



**North
Northamptonshire
Flood Risk
Management Study
Update**

Final Report

March 2012

Prepared for: North
Northamptonshire Joint
Planning Unit

UNITED
KINGDOM &
IRELAND



Revision Schedule
Final Update Report
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Executive Summary

This report is an update to the North Northamptonshire Flood Risk Management Study (2007) and the flood risk management strategy set out in the North Northamptonshire Detailed Water Cycle Strategy (2009).

The purpose of this study update is to provide a technical evidence base that will underpin the emerging replacement Joint Core Strategy (JCS) for North Northamptonshire which is currently programmed for adoption in early 2013.

Spatial Options for the replacement JCS have been undergoing technical testing and from the assessments undertaken so far a preferred approach based on elements from the different Spatial Options considered is now emerging.

Position Statement

March 2012

North Northamptonshire Flood Risk Management Study Update document

This report has been based on information provided at the time on the emerging approach to the revised JCS. It should be noted that a Preferred Option has not yet been finalised and still has to undergo further testing and consultation. Therefore this report should be regarded as a "Living Document" which may require further updating in the future.

The various flood risk management (FRM) strategies and recommended policies and actions given in previous strategic studies and assessments that have been produced for the area of North Northamptonshire since 2007 have been reviewed and considered in the light of the current emerging JCS.

Workshops have been held with representatives of all the relevant stakeholders of the North Northamptonshire Joint Planning Unit to consider and agree priority projects and actions that will then be used to inform the Local Lead Flood Authority (Northamptonshire County Council) Flood Risk Management Strategy, but also the JCS Review, the Infrastructure Delivery Plan, wider evidence base and local authority planning.

The main findings of this study can be summarised as follows:

- Most of the area identified for future development is on land at low risk from flooding.
- A strategic approach to managing flood risk should include the development of strategic flood storage on river floodplains upstream of urban areas which will provide benefits by not only offsetting the increased runoff from new development but also by reducing the flood risk to existing development downstream of the storage facility. The building of large numbers of small local storage schemes designed for each individual development site is not favoured by the EA. This approach of replacing the small storage schemes with much larger strategic schemes for an area is at the core of the strategy contained in the EA's CFMP.
- These strategic schemes offer opportunities for creating additional benefits for the local communities in addition to flood alleviation, which include creation of green and blue infrastructure, recreational areas, wildlife habitats and corridors linking adjoining communities.
- Several flood storage schemes have been identified and recommended as being priority schemes, located in the various districts, along with a number of investigations for other potential strategic schemes. A simple Multi Criteria Analysis has been applied to a range of FRM schemes to aid in the identification of Priority Schemes.

- SWMPs are recommended for each of the three principal towns, Corby, Kettering and Wellingborough as well as for the area known as the Four Towns. SWMPs would provide invaluable information on the extent and level of risk from surface water flooding in urban areas and would consider strategic and local mitigation scheme options taking account of future development and climate change impacts. The Stakeholders should consider the outputs of SWMP's in conjunction with other studies, for example to inform decisions to pursue schemes where there may be multiple benefits, e.g. fluvial, surface water and green infrastructure benefits.
- Watercourses, particularly within the urban areas, are not all conveying their intended capacity. This can lead to a lowering of the standard of flood protection to development areas increasing the risk of flooding. Recommendations have been made to identify reaches of the watercourses in each of the urban areas where channel improvements and routine maintenance programmes would be particularly beneficial, as an important part of the flood management strategy.

The Priority Schemes and Actions recommended in this report have been assigned an indicative cost and an Action Plan produced for stakeholders. Potential funding sources and mechanisms have been identified to support the priorities. As LLFA, Northamptonshire County Council (NCC) are currently preparing an Investment Plan for Northamptonshire as part of a FCERM (FD2656) Defra & EA R & D programme. This should provide a basis for preparing an investment plan for funding the North Northamptonshire Flood Risk Management Strategy.

NCC will also shortly be preparing a Local Flood Risk Management Strategy for Northamptonshire as required under the Floods & Water Management Act (FWMA) 2010. It is anticipated that the recommendations given in this report for North Northamptonshire will be taken into consideration in developing the LFRMS.

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Abbreviations

Abbreviation	Meaning / Definition
AEP	Annual Exceedance Probability
AStGWF	Area Susceptible to Groundwater Flooding
AWS	Anglian Water Services
BCW	Borough Council of Wellingborough
BGS	British Geological Society
CBC	Corby Borough Council
CDA	Critical Drainage Area
CFMP	Catchment Flood Management Plan. A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
CLG	(The Department for) Communities and Local Government
DEFRA	The Department for Food and Rural Affairs
DG5	Water companies record of Sewer Flooding
EA	Environment Agency
ENC	East Northamptonshire Council
ERDF	European Regional Development Fund
FEP	Flood Evacuation Plan
FIMP	Flood Incident Management Plan
FWMA	The Flood and Water Management Act 2010 has great implications for management of water resources and infrastructure and for water company responsibilities.
ENC	East Northamptonshire Council
FMfSW	Flood Maps for Surface Water
FRA	Flood Risk Assessment
FSR	Flood Storage Reservoir
FWD	Flood Warnings Direct
GIS	Geographical Information System
JCS	Joint Core Strategy
KBC	Kettering Borough Council
LDDs	Local Development Documents
LDF	Local Development Framework
LLFA	Lead Local Flood Authority

Abbreviation	Meaning / Definition
LPA	Local Planning Authority
Main River	This term is used for watercourses shown on statutory maps held by the Environment Agency and Defra. They 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 powers to carry out works of maintenance and improvement on these watercourses (Main Rivers).
MCA	Multiple Criteria Analysis
NCC	Northamptonshire County Council
NFCDD	National Flood and Coastal Defence Database
NFSS	Nene Flood Storage Study
NN JPU	North Northamptonshire Joint Planning Unit
Ordinary Watercourses / Non-Main Rivers	An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a 'Main river'. The Local Authority or IDB where relevant, has powers for ordinary watercourses that are similar to those of the Environment Agency on Main rivers.
PPG	Planning Policy Guidance Note
PPS1	Planning Policy Statement 1: Delivering Sustainable Development
PPS25	Planning Policy Statement 25: Development and Flood Risk
PPS3	Planning Policy Statement 3: Housing
RFCC	Regional Flood and Coastal Committee
RFDC	Regional Flood Defence Committee
RFRA	Regional Flood Risk Assessment
RSS	Regional Spatial Strategy
Sequential Testing	A risk based approach in to assessing flood risk, which gives priority in ascending order of flood risk, i.e. lowest risk first.
SFRA	Strategic Flood Risk Assessment
SMD	Soil Moisture Deficit
SoP	Standard of Protection
SUDS	Sustainable Drainage Systems
SAB	SuDS Approving Body
SUE	Sustainable Urban Extension
SWMP	Surface Water Management Plan
WCS	Water Cycle Study or Strategy

1 Introduction

1.1 Background

- 1.1.1 Corby Borough Council (CBC), East Northamptonshire Council (ENC), Kettering Borough Council (KBC) and the Borough Council of Wellingborough (BCW) have worked through the North Northamptonshire Joint Planning Unit (NN JPU) to prepare a JCS for North Northamptonshire. The NN JPU reports to a Joint Planning Committee comprised of three Members from each of the four Districts/Boroughs and from Northamptonshire County Council (NCC). The current JCS was adopted in June 2008 and is now under review, with a replacement strategy programmed for adoption in early 2013.
- 1.1.2 Spatial options for the replacement JCS have been subject to technical testing. The emerging approach is being discussed by the North Northamptonshire Joint Planning Committee and a draft of the replacement JCS will be reported to committee in summer 2012; dependent upon when the East Midlands Regional Plan is formally revoked. The implications of the spatial options and the issues and opportunities presented by the emerging approach have been assessed in this study. A clear strategy for Flood Risk Management (FRM) will be embedded within the replacement JCS.
- 1.1.3 A FRM Study (FRMS, Royal Haskoning, 2007) was undertaken for North Northamptonshire in 2007 and this formed part of the adopted JCS evidence base. Subsequently, a strategic approach to flood risk management was devised as part of the North Northamptonshire Detailed Water Cycle Strategy (WCS) (Halcrow, 2009) completed in September 2009. Several other strategic studies and updates to Strategic Flood Risk Assessments (SFRA's) have also been completed since 2007 which are relevant to this update and these include:
- River Welland Catchment Flood Management Plan (CFMP) and River Nene CFMP (both 2009),
 - Kettering Level 2 SFRA (2010),
 - Great Ouse CFMP (2011),
 - Kettering and Wellingborough Level 1 SFRA Update (2011),
 - Nene Flood Storage Study (2011).
- 1.1.4 There are two SFRA Updates, one for Corby and one for East Northamptonshire. A Level 2 Update was issued by Atkins in July 2011. The review and update to the East Northamptonshire Level 1 SFRA has been undertaken by URS and was published for general release in August 2011.
- 1.1.5 URS has been commissioned to undertake an update to the FRMS proposed for North Northamptonshire. The update is an important part of the evidence base underpinning the forthcoming replacement JCS. The replacement JCS will identify strategic land allocations that may include housing, employment, sports, tourism and green infrastructure projects. This is a distinct progression from the adopted strategy, which only identified 'broad locations' with land allocations to be subsequently made in detailed development plans at the district level.

1.2 Aims and Objectives

1.2.1 Key datasets that were required to inform the study update were identified and requested from stakeholders.

1.2.2 The aim of the report is to update the FRMS for North Northamptonshire to provide a sound basis for further developing local policy, along with related project priorities and delivery actions. Key objectives in delivering this aim are included below:

- Identify key priorities for the future, arising from updated Level 1 SFRAs and all other relevant studies,
- Provide clear policy recommendations that can be taken forward at all levels of plan making,
- Assess requirements arising from proposed strategic land allocations,
- Estimate broad costs and potential funding mechanisms to support priority infrastructure projects,
- Provide a sound evidence base to support infrastructure planning and the Community Infrastructure Levy charging schedule.

1.2.3 A key deliverable of the study update were two Workshops involving key local stakeholders and the objectives of the Stakeholder Workshops are outlined below:

- **Stakeholder Workshop 1:**
 - Initial stock take of the range of already agreed policies and actions in North Northamptonshire in relation to flood risk management and spatial planning,
 - Identify the implications of the emerging spatial options,
 - Identify potential show stoppers for the JCS,
 - Identify potential strategic flood risk management projects,
 - Determine existing information about costings.
- **Stakeholder Workshop 2:**
 - Consideration of deliverable projects identified by URS following Workshop 1,
 - Working sessions to identify any further project options,
 - Agree actions and priority projects,
 - Identify any 'contingency' projects that could be brought forward in the event of delivery issues with the priority projects.

Report Aims and Objectives

1.2.4 This report constitutes the Final Update Report for the North Northamptonshire FRMS, the aim of which is to provide an evidence base to support the emerging approach. This aim is to be achieved through meeting the following objectives:

- Providing an overview of the existing planning and flood risk policies and actions in North Northamptonshire;
- Assessing the spatial options in terms of flood risk management;
- Confirming the implications of the emerging approach and the requirements arising from the proposed strategic land allocations;
- Making policy development recommendations;
- Identifying / recommending strategic infrastructure projects to facilitate the emerging approach;
- Identifying priority and contingency and long term opportunities including indicative costs of priority projects;
- Making recommendations for funding mechanisms to support the priority projects; and
- Formulation of an Action Plan stating responsibilities for stakeholders and developers.

1.3 Data Collection and Review

1.3.1 Key datasets that were required to inform the study update were identified and requested from stakeholders.

1.3.2 In order to ensure that good quality data is used, all data received was reviewed and scored in relation to its relevance to the study and its accuracy. The scores have been allocated on a scale from 1 (Good) to 3 (Poor). Using the matrix below (Figure 1-1), the relevance and accuracy scores have been used to assign an overall confidence rating. It is important to note that this is a subjective approach and that less accurate data can still be very useful and relevant to the project. A Data Register is included in Appendix A. All data provided for the undertaking of this study has been assessed as falling within the overall confidence rating of 'very good' or 'good' and the outcomes of this study have therefore been underpinned by a strong evidence base that is considered to be both accurate and relevant.

Figure 1-1: Data Review Matrix

		Accuracy		
		1	2	3
Relevance	1	Very good	Good	Average
	2	Good	Average	Poor
	3	Average	Poor	Very Poor

1.4 Stakeholder Workshop 1

1.4.1 The first Stakeholder Workshop was held at the Environment Agency's (EA's) offices in Kettering on 9th June 2011. Twenty one people attended (including three workshop facilitators from URS), representing the following stakeholder groups:

- North Northamptonshire Joint Planning Unit (NN JPU),
- Environment Agency (EA),
- East Northamptonshire Council (ENC),
- Kettering Borough Council (KBC),
- Northamptonshire County Council (NCC),
- Corby Borough Council (CBC),
- Anglian Water Services (AWS),
- Wildlife Trust (WT).
- River Nene Regional Park (RNRP)

1.4.2 The first Stakeholder Workshop consisted of a series of presentations and working group sessions intended to extract information and opinions on the emerging spatial options for North Northamptonshire. The Attendee Briefing Note and Workshop Plan are included in Appendix B.

1.4.3 Useful information and analysis was gained from the first Workshop and the main findings from the Stakeholder Workshop have been incorporated into this report.

1.5 Stakeholder Workshop 2

1.5.1 The second Stakeholder Workshop was held in the Council Chamber of the offices of ENC at Thrapston on 18th August 2011. Approximately twenty people attended (including three workshop facilitators from URS) representing the following stakeholder groups:

- North Northamptonshire Joint Planning Unit (NN JPU),
- Environment Agency (EA),
- East Northamptonshire Council (ENC),
- Kettering Borough Council (KBC),
- Natural England
- Northamptonshire County Council (NCC),
- Corby Borough Council (CBC),
- Borough Council of Wellingborough (WBC)
- Anglian Water Services (AWS),
- Wildlife Trust (WT).

1.5.2 The second Stakeholder Workshop consisted of a series of presentations and working group sessions intended to consider deliverable strategic flood risk management infrastructure projects that had been identified following Workshop 1 (and the Interim NNFRMS Report), to identify any further options for consideration, identify actions and priorities and any 'contingency' projects that could be brought forward in the event of delivery issues with the priority projects. The Attendee Briefing Note and Workshop Plan are included in Appendix C.

2 North Northamptonshire

2.1 Overview of the Study Area

- 2.1.1 The North Northamptonshire sub-region includes the Local Planning Authority (LPA) administrative areas of Corby, East Northamptonshire, Kettering and Wellingborough. The main urban areas within the study area include the towns of Kettering, Wellingborough and Corby, and other smaller settlements including Rushden, Higham Ferrers, Raunds, Desborough, Rothwell, Irthlingborough, Thrapston and Oundle.
- 2.1.2 The North Northamptonshire study area is shown in Figure 2-1 overleaf.

