partners for monitoring responsibility are therefore highlighted.

The monitoring indicators will enable the LFRMS to be monitored and any problems or shortfalls to be highlighted and remedied at an early stage. If failings are evident, it will be necessary for the LFRMS to be revised so that the achievement of the SEA objectives is not compromised. Of note, it is unlikely that any effects negative or otherwise will be seen immediately and that the relative time scale for monitoring will vary for each indicator.

Table 6-1: SEA monitoring framework

LFRMS objective / measure	SEA objectives	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
Objective 3: Manage the impact of new development on flood risk to communities and the economy.	10	Potential significant impacts due to the promotion of SuDS schemes, which could lead to a range of environmental benefits.	Number of SuDS schemes installed as part of the LFRMS.	Sunderland City Council Environment Agency Northumbrian Water
Objective 4: Reduce flood risk to critical service and infrastructure.	11	Potential for significant benefits to key services and infrastructure.	Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets (e.g. emergency services centres, electricity	Sunderland City Council Environment Agency Northumbrian Water

LFRMS objective / measure	SEA objectives	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
			sub-stations, etc) at risk from flooding.	
Objective 7: Promote schemes that have multiple environmental benefits.	2 – 6 and 12	Potential to deliver significant benefits to the water environment that will contribute to the achievement of many of the SEA objectives. In particular, the RBMP will deliver improvements to biodiversity, water quality and quantity.	Area of statutory/non-statutory designated nature conservation sites affected by flooding or flood risk management measures. Area of BAP habitat adversely affected by flooding or flood risk management measures. Number of barriers to migration of riparian species removed/modified. Length of river de-culverted. Number of SuDS schemes installed as part of the LFRMS. Percentage of river lengths achieving 'Good' ecological status or an improvement on existing status. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat). Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc) at risk from flooding.	English Heritage Sunderland City Council Environment Agency Northumbrian Water Natural England Highways Authority
Objective 8: Reduce the impact of flood risk on the environment and cultural heritage.	2 – 6, 8 and 12	Provides significant opportunities to deliver a range of benefits for all SEA objectives. In particular, flood risk is reduced and managed in a sustainable way that supports improvements to the historic environment, biodiversity, water quality and quantity	Area of statutory/non-statutory designated nature conservation sites affected by flooding or flood risk management measures. Area of BAP habitat adversely affected by flooding or flood risk management measures. Number of barriers to migration of riparian species removed/modified. Length of river de-culverted. Number of SuDS schemes installed as part of the LFRMS. Percentage of river lengths achieving 'Good' ecological status or an improvement on existing status. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat). Number of heritage assets at risk from flooding.	English Heritage Sunderland City Council Environment Agency Northumbrian Water Natural England Highways Authority

LFRMS objective / measure	SEA objectives	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
			Proportion of conservation areas at risk from flooding. Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc) at risk from flooding.	

6.4 Habitats Regulations Assessment

A Test of Likely Significant Effect (screening assessment) has been prepared in accordance with the requirements of the Habitats Regulations to determine whether the LFRMS is likely to adversely affect the integrity of a European site (alone or in combination).

All European sites lying partially or wholly within 15km of the district boundary have been included in the assessment:

- Northumbria Coast Ramsar and SPA
- Durham Coast SAC
- Castle Eden Dene SAC
- Thrislington SAC
- Teesmouth and Cleveland Coast Ramsar and SPA

The outcome of this revised screening assessment is documented in Appendix A of this report.

The screening assessment concludes that a small number of LFRMS measures (those relating to coastal defences/protection) have been identified as having the potential for likely significant effects on the following sites:

- Northumbria Coast Ramsar and SPA
- Durham Coast SAC

These measures are included within the Whitburn to Ryhope Coast Protection Strategy 2013 which has been subject to a HRA. The HRA of the Coast Protection Strategy determined that the potential effects of Strategy Frontage 1 and 3 on the Northumbria Coast SPA and Ramsar and Durham Coast SAC could be reduced to negligible, and the potential for long term significant effects avoided, through the adoption of project and strategy level best practice mitigation measures.

It is therefore recommended that the following statement be included within the LFRMS to make sure that the necessary mitigation measures are put in place to ensure that the strategy does not have any significant effects on European Sites.

"Coastal defence options within Strategy Frontage 1 and Strategy Frontage 3 will be subject to further screening at the project design/planning consent stage to determine whether based on the provision of additional information the options could have a likely significant effect and require a full Appropriate Assessment. Any option which fails to demonstrate no adverse significant effect on the integrity of a European Site will not be permitted as it will not comply with the Habitats Directive or the LFRMS."

