North Somerset Local Flood Risk Management Strategy

North Somerset COUNCIL

Executive Summary

Flooding can threaten lives and cause substantial negative social and economic effects to people, property, infrastructure and agricultural land. Historical flooding within North Somerset has demonstrated these devastating effects. In addition to the Great Flood of 1607 which killed 2,000 people there have been a number of significant flooding incidents in North Somerset in 1968, 1981, 1989-90, 2007, 2008, and more recently in 2012 which was the second wettest year on record in the UK. Indeed, during 2012 it is estimated that approximately 340 properties flooded internally across North Somerset. Flooding in North Somerset arises from watercourses, the sea, surface runoff, exceedance from urban drainage networks, reservoirs, and groundwater.

Under legislation from 2010[1] North Somerset Council has new responsibilities for managing flood risk from surface runoff, ordinary watercourses and groundwater, in addition to the responsibility we already have to manage flood risk and drainage from our highway network. This type of flooding is becoming an increasingly recognised issue, although until the 2010 legislation there has been little understanding of these sources of flooding, or actions to manage the risk.

One of our primary responsibilities under the legislation is to produce a strategy, known as a 'Local Flood Risk Management Strategy', which sets objectives and outlines how we, in partnership with a range of other organisations and the public, will seek to manage flood risk from surface runoff, ordinary watercourses and groundwater.

The Strategy focuses on managing the risk of flooding to people and property due to surface runoff, ordinary watercourses and groundwater, in line with our responsibilities. However, we recognise that for those who suffer from flooding it matters little what type of flooding is causing the problem. So we are taking a leadership and coordinating role across North Somerset. This does not mean that we will act as the lead organisation on all types of flooding, but rather we will work with others to identify the most appropriate organisation to lead in any given location where flood risk is an issue.

We have developed this Strategy to identify actions we propose to take to reduce flood risk. The Strategy identifies the 15 communities in North Somerset which are considered to be most vulnerable to flooding from surface runoff, ordinary watercourses and groundwater. It identifies the measures we propose to take in these communities to reduce flood risk, subject to sufficient funding and resource availability.

The measures are designed to complement works undertaken by North Somerset highways which provide local improvements. The Strategy identifies where additional

[1] Flood and Water Management Act, 2010, available at: http://www.legislation.gov.uk/ukpga/2010/29/contents

investment is proposed beyond that currently programmed by the highways authority. It also complements the work undertaken by emergency management to plan for emergencies and work with local communities to increase resilience against flooding.

The 15 highest priority communities identified by the risk assessment and prioritisation exercise are listed in alphabetical order in the table below.

Community	
Backwell	Long Ashton
Churchill	Nailsea
Claverham	Pill
Clevedon (East)	Portbury
Congresbury	Winscombe
Hutton	Wrington
Langford	Weston-super-Mare*

* It should be noted that Weston-super-Mare (WsM) has been considered as a single community for the Strategy to align with the Surface Water Management Plan carried out for the town. However, the strategy has identified two specific parts of WsM which are most vulnerable: 1) Milton Hill and Worle, and 2) Central and West WsM.

The Strategy also identifies broader actions we propose to take across our area. These include actions such as ensuring runoff from new developments is appropriately managed and ensuring communities are more resilient and able to respond in the event of future flooding.

Before finalising the Strategy we sought the views of organisations and the public about whether we correctly identified the risk of flooding to communities in North Somerset, and whether our planned actions are appropriate. The consultation took place from December 2013 to February 2014. Over 30 responses were received on the consultation from individuals, town and parish councils, and organisations including the Environment Agency, Natural England and English Heritage. The majority of our responses to comments fell into one of the following themes:

- clarifying where there has been a misunderstanding in the Strategy documents;
- signposting responses to where existing information is located which addresses a query or comment;
- identifying specific local issues which need to be investigated outside of the Strategy, or;
- amending the Strategy documents and confirm what change has been made.

A summary of the all consultation responses received and the actions taken to amend the strategy is available on the NSC website at: http://www.n-somerset.gov.uk/lfrmsconsult. The headline changes made to the Strategy following the consultation were:

- further clarification provided on roles and responsibilities;

- greater emphasis placed on measures in relation to routine maintenance of ditches and gullies and how we will work with others to ensure this work is undertaken, and;
- clarified that the prioritisation of most vulnerable communities will be updated as appropriate in the future as further information becomes available.

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North Somerset Local Flood Risk Management Strategy

1 Introduction

1.1 Context

North Somerset is located in the southwest of England and borders the local authority areas of Bristol, Sedgemoor, Mendip and Bath & North East Somerset. North Somerset Council (NSC) is a unitary authority which is approximately 375km^2 in size, and more than two thirds of the district is rural. The majority of residents live in the main urban centres of Weston-super-Mare, Portishead, Clevedon and Nailsea. The population within the entire district is just over 200,000.

Flooding can threaten lives and cause substantial negative social and economic effects to people, property, infrastructure and agricultural land. Historical flooding within North Somerset has demonstrated these devastating effects. In addition to the Great Flood of 1607 which killed 2,000 people there have been a number of significant flooding incidents in North Somerset in 1968, 1981, 1989-90, 2007, 2008, and more recently in 2012 which was the second wettest year on record in the UK. Indeed, during 2012 it is estimated that approximately 340 properties flooded internally across North Somerset. Flooding in North Somerset arises from rivers, the sea, surface water runoff, exceedance from urban drainage networks, reservoirs, and groundwater. Flooding from the sea presents the most significant source of flood risk in North Somerset, although this is well managed by the presence of raised and natural sea defences along the majority of the coastline[2]. A future increase in precipitation and sea level due to climate change is likely to cause further increases in flood risk for North Somerset, although the nature and extent of this increase remains uncertain.

Given the scale of existing risk, and the predicted increase in future flood risk it is vital that key stakeholder organisations and local communities work together to better understand the flood risk issues in North Somerset. We must seek to identify measures which will help reduce the risk to people and property wherever it is economically, technically, socially and environmentally feasible to do so.

1.2 What is a Local Flood Risk Management Strategy?

It is important to recognise that flooding is a natural process which provides numerous benefits including the recharge of groundwater, improvement of soil fertility, maintenance of ecosystems in river corridors, and floodplain biodiversity. Flooding cannot be wholly prevented. The risk it poses through its interaction with people and property can be reduced, however, and its negative impacts can be mitigated through good planning and management, ongoing maintenance of critical channels such as the IDBs' Viewed Rhynes[3]

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[2] A draft copy of the Severn Estuary Flood Risk Management Strategy, which considers how flood risk along the Severn Estuary will be managed over the next 100 years, is available at: http://www.severnestuary.net/frms/

[3] Viewed Rhynes are the IDBs' maintained network of watercourses and are the primary routes by which water is removed from the land and field ditches to the Main Rivers (Environment Agency) and sea in IDB areas.

(without which existing flood protection standards could deteriorate), and by maximising the effectiveness of available resources.What is a Local Flood Risk Management Strategy?

Under the Flood and Water Management Act 2010[4] NSC is now a Lead Local Flood Authority (LLFA) with new statutory powers and responsibilities for the management of flooding from **surface water, ordinary watercourses and groundwater**, in partnership with other organisations within North Somerset. This is referred to as 'local flood risk' in the Flood and Water Management Act.

One of our overarching responsibilities as an LLFA is to develop, maintain, apply and monitor a strategy for local flood risk management in our area (a 'local flood risk management strategy')[5]. The Local Flood Risk Management Strategy (LFRMS) will set out our high level vision for local flood risk management, and provide the framework for identifying and prioritising the specific measures which should be undertaken. The LFRMS will also identify how NSC will work together with its fellow Risk Management Authorities[6], other stakeholders, and local communities to manage local flood risk.

Furthermore, the LFRMS will provide the evidence base to target future capital and operational investment to manage flood risk in North Somerset. It is important to note that the LFRMS focuses on managing flood risk to people and property due to surface runoff, ordinary watercourses and groundwater, in accordance with our statutory duties and responsibilities. The measures identified in the Strategy are designed to complement the works undertaken by North Somerset highways which provide local improvements. The Strategy identifies where additional investment will be required to manage flood risk beyond that currently programmed by the highways authority. In addition, the measures in the strategy complement the work being undertaken by emergency management who have a plan in place for dealing with emergencies such as flooding. During flood incidents emergency management will provide leadership in response and recovery to the incidents. The LFRMS will be used to pro-actively plan and implement measures in communities to reduce the probability or consequence of flood risk.

However, we recognise that by far the most significant risk to North Somerset is that of tidal flooding. Whilst it is not a direct requirement of the LFRMS to address tidal flooding, which remains the responsibility of the Environment Agency, sea levels are a contributory factor in surface water flooding across our low lying coastal areas which rely on managed land drainage. One third of North Somerset lies below high tide level. High tides can create tide locked conditions which if combined with heavy rainfall can significantly exacerbate flooding. Because of the flood risk associated with tidal and fluvial sources across North Somerset it is also important that we consider the interaction of local flood risk sources with other flood mechanisms.

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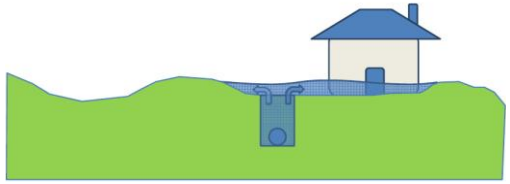
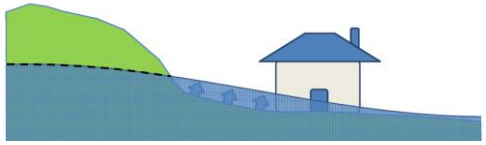
[4] http://www.legislation.gov.uk/ukpga/2010/29/contents

[5] Section 9 of the Flood and Water Management Act defines what the Local Flood Risk Management Strategy must include

[6] Risk Management Authorities are defined in the Flood and Water Management Act as the LLFA, district/borough councils (where present) the Environment Agency, water and sewerage companies, the highways authority and Internal Drainage Boards.

As a coastal authority, we also have responsibilities in relation to coastal erosion which, although not specifically required by the Flood and Water Management Act (FWMA), we have chosen to include within the Strategy so that all the information pertaining to our strategy for flood risk and coastal erosion is together in one document.

Figure 1-1 illustrates different sources of flooding and the Risk Management Authorities who have primary responsibility for managing that flooding. We recognise that flooding is often complex and from multiple sources, and are therefore committed to working in partnership with our fellow Risk Management Authorities. Appendix C contains more information on the roles and responsibilities of other stakeholders.

Surface water flooding: 	**Surface water flooding** occurs when rainfall cannot soak into the ground or drain into local surface water drains or rivers. This leads to the surface water flowing across the ground and pooling in low-lying areas. This flooding often occurs quickly during, or shortly after, a high intensity storm. Highway runoff is included within this category.	**NSC** is responsible for managing the risk of surface water flooding. NSC is also responsible for managing highway drainage and flooding.
Sewer flooding: 	**Sewer flooding** happens when the capacity of the sewerage system is less than the amount of rain and sewage trying to flow through it. This leads to sewage being surcharged from manholes and gullies. The lack of capacity can be caused by the system simply not being able to cope with the amount of rainfall and sewage, or it can be caused by blockages and collapses in the system.	**Wessex Water** is responsible for managing and operating the public sewer network.
Groundwater flooding: 	**Groundwater flooding** is caused when the water level held within underground rocks rises above the surface. Groundwater tends to respond to rainfall more slowly than water in rivers or on the surface. This slow response means that groundwater flooding can occur a long time after prolonged or heavy rainfall and can last for a long time (often several weeks or months).	**NSC** is responsible for managing the risk of flooding from groundwater.

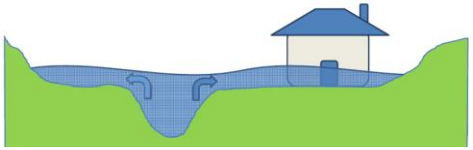
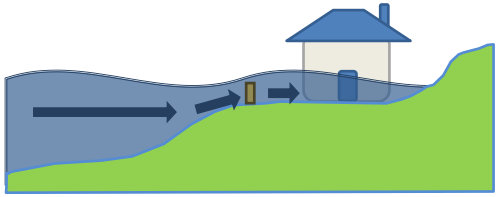
River (fluvial) flooding: 	**River Flooding** occurs when water overtops the banks of the stream. This can occur because there is more water draining into the channel than it can hold, or because it is blocked.	**NSC** is responsible for managing flood risk from Ordinary Watercourses (typically small ditches and streams – see Appendix B9), except within **Internal Drainage Board (IDB)** areas where the IDB retains responsibility (see Appendix B2 for IDB boundaries). Flooding from larger rivers and streams, officially classed as Main Rivers (see Appendix B9), remains the responsibility of the **Environment Agency**.
Tidal flooding: 	**Tidal flooding** occurs when water from the sea (due to high tide levels and waves) overtops natural or manmade defences	The **Environment Agency** is responsible for managing the risk of tidal flooding, and has produced a Severn Estuary Flood Risk Management Strategy which sets out the approach to managing flood risk in the Severn Estuary for the next 100 years (http://www.severnestuary.net/frms/)

Figure 1-1: Types of flooding and responsible organisations

1.3 Structure of LFRMS

The structure of the LFRMS is illustrated in Figure 1-2. As part of the development of the LFRMS we have developed an action plan which considers the types of measures, timescales and responsibility for implementation to enable us, in collaboration with our partner organisations to manage flood risk in North Somerset over the next 10 years. The action plans consider broad measures we will take across North Somerset to manage local flood risk, but also consider measures within the communities identified as being most vulnerable to local flood risk. It is important to recognise that whilst the action plans set the framework for how we will manage local flood risk over the next 10 years there will inevitably be legislative, regulatory and financial changes over this period which could affect how we manage local flood risk.

Therefore, we will need to maintain some flexibility during the delivery period of the LFRMS to allow for such changes. To reflect future uncertainty and maintain flexibility during the delivery period of the LFRMS, we will develop and maintain a ‘rolling’ two-year implementation plan, which will be reviewed, updated and published on an annual basis. The implementation plan will provide more specific details on: progress against the LFRMS objectives; any material changes which impact on delivery of the LFRMS (e.g. funding opportunity or regulatory changes), and; the priorities and actions for the next two year period. It is worth noting that consideration of suitable funding sources to deliver mitigation measures will be considered within the implementation plan.

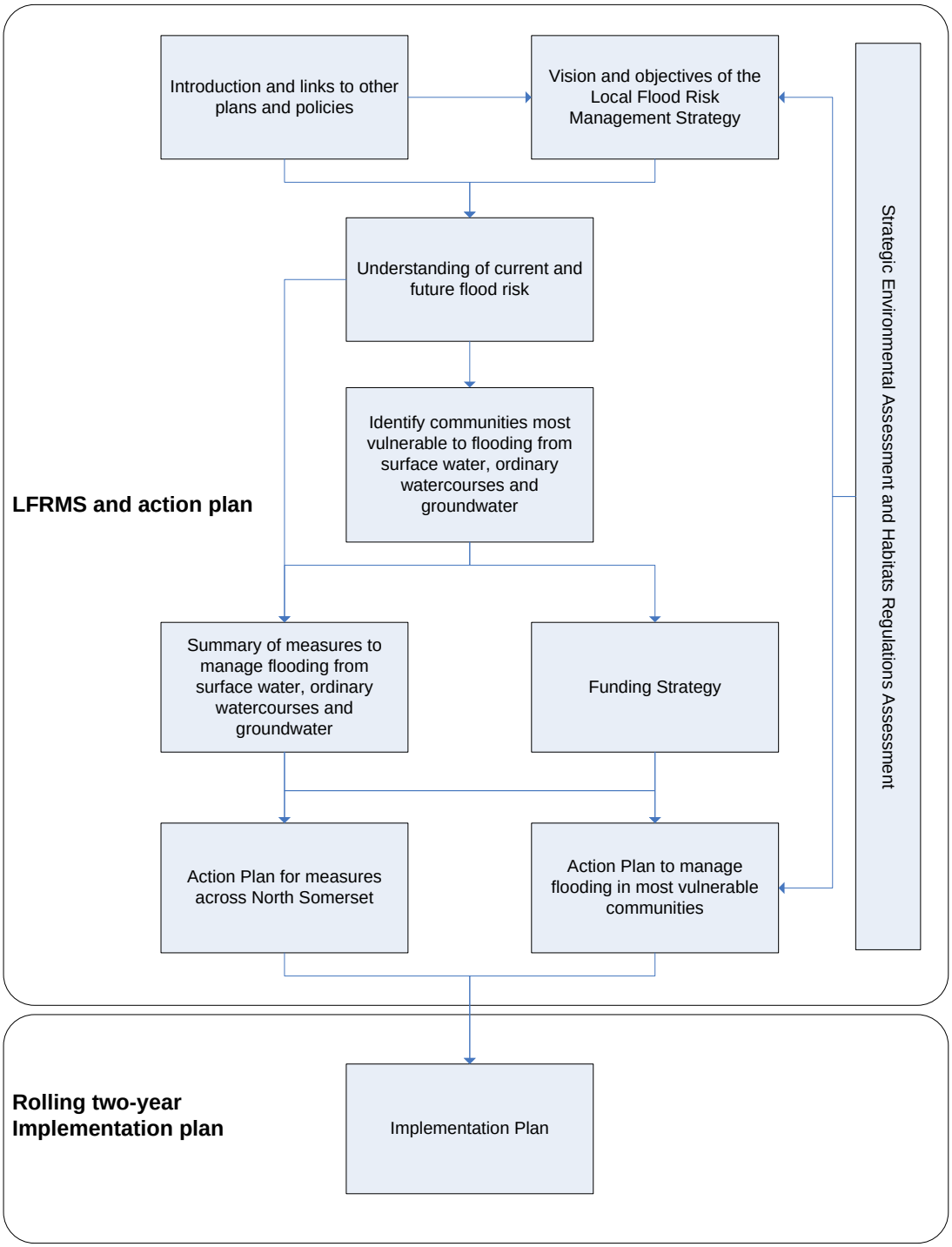


Figure 1-2: Structure of LFRMS and linkages between LFRMS and the implementation plan

1.4 Links to other plans, policies, legislation and regulation

The LFRMS influences and is influenced by a range of other plans, policies and legislation. The linkages between other plans, policies and legislation must be considered to ensure consistency whilst avoiding duplication.