2.2 Replacement JCS

- 2.2.1 The four LPAs have worked through the NN JPU to prepare a JCS for the area. The JCS was adopted in June 2008 and is currently being reviewed with a replacement strategy due for adoption in early 2013.
- 2.2.2 In preparing the JCS, consideration must be given to reasonable alternatives for delivering the spatial vision and objectives for North Northamptonshire. In March 2010, a 'Place Making Workshop' was held with representatives from key stakeholder groups. During the Workshop, four distinct spatial options were confirmed. These options are considered in greater detail in Section 4.
- 2.2.3 Spatial options for the replacement JCS have been subject to technical testing. The emerging approach is being discussed by the North Northamptonshire Joint Planning Committee and a draft of the replacement JCS will be reported to committee in summer 2012; dependent upon when the East Midlands Regional Plan is formally revoked. The implications of the spatial options and the issues and opportunities presented by the emerging approach have been assessed in this study. A clear strategy for Flood Risk Management (FRM) will be embedded within the replacement JCS.

Replacement JCS Position Statement

March 2011

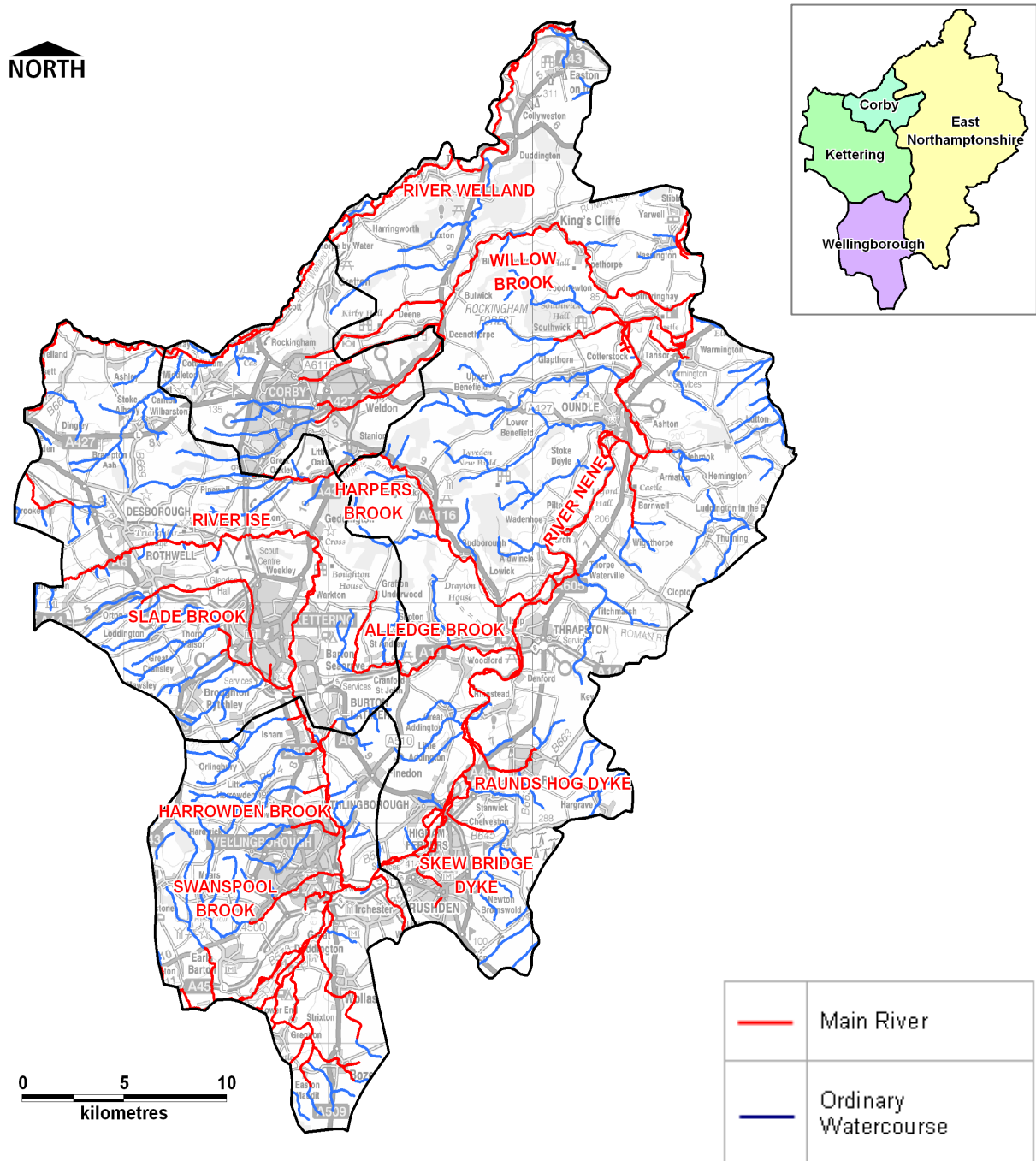
The replacement JCS will not be published for consultation until the East Midlands Regional Plan has been formally revoked by the Government. This is currently expected to be in Spring 2012.

2.3 Key Watercourses

- 2.3.1 The vast majority of the study area is located within the River Nene catchment. The northern extents of the study area fall within the River Welland catchment and the south eastern extent of the study area is located within the Great Ouse catchment.
- 2.3.2 The principal watercourses in the study area are:
- The River Nene and its main tributaries, the River Ise, Harpers Brook, Alledge Brook, Slade Brook and Willow Brook,

- The River Welland and its main tributary the River Jordan.

2.3.3 The watercourse network is shown in Figure 2-1



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Figure 2-1: North Northamptonshire Study Area and Watercourses

3 Existing Policies and Actions

3.1 Planning Policies and Actions

North Northamptonshire Adopted Core Spatial Strategy (2008)

- 3.1.1 The current JCS for North Northamptonshire was adopted in June 2008. It contains 17 key spatial planning policies which aim to deliver the vision and objective of the plan covering a plan period up to 2021. Some of the key policies linked into growth and development within the North Northamptonshire area are reviewed below.

Policy 1 – Strengthening the Network of Settlements

- 3.1.2 Policy 1 relates to settlements and advises that:

- *Development principally directed towards urban core with focus on growth towns of Corby, Kettering and Wellingborough with smaller towns providing secondary focus. Focus on town centre regeneration in order to provide jobs, services and promote self sufficiency;*
- *Growth towns to facilitate new SUE's as major locations for housing and employment. Development in rural north east to mainly be directed to rural service centres such of Oundle, Raunds and Thrapston with remaining rural development in village boundaries.*

Policy 5 – Green Infrastructure

- 3.1.3 Policy 5 relates to green infrastructure and states that:

- *As part of the green infrastructure framework, networks of sub-regional corridors have been identified that broadly follow the principal river valleys or their tributaries. The aim is to connect places to environmental spaces by linking locations with particular natural heritage, green space, biodiversity or other environmental interest. These corridors are the priority areas for investment and a focus for further enhancement.*
- *The framework is completed by a larger number of local corridors, which are zones within which a variety of land-uses, natural and built resources and settlement may be found.*

Policy 6 – Infrastructure Delivery and Developer Contributions

- 3.1.4 Policy 6 relates to funding mechanisms associated with infrastructure delivery and states that:

- *New development to be supported by associated delivery of infrastructure and services promoting self sufficiency and to secure a modal shift away from car use/road freight haulage;*
- *Progress on infrastructure delivery to be monitored and permissions to be phased to allow new infrastructure to be delivered against targets. Developers to contribute towards infrastructure provision on an individual or cumulative basis.*

Policy 7 – Delivering Housing

- 3.1.5 Policy 7 relates to housing delivery targets over the plan period stating that:

- *A total of 52,100 homes are to be delivered over the plan period up to 2021;*
- *Housing supply/delivery to be monitored to ensure a 5 year supply is maintained. SUE's to be phased in line with infrastructure requirement;*

- *SUE's to contribute a significant proportion of new housing up to the end of the plan period.*

3.1.6 Policy 7 also identifies the key strategic sites that will help to deliver the bulk of new housing growth through Sustainable Urban Extensions (SUE) which are identified in Table 3-1.

TABLE 3-1: SUE SITES IN THE NORTH NORTHAMPTONSHIRE AREA

SUE Location	Number of Dwellings
North East Corby	6,100
East of Kettering	5,500
Wellingborough East	3,100
NW of Wellingborough	3,000
Corby Western Urban extension	4,000
Total	21,700

Housing Deliverability Position Statement

March 2011

It should be noted that following the submission and review of the first draft of this document the dwellings outlined within Table 3-1 have now received planning permission which supersedes Figure 13 (Phasing of Sustainable Urban Extensions) of the core strategy. It should also be noted that the number of dwellings proposed within the Corby Western Urban extension could eventually be up to a maximum of 6,000.

Policy 8 – Delivering Economic Prosperity

3.1.7 Policy 8 relates to aspirations for economic growth targeting a net target increase of 47,400 jobs across all sectors. This will be delivered through maintaining a balance between homes and jobs and to create a diverse economic base. Investment in education and training will also be encouraged in order to create a resource of skilled workers and by association attract new businesses.

Policy 10 – Distribution of Housing

3.1.8 Policy 10 relates to the distribution of housing setting a hierarchy that focuses on the three growth towns, modest growth in smaller towns and rural service centres with limited development elsewhere. Indicative housing requirements at the district/borough level were set out and these are identified in Table 3-2.

TABLE 3-2: INDICATIVE HOUSING DISTRIBUTION AT BOROUGH/DISTRICT LEVEL

Local Authority	Number of Dwellings
Corby	16,800
Kettering	13,100
Wellingborough	12,800
East Northamptonshire	9,400
Total	52,100

Policy 11 – Distribution of Jobs

- 3.1.9 Policy 11 relates to the distribution of jobs and advises that new allocations will meet any shortfall in supply in locations around the main urban areas and SUE's, with large scale strategic distribution to be concentrated at the rail linked Eurohub site at Corby.

Policy 12 – Distribution of Retail Development

- 3.1.10 Policy 12 relates to the distribution of new retail development and advocates an approach which would see the town centres of Kettering, Corby and Wellingborough strengthened. Policy 12 also identifies provision to be made for a minimum net increase of comparison shopping floor space in the three towns as identified below:

- Kettering: 20,500 m²,
- Corby: 15,500 m²,
- Wellingborough: 15,500 m².

Policy 13 – General Sustainable Development Principles

- 3.1.11 Policy 13 relates to the general meeting of needs of residents and businesses without compromising the ability of future generations to enjoy the same quality of life that the present generation aspires to. In relation to meeting the needs within sustainable flood risk, policy 13 states that development should not cause a risk to (and where possible enhance) the quality of the underlying groundwater or surface water, or increase the risk of flooding on the site elsewhere, and where possible incorporate Sustainable Drainage Systems (SuDS) and lead to a reduction in flood risk.

3.2 Review of Existing Flood Risk Policies and Actions

North Northamptonshire Flood Risk Management Study (Royal Haskoning, 2007)

- 3.2.1 The North Northamptonshire FRMS (Royal Haskoning, 2007) formed the first iteration of the FRM strategy. Existing SFRA's for the four Councils formed the main evidence base for the study.
- 3.2.2 The key findings of the 2007 FRMS report are summarised below:
- Surface water management was found to be a key issue in all four council areas.
 - The study recommended that updates to the SFRA's are needed to fully comply with Planning Policy Statement 25: Development and Flood Risk (PPS25) to address the latest guidance on climate change, to assess all sources of flooding in more detail and to map functional floodplain.
 - At the time of the study, the Core Spatial Strategy for North Northamptonshire was emerging. The study found that the Councils had generally taken a sequential approach when identifying broad locations for the proposed SUE's.
 - Evidence of the Sequential Test undertaken by the Councils when identifying and allocating development sites was not available at the time of the study. It was recommended that further clarification and information on individual developments would be needed from the Councils to confirm the need for application of the Exception Test and any further modelling work.
 - The study recommended that a robust FRM strategy for North Northamptonshire would be needed, even if the development sites are located in low risk areas, in order to address extra runoff and residual risk issues resulting from planned growth proposals and the existing flooding problems on receiving watercourses.
- 3.2.3 The study outlined key requirements to be addressed by a flood risk management strategy, to be delivered through policies, planning conditions, physical measures, residual risk management and guidance.
- 3.2.4 The 2007 report recommended a strategy that:
- Implemented strategic flood risk management measures in advance or in parallel with the proposed developments in order to obtain financial contributions from prospective developers through Section 106 agreements including long term management.
 - Sought opportunities using a partnership approach across North Northamptonshire to avoid managing flood risk within individual administrative areas.
 - Provided a combination of source control and strategic SUDS measures within individual development sites where the opportunities for catchment-wide strategic measures are limited.
 - Incorporated sufficient capacity in strategic flood management measures allowing for planned growth and future climate change.

- Avoided a piecemeal approach to managing runoff from small individual sites whilst providing strategic and local green corridors to incorporate SUDS for managing additional runoff from new developments.
- Restored floodplains as land becomes available for redevelopment, through set back options and creation of green space.
- Incorporated SUDS within strategic and local green corridors where possible.
- Identified locations of known surface water flooding problems from sewers and overland flow routes and explores possible solutions for them through new development proposals.
- Recognised the importance of accommodating imminent development currently planned in North Northamptonshire ahead of the final JCS.

North Northamptonshire Detailed Water Cycle Strategy, incorporating the Flood Risk Management Investigation (Halcrow, 2009)

- 3.2.5 The North Northamptonshire Detailed WCS was commissioned and managed by the North Northants Development Company (NNDC) in partnership with the NN JPU, AWS and the EA. The purpose of the Detailed WCS was to identify the water services infrastructure requirements to support the levels of growth identified within the North Northamptonshire Core Spatial Strategy and also to provide a framework for the ongoing detailed technical work and delivery programme needed to achieve these requirements.
- 3.2.6 The WCS comprises an interactive pdf accompanied by six technical sections. The Flood Risk Investigation Report is the most relevant to this study as it provides an overview of flood risk in the study area and portrays the most recent (2009) FRM strategy for North Northamptonshire.
- 3.2.7 The 2009 report made a number of area-specific recommendations for strategic flood risk management within North Northamptonshire. The evidence base for the recommendations included existing datasets and new hydraulic modelling to test the effects of identified strategic flood risk management measures. The recommendations are summarised in Table 3-3.