7 Next steps

The next stage of the SEA process (Stage D) involves consulting upon the draft LFRMS and draft SEA Environmental Report with statutory consultees, stakeholders and the public, and then making any necessary amendments and updates to the documents. All consultation responses received will be reviewed and taken into consideration for the next stage of appraisal process. This will involve the preparation of a Statement of Environmental Particulars (SoEP), which will set out how the findings of the Environmental Report and the views expressed during the consultation period have been taken into account as the LFRMS has been finalised and formally approved. The SoEP will also set out any additional monitoring requirements needed to track the significant environmental effects of the strategy.

7.1 Consultation

This Environmental Report will be subject to public consultation for 12 weeks alongside the draft Sunderland LFRMS. All comments on the content of this Environmental Report should be sent to:

Paul Armin
Flood and Coastal Group Engineer
Sunderland City Council
Jack Crawford House,
Commercial Road,
Sunderland.
SR2 8QR

Or

Email:- LFRMS@sunderland.gov.uk

Appendices

A Habitats Regulations Assessment - Test of Likely Significance

A.1 Record of Assessment of Likely Significant Effect on a European / International Site (SAC/SPA/Ramsar)

This assessment identifies and considers the likely adverse effects of the LFRMS, either individually or in combination with other plans or projects, upon a European site and considers whether these impacts are likely to be significant.

It comprises a series of tables that identify the European sites of relevance to this assessment (see Table A-1); the potential hazards associated with the LFRMS objectives and measures and their relevance to these European sites (see Table A-2).

Table A-1: Assessment scope

Type or permission/activity	**Local Flood Risk Management Strategy (LFRMS)**
Project/File Ref. Number	Sunderland City Council
National Grid Reference (NGR)	NZ 378 524
Brief Description of the project	The LFRMS is a requirement under the Flood and Water Management Act (2010). The Act outlines the responsibility of the lead local flood authority to 'develop, maintain, apply and monitor' a strategy for local flood risk management. It notes that the strategy must identify or outline the following: • The risk management authorities in the area; • The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area; • The objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009; • The measures proposed to achieve those objectives; • How and when the measures are expected to be implemented; • The costs and benefits of those measures, and how they are to be paid for; • The assessment of local flood risk for the purpose of the strategy; • How and when the strategy is to be reviewed; and • How the strategy contributes to the achievement of wider environmental objectives.
European Site Name and Status	**Northumbria Coast Ramsar**
Distance to site	Located within the district.
Site EU Reference Number	UK 11049
Site Centre NGR	NZ 41586 54116
List of Site Interest Features	Criterion 6: species/populations occurring at levels of international importance: • Little Tern *Sterna albifrons albifrons* 43 apparently occupied nests, representing an average of 2.2% of the GB population (Seabird 2000 Census) • Purple Sandpiper *Calidris maritima maritima* 291 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3) • Ruddy Turnstone *Arenaria interpres interpres* 978 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3)
European Site Name and Status	**Northumbria Coast Special Protection Area (SPA)**
Distance to site	Located within the district
Site EU Reference Number	UK9006131
Site Centre NGR	NZ 41586 54116
List of Site Interest Features	Article 4.1 Qualification • Little Tern *Sterna albifrons* 1.7% of the GB breeding population 5 year peak means 1992/3-1996/7 Article 4.2 Qualification • Purple Sandpiper *Calidris maritima* 2.6% of the East Atlantic Flyway