Figure 1-3 shows where the LFRMS sits in relation to other relevant plans, policies and legislation. A more detailed overview of other relevant plans and policies is provided in Appendix A.

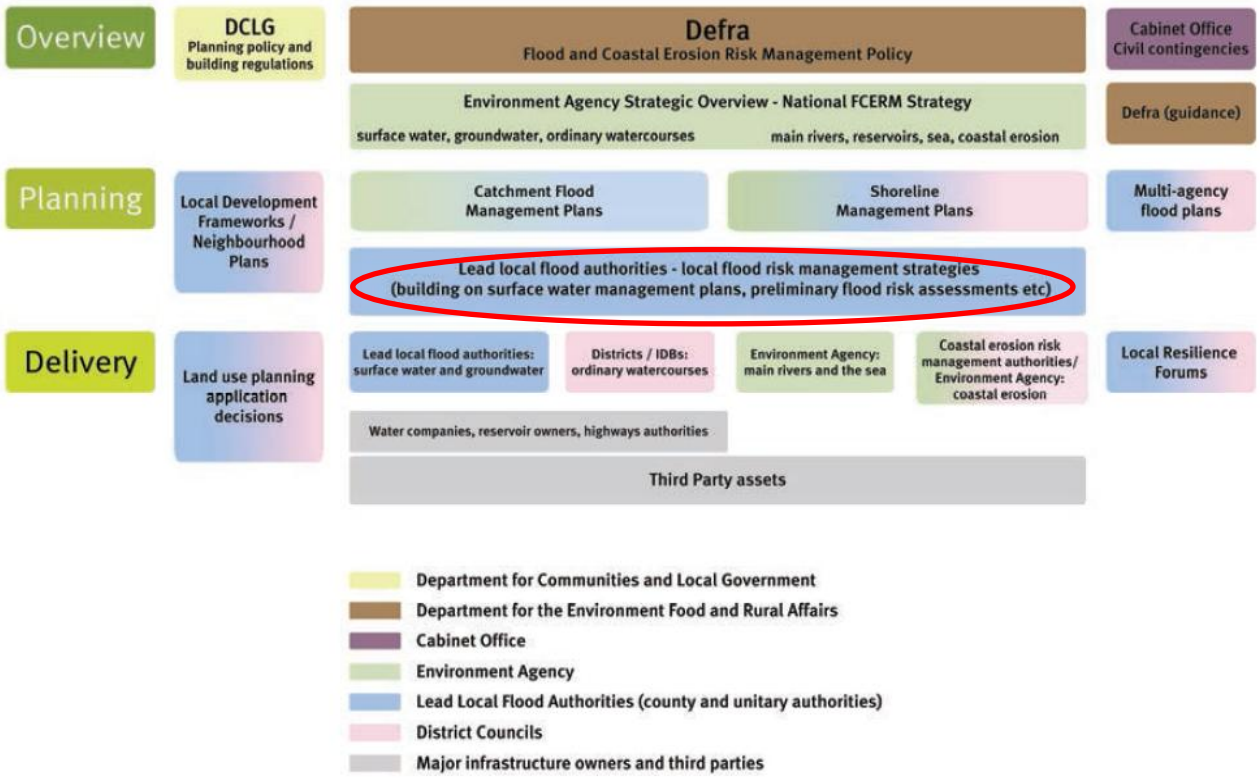


Figure 1-3: Overview of flood & coastal erosion risk management policy & strategy (NFCERM Strategy)

2 Key principles and objectives of the LFRMS

2.1 Key principles

2.1.1 Partnership working

As an LLFA we are responsible for providing leadership for managing flood risk from surface runoff, ordinary watercourses and groundwater, which is referred to as 'local flood risk', in accordance with our statutory duties and responsibilities. However, we cannot do this alone by simply improving the highways and public realm infrastructure over which we have direct responsibility. The integrated nature of flooding in North Somerset means that we will need to work in partnership with Risk Management Authorities, local communities and other stakeholders who have relevant responsibilities and/or assets in order to deliver effective improvements. It is also important that the 'professional' stakeholders, in particular Risk Management Authorities, work together to help local communities understand the risks they face and to support and promote appropriate local action. The LFRMS has been developed in partnership with our Risk Management Authorities, and in consultation with other stakeholders.

Maintaining this partnership approach will be essential to fulfilling our commitments under the LFRMS to deliver local flood risk management. Appendix C of this Strategy provides further details on roles and responsibilities of Risk Management Authorities, and provides more information on how we will communicate our plans effectively to other flood risk management stakeholders. We have established a core partnership with our fellow local Risk Management Authorities. This Strategic Flood Management Board (SFMB) meets quarterly to share information on flood risks, and to update each other on progress and future plans. We are also committed to working with our internal partners to manage flood risk. It should be noted that we are also working closely with our neighbouring local authorities to share information on cross-boundary issues as well as pooling experience and best practice. With all these partners we will continue to seek opportunities to deliver more for less through collaboration. The SFMB includes representatives from:

- North Somerset Council;
- Environment Agency;
- Wessex Water
- North Somerset Levels Internal Drainage Board (IDB)and;
- Axe Brue Internal Drainage Board.

The Terms of Reference for the SFMB are provided in Appendix C.

In addition, North Somerset Council has formed an Operational Group, which has a stronger focus on operational and 'on the ground' issues. The Operational Group focuses on: local priorities for flood risk; monitoring the operation of critical infrastructure and maintenance; raising relevant items for the SFMB to discuss, and; assisting the SFMB in the development and implementation of strategies.

2.1.2 Prioritising investment

We appreciate that flood risk is a concern for many of our residents, and we aim to mitigate flood risk wherever practicable. A key principle of the LFRMS is that investment will be prioritised in areas at greatest risk from local flooding. Prioritisation will be based on the most up to date available information and will ensure that resources are directed to those areas with the highest demonstrable level of local flood risk. This prioritisation will be revisited and adjusted accordingly as our understanding of local flood risk improves over time and as new information becomes available.

2.1.3 Promoting and supporting personal responsibility

Stakeholders at all levels have a role to play in managing flood risk. Risk Management Authorities have legal duties and powers to manage watercourses and drainage but individuals, communities and businesses can also play a key role in a number of ways. For example, by: reducing drain blockages by disposing of fats and oils responsibly, taking action to protect themselves and their properties, and getting involved in local flood risk management activities. Additionally, riparian owners have a responsibility to maintain a proper flow of water in any watercourse running through their land and NSC has a power to ensure that this responsibility is being met, including the use of enforcement powers where necessary by NSC or IDBs. The Strategy aims to promote personal responsibility by raising awareness of flood risk and supporting community-based actions. Within North Somerset the Community Resilience network will be the primary mechanism for engaging with local communities[7].

2.1.4 Sustainability

In developing and delivering our LFRMS we will be guided by the North Somerset vision of 'Sustainable, inclusive, safe, healthy, prosperous communities thriving in a quality environment'[8]. Flood risk management offers many opportunities to contribute to sustainable development and sustainable communities, and we will seek to maximise these to deliver multiple benefits to communities and the environment wherever possible. This will help to ensure that we deliver best value for our investment in flood risk. A Strategic Environmental Assessment (SEA) of the LFRMS has been undertaken concurrently, to guide the development of a sustainable LFRMS and associated action plan which has due regard to the environment and identifies potential enhancement opportunities when delivering flood risk management schemes.

2.2 Objectives

We have identified a set of high level objectives to guide the development of the LFRMS for North Somerset. These have been derived from the objectives of the Environment Agency's

[7] http://www.communityresilience-ns.org.uk/

[8] North Somerset Sustainable Community Strategy 2008 – 2026, http://www.northsomersetpartnership.co.uk/usefulinformation/sustainable+community+strategy+2008-20261.asp

National Flood and Coastal Erosion Risk Management (FCERM) Strategy[9], with which we are required to act consistently, and interpreted to make them locally relevant and specific.

The six strategic objectives for the LFRMS, which have been agreed by the SFMB, are:

- improve our understanding of flood and coastal erosion risks in North Somerset;
- develop plans and policies to manage these risks sustainably;
- work in partnership with other flood Risk Management Authorities and lead by example;
- maintain and improve flood and coastal erosion risk management infrastructure and systems to reduce risk;
- avoid inappropriate development in areas of flood and coastal erosion risk, and ensure that development does not increase risks elsewhere, and;
- increase public awareness of flooding and promote individual and community level flood resilience.

Under each of these strategic objectives we have set out specific goals and anticipated outcomes to help interpret them into actions.

Table 2-1: LFRMS Objectives

Detailed components	Anticipated outcomes
1. Improve our understanding of flood and coastal erosion risks in North Somerset	
Review and collate existing information on flood risk and identify data gaps.	Establish an understanding of flood risk and mechanisms of flooding based on best available information, and identify where additional information is needed.
Identify and prioritise areas of locally significant flood risk.	Using the existing evidence base a prioritised list of target areas can be produced using a fair and transparent process.
Establish and maintain a register of structures or features (assets) which are likely to have a significant effect on flood risk.	Identify assets which could have a significant impact on where and how flooding occurs, to improve prioritisation of investment.
Record, map and investigate flooding incidents to a proportionate level.	Improved historical flooding records leading to better informed prioritisation of capital and operational investment.

[9] http://www.environment-agency.gov.uk/research/policy/130073.aspx

2. Develop plans and policies to manage these risks sustainably	
Ensure that flood risk management proposals are consistent with other relevant high level plans, policies and strategies.	LFRMS will comply with legislation and be consistent with other relevant plans, helping to deliver against common objectives.
Develop an implementation plan to drive investment in local flood risk management in North Somerset, reviewed annually and/or in response to defined triggers.	A clear plan for investment in flood risk management over the short, medium and long term, to direct appropriate use of resources and support fundraising opportunities.
Ensure that flood risk management measures seek to deliver wider benefits for local communities wherever practicable.	Flood risk management measures which offer additional benefits such as education, recreation or cultural heritage will be promoted, leading to social and economic benefits for local communities. Flood risk management activities will seek to improve the built environment.
Ensure that flood risk management measures work with natural processes and contribute to achieving specific environmental objectives wherever practicable.	Flood risk management measures are delivered without detriment to existing natural processes, and wherever possible offer environmental enhancements. Wherever possible, flood risk management measures contribute to achieving environmental objectives.
Ensure that flood risk management measures incorporate actions to tackle climate change and adapt to the changes it brings wherever practicable.	Adaptable and flexible flood defences with greater resilience to extreme weather events and the projected impacts of climate change[10].
Develop a monitoring and review cycle for the LFRMS, including procedure, review period, stakeholders involved, defined triggers for interim review.	Progress will be regularly reviewed, difficulties will be identified and addressed, and the LFRMS will be kept up to date.
3. Work in partnership with other flood risk management authorities and lead by example	

[10] *Guidance for risk management authorities on sustainable development in relation to their flood and coastal erosion risk management functions*, Defra, October 2011 (http://www.defra.gov.uk/publications/files/pb13640-sdg-guidance.pdf)

Ensure the roles and responsibilities of all RMAs in North Somerset are clearly defined and that common objectives, as well as potential differences, are appreciated.	Risk management activities will be well coordinated. RMAs will understand how and when to work together to achieve common objectives, and appreciate where different drivers may make this difficult.
Engage all local RMAs in development and review of flood risk management plans and policies, and promote partnership working.	Plans will take into account the actions and intentions of other RMAs to avoid duplication and achieve synergies. RMAs will co-ordinate their activities to deliver the most appropriate and cost beneficial solutions.
Establish and develop mechanisms to facilitate sharing of information between risk management authorities.	Relevant information will be shared promptly between risk management authorities to assist in local flood risk management, wherever possible.
Engage with other RMAs on a regular basis to monitor and review progress against flood risk management objectives, share information and discuss any issues arising.	Progress will be monitored and plans reviewed if circumstances change or new information becomes available. A forum for relationship building and information sharing between RMAs will be maintained.
4. Maintain and improve flood and coastal erosion risk management infrastructure and systems	
Improve operational maintenance planning and data capture to develop a positive maintenance regime for flood risk assets.	More targeted maintenance regime focusing investment on infrastructure in highest priority areas.
Improve flood incident reporting and response systems.	More effective use of resources in the event of flooding, leading to: shorter response times, increased availability of support to the public and more effective interaction with other risk management authorities and responders.
5. Avoid inappropriate development in areas of flood and coastal erosion risk, and ensure that development does not increase risks elsewhere	
Engage with spatial planning and development management services during the development of flood risk management plans and policies.	Flood risk management objectives will be effectively supported by appropriate spatial planning and enforcement.

Ensure planning authority service uses the 'Locally Agreed Surface Water Information' to support spatial planning.	Spatial planning will be informed by the best available information on local flood risk.
Ensure that drainage proposals for new development are appropriately reviewed for compliance with relevant national and local standards.	New development and redevelopment will manage surface water effectively and not increase the risk of flooding elsewhere.
Engage with developers as early as possible in the planning process to ensure that they are aware of drainage requirements and build these into their proposals from the outset.	Development will take into account space for water from the outset, making it more likely that site drainage will be managed sustainably.
6. Increase public awareness of flooding and promote individual and community level flood resilience	
Establish and promote links with local communities through which information about local flood risk can be shared.	Communities will be aware of their vulnerability to flooding and better equipped to appropriately prepare and respond to flood incidents. We will be able to use local intelligence to help develop and prioritise flood risk management strategy.
Support local communities to raise awareness of individual and community-led measures that they could implement to increase their resilience to flood risk.	Communities will be better informed of measures available to them, and empowered to put in place mitigation measures to reduce their vulnerability to flooding.
Encourage local communities and individuals to sign up to flood warning systems, where available.	Local communities and individuals will have access to early information about potential flooding incidents, which will improve their ability to respond, recover more quickly and reduce the potential impact of a flood incident.
Provide support to communities and individuals both in the event of flooding and throughout the aftermath.	Local communities will have access to the information and services they need to help them recover more quickly in the event of flooding.

3 Understanding current and future flood risk

3.1 Historic flooding in the North Somerset administrative area

North Somerset has a long history of flooding, with records dating back to the infamous 'Great Flood' in 1607 which killed 2,000 people across Somerset. Within the last 30-40 years there have also been a number of significant flooding incidents in North Somerset. Appendix A of the Preliminary Flood Risk Assessment provides a summary of the most significant flooding incidents in North Somerset up to 2010, including:

- July 1968 – flooding to Banwell Moor, St Georges Village, Wrington, Congresbury, Weston-super-Mare and Clevedon due to a combination of fluvial and surface water flooding;
- 1981 – tidal flooding affected Uphill, Clevedon, Wick St Lawrence and Kingston Seymour and Portishead;
- 1989-90 – tidal inundation on a lesser scale in Weston-super-Mare, Kingston Seymour, Wick St Lawrence and Clevedon and Portishead;
- Summer 2007 – flooding was experienced in Wrington due to surface water runoff and overtopping of the ordinary watercourse;
- January 2008 – there were over 200 incidents recorded by the Avon Fire and Rescue Service in one afternoon, and within North Somerset properties were affected in Winford, St Georges Hill and Wrington, and;
- February 2008 – Station Road (A370) at Flax Bourton became impassable and the railway line was temporarily closed with trains cancelled.

More recently, there was significant flooding across the North Somerset administrative boundary in August, September and November 2012. Records from North Somerset Council indicate that approximately 340 properties suffered internal flooding in North Somerset over this period. A summary of the key flooded locations where more than 10 properties suffered internal flooding is provided in Table 3-1. A map of historic flooding incidents is provided in Appendix B.