TABLE 3-3: SUMMARY OF STRATEGIC FRM RECOMMENDATIONS TAKEN FROM THE 2009 NORTH NORTHAMPTONSHIRE FLOOD RISK MANAGEMENT INVESTIGATION

Development Area	Recommendation
River Ise and Slade Brook	<p>Storage on Slade Brook upstream of the railway culvert should be pursued as the preferred option. A design study should be commissioned to assess in more detail the required volumes and costs of the facility, sized to restrict flows to in the order of 2 m³/s with a variable control structure for real-time response to different duration events and rainfall sequences. The construction of this facility would relax requirements for developers in the River Ise catchment to attenuate flows to greenfield rates on-site, provided there is sufficient capacity in the sewer system to transport surface water to the river without flooding.</p> <p>Attenuating flows to 2 m³/s or lower should mitigate the effects of unattenuated runoff from development. However, further improvement to flood levels can be achieved through a second flood storage facility in the Thorpe Malsor and Cransley reservoirs catchment. A study should be commissioned by the developers and the EA to assess in more detail the costs, benefits and locations for flood storage facilities, including an extension to the Slade Brook model. This could be achieved through proposed road works to the A43, or by alterations to the operation of the two disused public water supply reservoirs. Storage in the Thorpe Malsor and Cransley reservoirs catchment cannot fully mitigate the effects of development. Therefore this option could not be used as an alternative to storage upstream of the railway culvert.</p>

TABLE 3-3: SUMMARY OF STRATEGIC FRM RECOMMENDATIONS TAKEN FROM THE 2009 NORTH NORTHAMPTONSHIRE FLOOD RISK MANAGEMENT INVESTIGATION

Development Area	Recommendation
Harrowden Brook	Further investigations should be made by the developers and EA into the potential opportunities for reducing flood levels downstream of the Castleridge site by enhancing the Harrowden Road flood storage reservoir. The existing model constructed by Peter Brett Associates for the Borough Council of Wellingborough (December, 2002) should be updated and extended with additional downstream survey to the confluence with the River Ise in order to include critical locations in the industrial estate. Possible backwater effects from the River Ise should be considered and the residual risks of a series of extreme events should be accounted for by designing improvements to the facility to be capable of storing 80% of additional run-off from a 1 in 10 year flood occurring 24 hours after the top water level being attained for the design event.
	This study should be extended to examine the impacts of relative timings of inflows from the Hatton Park tributary. The residual effects of SUDS measures on the tributary hydrographs should be examined to ensure the phasing of inflows is not altered so as to unintentionally increase peak flood levels downstream.
Swanspool Brook	A flood storage reservoir currently exists on Swanspool Brook upstream of the A4500. The operation and standards of protection afforded by this reservoir are currently unknown and further investigations are required to assess any options for improvement.
Alledge Brook	As the Kettering East site overlies permeable geology, infiltration SUDS may be used, depending on more detailed site investigations. However, there may also be potential for strategic flood mitigation storage to be included on the site. The site overlays the most westerly tributary of Alledge Brook, which contributes approximately 40% of flows from the upstream catchment to Cranford St. Andrew and Cranford St. John. Flood risk to these villages is currently unknown, but a hydraulic study of the watercourse has been recently commissioned by the EA to improve flood mapping along the 'Main River' section. It is recommended that this study is extended to examine options for strategic flood storage within the Kettering East site.
Rushden, Higham Ferrers, Irthlingborough and Raunds	A number of developments are planned for the four town's area and therefore it is expected that a Surface Water Management Plan (SWMP) for North Northamptonshire will consider the highlighted areas to identify existing flood risks and potential mitigation strategies. It was recommended that the developers in Rushden, Higham Ferrers, Irthlingborough and Raunds abide by the findings of that study and in the interim period, attenuate surface water runoff to greenfield rates and volumes using on-site SUDS measures.
Thrapston and Oundle	Allowing a more rapid run-off of surface water could reduce flood risk in the River Nene, because the time between the arrival of flood peaks would be increased and greater floodplain storage volume would be available for the later main river peak. Therefore, if it can be shown that direct discharge to the River Nene will have no adverse effects on local flood risk, urban drains and watercourses, it may be possible for developments to discharge directly to the River Nene without on-site attenuation. However, careful consideration will have to be given to managing the water quality of the run-off. Developments not providing on-site attenuation would instead contribute a commuted sum towards future projects to enhance floodplain storage along the River Nene corridor.

Corby Phase 2 Water Cycle Study (Halcrow, 2006)

- 3.2.8 The Corby Phase 2 WCS (Halcrow, 2006) was completed in 2006. The WCS examines flood risk issues for Corby in detail in the context of proposed developments, and proposes a schedule of mitigation works to mitigate the effects of development and climate change.
- 3.2.9 A key objective of the Phase 2 WCS was to reassess the strategic flood mitigation measures that were proposed during Phase 1 of the study. This was achieved by constructing an integrated surface water (1D-2D, Estry-Tuflow) hydraulic model that represented the river channels and storm sewers in Corby to identify overland flow paths. The effects of development and climate change were assessed using the hydraulic model. Modelling showed that large parts of the town are at risk of flooding from the sewer network, though to shallow depths of typically < 0.25 m. Areas of deeper flooding are generally confined to the river channels.
- 3.2.10 A plan and timeline for development and infrastructure provision is included in the WCS, along with costs and a spend profile.
- 3.2.11 Future key actions in relation to flood risk management include:
- Maintain watercourses and restore to a satisfactory standard as a matter of urgency,
 - Re-assess calibration of hydraulic models (especially for storm water drainage) as subsequent events occur,
 - Commence works to Weldon Flood Storage Reservoir (FSR), channel widening / crossing widening measures and railway culvert as soon as possible,
 - Establish a maintenance company to look after all the flood mitigation measures provided and keep on top of maintenance,
 - Government will need to provide up-front funding to start the process.
- 3.2.12 It should be noted that Corby WCS (2006) findings and recommendations were incorporated into the 2009 North Northants WCS.
- 3.2.13 It is also prudent to note that following on from the Corby WCS, Atkins are currently in the process of undertaking some additional analysis on behalf of the CBC to assess the cost and model the effects of increasing the capacity of a culvert on Willow Brook under the steelworks railway embankment in connection with the Weldon FSR upgrading scheme. The current flow restriction is giving rise to a flood risk to the STW and is also likely to restrict development growth in Corby in the future until the issue is resolved.

Nene Flood Storage Study (NFSS, Royal Haskoning, 2011)

- 3.2.14 The Nene Flood Storage Study (NFSS) was commissioned by the EA. The objective of the NFSS is to identify, at a catchment-wide strategic level, the opportunities within the Nene catchment for storing floodwater to provide overall flood risk reduction and, where achievable, wider environmental benefits. The study investigated engineered Flood Storage Areas (FSAs) and considered opportunities for maximising use of the floodplain. Furthermore, the study prioritised suitable locations for strategic flood storage.
- 3.2.15 Three of the twelve flood storage opportunities that were identified by the study are located within North Northamptonshire and would have a beneficial impact for the study area.

- 3.2.16 The Kettering flood storage opportunity at Glendon Hall, located to the north of Kettering, would provide on-line flood storage upstream of Kettering on Slade Brook. Downstream communities, including Kettering town centre and parts of Wellingborough, would benefit from the scheme.
- 3.2.17 The Northampton to Thrapston Gravel Pits flood storage opportunity would maximise the volumes available in the floodplain. Wellingborough, Thrapston and other downstream communities along the River Nene would benefit from the scheme.
- 3.2.18 The flood storage opportunity at Finedon would provide on-line storage upstream of Wellingborough on the River Isle. The scheme would benefit the Finedon Road Industrial Estate and Wellingborough.

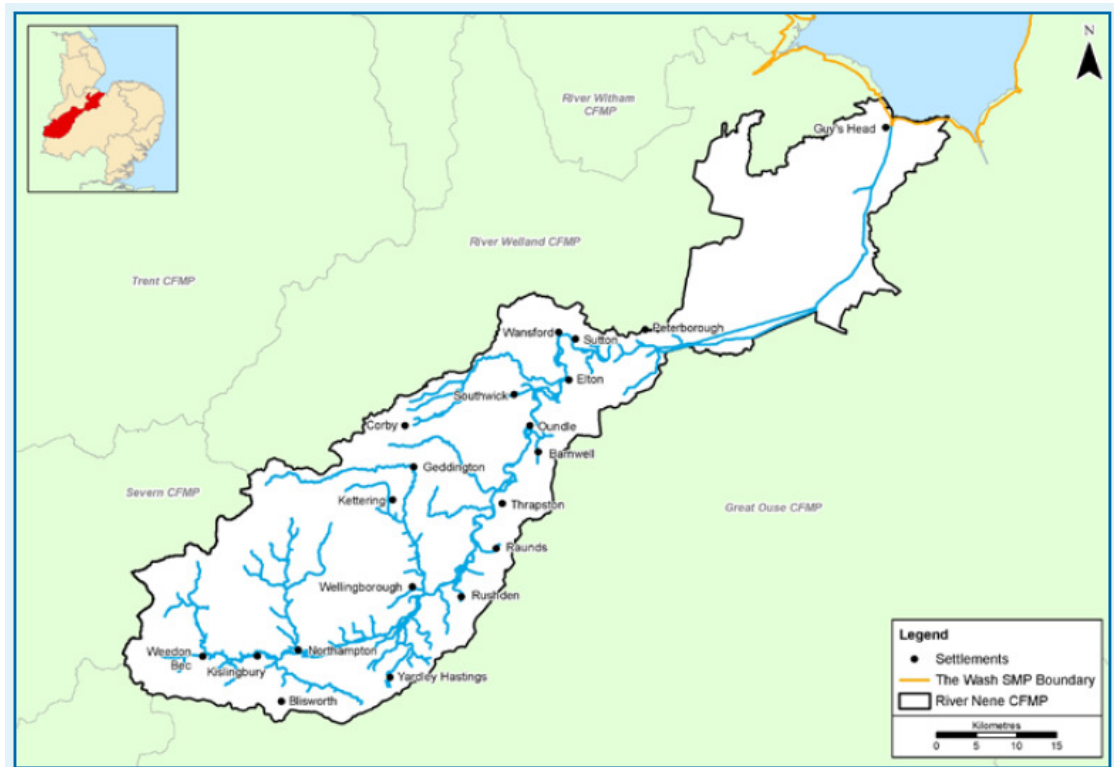
Catchment Flood Management Plans

- 3.2.19 CFMPs are key strategic documents that outline future flood risk management policies on a catchment by catchment basis. The Nene CFMP, River Welland CFMP and Great Ouse CFMP cover the study area. The vast majority of the study area however is covered by the River Nene CFMP and has therefore been the focus of this CFMP policy review. However, a brief overview of the River Welland and Great Ouse CFMPs has also been included within this policy review.
- 3.2.20 Each CFMP gives an overview of flood risk in the catchment and sets out the preferred plan for sustainable flood risk management over the next 50 to 100 years. CFMPs have been prepared in partnership with regional and local planning authorities, community and environment groups and other stakeholders. Local flood risk management strategies for North Northamptonshire should reflect the policies set out in the CFMPs.

River Nene CFMP

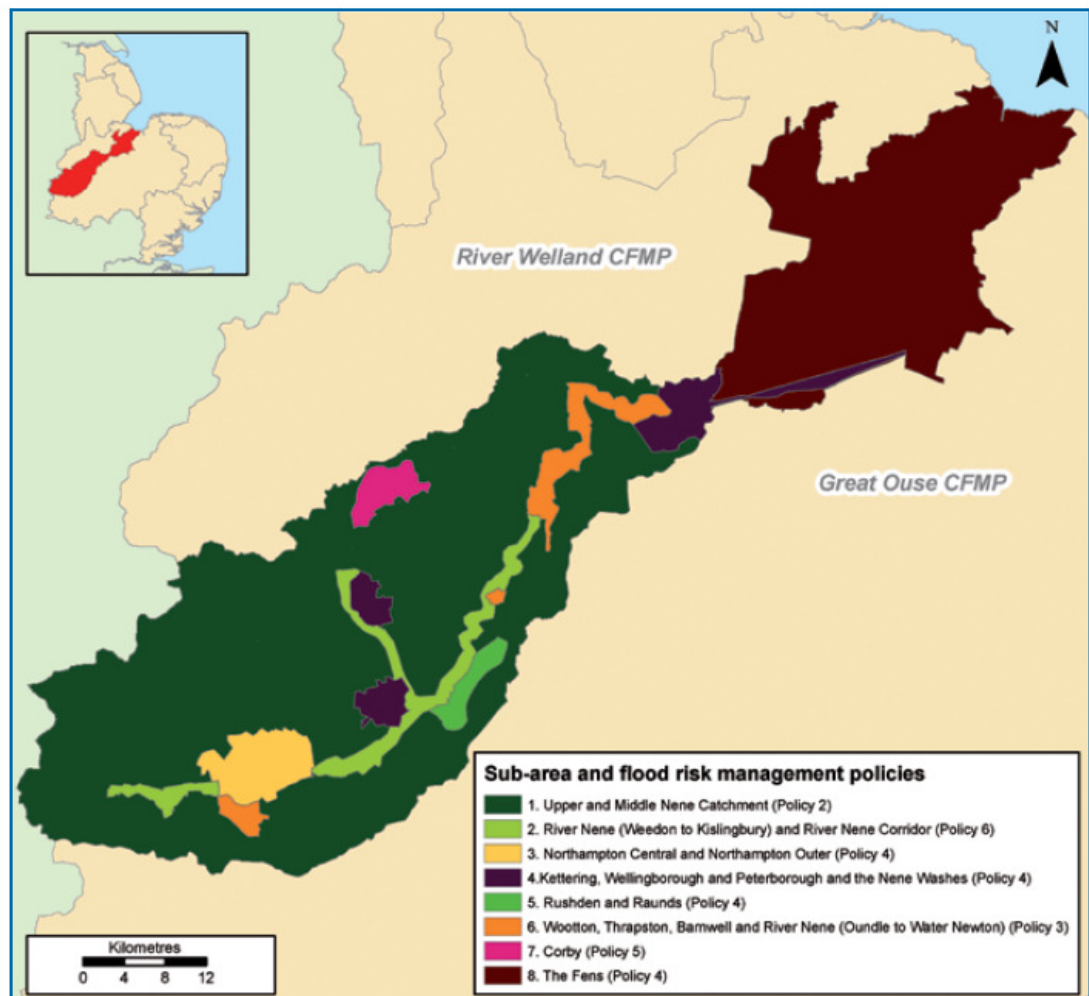
- 3.2.21 The EA has formally agreed the River Nene CFMP. The plan was signed off by the Anglian Regional Director on the 30th September 2008 and was agreed by the Anglian Regional Flood Defence Committee (RFDC) on the 24th August 2009. Figure 3-1 shows the area extent of the River Nene CFMP.