	population 5 year peak means 1992/3-1996/7 • Ruddy Turnstone *Arenaria interpres* 1.6% of the East Atlantic Flyway population 5 year peak means 1992/3-1996/7
European Site Name and Status	**Durham Coast Special Area of Conservation (SAC)**
Distance to site	A very small area located just within the north-eastern edge of the district
Site EU Reference Number	UK0030140
Site Centre NGR	NZ 455 407
List of Site Interest Features	Annex I habitat: 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts
European Site Name and Status	**Castle Eden Dene SAC**
Distance to site	8 km
Site EU Reference Number	UK0012768
Site Centre NGR	NZ 435 397
List of Site Interest Features	Annex I habitat: 91J0 *Taxus baccata* woods of the British Isles
European Site Name and Status	**Thrislington SAC**
Distance to site	12 km
Site EU Reference Number	UK0012838
Site Centre NGR	NZ 317 328
List of Site Interest Features	Annex I habitat: 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites)
European Site Name and Status	**Teesmouth and Cleveland Coast Ramsar**
Distance to site	14 km
Site EU Reference Number	UK11068
Site Centre NGR	NZ 483 376
List of Site Interest Features	Criterion 5: Assemblages of international importance: Species with peak count in winter: • 9528 waterfowl (5 year peak mean 1998/99-2002/2003) Criterion 6: species/populations occurring at levels of international importance. • Common Redshank *Tringa totanus* 883 individuals, representing an average of 0.7% of the GB population (5 year peak mean 1998/9-2002/3) • Red Knot *Calidris canutus islandica* 2579 individuals, representing an average of 0.9% of the GB population (5 year peak mean 1998/9-2002/3)
European Site Name and Status	**Teesmouth and Cleveland Coast SPA**
Distance to site	14 km
Site EU Reference Number	UK9006061
Site Centre NGR	NZ 483 376
List of Site Interest Features	Article 4.1 Qualification: • Little Tern *Sterna albifrons* 1.7% of the breeding population in Great Britain Four year mean for 1995 to 1998 • Sandwich Tern *Sterna sandvicensis* 6.8% of the population in Great Britain Five year mean for 1988 to 1992 Article 4.2 Qualification: • Red Knot *Calidris canutus* 1.6% of the population Five year peak mean for 1991/92 to 1995/96 • Common Redshank *Tringa totanus* 1.1% of the East Atlantic Flyway population 5 year peak mean, 1987 – 1991 • Over winter the area regularly supports 21312 waterfowl (5 year peak mean 01/03/2000) including *Calidris canutus*.
Is this proposal directly connected with or necessary to the management of the sites for nature conservation?	No

Table A-2: Potential hazards and effects to European sites associated with the LFRMS

Hazards and Effects in reference to the individual elements and consented activities of the project. Describe any hazards or effects with potential to give rise to impacts on the European Site (either alone or in combination with other plans or projects).		
Sensitive Interest Features	**Potential Hazard(s)**	**Potential Exposure to hazard and mechanism of effect/impact if known**
Northumbria Coast Ramsar and SPA • Little Tern • Purple Sandpiper • Ruddy Turnstone	Disturbance (i.e. noise, visual)	Implementation of flood risk management measures in the district, particularly potential schemes identified at South Bents, Seaburn and Hendon (Strategy Frontage 1 and 3) in relation to coastal flood risk management have the **Potential for likely significant impacts upon the integrity of the SAC.** Depending on the exact location and nature of such schemes there is the potential for disturbance to the bird species for which the SPA and Ramsar are designated.
Durham Coast SAC Annex I habitats: 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts	Habitat loss Physical damage Changes in water chemistry Changes in water levels or table	The vegetation communities present on the sea cliffs are largely maintained by natural processes including exposure to sea spray, erosion and slippage of the soft magnesian limestone bedrock and overlying glacial drifts, as well as localised flushing by calcareous water. Implementation of flood risk management measures in the district, particularly potential schemes identified at South Bents, Seaburn and Hendon (Strategy Frontage 1 and 3) in relation to coastal flood risk management have the **Potential for likely significant impacts upon the integrity of the SAC.** Depending on the exact location and nature of such schemes there is the potential for direct impacts on the site including physical damage or habitat loss. There is also potential for such schemes to result in changes to water quality and flow which may impact upon the calcareous water sources.
Castle Eden Dene SAC Annex I habitats: 91J0 Taxus baccata woods of the British Isles	None	The SAC site is located a significant distance (8km) from the boundary of Sunderland district. The site is not hydrologically linked with the district and is not designated for wetland /hydrological interest features. The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the City. No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS. **Therefore, no likely significant effects are predicted.**
Thrislington SAC Annex I habitats: 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites)	None	The SAC site is located a significant distance (8km) from the boundary of Sunderland district. The site is not hydrologically linked with the district and is not designated for wetland /hydrological interest features. The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the City. No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS. **Therefore, no likely significant effects are predicted.**
Teesmouth and Cleveland Coast Ramsar and SPA • Little Tern • Sandwich Tern • Red Knot • Common Redshank • Important assemblages of waterfowl	None	The Ramsar and SPA is located a significant distance (14km) from the boundary of Sunderland district. The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the City. No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS. **Therefore, no likely significant effects are predicted.**

A small number of LFRMS measures (those relating to coastal defences/protection) have been identified as having the potential for likely significant effects on the following sites:

- Northumbria Coast Ramsar and SPA
- Durham Coast SAC

These measures are included within the Whitburn to Ryhope Coast Protection Strategy 2013 which has been subject to a HRA. The HRA of the Coast Protection Strategy determined that the potential effects of Strategy Frontage 1 and 3 on the Northumbria Coast SPA and Ramsar and Durham Coast SAC could be reduced to negligible, and the potential for long term significant effects avoided, through the adoption of project and strategy level best practice mitigation measures.