Table 3-1: Key flooded locations in 2012

Location	Estimated no. internal flooding incidents in 2012	Estimated no. external flooding incidents in 2012
Congresbury	10-20	10-20
Clevedon	20-30	5-10
Langford	10-20	10-20
Locking	10-20	5-10

Nailsea	20-30	40-50
Weston-super-Mare	20-30	20-30
Winscombe	20-30	10-20
Wrington	80-90	140-150

Whilst historic flooding locations may not be indicative of all areas which may be at risk in the future, it is evident that flooding remains a big issue in North Somerset. The available historic data does not record the source of flooding, although it is known that flooding in North Somerset is caused by overtopping of watercourses (fluvial flooding), overtopping of tidal defences whether natural or man-made, flooding from surface water runoff, flooding from drainage networks (highway and sewerage systems), waterlogged conditions in low-lying areas, and groundwater

3.2 Current flood risk in North Somerset

In addition to collating reported evidence of flooding there are tools and methods available to assess the risk of future flooding from a range of sources. In this situation, risk equates to the likelihood of flooding occurring multiplied by the consequence of flooding to people, property and the environment. The following sources of flood risk are considered in the LFRMS:

- flooding from surface runoff (part of local flood risk);
- flooding from ordinary watercourses (part of local flood risk);
- flooding from groundwater (part of local flood risk);
- flooding from Main Rivers and the Sea (responsibility of the Environment Agency);
- flooding due to tidal or fluvial 'locking' which prevents free discharge of drainage networks to rivers and the sea, and;
- flooding from sewerage systems (responsibility of water and sewerage companies).

3.2.1 Flood risk from surface runoff and ordinary watercourses

Since the summer floods of 2007 much work has been undertaken to better understand flood risk from surface runoff and ordinary watercourses both nationally by the Environment Agency and locally such as Weston-super-Mare Surface Water Management Plan. As part of the Preliminary Flood Risk Assessment (PFRA) in 2010 we analysed the available mapping to determine which sources of mapping were most representative of flood risk in North Somerset. This is known as the 'Locally Agreed Surface Water Information'[11]. As the 'Locally

[11] Whilst the Flood Map for Surface Water is a representation of surface water flooding, it can be used as a surrogate to identify locations where flooding from smaller watercourses (ordinary watercourses) will occur because surface water naturally collects in valley bottoms and low spots where watercourses are present. An analysis of the Flood Map for Surface Water and Flood Zone 3 indicates that flooded locations between the two maps broadly correlate for ordinary watercourses which are typically smaller and respond to intense rainfall.

Agreed Surface Water Information' represents the best available information on areas vulnerable to surface water flooding this should be used as the primary dataset when understanding whether an area is vulnerable to surface water flooding. A map of the flood risk from surface water is provided in Appendix B

Based on the 'Locally Agreed Surface Water Information' nearly 2,000 residential and non-residential properties are predicted to be at risk of surface water flooding during a rainfall event with a probability of occurring once every 30 years[12]. During a rainfall event with a probability of occurring once every 200 years nearly 6,000 residential and non-residential properties could be at risk of surface water flooding. Key surface water flood risk areas for a rainfall event with a probability of occurring once every 30 years, are:

- Backwell - >75 properties predicted to be at risk (NB: limited recorded flooding in this location);
- Claverham - >100 properties predicted to be at risk (NB: limited recorded flooding in this location);
- Clevedon - >50 properties predicted to be at risk
- Long Ashton - >125 properties predicted to be at risk (NB: limited recorded flooding in this location);
- Nailsea - >100 properties predicted to be at risk;
- Portishead – nearly 70 properties predicted to be at risk;
- Weston-super-Mare - >200 properties predicted to be at risk;
- Winford - >50 properties predicted to be at risk, and;
- Wrington – 125-150 properties predicted to be at risk.

Locally Agreed Surface Water Information

The Environment Agency is currently in the process of updating their national surface water flood map ('updated Flood Map for Surface Water'). It is anticipated that this updated map will provide a more robust prediction of areas vulnerable to surface water flooding due to improvements in the hydrology, representations of the urban drainage network and the Digital Terrain Model (DTM). The new mapping was published in December 2013 during the public consultation on the LFRMS. NSC will work with Risk Management Authorities to assess whether the 'Locally Agreed Surface Water Information' should be updated to reflect this new mapping, and any changes will be incorporated in the update to the LFRMS in 2017.

The LFRMS risk assessment uses the Flood Map for Surface Water as a surrogate for surface water and ordinary watercourse flooding to identify high risk areas

[12] This equates to an annual probability of occurring in any given year of 3.33%

3.2.2 Flooding from groundwater

Current understanding of groundwater flooding is very limited due to the complexities of representing the flow and emergence of groundwater. Existing approaches have tended to focus on the **susceptibility** of areas to groundwater flooding.

The Environment Agency has produced a groundwater susceptibility map (see Appendix B), known as the 'Areas Susceptible to Groundwater Flooding map', which identifies vulnerability to groundwater flooding on a 1km square grid. It must be noted that this map should only be used to identify broad areas, rather than individual properties, which are vulnerable to groundwater flooding and hence may need further investigation. Based on this analysis locations which may be vulnerable to groundwater flooding include:

- Claverham;
- Langford and Lower Langford;
- North of Junction 19 (M5) near Portbury Royal Docks;
- Portishead east of the A369, and;
- Winscombe.

Due to the uncertainties in groundwater mapping it is recommended that the mapping only be used in conjunction with reported evidence of groundwater flooding.

3.2.3 Flood risk from Main Rivers and the Sea

Flooding from Main Rivers and the Sea is managed by the Environment Agency using its permissive powers under the Environment Act 1995. The 'undefended' Environment Agency flood maps indicate large areas of North Somerset being at risk due to flooding from Main Rivers and the Sea. Indeed the PFRA noted that 25% of the total NSC administrative area was considered to be at risk of tidal flooding based on Flood Zone 3[13].

With respect to Main Rivers and the Sea, the communities outlined below are at risk of flooding. In all cases there is likely to be more than one flood source, and close partnership working will be needed.

- Clevedon – large parts of South and Central Clevedon are located within the combined fluvial/tidal Flood Zone 3 due to flood risk from the Land Yeo and Blind Yeo.
- Congresbury – the town suffered severe flooding in 1968 due to overtopping of the Congresbury Yeo. Since then the raised flood defences which are situated along both sides of the river have been greatly improved to manage the risk of overtopping of the river.
- Pill – properties adjacent to the Markham Brook are located within Flood Zone 3.
- Portishead – parts of East Portishead are located within the combined fluvial/tidal Flood Zone 3.

[13] Flood Zone 3 represents the risk of flooding from the Sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year OR flooding from a river that has a 1% (1 in 100) or greater chance of happening each year

- Winford - it should be noted that the Winford Brook becomes a Main River on Church Road and upstream of this it is an ordinary watercourse.

With respect to flooding from the sea, there is an extensive network of tidal defences along the North Somerset coast, which are built to offer protection up to either a 100 year (1% chance of occurring in any given year) or 200 year (0.5% chance of occurring in any given year). Therefore, there is a high current standard of protection along many parts of the coastline. The Environment Agency's draft Severn Estuary Flood Risk Management Strategy[14] provides an overview of the current and future investment needs and proposals for the Severn Estuary.

The Strategy notes several areas where flood risk from the Estuary may affect people, property, infrastructure or agricultural land either now or in the future due to sea level rise associated with climate change. Between Clevedon and Middle Hope the probability of tidal flooding to properties in Kingston Seymour, Wick St. Lawrence, Weston-super-Mare and west Clevedon is currently2% chance of flooding in any year, and some agricultural land can flood on an annual basis. Between Middle Hope and Brean Down some agricultural areas to the north of Weston-super-Mare have a 5% chance of flooding in any year, and there is a risk of flooding east of Sand Bay due to the transient nature of sand dunes in the area.

3.2.4 Flooding due to tide and fluvial 'locking'

Fluvial or tidal 'locking' occurs when high tides or high river levels prevent the free flow discharge from urban drainage systems or cause river systems to back up. This occurs particularly in low-lying areas which are characteristic of the area, and can cause or exacerbate flooding. Indeed in September and November 2012 some parts of North Somerset were severely affected as a result of urban drainage systems being prevented from discharging due to elevated levels in rivers and rhynes.

The Mid and North Somerset Catchment Flood Management Plan[15] specifically identifies tide locking causing potential flood risk in:

- Clevedon from the Blind Yeo tide locking of urban drainage networks;
- Portbury from tide locking of urban drainage networks;
- Portishead from tide locking of urban drainage networks;
- Uphill from the Uphill Great Rhyne, and;
- Weston-super-Mare from tide locking of urban drainage networks.

Furthermore, there is reported evidence of tidal/fluvial locking exacerbating flood risk in the 2012 flooding in Congresbury, Nailsea and Weston-super-Mare.

[14] http://www.severnestuary.net/frms/2013sgas.html

[15] http://www.environment-agency.gov.uk/research/planning/114342.aspx

3.2.5 Flooding from sewerage systems

Flooding from sewerage systems occurs when the capacity of the drainage network is exceeded. This can be due to blockage, failure of equipment or overloading of sewers due to rainfall. Water and sewerage companies are responsible for managing sewerage networks under the Water Industry Act 1991. All water and sewerage companies maintain a register of properties/areas which have experienced flooding from the sewerage system due to lack of capacity in their network; this is known as the DG5 Register[16]. This includes flooding from foul sewers, combined sewers and surface water sewers.

For the LFRMS Wessex Water provided their DG5 Register (correct as of January 2013). This has been used to identify areas where flooding from the sewerage systems is an existing issue. Where local flood risk corresponds to properties on the DG5 Register we can identify potential opportunities for joint working and funding to manage flood risk. The majority of properties on the DG5 Register are in Weston-super-Mare.

3.3 How flood risk may change over time

3.3.1 Climate change

Over the past century around the UK we have seen sea level rise and more of our winter rain falling in intense wet spells. Seasonal rainfall is highly variable. It seems to have decreased in summer and increased in winter, although winter amounts changed little in the last 50 years. Some of the changes might reflect natural variation; however the broad trends are in line with projections from climate models.

Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in the future. Past GHG emissions mean some climate change is inevitable in the next 20-30 years. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080s.

We have enough confidence in large scale climate models to say 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 rain storms may become more intense, even if we can't be sure about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09) are that there could be around three times as many days in winter with heavy rainfall, which is defined as more than 25mm in a day. It is plausible that the amount of rain in extreme storms (those with a 20% annual chance or rarer) could increase locally by 40%.

North Somerset is located in two River Basin Districts, Severn River and South West. As the majority of North Somerset falls within the Severn River Basin District projections for this River Basin District have been used for the LFRMS.

[16] A water company keeps a register of properties that have flooded, where the cause of flooding is deemed to be due to incapacity in the sewer network. This excludes flooding due to blockages, collapses or equipment failure

Key projections for Severn 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 around 12% (very likely to be between 2 and 26%)

Precipitation on the wettest day in winter up by around 9% (very unlikely to be more than 22%)

Relative sea level at Bristol very likely to be up between 10 and 40cm from 1990 levels (not including extra potential rises from polar ice sheet loss)

Peak river flows in a typical catchment likely to increase between 9 and 18%

Increases in rain are projected to be greater at the coast and in the south of the district.

In North Somerset, increased precipitation will increase the risk of inland surface water flooding, which may be exacerbated by blockages in culverts, gutters and drains.

The adaptation sub-committee's progress report[17] identified four key adaptation measures to manage long-term flood risk in a changing climate:

- location and design of new development;
- actions to protect existing properties from flooding;
- measures for managing surface water flows in developed areas [NB: surface water flows will also need to be effectively managed in rural areas to protect properties in rural areas and in downstream developed areas], and;
- emergency planning and response

Table 3-2 identifies example mitigation measures which could be taken for each of the four categories. Example mitigation and adaptation measures have been identified from our Climate Change Adaptation Plan[18].

[17] http://hmccc.s3.amazonaws.com/ASC/2012%20report/CCC_ASC_2012_Spreads.pdf

[18] http://www.n-somerset.gov.uk/NR/rdonlyres/7F5AF047-6054-40A0-9ACA-8285D9657281/0/ClimateChangeAdaptationActionPlanfinal.pdf

Table 3-2: Mitigation measures for adapting to climate change

Category	Example mitigation / adaptation measures
Location and design of new development	• Follow guidelines of National Planning Policy Framework to ensure all sources of flood risk are considered when assessing development sites, and that downstream properties are protected from an increase in flood risk due to development [NB: this is part of policy CS3 of the adopted Core Strategy] • Use climate change maps in determining suitable locations for development [NB: this is part of policy CS3 of the Core Strategy] • Ensure sustainable drainage systems (SUDS) are implemented in new development, using the SUDS Approval Body as the delivery mechanism when established [NB: this is part of policy CS2 of the adopted Core Strategy and we are currently developing local SUDS guidance to support implementation of the SuDS Approval Body]
Actions to protect existing properties from flooding	• Review maintenance regimes for clearance of gullies and amend as necessary • Design green infrastructure provision to reduce surface water runoff [NB: this is part of policy CS9 of the adopted Core Strategy] • Adjust arable farming practices to restrict the rate of surface water runoff (e.g. changing direction of ploughing, reversion to grassland) • Ensure existing buildings are more resilient (e.g. raising plug sockets) • Ensure critical infrastructure have plans in place to deal with flooding if they are at risk [NB: these have been identified during the LFRMS] • Maintain and seek to enhance existing watercourses and overland flow corridors • Minimise future culverting of watercourses and seek to 'daylight' culverts where possible • Identify opportunities to educate individuals and communities about flood risk and to promote
Measures for managing surface water flows in urban [and rural] areas	

	personal response • Promote, and provide grant aid (via the EA) for, community-led property level protection (PLP) schemes
Emergency planning and response	• Continue to encourage uptake of Environment Agency flood warnings • Emergency Management to continue their scheduled review of rest centres to house people in the short-term, although due to the unpredictable nature of flooding the accessibility of any pre-identified rest centre will need to be determined during a flooding incident • Support development and assessment of flood evacuation and shelter plans, early warning and community-led response will be key prior to and during a flooding incident • Raise community awareness of flood risks and actions to take in the event of a flood • Target vulnerable groups and individuals to encourage action [NB: programme already underway with community resilience teams] • Ensure that emergency services have access to the latest flood risk mapping to know vulnerable locations

3.3.2 New Development

Without effective planning policy there is a risk that the increase in hard standing and impermeable surfaces associated with development will increase surface water runoff and hence the risk of flooding. It is imperative that surface runoff and flood risk are fully assessed as part of the development of local planning documents and in determining planning applications to mitigate this risk.

Adopted in April 2012, the Core Strategy[19] is the main planning document for North Somerset. It sets out the objectives and strategic planning policies for North Somerset up to 2026.

The Core Strategy outlines the mitigation measures required to offset the potential impacts of new development. The key policy relating to flood risk management within the Core

[19] http://www.n-somerset.gov.uk/Environment/Planning_policy_and-research/localplanning/Documents/Core%20Strategy/adopted%20core%20strategy%20(pdf).pdf

Strategy is CS3: Environmental impacts and flood risk assessment. This outlines that development which would lead to environmental pollution or harm amenity, health or safety will only be permitted if potentially negative effects would be mitigated to an acceptable level. It states that development will not be permitted in flood zones 2 and 3 of the Environment Agency Flood map unless it complies with the sequential test, and where necessary the exception test as outlined in the National Planning Policy Framework. The policy also refers to the use of the 'climate change additional extents' map produced as part of the North Somerset Strategic Flood Risk Assessment for use in long term planning.

Other policies within the Core Strategy which relate to flood risk management include:

- CS1: Addressing climate change and carbon reduction which includes the principle that "areas will be enhanced to be resilient to the impacts of climate change including flood defence and public realm enhancements"
- CS2: Delivering sustainable design and construction states that when considering proposals for developments the council will "require the application of best practice in Sustainable Drainage Systems to reduce the impact of additional surface water runoff from new developments."
- CS9: Green infrastructure: which seeks to safeguard, improve, enhance the existing network of green infrastructure by 'further provision, linking in to existing provision where appropriate, ensuring it is a multi-functional, accessible network which promotes healthy lifestyles, maintains and improves biodiversity and landscape character and contributes to climate change objectives'.

3.3.3 Asset deterioration

Assets (e.g. watercourses, control structures, pumping stations, culverts, trash screens, gullies) which are not adequately maintained may not function appropriately during times of rainfall and could therefore exacerbate the consequences of flooding. In addition over time the performance of assets may be reduced due to deterioration of such assets.