Figure 3-1: Location and Extent of the River Nene CFMP area



- 3.2.22 The CFMP has been prepared in partnership with regional and local planning authorities, community and environmental groups and other stakeholders. Local flood risk management strategies for North Northamptonshire should reflect the policies set out in the CFMP.
- 3.2.23 The River Nene catchment has been divided into eight distinct sub-areas which have similar physical characteristics, sources of flooding and level of risk. Each sub-area has then been allocated one of six generic flood risk management policies. These are shown in Figure 3-2.

Figure 3-2: Location of sub-areas and flood risk management policies



3.2.24 The policies contained within the Nene CFMP that are pertinent to the study area and which need to be taken into account in the strategic flood risk management strategy for North Northamptonshire are included below:

Upper and Middle Nene Catchment (Policy 2): Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.

The Key Messages:

- Where feasible, flood risk management activities will be reduced as the current activity to manage flooding is out of proportion with the level of flood risk,
- Reducing bank and channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain,
- Maintain flood warning infrastructure (such as river flow gauging stations) to ensure that an effective flood warning service can be provided throughout the catchment.

Proposed Actions to Implement the Preferred Policy:

- Investigate options to cease or reduce current bank and channel maintenance and flood defence maintenance. In addition, changes in land use, development of sustainable farming practices and environmental enhancement should be investigated to mitigate an increase in flooding in the future,
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans,
- Continue maintenance and inspection of Grendon Brook Villages, Great Oakley and Clipston flood storage reservoirs and Geddington flood relief channel,
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding,
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in PPS25. Any new development should be targeted to areas with lowest flood risk,
- Encourage planners to develop policies for regeneration and redevelopment of commercial sites to incorporate resilience measures so that location, layout and design of development can help to mitigate residual flood risk. Regeneration and redevelopment should also provide opportunities to improve the environment and make space for water.

River Nene Corridor (Policy 6): Areas of low to moderate flood risk where we will take action with others to store water or manage runoff in locations that provide overall flood risk reduction or environmental benefits.

The Key Messages:

- Storing water on the floodplain in these areas can reduce flood risk to settlements downstream,
- Development that affects the ability of the floodplain to retain water should be prevented,
- Maintenance work on rivers should aim to increase the capacity of the floodplain to retain water,
- Storing water on the floodplain could provide long-term benefits for the river environment and wetland habitats.

Actions Specific to River Nene Corridor:

- Identify opportunities where bank and channel maintenance can be reduced to improve the flow between the river and its floodplain to increase water storage on the natural floodplain,
- Encourage planners to prevent new development within the floodplain. The floodplain should be maintained as an asset to make space for water,
- Encourage planners to develop policies for regeneration and redevelopment of commercial sites to incorporate resilience measures so that the location, layout and design of development can help to mitigate residual flood risk,

- Regeneration and redevelopment should also provide opportunities to improve the environment and make space for water,
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.

Nene Catchment Flood Management Plans Position Statement

March 2011

It should be noted that while the policy of reducing bank, channel and flood defence maintenance to promote the improved interaction, naturalisation and flood storage capacity of the River Nene and its floodplain has been identified as a recommended action within the Nene CFMP, the primary focus of development within this FRMS update is within the sustainable urban extensions outside of the rural sections of the River Nene Flood corridor. Subsequently, some of the flood mitigation measures outlined within the Nene CFMP are therefore relevant only in the case of mitigating flood risk within predominantly rural environments and may therefore be contradictory to the management of flood risk quoted later on in this report, particularly with regard to channel maintenance programmes which are considered necessary to improve the conveyance of flood flows within urban centres where significant development restricts the availability of natural floodplain storage.

Kettering, Wellingborough (Policy 4): Areas of low, moderate and high flood risk where we are already managing the risk effectively but where we may need to take further actions to keep pace with climate change.

The Key Messages:

- Where possible, future flood risk should be managed by storing water on the floodplain upstream of settlements at risk,
- Any redevelopment of floodplain areas is an opportunity to increase their flood resilience,
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding,
- Flood awareness plans will be used to manage the consequences of flooding.

Proposed Actions to Implement the Preferred Policy

- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk,
- Planners should prevent inappropriate development in the floodplain using measures set out in PPS25 and ensure that any new development does not increase the risk to existing development.
- Any new development or regeneration should provide opportunities to improve the river environment and make space for water,
- Reduce the consequences of flooding by: improving public awareness of flooding; encouraging people to sign up to, and respond to, flood warnings; and by improving local emergency planning for critical infrastructure at risk,

- Work with partners to investigate the options for managing urban drainage issues and surface water flooding. Where strategies, including water cycle strategies, have been developed, organisations need to work together to implement the recommendations made,
- Develop a flood storage study to investigate the feasibility of creating storage areas, natural or engineered, within the River Nene (Weedon to Kislingbury) and River Nene corridor sub-area to manage future flood risk within these settlements,
- Continue with the current flood risk management activities through these settlements.

Rushden and Raunds (Policy 5): Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

The Key Messages:

- Future flood risk should be managed by opening up river channels and re-creating river corridors so there is more space for rivers to flow,
- Flood risk management planning needs to be linked closely with regeneration and redevelopment so that the location and layout of development can help to reduce flood risk,
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding,
- Flood awareness plans will be used to manage the consequences of flooding.

Proposed Actions to Implement the Preferred Policy:

- In the short term, continue with the current flood risk management activities,
- Investigate the feasibility of increasing the passage of water along Skew Bridge Dyke and Hog Dyke to manage future flood risk,
- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk,
- Planners should prevent inappropriate development in the floodplain using measures set out in PPS25 and ensure that any new development does not increase the risk to existing development,
- Encourage planners to develop policies for new development and regeneration to provide opportunities to recreate a river corridor and make space for water,
- Reduce the consequences of flooding by: improving public awareness of flooding; encouraging people to sign up to, and respond to, flood warnings; and by improving local emergency planning for critical infrastructure at risk,
- Work with partners to investigate the options for managing urban drainage issues and surface water flooding. Where strategies, including water cycle strategies, have been developed, organisations need to work together to implement the recommendations made.

Wootton, Thrapston, Barnwell, R Nene (Oundle to Water Newton) (Policy 3): Areas of low to moderate flood risk where we are generally managing existing flood risk effectively.

The Key Messages:

- The current level of flood risk management should be continued in these settlements,
- In some areas there may be alternative, more appropriate ways to manage flood risk at the current level,
- Any new development or re-development should be resilient to all sources of flooding.

General Actions across the Sub-Area:

- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans,
- Work with planners to influence the location, layout and design of new and redeveloped property,
- Ensure that only appropriate development is allowed on the floodplain through the application of PPS25.

Actions Specific to Thrapston:

- In the short term, continue with the current flood risk management activities,
- In the longer term, consider alternative, more appropriate ways to manage flood risk at the current level by taking into account potential benefits from future upstream storage areas,
- Work with partners to develop an emergency response plan to manage flood risk from the defences failing or being overwhelmed.

Actions Specific to Barnwell:

- Continue with the current flood risk management activities.

Corby (Policy 5): Areas of moderate to high flood risk where we can generally take further action to reduce flood risk.

The Key Messages:

- A study for Corby will investigate how flood risk in the town should be managed,
- Flood risk management planning needs to be linked closely with regeneration and redevelopment so that the location and layout of development can help to reduce flood risk,
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding,
- Flood awareness plans will be used to manage the consequences of flooding.

Proposed Actions to Implement the Preferred Policy:

- Develop a study for Corby to investigate how flood risk in the town should be managed. The study should investigate the possibility of building new flood defences through the town,
- Continue with the flood warning service including the maintenance of flood warning infrastructure for example, river flow gauging stations,
- Develop a flood awareness plan to encourage people to sign up to, and respond to flood warnings. The flood awareness plan will inform people about actions they can take to protect themselves and their property,
- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk. Planners should prevent inappropriate development in the floodplain using measures set out in PPS25 and ensure that any new development does not increase the risk to existing development. Any new development or regeneration should provide opportunities to improve the river environment and make space for water,
- Work with partners to develop an emergency response plan for critical infrastructure and transport links at risk of flooding,
- Work with our partners to put in place the recommendations from the Corby WCS to ensure that water resources and flood risk management issues can be addressed in a sustainable way to accommodate future planned growth.

River Welland CFMP

- 3.2.25 The Upper Tributaries sub-area of the River Welland CFMP extends just inside the council boundaries of Corby, Kettering and East Northants along the northern boundary of the study area. The EA has formally agreed the River Welland CFMP. The plan was signed off by the Anglian Regional Director on the 30th September 2008 and was agreed by the Anglian Regional Flood Defence Committee (RFDC) on the 24th August 2009.
- 3.2.26 The policies contained within the River Welland CFMP that are pertinent to the North Northants study area and which need to be taken into account in the strategic flood risk management strategy for North Northamptonshire are included below:

Upper Welland Catchment (Policy 2): Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.

The Key Messages:

- Where feasible, flood risk management activities will be reduced as the current activity to manage flooding is out of proportion with the level of flood risk,
- Reducing bank and channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain,
- Maintain flood warning infrastructure (such as river flow gauging stations) to ensure that an effective flood warning service can be provided throughout the catchment.

Proposed Actions to Implement the Preferred Policy:

- Investigate options to cease or reduce current bank and channel maintenance and flood defence maintenance. In addition, changes in land use, development of sustainable farming practices and environmental enhancement should be investigated to mitigate an increase in flooding in the future,
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans,
- Continue maintenance of Rutland Water. Anglian Water must carry out their duties under the Reservoirs Act,
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in PPS25. Any new development should be targeted to areas with lowest flood risk, must not increase risk to existing development and should provide opportunities to improve river environments.

Great Ouse CFMP

- 3.2.27 The Great Ouse CFMP northern boundary just crosses into small areas of the southern boundary of the NN SFRM study area. The EA has formally agreed the Great Ouse CFMP. The plan was signed off by the Anglian Regional Director on the 26th July 2010 and was agreed by the Anglian Regional Flood Defence Committee (RFDC) on the 22nd July 2010.
- 3.2.28 The policies contained within the Ouse CFMP that are pertinent to the study area and which need to be taken into account in the strategic flood risk management strategy for North Northamptonshire are included below:

Bedford Ouse Rural and Eastern Rivers (Policy 3): Areas of low to moderate flood risk where we are generally managing existing flood risk effectively.

The Key Messages:

- Organisations must work together to continue current levels of flood risk management where flood risk is more concentrated (for example in towns and villages) and seek opportunities to review the approach in areas where the flood risk is lower.

Strategic Flood Risk Assessments

- 3.2.29 SFRAs are at the core of the approach advocated by PPS25. They provide the essential information on flood risk, taking climate change into account, to allow the LPA to understand the risk across its area so that the Sequential Test can be properly applied.
- 3.2.30 Each of the four LPAs within North Northamptonshire have undertaken SFRAs and are at varying stages within the SFRA process:

East Northamptonshire SFRA

- 3.2.31 ENC completed an SFRA in 2006 under Planning Policy Guidance Note 25: Development and Flood Risk (PPG25)¹. At the time of completion the SFRA was sound and fulfilled the requirements of PPG25. The 2007 FRMS (Royal Haskoning, 2007) provides a comprehensive review of the 2006 East Northamptonshire SFRA.
- 3.2.32 Shortly after the completion of the 2006 East Northamptonshire SFRA, PPS25 was released, superseding PPG25. ENC reviewed and updated the 2006 SFRA to meet the requirements of PPS25. The Level 1 SFRA update was released in Autumn 2011 and has been briefly summarised below;

East Northamptonshire Level 1 SFRA Update

- 3.2.33 The Level 1 SFRA for East Northamptonshire Council was published in August 2011 and will contribute to the evidence base for the plan-making process of the Local Development Framework (LDF).
- 3.2.34 The purpose of the Level 1 SFRA is to collate existing data and information with respect to flood risk, sufficient to enable the application of the Sequential Test by the Council, i.e. to steer development towards areas of lowest flood risk. It is the role of the Council to undertake the application of the Sequential Test within their administrative area and guidance to assist in this process is included within the SFRA.
- 3.2.35 The majority of the study area falls within the middle reaches of the River Nene catchment. The north of the study area drains to the River Welland Catchment, whilst a small number of minor watercourses at the southern and eastern extents of the study area drain to the River Great Ouse Catchment.
- 3.2.36 The SFRA assesses risk in relation to flooding from Fluvial, Surface Water, Sewers, Groundwater and Artificial Sources. In addition, reservoirs within the study area and in the upstream catchment present a residual flood risk in the event of a breach.
- 3.2.37 The main sources of flooding within the study area are from fluvial and surface water sources, with the SFRA stating that there have been a number of reported incidents of flooding from different sources within the ENC study area. The majority of recorded historical flooding in the study area is from fluvial sources: Urban development in the floodplain, insufficient channel capacity and inadequate culvert capacity being the main issues.
- 3.2.38 Surface water flooding, which includes direct runoff, inadequate stormwater drainage and land drainage is also a significant flood source within the study area. The majority of the study area is situated within the middle Nene catchment. Major catchment wide flooding occurred in 1947 following a period of rapid snowmelt and rainfall. More recently, in Easter 1998, significant flooding occurred throughout the central England following heavy and prolonged rainfall.
- 3.2.39 Sewer and pluvial/surface water flood risk is identified as an issue in the settlements of Rushden, Raunds, Irthlingborough, Glapthorn and Oundle. In addition to the areas identified in the WCS, Anglian Water data shows that Brigstock, Islip, Denford, Nassington, Ringstead and Thrapston have also experienced sewer flooding. Rushden and Raunds are considered to have the greatest risk of surface water flooding within the district. These settlements are

¹ PPG25 preceded PPS25

served by both combined and surface water sewer networks. Where future development is proposed, sewer networks may need to be upgraded to ensure sufficient capacity is maintained. The effects of climate change may also place further pressure on sewer systems with predictions of milder wetter winters and increased rainfall intensity in summer months. This combination is likely to result in more frequent sewer flooding. Developers should consult the Water Company to establish what capacity there is and provide evidence as part of their FRA's of any agreements. This is particularly pertinent in Rushden and Raunds.