It is therefore recommended that the following statement be included within the LFRMS to make sure that the necessary mitigation measures are put in place to ensure that the strategy does not have any significant effects on European Sites.

"Coastal defence options within Strategy Frontage 1 and Strategy Frontage 3 will be subject to further screening at the project design/planning consent stage to determine whether based on the provision of additional information the options could have a likely significant effect and require a full Appropriate Assessment. Any option which fails to demonstrate no adverse significant effect on the integrity of a European Site will not be permitted as it will not comply with the Habitats Directive or the LFRMS."

B Review of policies, plans and programmes

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
International				
EU Sustainable Development Strategy (revised 2006)	Outlines the need for economic growth to support social progress and respect the environment to achieve sustainable development.	The strategy aims to limit climate change and manage natural resources more responsibly, issues which are directly relevant to flood risk. Provides direction for the LFRMS in the managing of natural resources for flood risk	The LFRMS should seek to promote objectives that deliver sustainable flood risk management and sustainable development.	• Biodiversity, flora and fauna • Water environment
European Biodiversity Strategy to 2020	Outlines strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020.	Aims include the provision of better protection for ecosystems and fish stocks, promotion of green infrastructure and tighter controls on invasive alien species.	The LFRMS may contribute to the aims of the strategy through the provision of new green infrastructure to manage flood risk. In contrast, the strategy may limit certain flood risk management objectives if they are shown to be likely to adversely affect biodiversity or ecosystem services.	• Biodiversity, flora and fauna
EC Birds Directive – Council Directive 2009/147/EEC on the conservation of wild birds	Provides for protection of all naturally occurring wild bird species and their habitats, with particular protection of rare species.	Designates Special Protection Areas (SPAs) to protect birds and their habitats. The LFRMS objectives should avoid any significant adverse effect on these sites and supporting features. Requires LFRMS to be assessed for potential impact.	May restrict certain flood risk management objectives if they are shown to be likely to have a significant effect on a SPA.	• Biodiversity, flora and fauna
EU Floods Directive – Directive 2007/60/EC on the assessment and management of flood risks	Aims to reduce and manage the risk of flooding and associated impacts on the environment, human health, heritage and economy. Principle requirement is the preparation of flood risk management plans at River Basin District level, together with preliminary flood risk assessments and hazard/risk maps.	Provides strategic direction to reduce impacts of flooding and promote enhanced flood risk management. The LFRMS will need to demonstrate compliance with the requirements of the Directive.	None likely as the LFRMS will seek to contribute to achieving the Directive.	• Water environment • Climate
EU Groundwater Directive – Directive 2006/118/EC on the protection of groundwater against pollution and deterioration	Establishes a regime that sets underground water quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. Implemented in the UK through the Environmental Permitting Regulations (2010).	Water quality is relevant to the LFRM as flooding is linked to water pollution and a reduction in surface water and groundwater quality.	Improved flood risk management may benefit groundwater quality by reducing the risk of water pollution during a flood event. LFRMS objectives would need to consider potential impacts on groundwater and may be restricted if they contribute to an adverse impact.	• Water environment
EC Habitats Directive – Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora	Principle aim is to promote the maintenance of biodiversity by requiring Member States to take measures to restore habitats and species to favourable conservation status. Introduces robust protection for habitats and species of European importance. Enables the creation of Special Areas of Conservation (SACs) in order to establish a coherent ecological network of protected sites. Encourages protection and management of flora and fauna and supporting	Designates SACs to protect and promote biodiversity. The LFRMS objectives should avoid any significant adverse effect on these sites and supporting features. Requires LFRMS to be assessed for potential impact.	May restrict certain flood risk management objectives if they are shown to be likely to have a significant effect on a SAC.	• Biodiversity, flora and fauna