The Environment Agency, using their permissive powers under the Environment Act (1995)[20], maintain flood defence assets associated with Main Rivers and the Sea using a risk-based approach and depending on availability of funding. The Environment Agency uses an asset management system (AIMS [Asset Information Management System]) to manage the maintenance and condition of assets related to Main Rivers and the Sea. In addition, Wessex Water has an asset management system for their public sewerage network. The North Somerset Levels and Axe and Brue IDBs maintain more than 200 kilometres of watercourses and associated structures in the lower parts of the area. Almost all the 200km is cleaned out annually with the costs being met by direct rates on the property affected. If these important ongoing asset maintenance tasks were not undertaken then existing flood protection standards could deteriorate.

There is significantly less knowledge about the location, ownership and condition of other assets which affect local flood risk. Typically, these might be include culverts on ordinary

[20] http://www.legislation.gov.uk/ukpga/1995/25/contents

watercourses or local drainage ditches. Section 21 of the Flood and Water Management Act has created a duty for us to maintain a register of assets which records the condition, location and ownership of assets with a significant effect on a flood risk. Our approach to better understanding assets which have a significant effect on a flood risk is provided in the action plan of the LFRMS, which is outlined in Section 6.

3.4 Identifying communities most vulnerable to local flooding

Under objective 1 of the LFRMS one of the key activities is to "identify and prioritise areas of locally significant flood risk." This will ensure that we can inform future investigations and investment on the basis of the priority areas across North Somerset and that the limited resources are targeted to the areas of greatest flood risk. In the highest risk communities it is likely that more significant capital investment will be required to manage flood risk, and these highest risk communities will remain our priority.

However, it is important to note that just because a location is classified as lower risk it does not mean we will not consider actions in these areas to mitigate risk. In areas of lower risk smaller scale operational improvements (e.g. highway improvements) and community resilience measures will be preferred measures to manage flood risk. In all locations collaborative approaches with partners and the community will be essential.

3.4.1 Methodology

To identify and prioritise the communities most vulnerable to local flood risk we have defined a methodology which uses the best available historic and predictive data on local flooding. The methodology is based on identifying communities most vulnerable from surface water and ordinary watercourses, although subsequent analysis has been undertaken to assess potential interactions between local flood risk and other sources of flooding, including Main Rivers, the Sea and the urban drainage network. It should be noted that the methodology seeks to identify the locations where the greatest number of properties are at risk of flooding, recognising that internal property flooding will cause the biggest social and economic effects to local communities.

We recognise that flooding of infrastructure will also cause adverse social and economic impacts, and we have considered the risks of flooding to critical infrastructure as part of the LFRMS. Information on roads and other critical infrastructure (e.g. schools) have been passed onto internal partners within NSC, and we are committed to working with internal partners to manage flood risk to people, property and infrastructure.

The methodology to identify the most vulnerable communities is briefly outlined below.

i. Divide the North Somerset administrative area into a 1km grid as the basis for the assessment. We recognise that flooding does not respect such boundaries, but the purpose of splitting the area into a grid is to provide a consistent scale for the analysis at a sufficiently detailed resolution. We explored a number of different spatial scales for this analysis, including parish and ward boundaries. However, the best results were achieved through a 1km grid approach.
ii. Collate and map historic flooding incidents from North Somerset Council, which includes geo-referenced information dating back as far as 1994, although it should be

noted there is greater confidence in more recent data due to more accurate reporting methods.

iii. Count the number of known internal flooding incidents from North Somerset Council within each 1km grid square.

iv. Count the number of 'other'[21] flooding incidents from North Somerset Council within each 1km grid square.

v. Count the number of residential and non-residential properties predicted to be at risk using the 'Locally Agreed Surface Water Information' for a rainfall event with a probability of occurring once every 30 years.

vi. Using the matrix outlined in Table 3-3 calculate a 'risk score' for each 1km grid cell. It should be noted that the matrix has applied a higher weighting to predictive surface water data because at the time of writing the LFRMS we have relatively low confidence in historic data (with the exception of 2012 data). We are continuing to improve the capture of flood incident data and therefore will have improved confidence as we gather data in the event of future flood incidents. In future revisions of the risk assessment methodology this will mean we can apply a higher weighting to recorded flooding incidents. The current weighting applied has been tested to understand the sensitivity of the weighting to the outputs from the risk assessment. It was found that the highest risk communities did not change with different weightings applied.

vii. Identify areas where there may be interactions between local flood risk, and fluvial/tidal/sewerage flooding.

The output from the analysis provides a 'risk score' for each 1km grid cell. Adjacent grid cells which have a high risk score have been clustered together; these will form the communities most vulnerable to local flood risk. For the communities most vulnerable to local flood risk specific action plans have been developed to identify the next steps and actions to mitigate local flooding. The list of communities most vulnerable to local flood risk will be updated as mitigation measures are implemented to manage risk in these locations.

[21] 'Other' flooding incidents includes external flooding to gardens, roads, and where it is unknown whether the flooding was internal or external

Table 3-3: Matrix for risk assessment

Criteria	Weighting	Score				
		1	2	3	4	5
Known internal flooded properties	35%	<2	2-5	5-15	15-25	>25
'Other' historic flooding incidents	15%	<2	2-5	5-15	15-25	>25
No. residential and non-residential properties at risk from SW flooding during 1:30 year rainfall event	50%	<5	5-10	10-25	25-50	>50

3.4.2 Summary of most vulnerable communities

Table 3-4 indicates the communities most vulnerable to local flood risk is based on the methodology described in Section 3.4.1. A map of these communities is available in Appendix B. The table summarises the numbers of properties which have experienced flooding based on the our historic flood database and the numbers of properties predicted to be at risk based on surface water mapping, alongside a summary of the key sources of flooding within these communities.

It should be noted that Weston-super-Mare (WsM) has been considered as a single community for the LFRMS to align with the SWMP undertaken for the town. However, the LFRMS has identified two specific parts of WsM which are most vulnerable to local flood risk: 1) Milton Hill and Worle, and 2) Central and West WsM.

Table 3-4: Summary of most vulnerable communities (= one of top 5 communities)*

Location	Known internal flooded properties	Other historic flooding incidents	No. residential and non-residential properties at risk from SW flooding during 1:30 year rainfall event	Surface runoff	Fluvial	Ground water	Highway	Sewerage	Fluvial / tide locking	Other
Backwell	0-5	5-10	80-90	☐			☐			
Churchill	5-10	5-10	40-50	☐	☐	☐	☐	☐		Blockages
Claverham*	10-20	10-20	60-70	☐		☐	☐	☐		
Clevedon East	10-20	5-10	10-20			☐	☐	☐	☐	
Congresbury	20-30	5-10	10-20	☐	☐	☐	☐		☐	Blockages
Hutton	5-10	5-10	10-20		☐	☐		☐		
Langford	15-20	15-20	20-30	☐	☐	☐	☐	☐		
Long Ashton	0-5	10-15	110-120		☐		☐	☐		
Nailsea*	10-20	50-60	100-110	☐		☐	☐	☐	☐	Blockages
Pill	0-5	0-5	60-70	☐	☐		☐	☐		
Portbury	0-5	0-5	30-40	☐	☐		☐		☐	
Winscombe*	10-20	5-10	60-70	☐	☐	☐	☐	☐	☐	Blockages

Wrington*	80-90	140-150	120-130	☐	☐		☐	☐	☐	
WSM*	20-30	70-80	210-220	☐		☐	☐	☐	☐	

4 Managing local flood risk

4.1 Overview of approach

There are a range of measures which can be taken to manage local flood risk. The purpose of this section is to provide a broad overview of the measures we propose to take to manage local flood risk.

Table 4-1 outlines the range of measures and actions we have taken since we became an LLFA under the Flood and Water Management Act 2010. Table 4-2 considers the measures we propose to take across the North Somerset administrative area through the LFRMS to achieve the objectives set out in Section 2.2.

In addition Table 4-3 summarises the types of measures which can be taken in the communities most vulnerable to local flood risk.

It is important to note that the delivery of the proposed measures will be dependent upon the availability of funding, and will be undertaken over the long term rather than immediately. A phased approach will be required, particularly with respect to capital investment measures. The LFRMS action plan in Section 6 provides further consideration of the timetable, responsibilities and funding to deliver these measures.

4.2 Measures in place to manage local flood risk

Table 4-1: Measures already in place to manage local flood risk

Strategic objective	Type of measure	Description of measures already in place
Strategic objective 1: Improve our understanding of flood and coastal erosion risks in North Somerset	Capital	We have undertaken a risk assessment to identify the 15 communities most vulnerable to local flood risk in North Somerset
	Capital	We have developed a prioritisation matrix for highways schemes to manage drainage and flood risk from highways. This will be used to drive investment in highways
	Operational	We have developed an asset register to record the location, condition and ownership of key assets in North Somerset, and will be further developing this asset register ('asset register plus')
Strategic objective 2: Develop plans and policies to manage these risks sustainably	Capital	For the most vulnerable communities we have developed action plans to identify what actions should be taken to manage local flood risk (see Section 6). Furthermore we have developed a Surface Water Management Plan for Weston-super-Mare
	Capital	We have developed a clear action plan to identify all actions we propose to take across North Somerset to manage local flood risk (see Section 6)
	Capital	We have developed a funding strategy and funding guidance that identifies the primary sources of local flood risk management funding. The strategy also identifies how to maximise other non-flood related outputs to secure

		contributions from other secondary sources of funding (see Section 5)
	Policy	We have developed a Strategic Environmental Assessment which considers the environmental benefits associated with actions in the LFRMS and identifies environmental enhancement opportunities
	Policy	We have ensured that the LFRMS is consistent with the National Flood and Coastal Erosion Risk Management Strategy
Strategic objective 3. Work in partnership with other flood risk management authorities and lead by example	Policy	We have established a Strategic Flood Management Board and North Somerset Operational Group which include representatives from all Risk Management Authorities
	Policy	We have established mechanisms to share data between Risk Management Authorities which will be enhanced through the development of the 'asset register plus'
	Policy	We are engaging with neighbouring risk management authorities through the West of England partnership and South West Flood Risk Managers Group
	Policy	We have been working closely with our internal partners to share information, establish common investment needs and manage flood risk more effectively
	Operational	We have improved our procedures for capturing recorded flood incident data
Strategic objective 5: Avoid inappropriate development in areas of flood and coastal erosion risk,	Operational	We have engaged with development management services during the development of the LFRMS to ensure consistency with spatial planning and transfer of information

and ensure that development does not increase risks elsewhere	Operational	We have provided up to date surface water mapping information to assist development management services in 'plan-making' and 'decision-taking'
Strategic objective 6: Increase public awareness of flooding and promote individual and community level flood resilience	Capital	We have undertaken a community resilience pilot in Congresbury, which has now been extended across North Somerset's administrative area[22]
	Operational	We have improved the flood content on our website which enables communities to better access information about flood risk management

4.3 Measures we propose to take to manage local flood risk

Table 4-2: Measures we propose to take to manage local flood risk

Strategic objective	Type of measure	Description of measure/s	Consideration in LFRMS
Strategic objective 1: Improve our understanding of flood and coastal	Operational	We will establish an enhanced asset register ('asset register plus') to improve our understanding and management of	Section 6.1.1

[22] Following completion of a successful pilot in 2012, the Community Resilience North Somerset programme has been rolled out across the Local Authority and is now being taken forward in more than 20 communities. As of May 2014 the network is moving towards charitable status with a Memorandum of Understanding demonstrating the long term relationship with North Somerset Council.

erosion risks in North Somerset		assets which have a significant impact on local flood risk	
	Operational	We will develop protocols for the reporting and investigation of flooding incidents and will ensure that flood incidents are investigated in accordance with our statutory duties	Section 6.1.2
	Operational	We will develop protocols for designating structures or features and propose to designate key structures or features	Section 6.1.3
	Operational	We will work closely with parish councils to collate historic flood incident data, which will be used to update the vulnerable communities' assessment. We will establish a mechanism to enable improved transfer of information from parish councils to NSC in the event of future flooding incidents	Section 6.1.4
	Operational	We will work with Community Resilience groups across North Somerset to build communities which can be more resilient to flooding. Recognising that resources are limited we will prioritise community resilience to flooding in those communities which are identified in this Strategy as being most vulnerable to flood risk.	Section 6.1.5
	Operational	We will develop protocols for the consenting and enforcement of ordinary watercourses	Section 6.1.6
	Policy	We will improve our understanding of future flood risk due to climate change	Section 6.1.14

Strategic objective 2: Develop plans and policies to manage these risks sustainably	Operational	We will develop an two-yearly implementation plan which sets out progress against the objectives of the LFRMS and the works programmed over the next two year period	Section 6.1.7
Strategic objective 3. Work in partnership with other flood risk management authorities and lead by example	Policy	We will continue to work in partnership with Risk Management Authorities through the SFMB and Operational Group	Appendix C and Section 6.1.8
Strategic objective 4: Maintain and improve flood and coastal erosion risk management infrastructure and systems	Operational	We will operate and maintain the tidal flood defences where we are the operating authority, in partnership with the Environment Agency.	Section 6.1.9
	Operational	We will develop a risk-based approach to the maintenance of our assets in the highest risk locations, using our 'asset register plus' as the platform to accomplish this	Section 6.1.10
	Policy	We will encourage and promote investment in drainage and flood risk management infrastructure which achieves multiple benefits (e.g. green infrastructure)	Section 6.1.11
Strategic objective 5: Avoid inappropriate development in areas of flood and coastal erosion risk, and ensure that development does not increase flood risk elsewhere	Operational	We will develop our SUDS Approval Body protocols in time for commencement of Schedule 3 of the FWMA	Section 6.1.12
	Policy	We will develop local SUDS guidance to set out our vision to the design of SUDS in North Somerset	
	Operational	We will continue to improve linkages with development management services to inform decisions on planning	Section 6.1.13

		applications	
Strategic objective 6: Increase public awareness of flooding and promote individual and community level flood resilience	Operational	We will publish up to date surface water mapping to raise awareness of surface water flood risk, working closely with the Environment Agency	Section 6.1.15
	Operational	We will develop an information brochure to raise awareness for residents on how to prepare for a flood and what to do in the event of a flood in consultation with all partners	Section 6.1.16

4.4 Measures proposed in communities most vulnerable to flooding

Table 4-3 summarises the types of measures that can be taken to mitigate flood risk in local areas. The measures are broken down into broad themes:

- **Investigations** aim to better understand the cause of flooding to improve the confidence in decision-making
- **Source control measures** for surface water flooding normally aim to reduce flooding by increasing storage of flood water, reducing the rate of runoff or increasing the volume of water which soaks into the ground. Sustainable Drainage Systems (SUDS) are often an effective means to implement source control. SUDS encompass a variety of measures such as permeable paving which allows more water to soak into the ground than traditional impermeable road and path surfaces. Other SUDS measures may include introducing ponds and wetlands that can hold flood water, or swales and detention basins which slow the movement of water and reduce the volume of runoff. Source control measures can also integrate with re-use of water through grey-water recycling or rainwater harvesting.
- **Pathway measures** aim to manage the movement of flood water through both natural and manmade drainage systems. Measures may be structural, for example involving the development of new drainage systems, or separating foul and surface water sewers, or may be non-structural for example encouraging land management practices which reduce runoff. We recognise that maintenance of our existing drainage infrastructure will be an important aspect to managing flood risk; it can reduce flood risk with minimal capital investment, freeing up funds for measures elsewhere.
- **Receptor-level measures** aim to reduce the likelihood but more often the impact of flooding on people, property and environment. We will work with our partners to increase awareness of flood risk so that individuals and communities understand the flood risks they face and the ways in which they can help to manage that risk. We will help people to understand how they can become more resilient to flooding. This will better equip people to take measures to prevent flood water entering their properties, and recover if they are affected by flooding.

The Action Plan in Section 6 considers which of these measures will be applicable in each of the communities most vulnerable to local flooding.

Table 4-3: Types of measures that can be taken to manage flood risk in vulnerable communities

Theme	ID	Capital / Operational / Policy	Type of measure
Investigation	I-1	Capital	Study (e.g. SWMP) or investigation (e.g. site walkover)
Investigation	I-2	Capital	Survey / Modelling
Source	S-1	Capital	Retrofit SUDS measures / Green Infrastructure / Rainwater Harvesting
Source	S-2	Capital	Land management practices
Source	S-3	Capital	Intercept and divert pluvial runoff
Pathway	P-1	Capital	Storage above or below ground
Pathway	P-2	Capital	Manage exceedance flows (e.g. re-profiling road)
Pathway	P-3	Capital	Increase capacity of urban drainage network (sewer or highway drainage)
Pathway	P-4	Capital	Increase capacity of drains/watercourses
Pathway	P-5	Capital	Raise/create flood defences
Pathway	P-6	Capital	Daylight culverted watercourses
Pathway	P-7	Operational	Enhance maintenance of gullies / drainage network

Pathway	P-8	Operational	Enhance maintenance of watercourses/culverts
Pathway	P-9	Capital	Separate foul and surface water sewer systems
Receptor	R-1	Capital	Individual property level protection
Receptor	R-2	Policy	Improve flood warning
Receptor	R-3	Policy	Planning policies to influence development
Receptor	R-4	Policy	Raise awareness and education
Receptor	R-5	Capital / Operational	Community level resilience

5 Funding Strategy

5.1 Introduction

Successful delivery of local flood risk management measures will require innovative ways of working and funding, based on teamwork and trust. Collaborative working and joint funding across partner organisations will be key to maximising the return on investment in flood risk management. Defra's introduction in 2011 of the partnership funding approach means that the ability of LLFAs to leverage both financial and in kind contributions from local partners could make the difference between locally important projects going ahead or not. Successful fundraising is dependent on relationships, timing and effort. Understanding what types of outputs and outcomes are needed to qualify for various funding sources is critical in order to persuade potential funders to commit to a project. The qualifying benefits for dedicated flood risk funding sources are typically well understood, but it may also be possible, with slight modifications or additions to a flood risk project or even just a different way of 'selling' the benefits, to meet the requirements of funders outside the flood risk industry and access additional funding in this way.