Corby SFRA

- 3.2.40 CBC completed an SFRA in 2006 under PPG25. At the time of completion the SFRA was sound and fulfilled the requirements of PPG25. The 2007 FRMS (Royal Haskoning, 2007) provides a comprehensive review of the 2006 Corby SFRA.
- 3.2.41 Shortly after the completion of the 2006 Corby SFRA, PPS25 was released, superseding PPG25. CBC has recently reviewed and updated what was the Stage 2 SFRA to ensure that it meets the requirements of PPS25. The Level 2 Corby Borough SFRA (Atkins) Update was completed in July 2011. This document does not appear to have been released for public viewing at the time of writing. The EA have confirmed that the study does not distinguish flood zone 3a from flood zone 3b (Functional Floodplain). This means therefore, that all of flood zone 3 is considered to be functional floodplain, unless proven otherwise by developers with suitable modelling. Also, neither the flood outlines from the EA nor those utilised within the Corby WCS extend to cover the western expansion area. Therefore a 30m buffer zone either side of the watercourse has been proposed to represent a conservative Flood Zone 2. Surface water runoff in the same area was to be throttled to either 2l/s/ha or 2.7l/s/ha, to be agreed with CBC. Elsewhere in Corby runoff was to be restricted to 2l/s/ha to provide betterment in relation to surface water flood risk.

Kettering and Wellingborough SFRA

- 3.2.42 KBC and WBC completed a Level 1 SFRA update in February 2011 (Royal Haskoning, 2011). The aim of the level 1 SFRA update was to collate and consider all sources of flood risk information gained through consultation with the EA, AW, NCC, KBC and WBC to inform land allocation and future flood risk management needs within the Boroughs in line with the requirements of PPS 25.
- 3.2.43 In terms of flood risk, the SFRA highlights that fluvial flooding from the River Nene and its tributaries has historically been the dominant source of flood risk, with significant flooding occurring in March 1947, Easter 1998 and July 2007. In urbanised areas such as Kettering and Wellingborough, watercourses are heavily culverted and the subsequent risk of blockage high. With the impact of future climate change, the risk to the Boroughs in terms of fluvial flood risk is set to increase.
- 3.2.44 Surface Water Flooding has also been identified as a key constraint on development. A number of instances of surface water flooding have been reported, most of them occurring in the larger settlements of Kettering and Wellingborough. New developments will therefore need to address surface water management, ensuring that, at the very least runoff from new development is not increased and, if possible, is reduced. This will be achieved through careful design of the site lay-out and drainage system, giving due consideration to the implementation of SuDS solutions where appropriate. Detailed site investigation and infiltration tests will be needed to clarify the permeability of the soil and design infiltration systems.

- 3.2.45 Within the River Nene Corridor, joint-working between the EA, the River Nene Wildlife Trust (RNWT) and AW should be promoted to maximise opportunities for a green corridor and deliver benefits for flood risk reduction, water quality, amenity and habitat improvement.
- 3.2.46 The risk of groundwater flooding has generally been deemed to be low although use should be made of local, site-specific information in the preparation of FRAs to ensure this source of flood risk is appropriately addressed.
- 3.2.47 The Level 1 SFRA update identified that, at present, there is no requirement for a Level 2 SFRA for Wellingborough and that a Level 2 SFRA had already been completed for Kettering Town Centre in April 2010.

Kettering Town Centre Level 2 SFRA

- 3.2.48 The Kettering Town Centre Level 2 SFRA (Royal Haskoning, 2010) has concluded that Kettering Town Centre contains localised areas that are prone to flooding from a range of sources including rivers, sewers and surface water. The dominant sources of flooding are from the Slade Brook which runs through the centre of Kettering, and also surface water flooding relating to inadequate drainage systems.
- 3.2.49 As part of the regeneration of Kettering Town Centre, KBC has proposed new developments that are at risk of flooding. The Level 2 SFRA assessed these sites in terms of flood risk and hazard. Of the proposed developments that were assessed, all sites at risk of flooding are only partially inundated, providing the potential for application of the sequential approach within the developments.
- 3.2.50 The SFRA identified that, in order to meet PPS25 requirements of allocating safe development where the likelihood of flooding at the development and consequences of flooding are acceptable for vulnerability of the development, there are options available to mitigate flood risk. The Level 2 SFRA in particular recommended that a whole catchment approach would be the most sustainable solution, not only to mitigate against flooding, but also to reduce flooding elsewhere as a result of new development.
- 3.2.51 The Level 2 SFRA explored the requirements for flood storage at a suitable site upstream of Kettering on the Slade Brook and assessed the impacts this would have on flood risk throughout the town centre. Results indicated that the implementation of such a measure would provide all development sites with a standard of protection up to a 1% AEP (1 in 100yr) flood event with climate change. Furthermore, this upstream measure would also provide the opportunity for the implementation of strategic Sustainable Drainage Systems (SUDS) along the Slade Brook corridor, which could be assessed through the development of a Surface Water Management Plan.
- 3.2.52 The SFRA also demonstrated that there is an opportunity for implementation of strategic SuDS along the Slade Brook Corridor to reduce runoff from potential development sites and recommended that a SWMP be developed for Kettering Town Centre.

Kettering Town Centre SWMP

- 3.2.53 KBC is carrying out a SWMP between Jan 2012 and April 2013. This will identify issues in the Town Centre and may provide some overlap with fluvial issues. This study may therefore feed into any solution for the Slade Corridor.

4 Emerging Spatial Options and Flood Risk Management

4.1 Overview of Emerging Spatial Options

- 4.1.1 Balancing homes with jobs is a key objective of the adopted JCS in order to ensure that North Northamptonshire does not become more dependent upon out-commuting. The adopted JCS is based on the regional plan targets of 47,400 jobs and 52,100 homes by 2021. The distribution of new jobs and homes in the JCS reflects the planned roles of different areas and studies of their economic potential. It has a strong focus on the three Growth Towns, of which Corby is expected to provide the most new homes and Kettering the most new jobs.
- 4.1.2 The revocation of the Regional Plan will give flexibility to reconsider the amount and distribution of new jobs and homes, including the role of East Northamptonshire, which is played-down in the adopted JCS, but has accommodated significant additional housing and jobs in the past.
- 4.1.3 In preparing the replacement JCS, consideration has been given to reasonable alternatives for delivering the spatial vision and objectives for North Northamptonshire.
- 4.1.4 During an intensive stakeholder workshop (the Place Making Workshop in March 2010), a number of spatial options were developed. The spatial options were developed by:
- Dividing North Northamptonshire into logical building blocks,
 - Outlining the current balance of jobs, homes and workers in each,
 - Identifying homes and jobs requirements to be used to describe the different spatial options for the area,
 - Setting out how the balance between workers and jobs in each sector might change under different spatial options.
- 4.1.5 Four distinct spatial options were developed and are summarised below. As part of this FRM update and through the stakeholder workshop held as part of this strategy, the risk implications of flooding from fluvial, groundwater and land sources for each of the emerging spatial options are identified. It should be noted that the impact and risk of flooding arising from the sewer system has been highlighted in all of the options and has therefore been discussed separately as management of this flood risk is generic within all options.

4.2 Common Flood Risk and management options

- 4.2.1 Flooding from sewers has been raised as a significant barrier to future development throughout the spatial framework options which includes the 'Core' development centres of Corby, Kettering, Wellingborough and Rushden as outlined in spatial options A, B, C and D, along with the Four Towns area outlined in spatial option C.
- 4.2.2 The historical sewer flooding issues in these areas have been identified in the relevant SFRAs and during Workshop 1. The Kettering and Wellingborough SFRA and Corby WCS identify that both Kettering and Corby experience surface water flooding in relation to inadequate drainage systems, a factor also highlighted as a problem within the Kettering Town Centre Level 2 SFRA.

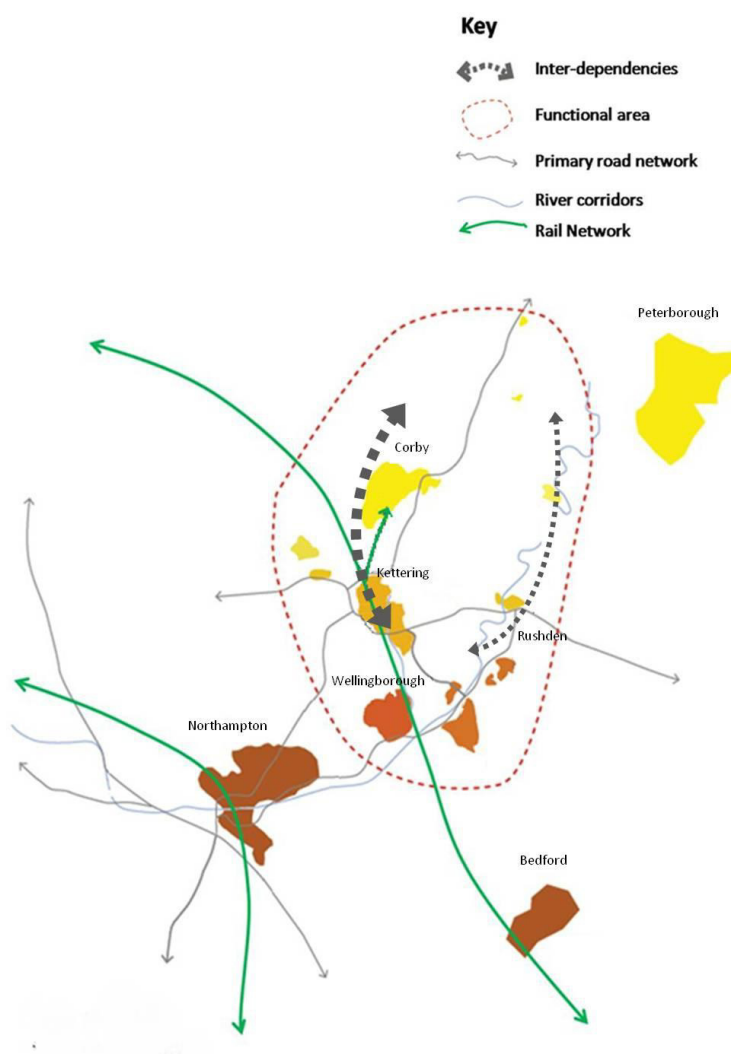
- 4.2.3 The Corby WCS undertook hybrid hydraulic modelling of the sewer network and river systems in Corby town. The modelling showed that, excluding development and climate change, large parts of the town are at risk of flooding from the sewer network during the 1% AEP (1 in 100 chance) flood event, though mostly to shallow depths (< 0.25 m). Areas of deep flooding are generally confined to river channels.
- 4.2.4 As a result of this modelling, the Corby WCS identifies a programme of works, which includes upgrading drainage systems and it is necessary that these upgrades, or the further investigation into the scale, cost and delivery of such upgrades, be implemented to allow for the further development proposed under Options A through E to commence.

4.3 Option A: Core Strategy Plus

Overview

- 4.3.1 This option is based on the current JCS but with a greater role for Rushden and more detail for the rural areas and small towns. Settlements work as a network, providing a complementary range of facilities and services to make North Northamptonshire more self reliant. The 'Urban Core' with the main towns of Corby, Kettering, Wellingborough and Rushden is the focus of development, providing jobs and services to compete with Northampton and other larger centres. A 'Rural Service Spine' of settlements extending from Raunds up to Kings Cliffe meets day-to-day needs in the rural north-east. Figure 4-1 shows a schematic to represent the themes outlined in Option A.

Figure 4-1: Option A, Core Strategy Plus



**Source: Spatial Options for North Northamptonshire Discussion Paper NN JPU
September 2011**

- 4.3.2 The distribution of new housing in this option reflects that in the current JCS, but with a slightly higher share for the Four Towns area (Rushden, Higham Ferrers, Irthlingborough and Raunds)

of East Northamptonshire and a corresponding reduction for Wellingborough. This recognises the potential for Rushden to grow and to take a stronger role.

Flood Risk Management

Flooding from Rivers

- 4.3.3 Generally, the proposed development areas as part of Option A are not at significant risk of flooding from rivers (fluvial flooding). Of the broad growth areas that are at risk of fluvial flooding, only a small proportion of the site is at risk. An example of this is the Wellingborough East SUE, which is partly located within Flood Zone 2 (medium probability of flooding) and Flood Zone 3 (high probability of flooding) associated with the River Ise and River Nene, though large parts of the site are located within Flood Zone 1 (low probability of flooding). Therefore, there would be opportunities to apply the sequential approach advocated in PPS25 within sites, where the highest vulnerability land uses are located within the areas of lowest flood risk. Parts of the site that are at higher risk of fluvial flooding could be used for water compatible uses such as public amenity open space. Opportunities for open space and flood storage in these areas could link to green infrastructure and should be explored as part of the master planning process.
- 4.3.4 The strategic flood storage area identified on Slade Brook in the EA NFSS may have a direct beneficial impact on the River Ise and River Nene and therefore benefit growth proposed in Wellingborough. Due to its location within the catchment, the FSA could not provide a direct benefit to the proposed Kettering East SUE. However, it would benefit Kettering Town Centre, which would bring regeneration benefits to the local area, with subsequent socioeconomic improvements for the broad growth area.
- 4.3.5 The existing FRM strategy (Halcrow, 2009) identified that the Kettering East SUE may provide opportunities for strategic storage in the Alledge Brook catchment to manage flood risk to downstream areas such as Thrapston, Oundle and smaller settlements. The strategic storage could be of benefit to both fluvial and surface water / sewer flood risk and the 'Rural Service Spine' proposed under Option A. NB: The planning permission for Kettering East includes a condition for the provision of a flood enhancement scheme. Indicative layout plans for the proposal include areas of open space adjacent to the river corridor which have the potential to accommodate a scheme.

Flooding from Sewers

- 4.3.6 Flooding from sewers is an issue in the 'Urban Core', which includes Corby, Kettering, Wellingborough and Rushden. The historical sewer flooding issues in these areas has been identified in the relevant SFRAs and during Workshop 1, as detailed in Section 4.2.
- 4.3.7 The risk of flooding from sewers should be considered if this spatial option is to be taken forward. Opportunities for strategic-scale SUDS and sewer upgrades should be explored, as investment may be required to ensure that sewer capacity issues are not exacerbated. Separation of surface water from combined systems may have a significant part to play in regeneration schemes.

Flooding from the Land

- 4.3.8 The EA's Flood Map for Surface Water (FMfSW) shows that surface water flooding in North Northamptonshire is generally confined to low lying areas, including river valleys. The FMfSW shows parts of Rushden to be at risk of surface water flooding, which is supported by anecdotal evidence of historic flooding from this source in the town. Kettering and Corby also

have discrete areas at risk of surface water flooding, though generally, the areas at risk do not affect the proposed broad development areas. Parts of the Wellingborough broad growth areas have some areas at risk of surface water flooding, though these are confined to small areas that could be managed through careful design.