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
	landscapes through planning and development policies.			
Urban Wastewater Treatment Directive – Directive 91/271/EEC concerning urban waste water treatment	Aims to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors.	Defines requirements for the collection and treatment of waste water in line with the population equivalent. LFRMS would need to consider potential impact of flood risk management objectives on water treatment sites.	The LFRMS could support the aims of the Directive by reducing the risk of flooding to water treatment sites. However, LFRMS objectives may be restricted if they are shown to be likely to effect on wastewater discharges during flood events.	• Water environment
EU Water Framework Directive – Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy	Establishes framework for protection of inland surface waters, transitional waters, coastal waters and groundwater to prevent pollution, promote sustainable water use, protect the aquatic environment, improve the status of aquatic ecosystems and mitigate the effects of floods and droughts.	Member states must prepare River Basin Management Plans and programme of measures for each River Basin District that sets out a timetable approach to achieving the WFD objectives. Places requirements on all relevant authorities to ensure their actions do not contravene the objectives of the Directive.	May restrict certain flood risk management options if likely to inhibit achievement of WFD objectives and detailed programme of measures. Flood risk management options may be strengthened if they actively contribute to meeting the WFD requirements.	• Biodiversity, flora and fauna • Water environment
National				
Securing the Future – the UK Government Sustainable Development Strategy (2005)	Establishes a broad set of actions and priorities to support the achievement of sustainable development. It includes measures to enable and encourage behaviour change, measures to engage people, and ways in which the Government can promote sustainability.	Includes high level aims to promote sustainable development and sets out how local authorities can contribute to delivering this and the improvement of the local environment.	The LFRMS can contribute to sustainable development through the promotion of better flood risk management to benefit people, the economy and the environment.	• Population • Material assets
Flood and Water Management Act (2010)	Designates Lead Local Flood Authorities (LLFAs) who *'must develop, maintain, apply and monitor a strategy for flood risk management in its area'*. Applies to ordinary watercourses, surface runoff and groundwater.	Provides key driver for production of LFRMS and sets strategic direction.	None	• Water environment • Climate
Flood Risk Regulations (2009)	Implements the requirements of the EU Floods Directive, which aims to manage the risk of flooding and associated socio-economic and environmental impacts. Requires LLFAs to manage flooding from surface runoff.	Key driver for implementing flood risk management strategies at the local level.	None	• Water environment • Climate
Water for People and the Environment, Water Resources Strategy for England and Wales (2009)	Sets out the approach to sustainable water resources management throughout England and Wales to 2050 and beyond to ensure that there will be sufficient water for people and the environment.	Flood risk management measures are linked to wider water resources management issues and both aspects can actively contribute to achieving corresponding objectives.	None	• Water environment • Population • Climate
Future Water, The Government's water strategy for England (2008)	Future Water defines future objectives for the water sector by 2030 and implementation steps on achieving the objectives. It includes objectives to reduce flood risk from rivers and the coast; improve the sustainable delivery of water supplies; improve the quality of the water environment through greater protection; and more effective management of surface water , which includes the promotion of SuDS, water reuse and	The strategy includes provisions that seek to better manage surface water drainage and reduce flood risk, and the LFRMS could actively contribute to achieving these objectives.	The strategy promotes greater protection of the water environment, reduced water pollution and enhanced ecological quality of watercourses. The strategy may restrict certain flood risk management options if they are likely to inhibit achievement of these wider environmental objectives.	• Water environment