Whilst it may be possible to fully fund some projects using only the mainstream dedicated flood risk funding sources such as Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA), the majority are likely to require supplementary funding from a range of sources to make up the total sum needed. Some projects may attract only limited funding of any kind and it is important that fundraising opportunities are maximised for more 'attractive' projects.

Appendix D of this document contains an overview of the funding sources considered most likely to be suitable for local flood risk management measures. In addition, Defra has published a guide to "Partnership funding and collaborative delivery of local flood risk management"[23], intended to promote successful collaboration and partnership funding. There are a wide range of potential alternative sources of funding, and the suitability of these for individual projects will depend on a number of factors:

- Total sum required (funding gap)
- Total fund available
- Effort / investment required (number of applications, match funding, etc)
- Qualifying benefits (outputs/outcomes) required
- Frequency of availability (e.g. annual)
- Longevity
- Level of competition

[23] http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=17085

It is important to strike a balance between spreading the fundraising risk over a range of funders and fund types without burdening individual projects with numerous funders all requiring updates and reports, i.e. proportionality of investment versus return.

5.2 Strategic funding approach

For measures proposed under North Somerset Council's LFRMS we anticipate that the majority of funding will come from dedicated flood risk management sources and other local authority based funding sources, supplemented by contributions from appropriate alternative sources wherever sufficient qualifying outputs/outcomes are identified. In addition, the North Somerset Levels IDB and Axe and Brue IDB between them maintain more than 200 kilometres of watercourses and associated structures in the lower parts of the area, the cost of which is met by direct rates on those affected.

It is likely that the most appropriate funding mix for most local flood risk projects will take in a cross section of the funding sources outlined in Appendix D. However, at a time of significant austerity across the whole of the public sector, expectations as to the level of available funding need to be carefully managed.

We will seek to secure dedicated flood risk funding first from FCRM GiA and Local Levy, supplemented by LLFA, local authority and/or development-related sources depending on local circumstances. We will use Defra's Partnership Funding Calculator to estimate in advance the amount of FCRM GiA a project may qualify for, and thus determine the likely size of the funding gap. Since one of the factors affecting FCRM GiA eligibility is the amount of other contributions obtained, we will engage as early as possible with the local community in the development of flood risk management proposals in order to establish an understanding of the likely availability of local contributions. Once the funding gap left by the main dedicated flood risk funding sources has been established, projects will be individually assessed according to how they meet a range of funders' requirements and this assessment will be used to determine the best approach for making up the shortfall. As individual schemes are progressed fundraising should be considered as an integral part of project development, assuming a need for some form of third party funding has been identified. Annual business planning cycles will allow work programs to be drawn up within the available budgets.

5.3 Individual project funding

There are many contributing factors that will lead to the delivery of successful fundraising action plans for flood risk management projects, but the three main areas are:

- partnership working, to identify opportunities and to share knowledge;
- early planning to ensure that deadlines are not missed and that projects are designed with the funder's requirements in mind; and,

- the development of a sound business case for support, including benefits to local businesses and communities that go beyond those specific to flood risk management.

As proposed measures are developed in detail we will work with our partners on the SFMB and Operational Group and with the project-specific delivery teams as appropriate to explore the costs and benefits and determine how they can best be packaged up to attract the necessary financial support.

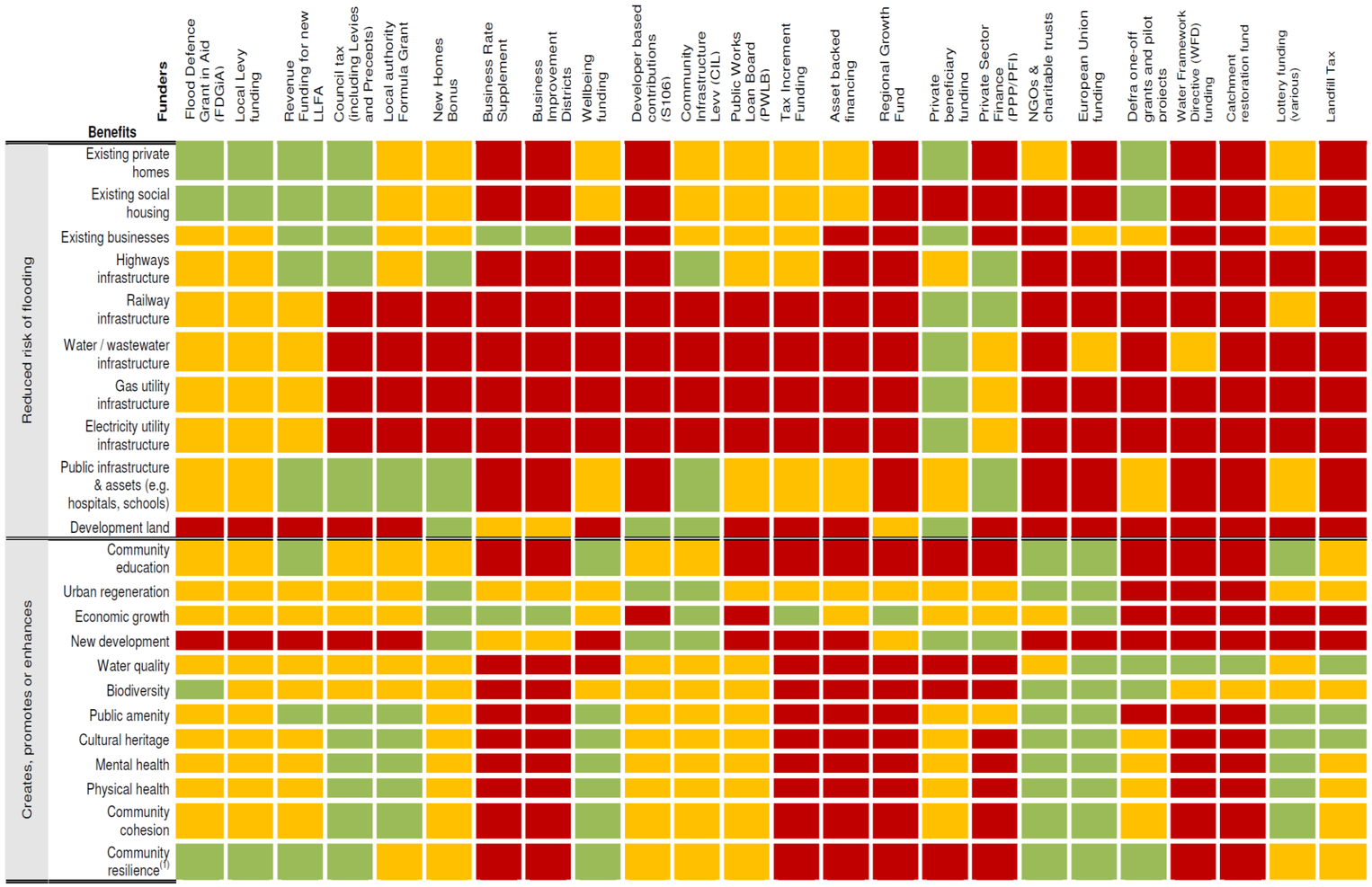
The matrix of funding sources and benefits in Figure 5-1 is designed to help with the initial identification of those funding sources most likely to be suitable based on the anticipated outcomes and outputs of a measure. The top section focuses on the primary benefit of flood risk management measures (i.e. to reduce the risk of flooding to various types of receptor), whilst the bottom section focuses on opportunities to create, promote or enhance 'other' benefits**.** To use the matrix select the receptor(s) that will benefit from a reduction in flood risk as a result of the measure under consideration and read along the row to identify the funding sources with the highest potential. Next, read down the funding source column to identify other outputs and outcomes which could increase the likelihood of accessing this funding source. For example, it is unlikely that European Union funding could be secured for a flood risk scheme in isolation. However if there was a flood risk scheme which was fully integrated with regeneration and community education, for example, these additional benefits could be brought to the fore to maximise the likelihood of securing European Union funding.

To secure funding from sources which are not primarily dedicated to flood risk management will require Risk Management Authorities to consider 'other' benefits early on in the development of a scheme to ensure they are fully integrated. It will also require Risk Management Authorities to appropriately demonstrate these 'other' benefits when submitting funding applications

The matrix in Figure 5-1is intended as an initial guide to help direct fundraising efforts. If project or area specific knowledge suggests a funding source may have greater or lesser potential than is suggested by this matrix then such evidence should take precedence.

5.4 Review

This funding strategy will be realigned against the LFRMS objectives and action plan during the development of the two-yearly implementation plan, and the suggested funding mix is not set in stone. The funding strategy is likely to need adjusting over time to take advantage of new opportunities; building on strong/successful areas and or to re-evaluate in light of changes to the availability of different funding sources. We must be flexible to enable us to respond to funding opportunities which may arise over the next 10 years.



Note: This matrix is intended as an initial guide to help direct fundraising efforts. If project- or area- specific knowledge suggests a funding source may have greater or lesser potential than is suggested by this matrix then such evidence should take precedence.

(1) *Refers to 'soft' measures which improve a community's ability to respond and recover effectively; for example community flood plans, flood wardens, etc. Structural resilience measures such as individual property protection are included in reduced flood risk to existing homes

Figure 5-1: Funding sources and beneficiaries

6 Action Plan

The purpose of the action plan is to set the timescales and responsibility for the suite of measures identified that we propose to take across North Somerset and in specific communities to manage the risk of flooding. It should be recognised that whilst the action plan sets the framework for how we will manage local flood risk over the next 10 years there will inevitably be legislative, regulatory and financial changes over this period which could affect how we manage local flood risk. Therefore, we will need to maintain some flexibility during the delivery period of the LFRMS to allow for such changes. To this end we will develop a 'rolling' two-yearly implementation plan which is reviewed on an annual basis, which will:

- assess progress against the LFRMS objectives;
- identify whether measures have been delivered in accordance with the action plan;
- assess whether there have been any material changes which impact upon the LFRMS (e.g. funding opportunity or regulatory changes) and in particular the risk prioritisation, and;
- set the priorities and measures for the next two year period.

6.1 Action plan for over-arching measures

Table 6-1 illustrates the measures we propose to take across North Somerset over the next 10 years to manage local flood risk.

More detail on each of these measures is presented in Sections 6.1.1 to 6.1.16.

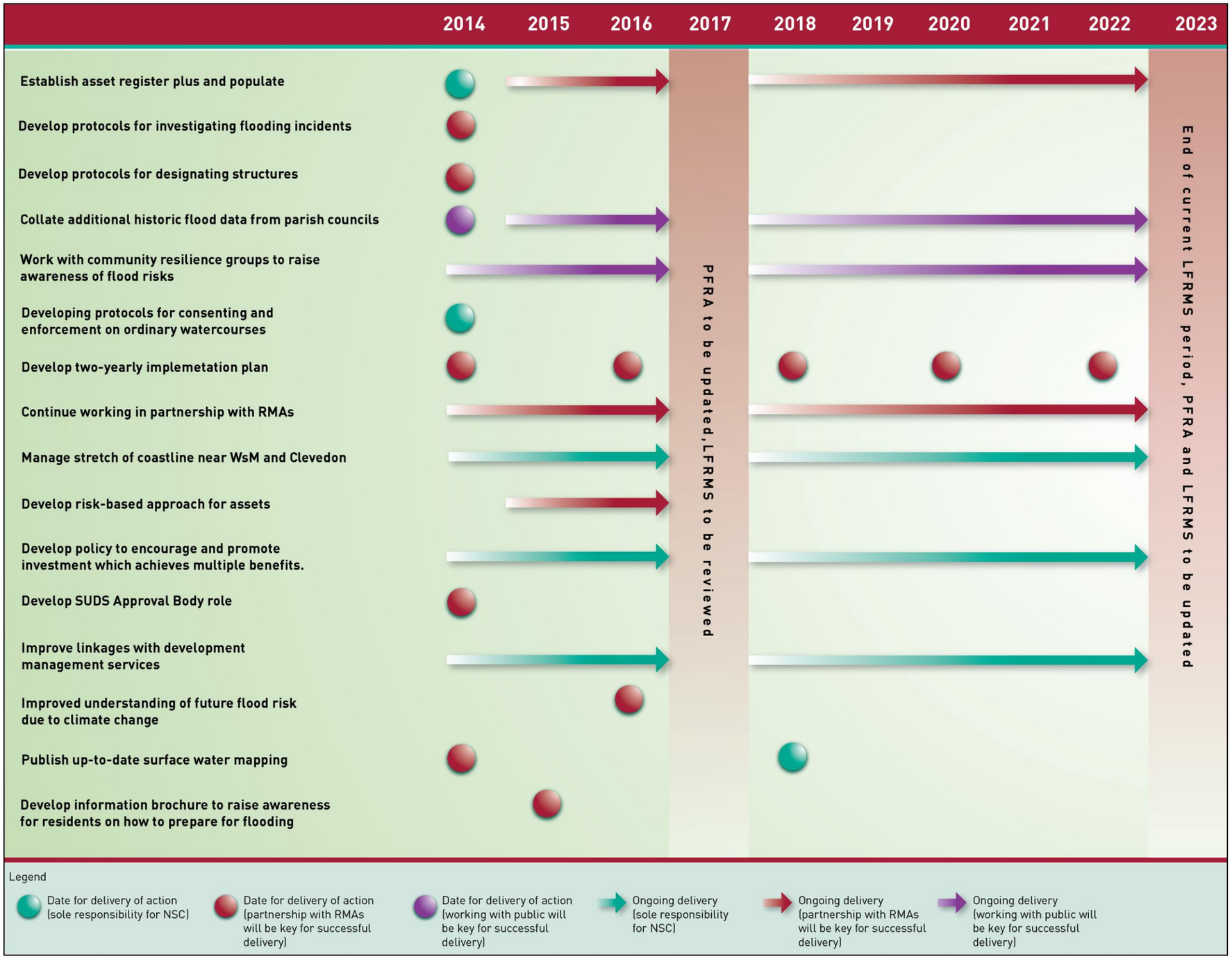


Figure 6-1: Summary of over-arching measures we propose to take across North Somerset

Table 6-1: Overview of how measures will be funded, assessed and who is responsible for delivery