Flooding from Groundwater

- 4.3.9 Flooding from groundwater has been assessed using the EA's Susceptible to Groundwater Flooding (AStGWF) maps, which identify the susceptibility of groundwater emergence². Under Option A, the proposed growth directions for Corby, Kettering and Rushden are shown to have a low susceptibility to groundwater emergence. For the Wellingborough proposed growth directions, some areas are at medium risk of groundwater emergence.
- 4.3.10 The SFRAs within North Northamptonshire identify that the risk of groundwater flooding within the areas that are identified for growth under Option A are at low risk of groundwater flooding.

Summary

- 4.3.11 In summary, the main flood risk implications for Option A relate to the potential increase in sewer flood risk as a result of runoff from new developments. Careful management of runoff from new developments, through policy and sustainable drainage design, would manage the potential increase in flood risk. Some of the broad development areas are at risk of fluvial and surface water flooding. However, in all cases, areas at risk do not encompass the whole site and therefore there would be opportunities to apply the sequential approach advocated in PPS25 to place the highest vulnerability land uses within the areas of lowest flood risk.

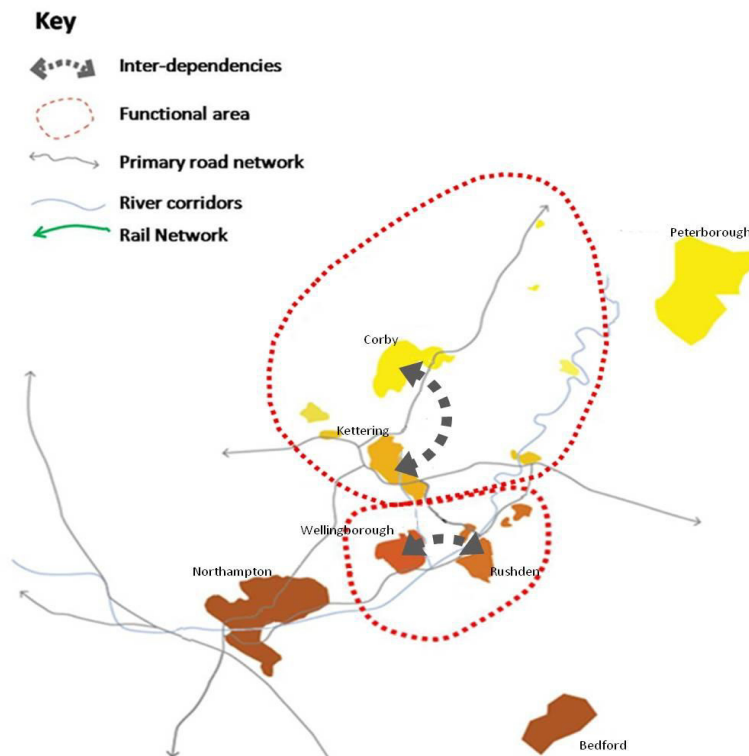
² The AStGWF maps do not show the likelihood of groundwater flooding.

4.4 Option B: Twin Poles

Overview

- 4.4.1 Instead of treating North Northamptonshire as a single functional area, this option builds on existing relationships and the distinctive character of the northern area (Corby / Kettering and surrounding settlements) and the southern area (Wellingborough / Rushden and surrounds). Greater self-reliance is sought within each of these areas, with significant housing and employment growth in the northern functional area and refocused growth with an employment emphasis in the southern functional area (reducing commuting to Northampton in particular). Rushden would play a greater role and accommodate more development in this option. Figure 4-2 shows a schematic to represent the themes outlined in Option B: Twin Poles.

Figure 4-2: Option B, Twin Poles



Source: Spatial Options for North Northamptonshire Discussion Paper NN JPU
September 2011

Flood Risk Management

Flooding from Rivers

- 4.4.2 The focus areas for growth in Option B are similar to that identified in Option A: Corby, Kettering, Wellingborough and Rushden. Therefore, the risk and management of risk for flooding from rivers is similar to that outlined in Paragraph 4.3.3 above. The focus areas for growth are generally not at significant risk from fluvial flooding and opportunities would be available to apply the PPS25 sequential test within site boundaries. Flood storage provided within development sites could provide green infrastructure ('blue corridor') opportunities. At

Workshop 1, it was identified that the proposed pattern of development would place a greater pressure on the River Ise and it is likely that flood storage would be required.

- 4.4.3 At Workshop 1, it was also identified that Wellingborough has the greatest development constraints with regards fluvial flooding, with the River Nene and River Ise presenting the greatest risk. Employment growth would be focused in Wellingborough under Option B and, if employment development occurs in flood risk areas, there may be an adverse economic impact in the event of a flood.
- 4.4.4 As with Option A, the strategic FSAs on Slade Brook and on the River Nene from Northampton to Thrapston identified in the EA's NFSS may have a direct beneficial impact on the River Ise and River Nene respectively and therefore proposed growth in Wellingborough and Rushden under Option B. The FSA would not provide a direct benefit to the proposed SUE to the east of Kettering. However, it would benefit Kettering Town Centre, which would bring regeneration benefits to the local area, with subsequent socioeconomic improvements for the broad growth area.
- 4.4.5 The existing FRM strategy (Halcrow, 2009) identified that the Kettering East SUE may provide opportunities for strategic storage in the Alledge Brook catchment to manage flood risk to downstream areas such as Thrapston, Oundle and smaller settlements. The strategic storage could be of benefit to both fluvial and surface water / sewer flood risk.

Flooding from Sewers

- 4.4.6 Flooding from sewers is an issue in the 'Twin Poles' growth areas, which includes Corby, Kettering, Wellingborough and Rushden. The historical sewer flooding issues in these areas have been identified in the relevant SFRAs and during Workshop 1 although it is worth noting that the Kettering SFRA and Corby WCS identifies that both Kettering and Corby experience sewer flooding, whilst surface water flooding in relation to inadequate drainage systems has also been cited as a factor within the Kettering Town Centre Level 2 SFRA.
- 4.4.7 The risk of flooding from sewers should be considered if this spatial option is taken forward. Opportunities for strategic-scale SUDS and sewer upgrades should be explored if this option is to be considered further, as significant investment may be required to ensure that sewer capacity issues are not exacerbated.

Flooding from the Land

- 4.4.8 The FMfSW shows that surface water flooding in North Northamptonshire is generally confined to low lying areas, including river valleys. The FMfSW shows parts of Rushden to be at risk of surface water flooding, which is supported by anecdotal evidence of historic flooding in the town. Kettering and Corby also have discrete areas at risk of surface water flooding, though generally, the areas at risk do not affect the proposed broad development areas. Parts of the Wellingborough strategic growth areas have some areas at risk of surface water flooding, though these are confined to small areas that could be managed through careful design.

Flooding from Groundwater

- 4.4.9 The AStGWF maps show that the proposed growth directions under Option B generally have a low susceptibility to groundwater emergence. The exception is Wellingborough, where parts of proposed growth directions are shown to be at medium risk of groundwater emergence.
- 4.4.10 The SFRAs within North Northamptonshire identify that the risk of groundwater flooding within the areas that are identified for growth under Option B are at low risk of groundwater flooding.

Summary

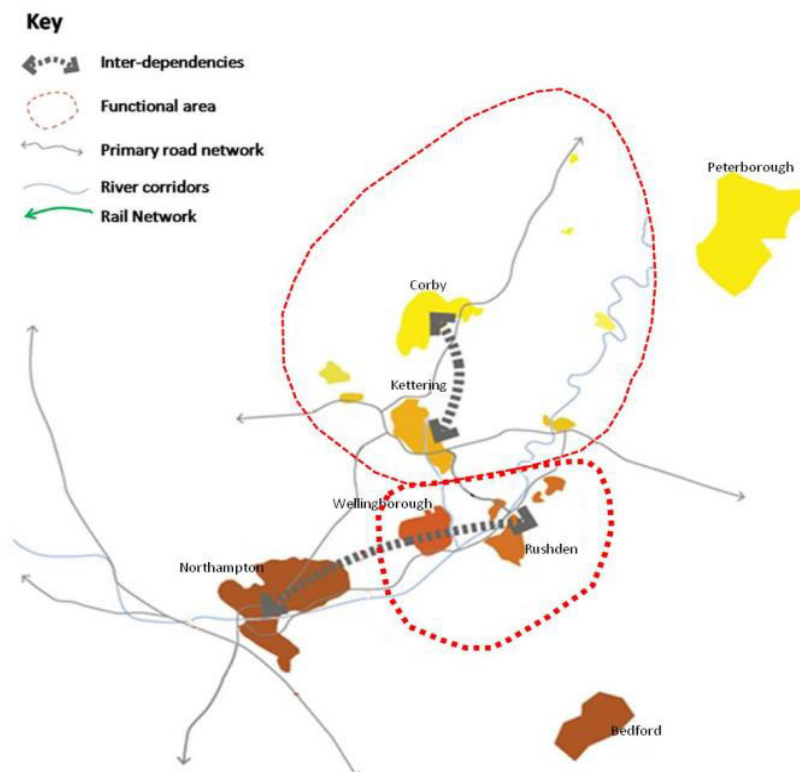
- 4.4.11 In summary, the main flood risk implications for Option B relate to the potential increase in sewer flood risk as a result of runoff from new developments and the increased likelihood of development in the floodplain around Wellingborough. Careful management of runoff from new developments, through policy and sustainable drainage design, would manage the potential increase in flood risk. Some of the broad development areas are at risk of fluvial and surface water flooding. However, in all cases, areas at risk do not encompass the whole site and therefore there would be opportunities to apply the sequential approach advocated in PPS25 to place the highest vulnerability land uses within the areas of lowest flood risk. Effective avoidance of development in areas at flood risk would potentially have significant implications for other issues in flood zone 1, such as landscape impacts.

4.5 Option C: Northern Focus

Overview

- 4.5.1 This option means a strong focus on Corby and Kettering / Burton Latimer for housing, jobs and retail growth as a counterpoint to Northampton and other larger centres such as Peterborough. The southern area (Wellingborough and the Four Towns area) would increasingly look to Northampton for jobs and services. This would mean putting the bulk of the housing and jobs growth in Corby / Kettering and focusing higher order facilities and retail growth in these two towns. This would require close complementary working as neither centre can, on its own deliver the scale of growth or the range of facilities required. The other towns would consolidate their roles as district or local service centres, with lower levels of growth except at Burton Latimer. Figure 4-3 shows a schematic to represent the themes outlined in Option B: Northern Focus.

Figure 4-3: Option C, Northern Focus



Source: Spatial Options for North Northamptonshire Discussion Paper NN JPU
September 2011

Flood Risk Management

Flooding from Rivers

- 4.5.2 Corby is located in the upper reaches of the Willow Brook catchment and flood risk (Flood Zone 2 and Flood Zone 3) is confined to the river channels of the upper tributaries of the brook. It is likely that if any sites that are at risk of fluvial flooding, only a small proportion of the site will be affected. Consequently, there would be opportunities to apply the sequential approach advocated in PPS25 within sites, such that the highest vulnerability land uses are located within the areas of lowest flood risk. It is considered that sewer flooding presents a greater issue in Corby. NB: Extra treated waste water entering the river from the waste water treatment works would cause flooding to the works from water backing up from the railway culvert just downstream of the works.
- 4.5.3 The Slade Brook and the River Ise present fluvial flood risk to Kettering. As with Corby, Kettering is located in the upper reaches of the catchment and flood risk areas are confined within the narrow river valleys. The strategic flood storage area identified on Slade Brook in the EA NFSS may have a direct beneficial impact on the town centre which would bring regeneration benefits to the local area, with subsequent socioeconomic improvements for the broad growth area. However, it would not directly benefit on Kettering East SUE due to its location within the catchment.
- 4.5.4 Latimer Brook and its tributaries flow through Burton Latimer. The fluvial flood zones associated with the brook do not cover a large area and fluvial flood risk is not considered to be significant.

Flooding from Sewers

- 4.5.5 The Kettering SFRA and Corby WCS identify that both Kettering and Corby experience sewer flooding. During Workshop 1 it was identified that the focus on residential growth under Option C is likely to place an increasing pressure on foul sewer systems, as residential uses generate greater foul flows compared to retail and commercial development.
- 4.5.6 The risk of flooding from sewers should be considered if this spatial option is taken forward, as new development may place additional pressure on sewer systems. Opportunities for strategic-scale SUDS and sewer upgrades should be explored, as significant investment may be required to ensure that sewer capacity issues are not exacerbated.

Flooding from the Land

- 4.5.7 The FMfSW shows that surface water flooding in North Northamptonshire is generally confined to low lying areas, including river valleys. Kettering and Corby have discrete areas at risk of surface water flooding, though generally the areas at risk do not affect the proposed broad development areas.

Flooding from Groundwater

- 4.5.8 The ASfGWF maps show that the proposed growth directions under Option C generally have a low susceptibility of groundwater emergence.
- 4.5.9 The SFRAs within North Northamptonshire identify that the areas identified for growth under Option C are at low risk of groundwater flooding.

Summary

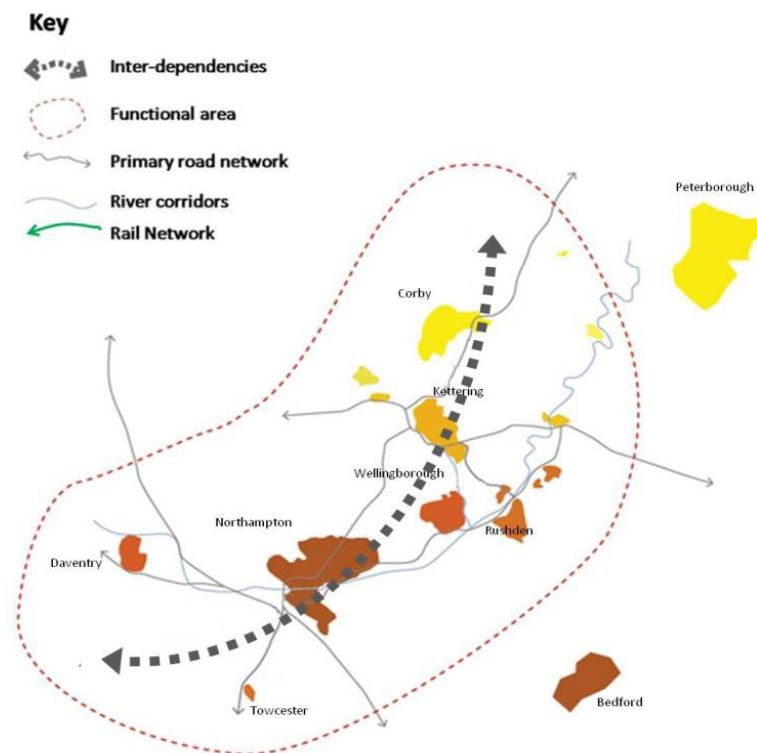
- 4.5.10 In summary, the main flood risk implications for Option C relate to the existing sewer flooding issues in Corby and Kettering. Sewer flooding should be carefully considered if this option is to be considered further. The River Ise and Slade Brook present fluvial flood risk to some growth areas. However, opportunities exist to apply the sequential approach to development within the site boundary. FSAs proposed by the EA NFSS would benefit the proposed growth areas under Option C.