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
	above-ground storage;			
Making Space for Water – taking forward a new Government strategy for flood and coastal erosion risk management in England (2005)	Aims to provide strategic direction to deliver sufficient space for water and enable more effective management of coastal erosion and flooding to benefit both people and the economy. The aim being to address these issues to mitigate their impact and to achieve environmental and social benefits.	National guidance regarding flood risk management is directly relevant to the LFRMS. The LFRMS can contribute to its aims, including promoting greater land management and land use planning, and integrated urban drainage management.	None	• Water environment • Population • Climate
The National Flood and Coastal Erosion Risk Management Strategy for England (2011)	Provides strategic direction to manage and monitor flood and coastal erosion risks in England. It sets out responsibilities of different organisations including local authorities to reduce risks and sets out the requirements for LLFAs to develop LFRMS.	Key driver for implementing flood risk management strategies at the local level.	None	• Water environment • Population • Climate
Water Act (2003)	Sets out the framework for abstraction licensing, impoundments, water quality standards and pollution control measures, and includes measures for drought management and flood defence work in England and Wales.	Flood risk management is one of the themes addressed by the LFRMS.	The strategy promotes greater protection of water resources and may restrict LFRMS objectives if they are likely to adversely affect water quality or sustainable resource management.	• Water environment
Draft Water Bill (2012)	Emerging national strategy aimed at improved regulation of the water industry, whilst increasing its resilience to natural hazards such as drought and floods. It includes provisions to better manage sustainable water abstraction and encourage the use of SuDS.	Aims to promote better management of water resources and reduce the risks of flooding.	The strategy promotes greater protection of water resources and may restrict LFRMS objectives if they are likely to adversely affect water quality or sustainable resource management.	• Water environment
The National Flood Emergency Framework for England (2011)	Sets out a strategic approach to emergency response planning to reduce the impacts of flooding and improve resilience.	The framework sets out organisational responsibilities and promotes a multi-agency approach to managing flooding events.	None	• Water environment
The Carbon Plan (2011)	The carbon plan sets out a vision for Britain powered by cleaner energy used more efficiently, with more secure energy supplies and stable energy prices and benefits from jobs and growth that a low carbon economy will bring. Key areas are electricity generation, eating homes and businesses and travel.	Carbon emissions, and the resulting climate change impacts, are highly relevant to the issue of flood risk management due to the likely increased flood risk resulting from climate change.	None	• Climate change
Building a Low Carbon Economy – the UK's Contribution to Tackling Climate Change (2008)	Puts forward a framework for adapting to climate change and associated threats as well as a case for increased resilience to climate change.	Emphasises the commitment to sustainable development and consideration of the potential impacts of climate change, including increased flooding.	The LFRMS may contribute to the aims of the strategy through the provision of measures to adapt to an increase in flood risk due to future climate change.	• Climate change
Climate Change Act (2008)	Establishes a definite target to reduce UK national carbon emissions by 80% by 2050, relative to a 1990 baseline. Requires the government to publish five yearly carbon budgets	Emphasises the commitment to sustainable development.	The LFRMS will need to consider the carbon implications of its objectives and should seek to minimise emissions whilst promoting sustainable	• Climate change

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
	starting with the period 2008-2012. Sets targets to reduce greenhouse gases, and puts in place funding and mechanisms to reduce and alter activities which contribute to the emission of these gasses.		flood risk management.	
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystems (2011)	Sets out the Government's strategy for improving biodiversity in England up to 2020.	Flooding can have adverse impacts on biodiversity. However there may be opportunities for the LFRMS to provide for biodiversity enhancements, as well as reducing risks to habitats and species from flood events.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse impact on water quality or local biodiversity.	• Biodiversity, flora and fauna • Water environment
England Biodiversity Framework (2008)	The framework encourages a number of conservation aspects including the adoption of an ecosystem approach and to embed climate change adaptation principles in conservation action.	The LFRMS may include measures that would result in biodiversity enhancements across landscapes and restoring / improving habitats.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse impact on water quality or local biodiversity.	• Biodiversity, flora and fauna • Water environment
UK Biodiversity Action Plan (1994)	The UK BAP aims to maintain and enhance biological diversity within the UK and contribute to the conservation and enhancement of global diversity.	The LFRMS will need to consider the potential impacts of measures within it on important species and habitats that are within the District, including the various Sites of Special Scientific Interest.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse impact on water quality or local biodiversity.	• Biodiversity, flora and fauna • Water environment
National Wetland Vision (2008)	The Wetland Vision is of a future where wetlands are a significant feature of the landscape in which wildlife can flourish. It will be a future in which wetland heritage is recognised and safeguarded; where everyone can enjoy wetlands for quiet recreation and tranquillity. Vitally, it will be a future where wetlands are valued both for the roles they play in helping us deal with some of the challenges of the 21st century and in improving and sustaining our quality of life.	Preserving and restoring wetlands such as peat lands, rivers and lakes will help regulate surface water run-off, store flood water and recharge groundwaters. These actions that are part of the wetland vision could potentially link with measures within the LFRMS.	May restrict certain flood risk management objectives if they are shown to be likely to have a significant effect on wetland habitats within the City.	• Biodiversity, flora and fauna • Water environment
Wildlife and Countryside Act (as amended) (1981)	The Act is the principle mechanism for legislative protect of wildlife in Great Britain. The Act deals with the protection of birds, other animals and plants.	The Act provides for the notification of Sites of Special Scientific Interest and their protection and management. Any potential impacts of the LFRMS, including on SSSIs, will need to be considered through the SEA.	May restrict certain flood risk management objectives if they are shown to be likely to have a significant effect on a SSSI.	• Biodiversity, flora and fauna • Water environment
Natural Environment and Rural Communities (NERC) Act (2006)	Provides guidance for the protection and enhancement of important habitat and species.	Requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.	May restrict certain flood risk management objectives if they are shown to be likely to have a significant effect on priority species or habitats.	• Biodiversity, flora and fauna • Water environment
Salmon and Freshwater Fisheries Act (1975)	Aims to regulate practice relating to freshwater fisheries and salmon fishing.	The Act's main purpose is to protect fish species. However, it does indirectly affect flood risk. Restricting the obstruction to passage of fish may have implications for flood risk, as this will prohibit the use of fish weirs and mill dams.	May restrict certain flood risk management objectives if they are shown to be likely to have an adverse effect on fish passage or compromise a waterbody from achieving Good status under the WFD.	• Biodiversity, flora and fauna • Water environment