Section No.	Measure	Who is responsible for delivery	How will the measures be paid for	When will the measures be implemented	How and when will we measure success
6.1.1	Establish Asset Register Plus	North Somerset Council, in partnership with Risk Management Authorities	Through NSC officer time, currently funded through Revenue funding from Defra	The asset register plus will be in place by December 2014. Populating the Asset Register Plus with additional data will be undertaken on an ongoing basis using a risk-based approach.	Development of 'Asset Register Plus' by December 2014, with evidence of additional data being incorporated year on year.
6.1.2	Develop protocol for investigating flooding incidents	North Somerset Council, in partnership with Risk Management Authorities	Through NSC officer time, currently funded through Revenue funding from Defra	The protocol will be produced in 2014, ready for publication by December 2014.	Development of the protocol by December 2014, and an ongoing assessment of whether the protocol is followed by Risk Management Authorities.
6.1.3	Develop protocol for designating structures	North Somerset Council, in partnership with the Environment Agency and Internal Drainage Boards	Through NSC officer time, currently funded through Revenue funding from Defra	The protocol will be produced in 2014, ready for publication by the commencement of the SUDS Approval Body role (date uncertain).	Development of the protocol by the end of 2014, and an ongoing assessment of whether the protocol is followed by designating authorities
6.1.4	Collate historic flood data from parish councils	North Somerset Council, in partnership with parish councils	Through NSC officer time, currently funded through Revenue funding from Defra	Initial work with the parish councils to collate existing flood information will be undertaken during 2014, after which we will need to continue to work closely with parish councils on an ongoing basis	Additional data collated from parish councils by December 2014 and ongoing data sharing in the event of future flooding incidents.
6.1.5	Work with community resilience groups to raise awareness of flood risk	North Somerset Council, in partnership with local community resilience groups	Through NSC officer time, currently funded through Revenue funding from Defra	Community resilience groups have been, and continue to be established. The flood risk management team will provide ongoing advice to community resilience groups, focusing on those communities which are most vulnerable to flood risk	Increased awareness and community led planning of how to prepare for, and respond during, a flood. Success will be measured by the Emergency Management Unit within NSC who are leading on this work
6.1.6	Develop protocol for consenting and enforcement on ordinary watercourses	North Somerset Council	Through NSC officer time, currently funded through Revenue funding from Defra	The protocol will be developed and in place by the end of 2014	Protocol in place by the end of 2014.
6.1.7	Develop two-yearly implementation plan	North Somerset Council	Through NSC officer time, currently funded through Revenue funding from Defra	On a two-yearly basis, with the first implementation plan to be published in 2014.	Publication of an implementation plan on a two-yearly basis
6.1.8	Continue working with RMAs through SFMB and Operational Group	North Somerset Council, in partnership with Risk Management Authorities	Through NSC officer time, currently funded through Revenue funding from Defra	The measure will need to be implemented on an ongoing basis	Continuation of the SFMB and Operational Group. The frequency of meetings will be reviewed on a two-yearly basis in conjunction with the update of the

					implementation plan.
6.1.9	Manage stretch of coastline near Weston-super-Mare and Clevedon	North Somerset Council	Operation and maintenance of tide gates, walls and associated drains/interceptors as well as beach levels forming the sea defence are currently funded through Development and Environment revenue funding, although an EA grant has been sought for beach management.	The measure will need to be implemented on an ongoing basis	Ongoing maintenance and operation of the sea defences within NSC's responsibility
6.1.10	Develop risk-based approach for maintaining assets	North Somerset Council	The development of the risk-based approach will be funded through NSC officer time, currently funded through Revenue funding from Defra. Funding for ongoing maintenance has yet to be confirmed.	The risk-based approach will be developed during 2015 and 2016, once the Asset Register Plus is in place.	Development of a risk-based approach by end 2016.
6.1.11	Encourage and promote investment in flood risk management and activities which have multiple benefits'	North Somerset Council	Through NSC officer time, currently funded through Revenue funding from Defra	The measure will need to be implemented on an ongoing basis	Ongoing analysis to identify whether drainage and flood risk management infrastructure is being designed to achieve multiple benefits
6.1.12	Develop SUDS Approval Body role	North Somerset Council, in partnership with Risk Management Authorities and West of England Partnership	Initial work will be paid for through NSC officer time, currently funded through Revenue funding from Defra. Government has stated that the ongoing costs of the SUDS Approval Body role (once implemented) will be cost neutral	We will deliver the measures in readiness for the commencement date of the SUDS Approval Body role, which is anticipated to commence in2014	Procedures, processes, local guidance and resources in place in a timely manner for the commencement of the SUDS Approval Body role.
6.1.13	Improve linkages with development management services	North Somerset Council	Through NSC (flood manager) officer time, currently funded through Revenue funding from Defra and D&E revenue for DM staff	This is an ongoing measure, and we will continue to work in collaboration with development management services	Ongoing analysis to assess flood risk information being included in planning conditions
6.1.14	Improve understanding of future flood risk due to climate change	North Somerset Council in partnership with the Environment Agency	Through NSC officer time, currently funded through Revenue funding from Defra	The work will be undertaken in 2016 to inform an update of the LFRMS and PFRA in 2017	Improved understanding of how future increases in precipitation may affect surface water, groundwater and ordinary watercourse flood risk to communities
6.1.15	Publish up to date surface water mapping	North Somerset Council in partnership with the	Through NSC officer time, currently funded through	Surface water mapping to be published online by December 2014 at the latest	Publication of surface water mapping online by December 2014, with an update programmed in December 2018 should

		Environment Agency	Revenue funding from Defra		improved data become available (e.g. through additional surface water mapping studies).
6.1.16	Develop information brochure to raise awareness of flooding	North Somerset Council	Through NSC officer time, currently funded through Revenue funding from Defra	Information brochure to be published by December 2015.	Publication of a web-based and hard copy information brochure by December 2015.

6.1.1 Establish Asset Register Plus

We have currently developed an asset register which meets the statutory duty under Section 21 of the Flood and Water Management Act. However, the asset register in its present form is an interim step towards a more comprehensive interactive system under development at present ('Asset Register Plus'). It is our intention that the more comprehensive system will be available to partners, stakeholders and the public to view via our website in due course. Once in place, we will work with Risk Management Authorities to gather additional data on assets. Additional data will be gathered using a risk-based approach, focusing on the most vulnerable communities identified in the LFRMS. In addition, during routine maintenance activities operatives will be instructed to gather further asset information on structures so as to continually improve and expand the asset register.

Over time the improved information being collected in the asset register plus will inform the development of a more targeted maintenance regime to better direct available funding towards the most critical areas. A key part of this approach will be to work with the community resilience network to ensure local knowledge is fully taken into account.

6.1.2 Develop protocol for investigating flooding incidents

Section 19 of the Flood and Water Management Act places a statutory duty for us as an LLFA to take a lead role in ensuring that flooding incidents are investigated and reported by the relevant Risk Management Authority "to the extent it considers it necessary or appropriate". Under our leadership role we will develop a protocol in partnership with the relevant Risk Management Authorities which will clearly outline how we propose to approach investigating flood incidents. The purpose of the protocol will be to ensure clarity and consistency for NSC and Risk Management Authorities following flooding incidents. The protocol will consider:

- the circumstances and process for determining whether a Section 19 Investigation will be undertaken;
- how investigations should be undertaken, including engagement with Risk Management Authorities and affected communities;
- who will be responsible for undertaking investigations, depending on which organisation has relevant risk management functions;
- how information will be shared and communicated between Risk Management Authorities following a flooding incident, and;
- the programme for completing and publishing investigations.

6.1.3 Develop protocol for designating structures

Schedule 1 of the Flood and Water Management Act gives NSC, the Environment Agency and Internal Drainage Boards the power to designate structures or features which have an effect on flood risk. The effect of a designation is that the relevant structure or feature cannot be altered, removed or replaced without the consent of the 'designating authority'. To ensure a consistent approach is adopted across North Somerset we will develop a collaborative protocol with the Environment Agency and Internal Drainage Boards. The protocol will set

out how designating authorities should identify structures or features to be designated, and the process to designate a structure or feature.

6.1.4 Collate historic flood data from parish councils

During the development of the Preliminary Flood Risk Assessment (PFRA) and following the 2012 flooding event across North Somerset, we collected a wealth of information on flooded locations in partnership with parish councils. We recognise that there may still be data gaps and it is vital to ensure that the information we hold on historic flooding is as comprehensive as possible. Therefore, we will continue to liaise with parish councils and Community Resilience groups to identify any additional flood incident data from 2012 and preceding flooding incidents. Furthermore, we will also work with parish councils to establish mechanisms to facilitate data sharing in the event of future flooding.

6.1.5 Work with community resilience groups to raise awareness of flood risks

The community resilience network in North Somerset aims to build strong resilient communities, prepared to deal with any emergency using local resources and trained volunteers. This includes making local communities more resilient to flooding incidents, through:

- awareness and information sharing – establish and promote links with local communities through which information about local flood risk can be shared;
- education and training – encourage individuals and local communities to sign up to flood warning systems where available, and;
- community resilience and Integrated Emergency Management (IEM) – support communities to become more resilient and self-sufficient to the risks of flooding

We will work with Community Resilience groups across North Somerset to build communities which can be more resilient to flooding. Recognising that resources are limited we will prioritise community resilience to flooding in those communities which are identified in this Strategy as being most vulnerable to flood risk.

6.1.6 Develop protocol for consenting and enforcement on ordinary watercourses

Under Schedule 2 of the Flood and Water Management Act 2010 we have a duty to consent works and a power to undertake enforcement on ordinary watercourses under changes to the Land Drainage Act 1991 (sections 23, 24 and 25). The duty to consent enables us to approve or reject applications to do works on ordinary watercourses depending on the impact of the proposed works on flood risk. We will develop a protocol for consenting and enforcement works on ordinary watercourses to ensure consistency and transparency.

6.1.7 Develop two-yearly implementation plan

The LFRMS seeks to set the vision and framework for managing local flooding in North Somerset over the next ten years. It sets the strategic priorities and measures we propose to take in partnership with others. However, it is recognised that we need to maintain some flexibility in the delivery of local flood risk management to respond to legislative, financial or

environmental changes, for example. Therefore, we will develop a rolling two-yearly implementation plan which will be reviewed and updated on an annual basis. The implementation plan will assess progress made to date against the measures outlined in the LFRMS, and the measures to be taken in the forthcoming two year period. It will also identify specific funding changes/opportunities. The implementation plan will be subject to internal scrutiny, and will be the primary mechanism for ensuring we are delivering the objectives and measures in the LFRMS.

6.1.8 Continue working with RMAs through the SFMB

We have formed a core working partnership with Risk Management Authorities which also includes the Executive Elected Member with responsibility for flood and coastal erosion risk. This partnership was established primarily for the development of the Weston-super-Mare Surface Water Management Plan, but has since been more formally designated as North Somerset's Strategic Flood Management Board (SFMB). The SFMB meets quarterly as a minimum to develop flood management strategies, share information and discuss progress with on-going flood risk management activities.

In addition, we have formed an Operational Group, which has a stronger focus on operational and 'on the ground' issues. The Operational Group focuses on: local priorities for flood risk; monitoring the operation of critical infrastructure and maintenance; raising relevant items for the SFMB to discuss, and; assisting the SFMB in the development and implementation of strategies. We will continue to work with Risk Management Authorities through the SFMB and Operational Group to ensure a coordinated approach is adopted across North Somerset.

In particular we will continue to work with Bristol City Council and the Environment Agency to produce a Flood Risk Management Plan (FRMP) for the Bristol Flood Risk Assessment and all other parts of the NSC area.

6.1.9 Manage stretch of coastline near Weston-super-Mare and Clevedon

We act as the operating authority for managing a limited stretch of tidal flood defences. This includes tidal flood defence assets at Weston-super-Mare and Clevedon. We will operate and maintain the tidal flood defences where we are the operating authority, in partnership with the Environment Agency.

In addition, as a maritime authority we have responsibility to manage the risk of coastal erosion along the stretch of shoreline within our area. To ensure that this is done in a coordinated way we work closely with the Environment Agency, who have the national overview through their Coastal Monitoring programme. The Environment Agency and NSC are both core members of the Shoreline Management Group, which produces Shoreline Management Plans.

6.1.10 Develop risk-based approach for maintaining assets

We will use the Asset Register Plus, once implemented, to develop a risk-based approach for maintaining assets which have a critical effect on local flood risk (e.g. flood defence structures, culverts, channels). The risk-based approach will seek to identify the assets

whose performance will most significantly affect flood risk (e.g. where blockages to a culvert would cause property flooding). We will need to prioritise our maintenance programme for assets due to the availability of funding. Furthermore, because many assets are on third party land we will need to work with landowners to ensure they maintain their assets appropriately. The output of this work will be a prioritised list of assets and a proposed maintenance schedule. We will work closely with the community resilience network, riparian owners and other risk management authorities to ensure that the maintenance regime is targeted and cost-effective.

6.1.11 Encourage and promote investment in flood risk management activities which have multiple benefits

Historically, drainage and flood risk management infrastructure have been designed and implemented with limited focus on potential amenity, biodiversity or water quality benefits. Working with our highways, public open spaces, and leisure teams internally, as well as with Risk Management Authorities through the Operational Group, we will encourage and promote investment in drainage and flood risk management which integrates multiple benefits into design and implementation. For example, through implementation of green infrastructure in developed areas which capture surface water at source, thereby reducing flood risk, but which also provide significant opportunities to improve amenity, and to create habitat and biodiversity within developed areas.

6.1.12 Develop SUDS Approval Body role

Under Schedule 3 of the Flood and Water Management Act we will become a SUDS Approval Body, which means we will become responsible for approving, adopting and maintaining sustainable drainage systems (SUDS) for new and re-development. We have already developed a draft approvals procedure and process for the SUDS Approval Body role, but in preparation for the commencement of the role we will:

- finalise the approvals procedure and process document;
- develop local SUDS guidance in collaboration with our partners[24], which will complement the national SUDS standards, are more bespoke to North Somerset and will consider how green infrastructure is considered as part of SUDS infrastructure, and;
- identify and secure sufficient resources to deliver the SUDS Approval Body role.

6.1.13 Improve linkages with development management services

We recognise that good planning of new development will ensure that the development itself is not at risk of flooding and there is no increase in downstream flood risk. We are already working with the development management services in NSC to provide drainage and flood risk comments on planning applications. However, as part of the implementation of the

[24] We are producing joint local SUDS guidance with the West of England Partnership (http://www.westofengland.org/) to ensure consistency within the region and share good practice and knowledge.

LFRMS we are proposing to provide enhanced comments on planning applications, providing greater input in the most vulnerable communities. We will also seek earlier engagement with developers through the development management services to maximise the opportunities to influence the location and design of drainage in new development.

6.1.14 Improve understanding of future flood risk due to climate change

We recognise that future predicted climate change could lead to increased precipitation and sea level rise, which would result in increased flood risk to communities in North Somerset. Whilst there is understanding of how future sea level risk could affect tidal flood risk to communities which is outlined in the Severn Estuary Flood Risk Management Strategy, we have limited understanding of how future precipitation changes could affect flood risk from surface water, ordinary watercourses and groundwater. Therefore, working with the Environment Agency, we will assess the future implications of precipitation changes on flood risk from surface water, ordinary watercourses and groundwater. This will be undertaken by 2016, and the evidence base will be used to inform an update of the LFRMS in 2017.

6.1.15 Publish up to date surface water mapping

We will publish the most up to date surface water mapping to allow local residents to identify whether they are at risk from surface water flooding. This will be published alongside appropriate guidance on how to interpret and use this information. The Environment Agency published its updated Flood Map for Surface Water in December 2013. As this was not in time to meet the programme of this LFRMS, NSC agreed to use the existing surface water flood maps but that an impact assessment would be undertaken when the updated maps were released. This indicated that the highest priority locations are not altered, and it is on these that NSC will be focusing in the short term. The updated maps will be taken fully into account when the LRMS is reviewed in 2017. If significant flooding in other areas is reported in the meantime, this is likely to trigger a reconsideration in any case, as outlined in Section 6.3.2. We will progress this action in collaboration with the Environment Agency.

6.1.16 Develop information brochure to raise awareness of flooding

We believe there is significant merit in producing a single information brochure for local residents in order to raise awareness about how to prepare for a flood, what to do in the event of a flood, and how to recover following a flood. We will produce an information brochure in collaboration with the community resilience team and will distribute it online and via parish councils. It should be noted that the Emergency Management Unit is developing an Emergencies Handbook and App. The information brochure will support and work alongside the Emergencies Handbook and App.

6.2 Action plan for measures in the most vulnerable communities

Sections 6.2.1 to 6.2.14 outline the action plans for the most vulnerable communities identified based on the methodology discussed in Section 3.4.1. The action plans consider the types of measures, and their timescales for delivery. The timescales for delivery are split into short-term (2014 - 2016approximately 0-2 years), medium-term (approximately 2-5 years) and long-term (approximately 5-10 years). It should be noted that potential funding

sources for the measures will be considered in the development of the rolling two-year implementation plan.

An environmental appraisal of the measures has been undertaken and is reported in the Strategic Environmental Assessment report. However, the environmental enhancement opportunities from the SEA are presented in the action plans. This will help to ensure that environmental opportunities are identified as early as possible so they can be integrated into flood risk management.

It is important to note that in many locations the action plans recommend further investigation or survey in the first instance. This is necessary to fully understand flooding mechanisms and impacts prior to the development of flood mitigation schemes. As the actions identified in the subsequent sections are completed, and further measures identified, the action plans will need to be updated. The action plans will be updated during the review of the LFRMS in 2017 and 2023.

The top five most vulnerable communities in North Somerset are: Wrington; Weston-super-Mare; Nailsea; Winscombe, and; Claverham. The action plans for these communities are considered first in the sections below, followed by the remaining communities most vulnerable to local flood risk.