4.6 Option D: Northamptonshire Focus

Overview

- 4.6.1 This option is based on Northampton playing a stronger role as the county town and major regional centre, providing jobs and higher order facilities for many residents in North Northamptonshire. This would be supported by much improved transport links, including the Northamptonshire Arc Transit System (NATS) which would be bus based with longer term potential for a rail based system between Corby and Wellingborough. Growth would be focused in transport corridors and close to Northampton. Existing commuting patterns would continue, with fewer jobs created in North Northamptonshire than under other options. Figure 4-4 shows a schematic to represent the themes outlined in Option D: Northamptonshire Focus.

Figure 4-4: Option D, Northamptonshire Focus



**Source: Spatial Options for North Northamptonshire Discussion Paper NN JPU
September 2011**

Flood Risk Management

Flooding from Rivers

- 4.6.2 Development proposed along transport routes is potentially at risk of flooding from rivers and thus consideration to avoiding these risks needs to be given at the strategic level. Development along the A45 may fall within the wide floodplain of the River Nene. Outside of the North Northamptonshire study area towards Northampton, the A45 broadly follows the route of the River Nene and development to the south of the A45 may be constrained by fluvial flood risk. However, the use of the Northampton to Thrapston Gravel Pits as flood storage, as

identified as potential flood storage areas in the EA NFSS, would benefit proposed development falling within areas of flood risk.

- 4.6.3 Development along the A14 corridor is potentially at risk of flooding from Alledge Brook. The existing FRM Strategy (Halcrow 2009) identified the opportunity for flood storage in the Alledge Brook catchment as part of the Kettering East SUE. As the SUE is in the upstream reaches of the catchment, such flood storage would benefit any development along the A14 corridor. See comments under option A.
- 4.6.4 The A43 corridor links Northampton to Kettering. The flood risk to the corridor is less than the A14 and A45. However, the flood risk to and from smaller watercourses should not be ignored.
- 4.6.5 Option D includes the Kettering East and Wellingborough East SUEs. As noted for the other three options, there are significant proportions of the SUEs that are within Flood Zone 1 (low probability of flooding). The sequential approach should be applied within the site boundary, to place the highest vulnerability land uses in the areas of lowest flood risk.

Flooding from Sewers

- 4.6.6 The risk of flooding from sewers should be considered if this spatial option is taken forward, as new development may place additional pressure on sewer systems. Opportunities for strategic-scale SUDS and sewer upgrades should be explored, as significant investment may be required to ensure that sewer capacity issues are not exacerbated.
- 4.6.7 The Kettering SFRA and Corby WCS identify both Kettering and Corby experience sewer flooding. The Corby WCS undertook combined hybrid hydraulic modelling of the sewer network and river systems in Corby town. The modelling showed that, excluding development and climate change, large parts of the town are at risk of flooding from the sewer network during the 1% AEP (1 in 100 chance) flood event, though mostly to shallow depths (< 0.25 m). Areas of deep flooding are generally confined to river channels. The Corby WCS identifies a programme of works, which includes upgrading drainage systems and it is necessary that these upgrades, or the further investigation into the scale, cost and delivery of such upgrades, be implemented to allow for the further development proposed under Option D to commence.

Flooding from the Land

- 4.6.8 The FMfSW shows that surface water flooding in North Northamptonshire is generally confined to low lying areas, including river valleys. Kettering and Corby have discrete areas at risk of surface water flooding, though generally the areas at risk do not affect the proposed broad development areas.

Flooding from Groundwater

- 4.6.9 The spatial distribution of growth under this option, where development follows trunk road corridors means that growth may be subject to varying groundwater flood risk. AStGWF maps show that the proposed growth in Kettering and Wellingborough are at low susceptibility of groundwater flooding.
- 4.6.10 The SFRAs within North Northamptonshire identify that the risk of groundwater flooding within the areas that are identified for growth under Option D is low.

Summary

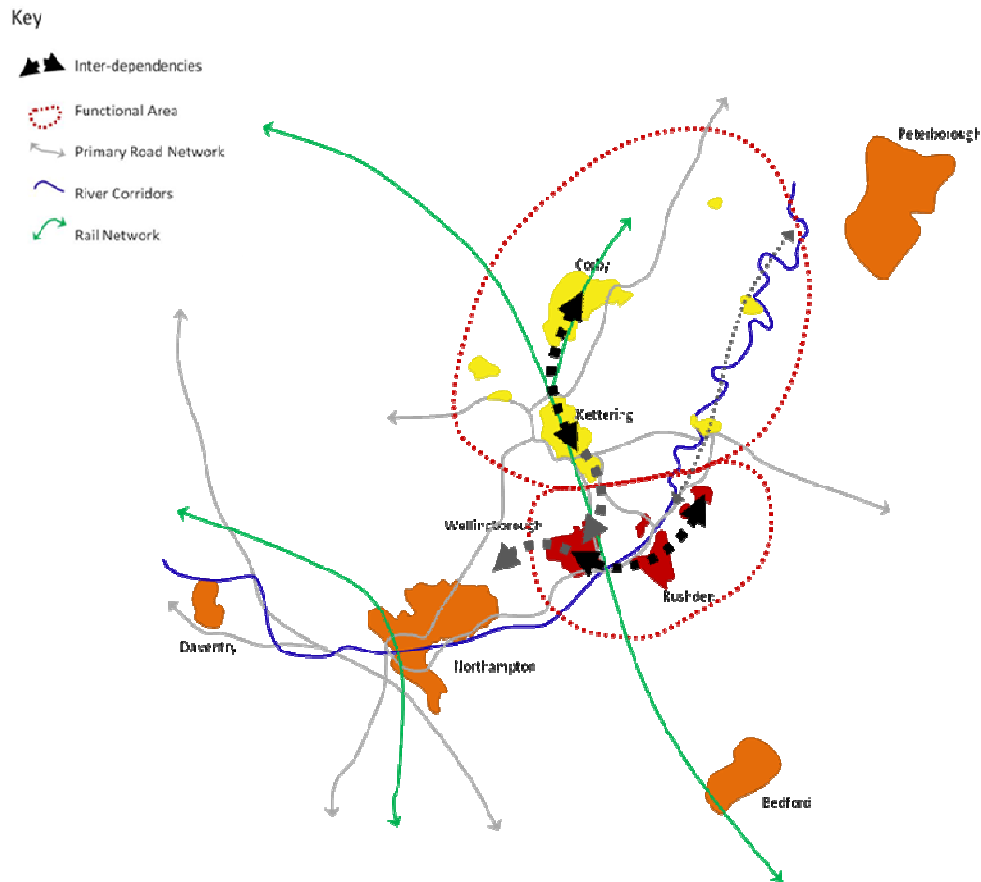
- 4.6.11 In summary, the main flood risk implications for Option D relate to the existing sewer flooding issues in Corby and Kettering. Sewer flooding should be carefully considered if this option is to be considered further. The proposed development along the corridors of the A14, A45 may be at risk of fluvial flooding from Alledge Brook and the River Nene respectively.

5 Emerging Approach

5.1 Overview of the Emerging Approach

- 5.1.1 The four options outlined in Section 4 have been tested by the NN JPU through technical work and consultation to allow the direction of travel for the JCS to be identified. Consultation on an initial draft JCS is planned for summer 2012. The testing process has involved assessing the options in terms of their contribution to Place Shaping (alignment with local aspirations and opportunities to create more sustainable settlements) and their deliverability in light of existing commitments and potential market conditions and resources.
- 5.1.2 An emerging approach is described below. Since it is currently the subject of further consultation and testing, it is likely to be refined considerably before the content of the revised JCS is finalised.
- 5.1.3 The emerging approach includes a focus of development on the four main towns, Kettering, Corby, Rushden and Wellingborough, which will be delivered in large part through Sustainable Urban Extensions' (SUEs). The strong functional linkages in the north and south of the area will be recognised (including between Wellingborough / Rushden and Northampton).
- 5.1.4 The revised core strategy will seek to strengthen the employment, services and retail offering in Wellingborough and the Four Towns Plan area (Rushden, Higham Ferrers, Irthlingborough and Raunds) area to ensure that they do not become more dependent upon Northampton and other larger centres.
- 5.1.5 The revised strategy is likely to be closer overall to Option A: Core Strategy Plus, though more in line with Option C: Northern Focus in respect of the distribution of housing growth. Emerging proposals are for around 40,500 homes, as follows:
- A target of at least 14,200 new homes in Corby
 - Around 10,700 new homes in Kettering Borough
 - Up to 7,700 new homes in Wellingborough
 - Around 7,900 new homes in East Northamptonshire
- 5.1.6 The focus on improving inter-urban public transport links embodied in Option D: Northampton Focus - based on the emerging Northamptonshire Arc Transit System (NATS) proposals - forms part of the emerging approach. This will initially be bus-based but longer-term potential for a rail-based system will be safeguarded, together with the development opportunities that this could create around transport hubs. Figure 5.1 shows a schematic to represent the themes outlined in the Emerging Approach.

Figure 5-1: Overview of the Emerging Approach



Source: NN JPU Emerging Approach November 2011

5.2 Flood Risk Implications

Flooding from Rivers

- 5.2.1 The areas of focus areas for proposed development through the emerging approach are not at significant risk of flooding from rivers (fluvial flooding). Of the broad growth areas that are at risk, the Wellingborough East SUE is at greatest risk. In addition, small parts of Kettering East SUE and some of the sites to the south and east of Corby fall within flood zones. However, in all cases, large parts of the sites fall within Flood Zone 1 (low probability of flooding), which provides the opportunity to apply the sequential approach, advocated by PPS25 within these sites where the highest vulnerability land uses are located within areas of lowest flood risk. The parts of the site that are at higher risk of fluvial flooding could be used for water compatible uses such as public amenity open space. Opportunities for open space and flood storage in flood risk areas could link to green infrastructure and should be explored for sites that fall partly within flood risk areas. It should be noted that further exploration of this management approach is being undertaken within the Kettering Town Centre SWMP.
- 5.2.2 The opportunity for a strategic FSA identified on Slade Brook in the Kettering Town Centre SFRA and the EA NFSS may have a direct beneficial impact on the River Ise and River Nene and therefore could benefit the Wellingborough East SUE. The FSA could benefit the aspirations for diverting growth from Desborough / Rothwell to Kettering town. The

Northampton to Thrapston Gravel Pit flood storage opportunity could also benefit the Wellingborough East SUE as well as the Four Towns area, where employment, services and retail are proposed.

- 5.2.3 The existing FRM Strategy (Halcrow, 2009) identified that the Kettering East growth area may provide opportunities for strategic storage in the Alledge Brook catchment to manage flood risk to downstream areas including the RNOT area and smaller settlements, which play a greater role in the emerging approach. The strategic storage could be of benefit to both fluvial and surface water / sewer flood risk.

- 5.2.4 SUEs to the west and south of Corby are not at significant risk of flooding. However, they are located in the upper reaches of the catchment and development must not exacerbate fluvial flood risk to downstream areas. In addition to Willow Brook, a number of small headwater tributaries of Harpers Brook flow through the Corby SUEs and development should be rolled back from these watercourses to reduce flood risk.

Flooding from Sewers

- 5.2.5 The risk of flooding from sewers should be considered if this spatial option is taken forward, as new development may place additional pressure on sewer systems. Opportunities for strategic-scale SUDS and sewer upgrades should be explored, as significant investment may be required to ensure that sewer capacity issues are not exacerbated.

- 5.2.6 Flooding from sewers is an issue within the growth focus areas under the emerging approach: including Corby, Kettering, Wellingborough and the Four Towns area. The historical sewer flooding issues in these areas has been identified in the relevant SFRA, WCSs and during Workshop 1.

Flooding from the Land

- 5.2.7 The EA's FMfSW shows that surface water flooding in North Northamptonshire is generally confined to low lying areas, including river valleys. As with fluvial flood risk, where a site is at risk of surface water flooding, there are parts of it that are not at risk and therefore the sequential test should be applied within the site boundary.

Flooding from Groundwater

- 5.2.8 The AStGWF maps show that the majority of growth areas proposed under Option E have a low to medium susceptibility of groundwater emergence.

- 5.2.9 The SFRA within North Northamptonshire identify that the risk of groundwater flooding within the areas that are identified for growth under the emerging approach is low. The exception to this is that anecdotal evidence highlighted within the East Northants Level 1 SFRA suggests that groundwater flooding has occurred in Irthlingborough as a result of a reduction in industrial abstractions. There has also been flooding associated with historic mine workings altering groundwater flows. This is likely due to the underlying geology of limestone and sandstone locally together with the presence of springs that are influenced by the former mine engineering. Redevelopment of these mines has the potential to change flows and site-specific FRAs should support planning applications in these areas, which should include detailed assessments and, where appropriate, modelling of groundwater flows. Proposed development in Irthlingborough (part of the Four Towns area) should take account of the risk of flooding from groundwater, making sure that suitable mitigation measures are employed.

Summary

- 5.2.10 In summary, growth areas identified in the emerging approach may be at risk of flooding from sewers and also have the potential to increase the flood risk from sewers and rivers in downstream areas. Careful management of runoff from new developments, through policy and sustainable drainage design, would manage the potential increase in flood risk.
- 5.2.11 Some of the broad development areas are at risk of fluvial and surface water flooding. However, in all cases, areas at risk do not encompass the whole site and therefore there would be opportunities to apply the sequential approach advocated in PPS25 to place the highest vulnerability land uses within the areas of lowest flood risk.

5.3 Policy Recommendations

National Planning Policy Framework

- 5.3.1 The Localism Bill was given Royal Assent on 15 November 2011, and is now an Act. The Act will lead to the abolition of Regional Spatial Strategies and the introduction of Neighbourhood Plans, and will allow local councils to have more control over local planning policy including policies on development and flood risk.
- 5.3.2 PPS25 is due to be superseded by the National Planning Policy Framework (NPPF) which will set out the government's requirements for the planning system. The NPPF was published in draft form in July 2011, and is expected to be finalised in spring 2012. The NPPF consists of a framework within which councils and local people can produce local and neighbourhood plans that reflect the needs and priorities of their communities. The principles of PPS25 will still form part of the new NPPF, however the indications are that the advice contained in it will be less detailed.
- 5.3.3 Until the NPPF is released PPS25 should be followed. The ethos of PPS25 will remain in NPPF. Following the release of the NPPF, NNJPU should consult with the EA before reviewing their policies on Flood Risk Management.