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
Contaminated Land (England) Regulations (2006)	Sets out provisions relating to the identification and remediation of contaminated land. The regulations identify contaminated land issues and pathways to pollution of surface, ground, and estuarine and coastal water environments.	Although there is no heavy industry in the City, other light industries may have contaminated the land.	Flooding of contaminated land can have adverse impacts on factors such as biodiversity, water and soils	• Biodiversity, flora and fauna • Water environment • Soils
Heritage Protection for the 21st Century, White Paper (2007)	Aims to promote the protection of the historic environment through the planning system.	Flooding events may have an adverse impact on historic features in the City and the LFRMS may provide an opportunity to deliver benefits through reduced flood risk.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse effect on heritage sites in the City.	• Cultural heritage
National Planning Policy Framework (2012)	The National Planning Policy Framework (NPPF) has replaced the set of national planning policy statements and national planning policy guidance notes, bringing them into one document. It sets high level national economic, environmental and social planning policy and includes a new presumption in favour of sustainable development.	The NPPF has replaced PPS25 along with the other PPSs and PPGs, and so comprises the national policy framework in relation to planning in areas of higher flood risk. The NPPF restricts development that would adversely affect sites European sites, designated sites, including Green Belt, Sites of Special Scientific Interest (SSSIs) and Areas of Outstanding Natural Beauty (AONB), as well as locations at risk of flooding or coastal erosion.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse effect on sensitive ecological and landscape sites in the City.	• Biodiversity, flora and fauna • Water environment • Landscape • Population • Soils
Regional				
River Basin Management Plan, Northumbria River Basin District (2009)	The CFMP provides an overview of the flood risk in these catchments and set out the preferred surface water management strategy for future years. They outline the wider context for managing flood risk in Northumbria.	The CFMP provides important context for the LFRMS	None	• Water environment
Northumbrian Water, Water Resource Plan (2009)	The plan identifies Northumbrian Water's intensions to manage a future drought and supportive measures available when levels of service are compromised.	WRMPs are required as part of a statutory process, as reflected in the Water Resources Management Plan Regulations (2007) and the Water Resources Management Plan Direction (2012).	The LFRMS will need to consider policies set out in the water Resources Plan.	• Water environment • Biodiversity flora and fauna
Tyne and Wear Integrated Transport Authority, 2011, The Third Local Transport Plan for Tyne and Wear Delivery Plan (2011)	Sets out how the Transport Strategy will be implemented within Tyne and Wear	Provides information on regional policies.	none	• Socio-economic • Air quality
Durham Biodiversity Action Plan (2013)	Details the priorities for habitats and species and offers practical measures which can be implemented to achieve the conservation of the areas biodiversity heritage. The content of the plan is informed and guided by national targets so that its implementation is firmly linked to national priorities.	Objectives include the improvement of water quality, removal of barriers to aquatic species and enhancement of wetland and riverine habitats and connectivity and the issue of invasive species.	Objectives of the Durham BAP are linked to those of the WFD to enhance biodiversity and improve water quality status.	• Biodiversity flora and fauna