6.2.1 Wrington

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1a & I-2	Study and survey / modelling	The ordinary watercourse through Wrington is under capacity, and there are complex riparian ownership issues. NSC is currently undertaking a study to investigate the most feasible options to mitigate flooding from the watercourse, and is undertaking hydraulic modelling to support the development of the business case. Several options are being investigated to alleviate flooding from the watercourse including: • P-1 – storage upstream of Wrington, and; • P-4 - upsizing of the watercourse at critical points.	There are traditional orchard and deciduous woodland BAP priority habitats in the 'Alburys'/High Street area in the north of Wrington. There are also larger areas of both these BAP habitats to the north of the developed area. Wrington contains examples of 'ancient and/or species-rich hedgerows', which are listed in the North Somerset BAP as being good examples of 'boundary and linear features' priority habitat. Wrington is close to a Strategic Nature Area with woodland priority habitat and secondary habitats of calcareous grassland and lowland heath. NSC has recognised that Wrington currently has an insufficient supply of neighbourhood open space, woodland, conservation sites and formal parks or public gardens. Any opportunities to improve this provision or enhance the LNR or BAP priority habitat should be explored with Natural England and Avon Wildlife Trust. If it is decided that upstream storage options will be constructed, it may be possible to provide biodiversity or amenity enhancements, for example through landscaping or planting.	Short-term - completion of study Medium term – implementation of measures (subject to funding)
2	I-1b	Study	Surface water mapping predicts further significant flooding in the north of Wrington to properties on School Road and Broad Street due to surface runoff. There is limited reported evidence of flooding to properties on these roads, although evidence from properties on Yeomans Orchard indicates surface runoff from Wrington Hill bypasses gullies during high intensity storms and ponds at the low spot. There is further predicted and reported evidence of flooding on Roper's Lane. NSC will undertake a localised investigation which will involve the following tasks: • investigating the route of any watercourses or ditches to the north of Wrington; • confirming the capacity and condition of watercourses, ditches and culverts; • liaising with local residents to confirm the flooding mechanism predicted on School Road, Broad Street and Roper's Lane, and; • investigating the sufficiency of highway and sewer networks to drain surface runoff.		Short-term – completion of investigation and recommendations for future work
3	I-1c	Study			

6.2.2 Weston-super-Mare

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1	Study	A Surface Water Management Plan is ongoing for the urbanised town centre of Weston-super-Mare as well as the 'Weston Development Area'. The SWMP is undertaking detailed hydraulic modelling of the town and will recommend specific capital, operational and policy measures to mitigate surface water flood risk in the town. The LFRMS has identified two specific	The Weston Woods Local Nature Reserve lies to the north of the urban area. Ellenborough Park West SSSI is close to the seafront in central Weston and Uphill Cliff SSSI/ LNR, Purn Hill and Bleadon Hill SSSIs all lie to the south of	Short-term – Completion of SWMP and recommendations for future work

			areas in Weston-super-Mare at highest risk of surface water flooding: 1) Milton Hill and Worle, 2) Central and West area. Following the completion of the SWMP specific measures will be identified and programmed into the implementation plan.	the urban area. The SWMP will be able to identify if there are likely to be any flood risk measures required in the vicinity of these schemes and, if so, whether any mitigation or enhancement is required. Weston is also within the project area of the North Somerset Wetland Programme so there may be opportunities to improve wetland habitats in the Weston area.	
2	R-4	Raise awareness	Surface water mapping predicts several critical infrastructure at risk of flooding to depths >0.3m during a 3.33% annual probability rainfall event. NSC will work with the infrastructure owners to raise their awareness of potential flood risk.		Short-term – raising awareness of flood risk

6.2.3 Nailsea

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	P-7	Improved maintenance of gullies	Reported evidence in Nailsea indicates that blocked highway gullies were a contributory factor in the flooding which occurred during 2012. Therefore, further investigation is required to understand the current maintenance of highway gullies in Nailsea and whether an enhanced maintenance regime is required. The outputs from the investigation will be linked to the asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.	Consultation with North Somerset Council has shown there are several locations in the district that would benefit from improved pollution control. This includes Tickenham Causeway, as the ditch which conveys the majority of surface water from Nailsea to Tickenham, Nailsea and Kenn Moors SSSI (ST 444705) has high levels of phosphates and organic pollutants; any improvement to the quality of this surface water through LFRMS schemes is likely to lead to biodiversity benefits for the SSSI, particularly for invertebrate species. Other SSSIs in the vicinity of Nailsea include West End Meadows (ST 458691), Fields along Youngwood Lane (ST 467695), Batch Farm Meadow (ST 450692) and Nursebatch Farm Fields (ST 453691). Nailsea is close to the Strategic Nature Area of Nailsea Moor, a priority habitat of Coastal and Floodplain Grazing Marsh. NSC has recognised that the developed area of Nailsea currently has an insufficient supply of woodland and conservation sites. Any opportunities to improve this provision or enhance designated sites or other habitats should be explored.	Short-term – improved maintenance of highway network
2	I-1	Study	Flood risk is an issue across different parts of Nailsea. As a result a Surface Water Management Plan would the ideal approach to enable NSC and its flood risk management partners to better understand the flooding mechanisms, and to identify feasible and cost-effective mitigation measures. The SWMP will include: • establishing a steering group which includes NSC, Wessex Water, North Somerset Levels Internal Drainage Board and the Environment Agency; • gathering further data from local residents on historic flooding; • gathering additional information on existing drainage infrastructure in Nailsea (including culverted watercourses [see I-2] and the public sewer network); • undertaking integrated hydraulic modelling of the developed area to confirm flooding mechanisms and properties at risk; • identifying and appraising mitigation measures, and; • preparing the evidence to support a business case for FDGiA funding. It should be noted that local residents have reported that the drainage network was constructed in 1959 and is no longer sufficient given recent		Short-term – completion of SWMP and recommendations for future work

			development. In addition, residents have noted that part of the flooding on Mizzymead Rise, Clarken Close and Coombe Road was due to surface runoff. The SWMP will consider these issues.		
3	I-2	Survey	There appear to be historic watercourses through Nailsea, which have been culverted as the town developed over time. In order to establish their effect on flood risk a data gathering exercise is required to establish what data currently exists and to scope the need for further survey. It is likely that a walkover and possibly a CCTV survey will be needed to establish the route, connectivity and location of these historic watercourses. Liaison with the Town Council and Wessex Water will be key in gathering data		Short-term – completion of investigation into historic watercourses
4	R-4	Raise awareness	Surface water mapping predicts an electricity sub-station at risk of flooding to depths >0.3m during a 3.33% annual probability rainfall event. NSC will work with the infrastructure owners to raise their awareness of potential flood risk.		Short-term – raising awareness of flood risk

6.2.4 Winscombe

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1a	Study	There is significant predicted flooding in Winscombe. The majority of predicted flooding is due to water flowing on the surface where there are culverted sections of watercourses. This is because the mapping does not represent the culverted watercourse. NSC will undertake a culvert capacity assessment of the culverted watercourses to establish their current capacity against expected peak flows from the catchment being drained. The culverts to be assessed are: • to the rear of properties on Wimblestone Road; • Sandford Road near Sloughpit Farm; • south of Woodborough Primary School; • culverts under Oakridge Lane (near Oakridge Close) and The Lynch, and; • south of the junction of Church Road / Barton Road Should the culverts be under-sized capital works will be required to increase their capacity	Cheddar Valley Railway Walk is a linear Local Nature Reserve lying to the west of Winscombe. The Mendip Hills AONB and some deciduous woodland BAP priority habitat also lie to the west, east and south of the developed area The LNR is in close proximity to 'The Lynch and The Green', areas where there are known highway drainage issues. NSC has recognised that Winscombe currently has an insufficient supply of neighbourhood open space. Opportunities to enhance the LNR, BAP priority habitat or neighbourhood open space should be explored with Natural England and Avon Wildlife Trust.	Short-term – assessment of capacity of culverts Medium-term – upsizing of culverts (if required and subject to funding)
2	I-2	Survey	CCTV of the culverts listed above will also be undertaken to confirm the route and condition of the culverts. Should the culverts require maintenance this will be programmed.		Short-term – completion of CCTV survey

3	I-1b	Study	According to the Environment Agency's flood defence database (NFCDD) there is a natural flood defence on the left and right bank of the watercourse which flows near the junction of Church Road / Barton Road. Further investigation will be undertaken to establish the standard of protection of these flood defences, and whether the presence of the flood defences is sufficient to protect properties in this location from flooding		Short to medium-term – investigation into flood defence near Church Road / Barton Road
4	I-1c	Study	There is significant predicted flooding to the east of the railway embankment, but this could be caused because existing mapping does not represent the location of culverts under the railway. NSC will investigate the presence and location of existing culverts under the railway to ensure surface water will drain rather than backing up against the railway embankment causing flooding to a significant number of properties		Short to medium-term – investigation into predicted flooding near railway embankment
5	P-3 / P-7	Improve drainage network or enhance maintenance	Based on information from the highways team there are three locations in Winscombe which are on the highways prioritisation list for future schemes. The flood risk management and highways teams will work together to identify the cause of flooding in these locations and the mitigation measures required. Reported evidence indicates that blocked gullies at the top of Well Close and near the primary school contribute to flooding to properties on Moorham Close. Any requirements to enhance the maintenance regime of highway drainage will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.		Short-term – investigation (and enhancements if required) into highway drainage network

6.2.5 Claverham

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1	Study	A Surface Water Management Plan would be the ideal approach to enable NSC and its flood risk management partners to better understand the flooding mechanisms, and to identify feasible and cost-effective mitigation measures. The SWMP will include: • establishing a steering group which includes NSC, Wessex Water, North Somerset Levels Internal Drainage Board and the Environment Agency; • gathering further data from local residents on historic flooding; • gathering additional information on existing drainage infrastructure in Claverham (including culverted watercourses and the public sewer network); • understand the condition and capacity of the existing ditch and	If it is decided that attenuation basins will be constructed, it may be possible to provide biodiversity or amenity enhancements, for example through landscaping or planting. Similarly, the construction of new ditches to the south of Claverham Road and/or new culverts under Claverham Road could also offer small-scale biodiversity enhancement opportunities.	Medium-term – completion of SWMP Medium-term – funding application should business case be applicable

			watercourse network in Claverham; • undertaking surface water modelling to confirm flooding mechanisms and properties at risk (NB: hydraulic modelling should include the upstream area of Cleeve to ensure that the hydrological catchment is included); • identifying and appraising mitigation measures, and; • preparing the evidence to support a business case for FDGiA funding.		
2	R-1	Property level protection	To the north of Claverham there are several properties that have suffered historic flooding in 2012 or are predicted to be at risk of flooding. NSC will work with these property owners to investigate whether property-level protection measures can be implemented. Wessex Water has fitted non-return valves on some flooded properties due to backing up of water into properties and some work has been undertaken to improve the capacity of the culvert under the road.		Medium-term – implementation of property-level protection (subject to funding)
3	R-4	Raise awareness	Surface water mapping predicts an electricity sub-station and factory at risk of flooding to depths >0.3m during a 3.33% annual probability rainfall event. NSC will work with the infrastructure owners to raise their awareness of potential flood risk.		Short-term – raising awareness of flood risk

6.2.6 Congresbury

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	P-3 / P-7 / P-8	Enhance existing maintenance and improve network	Reported evidence indicates that flooding on Kent Road is caused by backing up of the urban drainage and rhyne/watercourse network. This is likely to be due to elevated levels in the rhyne network which meant outfalls into the river backed up causing flooding. NSC flood risk management and highways teams will assess the current performance and maintenance of the drainage network and will enhance the network where needed. Partnership working with Wessex Water will be important. Any requirements to enhance the maintenance regime of highway drainage will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.	There is an area of coastal and floodplain grazing marsh BAP priority habitat to the east and west of Congresbury. This settlement is also within the project area of the North Somerset Wetland Programme and in close vicinity to two Strategic Nature Areas of Coastal and Floodplain Grazing Marsh. There are three SSSIs in the vicinity of Congresbury; rhynes south of Dolemoor Lane (ST 419635) and Congresbury Yeo, adjacent land and rhynes (ST 4286407). King's Wood and Urchin Wood SSSI, part of the North Somerset and Mendip Bats SAC also lies to the east and north of Congresbury.	Medium-term – investigation of performance of sewer network Medium-term – implementation of improvements (subject to funding)
2	P-8	Enhance maintenance of watercourses	Flooding at St Andrews Primary School is likely to be caused by a lack of maintenance of the rhyne running adjacent to the school and backing up of the foul sewer network. NSC will work with the IDB and Wessex Water to ensure the rhyne network is adequately maintained to drain flood water		Medium-term – implementation of mitigation measures

3	I-1a	Investigation	NSC will investigate the cause of flooding to properties on the High Street and Station Road before recommending mitigation measures	Opportunities to enhance the extent or quality of these habitats should be explored with Natural England and Avon Wildlife Trust. It is important to protect or enhance this ancient broad-leaved woodland.	Medium-term – implementation of mitigation measures
4	I-1b	Investigation	NSC will investigate the cause of flooding to properties near Verlands before recommending mitigation measures		Medium-term – implementation of mitigation measures
5	R-4	Raise awareness	Reported evidence indicates that part of the flooding to properties was due to bow waves caused by cars driving through flood water. NSC will undertake an education programme in the area through the community resilience group to encourage road users to take additional precautions when driving through flood water to avoid causing flooding to properties. In addition, NSC will continue to support and empower community flood resilience teams to promote and implement community based actions before, during and after a flood to mitigate the impacts of flooding		Short-term – raising awareness of flood risk

6.2.7 Long Ashton

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1	Study	Bristol City Council will be producing a Flood Risk Management Plan for the Bristol 'Flood Risk Area' under the Flood Risk Regulations, which includes parts of Long Ashton. NSC will form part of the steering group to influence the development of a plan to manage flood risk in Long Ashton[25]. This will need to fully assess the risk of flooding from the Long Ashton Brook, as the Brook is predicted to present a significant flood risk to properties, even though there has been little reported evidence of flooding. Reported evidence from 2012 indicates flooding on Yanley Lane is due to localised blockage of the drain into the Long Ashton Brook which causes backing up and flooding. This will need to be assessed as part of the study of the Long Ashton Brook	Long Ashton is within a Strategic Nature Area with primary woodland habitat and secondary habitats of calcareous and neutral grassland.	Short-term – completion of Flood Risk Management Plan in accordance with legislative deadline (December 2015)
2	P-7	Enhance maintenance of drainage network	Historic flooding in Long Ashton appears to be due to inadequate maintenance of highway drainage. NSC will investigate the performance of the highway drainage network in Rayens Cross Road and Providence Lane and enhance maintenance/undertake improvements where necessary. Any requirements to enhance the maintenance regime of highway drainage will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.		Medium-term – investigation into flooding issues and recommendations for future work

[25] NSC is also providing information to support the development of the Environment Agency's Severn Estuary Flood Risk Management Plan.

3	R-3	Planning policy	Long Ashton Parish Council is currently producing a Neighbourhood Plan. NSC will work with the parish to ensure flood risk issues are considered and incorporated into the plan		Short to medium-term – depending on progress of neighbourhood plan
4	R-4	Raise awareness	Surface water mapping predicts flood risk to Northleaze Primary School. NSC will work with the school to raise awareness of potential flood risk, identify feasible mitigation measures and ensure a flood emergency plan is in place		Short -term – raising awareness of flood risk

6.2.8 Backwell

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1a	Investigation	One of the dominant predicted flow pathways is surface water flowing on Farleigh Road and into Backwell. The source is likely to be pluvial runoff south of Farleigh Road but NSC will investigate the source of runoff and identify mitigation measures.	In the south of Backwell (Hillside Road) and north (Station Road) of the developed area there are traditional orchard BAP priority habitats. To the south-east of the developed area there is some deciduous woodland BAP priority habitat. Backwell is also close to a Strategic Nature Area of priority woodland habitat with secondary habitats of calcareous grassland and lowland heath.	Medium-term – completion of investigation and recommendation for future work
2	I-1b	Investigation	The majority of historic and predicted flooding in Backwell is through the centre of the town, including the A370. Further investigation is required to understand the cause of flooding in order to identify mitigation measures		Medium-term – completion of investigation and recommendation for future work
3	R-3	Planning policy	Backwell Parish Council is currently producing a Neighbourhood Plan. NSC will work with the parish to ensure flood risk issues are considered and incorporated into the plan	The Bucklands Pool/ Backwell Lake Local Nature Reserve is situated between the developed areas of Nailsea and Backwell. Backwell Lake is also an example of North Somerset BAP ‘open water’ priority habitat. Opportunities to enhance these sites, particularly the surface water conveyance to Backwell Lake, should be explored with Natural England and Avon Wildlife Trust.	Short-term – depending on progress of neighbourhood plan
4	R-4	Raise awareness	Surface water mapping predicts a school and hospice are at risk of flooding to depths >0.3m during a 3.33% annual probability rainfall event. NSC will work with the infrastructure owners to raise their awareness of potential flood risk.		Short-term – raising awareness of flood risk
5	P-3	Increase capacity of drainage network	Flooding of the A370 was observed during 2012 and the network is on the highways prioritised list for future schemes. The flood risk management and highways teams will work together to identify the cause of flooding and the mitigation measures required. Any requirements to enhance the maintenance regime of highway drainage will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.		Medium-term – depending on highways prioritisation
6	I-1c	Investigation	There is significant flooding predicted to properties in the north of Backwell due to surface water runoff backing up against the railway embankment. Whilst there is no reported evidence of this area flooding it needs to be investigated to identify whether this risk could materialise because of the depth of flooding and number of properties potentially at risk		Medium-term – completion of investigation