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
	An additional Habitat Action Plan for Rivers and Stream, lakes and Ponds and Associated Habitats has been produced that sets objectives for these particular habitats.			
Environment Agency, Wear Catchment Flood Management Plan (2009)	The Catchment Flood Management Plan establishes flood risk management policies which deliver sustainable flood risk management for the long term.	Provides policies for flood risk management that is relevant to the LFRMS.	None	• All
North East Coastal Authorities Group, Shoreline Management Plan 2: River Tyne to Flamborough Head (2007)	Provides a large-scale assessment of the risks associated with coastal evolution and presents the policy framework that will address the risks.	Provides a plan for the management of coastal defences, which the LFRMS incorporates.	None.	• All
Northumbrian Coastal Authority Group, Northumberland and North Tyneside Shoreline Management Plan 2 (2009)	Provides a large-scale assessment of the risks associated with coastal evolution and presents the policy framework that will address the risks	Provides a plan for the management of coastal defences, which the LFRMS incorporates.	None.	• All
Local				
Sunderland City Council: Local Air Quality Management Progress Report. (2011)	Strategies outline the direction for air quality policy in Sunderland. It includes details for air quality management and monitoring the effectiveness of policies to reduce pollution.	Provides information on regional policies.	none	• Air quality
Sunderland Partnership. The Sunderland Strategy 2008 - 2025 (2008)	Outlines the vision for the City including strategic and more detailed policies used in determining local planning applications.	Plan is required by the Planning and Compulsory Purchase Act 2004 (amended) and in line with the new National Planning Policy Framework (2012). The Local Plan provides important local context for the LFRMS	The LFRMS will need to consider policies set out in the Local Plan.	All
Sunderland City Council, The Sunderland Economic Masterplan	Outlines the direction for the City's economy over the next 15 years	Provides information on local policies	none	• Socio-economic • Air quality
Public Health England Health Profile 2012 for Sunderland. (2012)	Provides a picture of health in the area. Provides guidance for local government and health services on understanding needs of the local people and improving health.	Provides information on local policies	none	• Socio-economic • Human health
Sunderland City Council Infrastructure Delivery Plan (2013)	The plan identifies the physical, social, green infrastructure needed to support and underpin Sunderland's growth through to 2032	Forms part of the evidence base for the Local Development Framework. It describes what infrastructure is required now and in the future.	Objectives in the plan will and the requirements for infrastructure will need to be considered as part of the LFRMS	All
Sunderland County Council: Core Strategy (2013)	Sets out the City's vision for the future	Provides information on local policies	The LFRMS will need to consider policies set out in the Core Strategy	All

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
City of Sunderland Unitary Development Plan (2013)	The UDP provides the statutory development plan for the City	. A key function is to provide a starting point in the consideration of planning applications for land use or development.	The LFRMS will need to consider policies set out in the UDP.	All
Sunderland City Council: Sunderland Green Infrastructure Strategy Framework (2011)	Sets out the main elements for an effective strategy for the improvement, protection and management of green infrastructure in Sunderland.	Outlines a timetable for the strategy and proposes a provisional vision and principles for green infrastructure within the City.	none	• Water environment • Biodiversity flora and fauna • Socio-economic
Sunderland City Council, 2009, Topic Paper 1.12 Climate Change	Provides an overview to policy objectives, guidance and issues related to climate change.	The City's Topic Papers are fundamental to the preparation of the Core Strategy and other Development Plan documents	The LFRMS will need to consider policies set out in the Topic Paper.	• Climate • Air quality
Sunderland City Council, Strategic Flood Risk Assessment (2010)	Provides a spatial assessment of flood risk across Sunderland and includes sources of flooding. The risks associated with flooding have been mapped. The report provided key recommendations.	The flood risk assessment provides information on the risk associated with flooding in different areas of Sunderland and the likely sources of the flooding.	None.	• All
Sunderland City Council, Sunderland Greenspace Audit and Report 2012	Identifies the green space and spatial deficiencies and inequalities in Sunderland. The report provides recommendations to address these deficiencies.	Provides information on the green space to be protected in Sunderland.	None	• .Socio-economic • Biodiversity, flora and fauna.
Sunderland City Council, Habitat Regulations Appraisal: Screening Report (2013)	Report on the HRA as part of Sunderland's Local Development Framework (LDF).	Provides relevant information about the HRA.	An HRA was undertaken with relevance to this LFRMS, the LDF HRA did not affect the outcomes of HRA of the LFRMS.	• Biodiversity • HRA • Water environment
Sunderland City Council, UDP alteration No. 2 (Central Sunderland) Sustainability Appraisal Report (2007)	Sustainability Appraisal of the policies that have been developed as part of the Unitary Development Plan (UDP) alteration.	Includes sustainability appraisals of policies relevant to the LFRMS, including the River Wear policy	None.	• Socio-economic • Water environment

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