6.2.9 Churchill

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-2 / P-3	Survey and increase capacity of watercourses	There is uncertainty about the route of the watercourse in places, and a walkover / watercourse survey will be undertaken of the entire watercourse, including culverts. Reported evidence indicates there are broken culverts within the area. Should these be located during survey NSC will undertake to repair these	No specific opportunities identified.	Medium-term – completion of investigation and remedial works to watercourse
2	P-7 / P-8	Enhance maintenance of drainage and watercourses	Reported evidence indicates that some parts of the drainage and watercourse network require enhanced maintenance. A site walkover with officers from NSC and local residents will be undertaken to discuss future maintenance requirements. Evidence from local residents from 2012 indicates that there is a collapsed culvert underneath the road (Doleberrow), and that there were blocked drains and gullies which contributed to flooding on Doleberrow and further downstream at Jews Lane / New Road. Any requirements to enhance the maintenance regime of highway drainage or watercourses will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.		Medium-term – depending on highways prioritisation
3	I-1	Investigation	Following on from survey and review of the existing maintenance NSC will undertake an investigation to identify whether there is a capacity issue associated with the watercourse and/or culverts within the area. This may involve simplified hydrological / hydraulic assessment or a detailed 1D-2D hydraulic model if necessary to support a business case for FDGiA funding.		Medium to long-term – investigation completed following remedial works to the watercourse

6.2.10 Langford

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1a	Study	There is evidence of overtopping of the Langford Brook, so a study will be undertaken to investigate the hydraulic capacity of the watercourse and the existing natural flood defences on the right and left bank. Evidence from the 2012 flooding suggests there is a gap in the flood defence wall due to a footbridge and that flood water escaped at this gap causing property flooding. Properties flooded on Langford Road are also at risk of flooding due to overtopping of the Brook.	No specific opportunities identified.	Medium-term – completion of investigation and recommendation of mitigation measures
2	I-1b	Investigation	There is historic and predicted evidence of surface water flowing on Langford Road east of Langford Inn. An investigation is required to assess whether the existing highway drainage network could be improved to drain water off the		Medium-term – depending on highways prioritisation

			highway or whether runoff could be managed at source		
3	P-7	Enhance maintenance of drainage network	Reports of flooding from 2012 indicate that the highway gullies seem to be blocked or inefficient. Therefore, NSC will investigate the existing condition of the highway drainage network and evaluate any improvements to the maintenance regime required. Any requirements to enhance the maintenance regime of highway drainage will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.		Medium-term – depending on highways prioritisation programme

6.2.11 Pill

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1a	Investigation	The Environment Agency constructed a pumping station in Pill to enable surface water to be pumped into the River Avon during high tide. Given the flooding which occurred in Pill in 2012 the operation of this pump will be assessed by the Environment Agency and NSC	Priory Farm and Pill Paddock Local Nature Reserves are both close to Pill. NSC has recognised that Pill currently has an insufficient supply of woodland, formal park and public garden and conservation sites. Any opportunities to improve this provision should be explored. Pill lies within a strategic area of coastal habitat shown on the Strategic Nature Area map of the south west. Opportunities to enhance the biodiversity, wildlife corridors, amenity or access to the Local Nature Reserves or other habitats should be explored.	Long-term – completion of investigation
2	P-7	Enhance maintenance of drainage network	Evidence from local residents indicates that flooding on North Grove was caused by blocked highway gullies which resulted in water flowing down the cul-de-sac and into properties. Therefore, NSC will investigate the existing condition of the highway drainage network and evaluate any improvements to the maintenance regime required. Any requirements to enhance the maintenance regime of highway drainage will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.		Medium-term – depending on highways prioritisation programme
3	I-2	Survey	There is an ordinary watercourse which runs through Pill. The watercourse is open until just north of Brookside where it is mostly culverted until its confluence with the Markham Brook near the River Avon. A CCTV survey of the culverted watercourse should be undertaken to establish the condition and capacity of the watercourse.		Long-term – completion of survey and recommendations for future work if required

6.2.12 Hutton

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	P-3	Increase capacity of urban drainage network	Flooding to the north of Hutton (Moorcroft Road) appears to be the result of localised capacity issues in the highway drainage and/or sewer network, but there is also evidence of high groundwater levels causing flooding in this area. Any requirements to enhance the maintenance regime of highway drainage will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.	NSC has recognised that Hutton currently has an insufficient supply of neighbourhood open space, formal park and public garden, woodland and conservation sites. Any opportunities to improve this provision should be explored. Hutton is also close to a Strategic Nature Area of woodland priority habitat, which lies to the south.	Medium to long-term – investigation depending on alignment with investigations by Wessex Water
2	I-2	Survey	There is a culverted watercourse which runs through Hutton although the route is unclear. Flooding on Main Road is likely to be caused by overtopping of this watercourse, possibly at the culvert entrance near Main Road. A CCTV survey should be undertaken to establish the route, capacity and condition of the watercourse. If it is under capacity further mitigation measures may be required such as culvert upsizing or upstream storage. The Main Road is Hutton is on the highways prioritisation list for future schemes. The flood risk management and highways teams will work together to identify the cause of flooding and the mitigation measures required		Long-term – completion of investigation into watercourse

6.2.13 Portbury

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-2	Survey	NSC will undertake a walkover / watercourse survey of the watercourse and ponds which run along the west of Portbury Lane to establish their capacity and condition	Portbury Wharf, Prior's Wood and Priory Farm Local Nature Reserves are all close to Portbury. There are also various SSSIs locally, listed in the Environmental Report. Portbury is within a Strategic Nature Area, with primary woodland habitat and secondary habitats of calcareous and neutral grassland. Opportunities to enhance the biodiversity, wildlife corridors, amenity or access to the Local Nature Reserves or SSSIs should be explored.	Medium-term – completion of survey and recommendations for future work
2	S-3	Intercept and divert pluvial runoff	Flooding in Portbury is caused by pluvial runoff from the south flowing on Failand Lane and Mill Lane, before arriving in the village and causing property flooding. Options to intercept and divert pluvial runoff will be investigated		Long-term – implementation of mitigation (subject to funding)

6.2.14 Clevedon East

No.	ID	Type of measure	Description	Environmental enhancement opportunities	Programme
1	I-1a	Study	There is reported evidence and predicted flooding in Valley Road, Carey's Close and Tickenham Road, which lie in a natural valley between Fir Wood and Court Wood. Therefore this area is natural susceptible to surface water flooding. Further work will be undertaken to establish the drainage within this area and the cause of flooding, which will result in a recommendation for mitigation measures. Tickenham Road is on the highways prioritisation list for future schemes. The flood risk management and highways teams will work together to identify the cause of flooding and the mitigation measures required	There are potential landscape or biodiversity enhancement opportunities on the southern boundaries of Fir Wood and Court Wood. If there are any surface water pathways that reach Tickenham, Nailsea and Kenn Moors SSSI originating from the Clevedon east developed area, there may also be opportunities to filter out surface water contaminants through the use of SUDS.	Medium-term – investigation into highways flooding depending on highways prioritisation programme Long-term – wider investigation of flooding in natural valley
2	I-1b	Investigation	There was recorded flooding in Kingston Avenue in 2012, but the cause of this flooding is uncertain. Working with local communities NSC will investigate the cause of flooding and recommend suitable mitigation measures. There is some reported evidence of flooding due to elevated groundwater levels		Long-term – completion of investigation and recommendations for future work

6.3 Monitoring and Review

Ensuring public accountability, engaging with local people and taking informed and transparent decisions are among the key principles upon which NSC's code of corporate governance is based. We will follow this code when exercising our role as an LLFA, providing the LFRMS, and seeking the best use of resources and value for money.

The Act ensures that we consult with the public and its partner organisations on the content of the LFRMS. The process for continued accountability is already in place with the Act providing for close working co-operation between the Risk Management Authorities and a continuing exchange of information. This legislative framework of governance includes arrangements for Overview and Scrutiny Committees (OSC) to review and scrutinise the exercise by Risk Management Authorities of their flood risk management functions. The authorities must comply with any request by OSC for information or a response to a report.

6.3.1 Monitoring

We will monitor the progress of the LFRMS through the development of a 'rolling' two year implementation plan which will be presented to the Strategic Flood Management Board and scrutiny committee, and will be reviewed and updated annually. The implementation plan will also be published on our website. The implementation plan will ensure that the Strategy remains relevant by:

- assessing progress against the LFRMS objectives;
- identifying whether measures have been delivered that mitigate risk;
- assessing whether there have been any material changes which impact upon the Strategy and in particular the risk prioritisation, and;
- setting the priorities and measures for the next two year period.

6.3.2 Review and Update

The LFRMS (including the action plans) will remain live until 2023 after which it will be reviewed and updated as necessary. In addition an update of the LFRMS is planned for 2017 at the same time as the PFRA is being updated. A timeline illustrating the programme for reviewing and updating the LFRMS, SEA, implementation plan and PFRA is illustrated in Table 6-2. In the interim period the LFRMS will remain live and will only be updated if:

- the implementation identifies this as necessary (for example if the LFRMS is not meeting its objectives);
- significant flooding occurs that challenges the conclusion of the risk assessment;
- significant changes are made to any of the datasets upon which the risk assessment is based;

- there are significant policy changes that amend the roles and responsibilities of those responsible for flood risk management, and;
- there is a change in funding available which has a significant effect on the actions proposed in the LFRMS.

Table 6-2: Timeline for review and update of LFRMS and associated documents

Activity	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
LFRMS	●			◆						●
SEA	●									●
Implementation Plan	●	◆	~	◆	~	◆	~	◆	~	●
PFRA				●						●
FRMP		●						●		

● = Publish / Re-write of document/s, ◆ = Update of document/s to reflect progress, ~ = Report on progress

Appendix A Relevant legislation, regulations, plans and policies

(Available as a separate document)

Appendix B Maps

(Available as separate maps)

Appendix C Working together to deliver local flood risk management

(Available as a separate document)

Appendix D Potential funding sources

(Available as a separate document)

Appendix E Summary of action plans

(Available as a separate document)

Appendix F Glossary

CFMP – Catchment Flood Management Plan - A CFMP is a high-level strategic plan through which the Environment Agency seeks to work with other key-decision makers within a river catchment to identify and agree long-term policies for sustainable flood risk management.

Civil Contingencies Act (2004) - Legislation that aims to deliver a single framework for civil protection in the UK and sets out the actions that need to be taken in the event of a flood

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 Earth.

Climate Change Act (2008) – An Act that requires a UK-wide climate change risk assessment every five years, accompanied by a national adaptation programme that is also reviewed every five years. It also requires public bodies and statutory organisations such as water companies to report on how they are adapting to climate change.

Coastal Erosion - The wearing away of land or the removal of beach or dune sediments by wave action, tidal currents, wave currents, or drainage. Waves, generated by storms, wind, or fast moving motor craft, cause coastal erosion, which may take the form of long-term losses of sediment and rocks, or merely the temporary redistribution of coastal sediments; erosion in one location may result in accretion nearby.

Commencement Order – An instruction that brings a defined aspect of legislation into force

Community Resilience – The ability of a community to keep functioning during an emergency, being collectively prepared to respond and recover, and being able to provide assistance to vulnerable residents

Conservation of Habitats and Species Regulations (2010) - An Act which transposed the Habitats Directive into UK law. The regulations aim to help maintain and enhance biodiversity throughout the EU, by conserving natural habitats, flora and fauna. The main way it does this is by establishing a coherent network of protected areas and strict protection measures for particularly rare and threatened species.

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 surface drainage 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).

Defra - Department of Environment, Food and Rural Affairs

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.

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 and Water Management Act (2010) - The Act brings together the recommendations of the Pitt report and previous policies, to improve the management of water resources and create a more comprehensive and risk based regime for managing the risk of flooding from all sources. The Act states that its purpose is to "make provision about water, including provision about the management of risks in connection with flooding and coastal erosion."

Flood Map for Surface Water – National surface water mapping produced by the Environment Agency to facilitate analysis of areas naturally vulnerable to surface water flooding

Flood Hazard Map – A map that defines flood risk areas and shows: the likely extent (including water level or depth) of possible floods; the likely direction and speed of flow of possible floods; and whether the probability of each possible flood occurring is low, medium or high (in the opinion of the person preparing the map).

Flood Resistance – Actions taken to prevent to ingress of flood water to a property. Flood Resistance measures may include flood barriers placed over doorways.

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 and the impact (or consequence) that the event would cause if it occurred

Flood Risk Area – a term defined for the Flood Risk Regulations, and represents an area of significant flood risk. It is calculated by identifying a cluster where at least 30,000 people are at risk from surface water flooding. There are 10 'Flood Risk Areas' in England.

Flood Risk Map – A map showing: the number of people living in the area who are likely to be affected in the event of flooding; the type of economic activity likely to be affected in the event of flooding; any industrial activities in the area that may increase the risk of pollution in the event of flooding; any relevant protected areas that may be affected in the event of flooding; any areas of water subject to specified measures or protection for the purpose of maintaining the water quality that may be affected in the event of flooding; and any other effect on human health, economic activity or the environment (including cultural heritage).

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).

Fluvial - The processes associated with rivers and streams and the deposits and landforms created by them.

Flood Risk Regulations (2009) - Transposes the EC Floods Directive (Directive 2007/60/EC on the assessment and management of flood risks) into domestic law and implements its provisions. 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.

Flood Zones - Nationally consistent delineation of 'high' and 'medium' flood risk, published on a quarterly basis by the Environment Agency.

Functional Floodplain Zone 3b - Defined as areas at risk of flooding in the 5% AEP (1 in 20 year) design event. In any one year the chance of a 5% AEP (1 in 20 year) event occurring is 5%.

Groundwater - Water located beneath the ground surface, either in soil pore spaces or fractures in rock.

IDB – Internal Drainage Board

LLFA – Lead Local Flood Authority

Local Flood Risk – defined in the Flood and Water Management Act as flooding from surface runoff, ordinary watercourses and groundwater

Low Probability Zone 1 – The area outside Zone 2. Defined as an area with less that 0.1% AEP (1 in 1000 year) chance of flooding. In any one year the chance of a 1% AEP (1 in 100 year) event occurring is less than 0.1%.

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 appliance 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.

MSfW - Making Space for Water (Defra 2004). The Government's new evolving strategy to manage the risks from flooding and coastal erosion by employing an integrated portfolio of approaches, so as: a) to reduce the threat to people and their property; b) to deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles, c) to secure efficient and reliable funding mechanisms that deliver the levels of investment required.

Medium probability Zone 2 - Defined as an area at risk of flooding from flood events that are greater than the 1% AEP(1 in 100 year), and less than the 0.1% AEP (1 in 1000 year) design event. The probability of flooding occurring in this area in any one year is between 1% and 0.1%.

NRD – National Receptor Dataset

Ordinary Watercourse – Any section of watercourse not designated as a Main River.

PFRA – Preliminary Flood Risk Assessment

Pluvial – Direct runoff, which occurs when the intensity or amount of rainfall landing on a surface exceeds the natural or artificial capacity of the surface to drain the water away, resulting in runoff over land

Precipitation – Describes rain, sleet, hail, snow and other forms of water falling from the sky.

PPS 25 - Planning Policy Statement 25: Development and Flood Risk. Government policy on development and flood risk. Its aims are to ensure that flood risk is taken

into account at all stages in the planning process, to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

RBD – River Basin District.

RFCC – Regional Flood and Coastal Committee

RFRA – Regional Flood Risk Assessment

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.

Residual Risk - The risk which remains after all risk avoidance, reduction and mitigation measures have been implemented.

Return Period – The probability of a flood of a given magnitude occurring within any one year e.g. a 1% AEP (1 in 100 year) event has a probability of occurring once in 100 years, or a 1% chance in any one year. However, a 1% AEP (1 in 100 year) event could occur twice or more within 100 years, or not at all.

Riparian Owner - All landowners whose property is adjoining to a body of water have the right to make reasonable use of it and suitably maintain it.

Risk Management Authority – defined in the Flood and Water Management Act, they all have some responsibility for managing flood risk

Sequential Test - Informed by a SFRA, a planning authority applies the Sequential Test to demonstrate that there are no reasonably available sites in areas with less risk of flooding that would be appropriate to the type of development or land use proposed.

Sewer flooding – The consequence of sewer systems exceeding their capacity during a rainfall event.

SFRA (Strategic Flood Risk Assessment) - An SFRA is used as a tool by a planning authority to assess flood risk for spatial planning, producing development briefs, setting constraints, informing sustainability appraisals and identifying locations of emergency planning measures and requirements for flood risk assessments.

SUDS – Sustainable Drainage Systems. SuDS are drainage systems which are designed to reduce the impact of urbanisation on the hydrology of a river system.

SWMP – Surface Water Management Plan

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.

Sustainable Development – "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (The World Commission on Environment and Development, 1987)

Tidal Flood Risk – The flood risk that arises as a consequence of high tides or tidal surges.

Unitary Authority – A type of local authority that has a single tier and is responsible for all local government functions within its area or performs additional functions which elsewhere in the relevant country are usually performed by national government or a higher level of sub-national government.

WaSC – Water and Sewerage Company

WFD - Water Framework Directive