National Planning Policy Position Statement

March 2012

The Councils should continue to take the advice contained in PPS25 into account after the NPPF is adopted, until such time that it is replaced by a detailed local flood risk policy. The policy recommendations given in this Update should be reviewed once the NPPF is released and after consultation with the EA.

Flood Risk Management Policy Recommendations

- 5.3.4 The following recommendations taken from the North Northamptonshire Flood Risk Management Study (Royal Haskoning, 2007) are still relevant today and are included in this Update :
1. Implementation of strategic flood risk management measures in advance or in parallel with the proposed developments with the intent of obtaining appropriate financial contributions from the prospective developers through Section 106 Agreements including for long-term management.

2. Continuing to seek opportunities using a partnership approach to reduce flood risk within North Northamptonshire, avoiding the temptation just to manage flood risk within individual administrative areas.
3. Provision of a combination of source control and strategic SUDS measures within individual development sites where the opportunities for catchment wide strategic measures are limited.
4. Incorporation of sufficient capacity in strategic flood management measures allowing for planned growth and future climate change.
5. Rejection of a piecemeal approach to manage runoff from smaller individual sites whilst providing strategic and local green corridors to incorporate SUDS for managing surface water runoff from developments.
6. Restoration of the river floodplains as the land becomes available for redevelopment through set back options and creation of green space.
7. Identification of the locations that are known to have surface water flooding problems from sewers and overland flow routes and exploring possible solutions for them through new development proposals.

5.3.5 Based on the assessment of the emerging approach, a number of additional policy recommendations for North Northamptonshire are made below:

- Recognise that avoiding flood risks in some options would have implications for other issues – e.g. avoiding Nene Valley is likely to have transportation and landscape implications. Adopt a sequential approach to land allocation.
- Flood Risk Management approach should remain consistent with the CFMP and the Northamptonshire LFRMS,
- Piecemeal flood mitigation measures should be avoided by implementing strategic flood risk management infrastructure projects through partnership schemes that will benefit the principal towns of North Northamptonshire and the wider area downstream, taking climate change into account,
- Carry out SWMP's in priority areas as a condition of growth?
- Reduce surface water runoff where possible using SUDS in consultation with and following the SUDS Approval Body (SAB) guidance for Northamptonshire,
- Implement targeted watercourse maintenance regimes where shown to be effective in maintaining the standard of service that the channel was originally designed for, in line with EA and LLFA practices. This relates to introducing targeted channel maintenance in urban areas to restore and then subsequently maintain best possible level of service to reduce flood risk.
- A sequential approach should be applied within site boundaries: Development should be avoided in areas considered to have a high probability of flooding (Flood Zone 3) and directed towards areas of low probability (Flood Zone 1). Where development is required in parts of the site that are at a high risk of flooding, the Exception Test should be applied. The Exception Test considers whether development on that part of the site provides wider sustainability benefits, is on previously developed land, and is safe on the grounds of flood

risk. This sequential approach should be applied at all stages of planning for sites that are wholly or partly at risk of flooding, from master planning through to detailed design.

- Development should be rolled back from watercourses to provide blue corridors, which could link into green infrastructure.
- Flood risk Resistance and Resilience measures should be introduced into new developments within areas under pressure from fluvial and surface water flood sources. Inclusion in a design policy within the CSS would help with new developments.

6 Flood Risk Management Approach

6.1 Introduction

- 6.1.1 A key aim of this study is to establish a programme of priority actions that can be taken forward in order to meet the locally determined objectives and guiding principles of the strategy, those outlined in the emerging approach. The objectives and guiding principles of this strategy are established and discussed in Chapter 5. It is also important that the actions set out in this strategy are consistent with the objectives and guiding principles of other flood and water related documents undertaken across North Northamptonshire. Section 6 has therefore been split into a number of Sections detailing the approach to the management of flood risk within this study update.

6.2 Section Outline

- 6.2.1 Section 6.2 provides an initial outline review of the commonly recommended actions, objectives and guiding principles of previous flood and water related documents undertaken across North Northamptonshire, including management actions from:

- The North Northamptonshire Flood Risk Management Study (2007),
- The North Northamptonshire Detailed WCS, including FRMS (2009),
- The Corby WCS (2006),
- The Nene Flood Storage Study (2011),
- The River Nene CFMP (2009),
- The River Welland CFMP (2009)
- The Great Ouse CFMP (2011)
- The East Northamptonshire Level 1 SFRA (2006),
- The Corby Level 1 SFRA (2006),
- The Kettering and Wellingborough Level 1 SFRA (2011),
- The Kettering Town Centre Level 2 SFRA (2010).

- 6.2.2 An initial review of these policy documents highlight that the flood risk management actions included in previous studies can be split into two management categories:

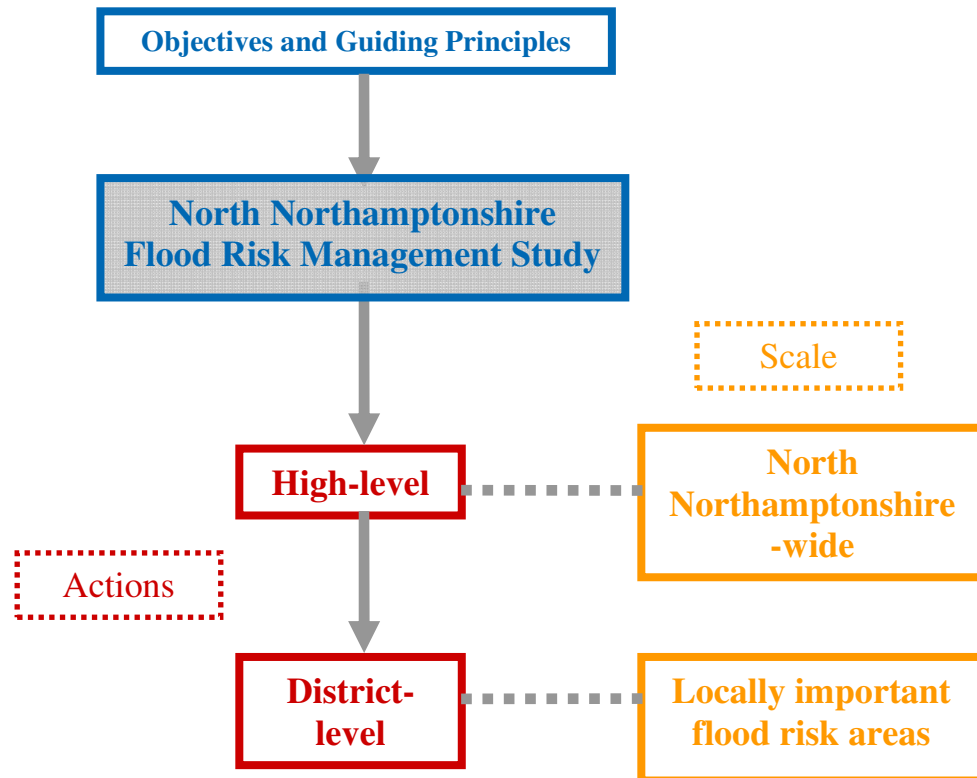
- **High level, strategic policies** - with the aim of following the guiding principles and meeting the overall objectives of the emerging approach, and
- **District level, specific management actions** – potential actions implemented within locally important flood risk areas in order to translate the aims of the overall strategic actions onto a district scale.

- 6.2.3 Given this previous structuring of management actions, Section 6.3 therefore provides a comprehensive review of the commonly prioritised High Level, Strategic Policies stated within the previously issued flooding documents within section 6.2.1. Furthermore a comprehensive

review of the previously stated management actions to be implemented at the District Level is covered in section 6.5.

- 6.2.4 The mechanism for identifying actions to further inform the framework of the local strategy is illustrated in Figure 6-1.

Figure 6-1: Framework for Actions to be established through the Local Strategy

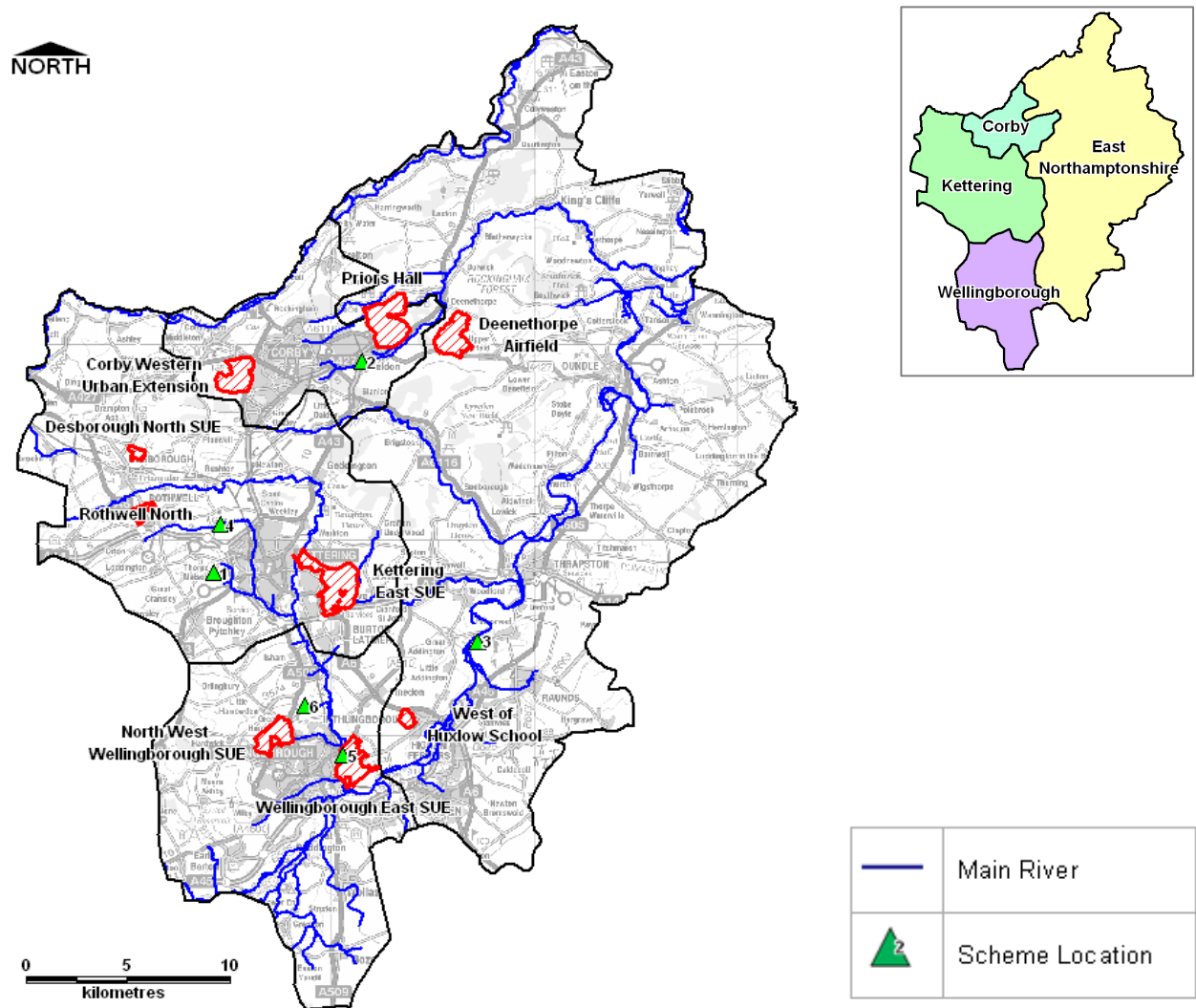


- 6.2.5 Following the combined review of the commonly prioritised High Level and District Level Policies and Actions within the previous Section, Section 6.6 provides an overview of the second of the two stakeholder Workshops where the schemes and actions outlined within Section 6.3 and 6.4 of this report were reviewed, discussed and initially prioritised based on a Multiple Criteria Analysis (MCA) undertaken by the stakeholders at the Workshop. The outcome of the Workshop has then by filtered into Section 6.7.
- 6.2.6 Following the review and MCA of the previously identified common management actions at the Stakeholder Workshop, Section 6.7 reviews additional management actions highlighted as a result of the Stakeholder Workshop discussions. The actions proposed within this Section combine previously detailed management actions with the outcomes and ideas of the Stakeholders Workshop to provide new, enhanced and adapted flood management actions which have been the subject of further analysis within this study update.
- 6.2.7 Section 6.8 details indicative costs for the undertaking of Strategic Flood Management Infrastructure Schemes, Strategic Plans and further recommended investigations/studies described in the previous Sections. The aim of this section is to 'financially inform' the further discussion of priority schemes within the MCA undertaken within Section 6.9.

- 6.2.8 Section 6.9 details the process undertaken for the scoring and subsequent selection of Priority flood mitigation schemes / actions through the use of a MCA based upon the impact upon Economic, Environmental and Social factors.
- 6.2.9 From the discussions held at Workshop 2 and the results of the MCA, Section 6.10 outlines the strategic flood risk management measures recommended for implementation as priority schemes within North Northamptonshire over a 5 year timescale.
- 6.2.10 Along with the identification of primary schemes, Section 6.11 outlines the remaining schemes that have been assessed as being beneficial to the further and future management of flood risk within North Northamptonshire.

6.3 Common Priority Actions from Previous Studies

6.3.1 Figure 6-2 shows the area of North Northamptonshire along with emerging development foci including the location of SUEs and strategic flood risk management infrastructure scheme opportunities which are described later in this section.



1. Thorpe Malsor and Cransley Reservoirs Catchment Storage Facility
2. Weldon Flood Storage Reservoir Enlargement and Additional Mitigation Works
3. River Nene Flood Storage Opportunities
4. Kettering Flood Storage Opportunity at Glendon Hall (Slade Brook)
5. Flood Storage Opportunity at Finedon
6. Harrowden Brook FSR

"Contains Ordnance Survey Data © Crown Copyright and database right 2011"

Figure 6-2: North Northamptonshire Potential Strategic Flood Storage Schemes and Major Development Proposals

- 6.3.2 The review of the studies detailed in section 6.2.1 has revealed a selection of common priority actions that include:

High Level Strategic Policies:-

- North Northamptonshire Flood Incident Management Plan (FIMP),
- Surface Water Management Plans (SWMP),

District Level Specific Management Actions or Schemes:-

- Channel Maintenance and Improvement Schemes,
- Strategic Flood Storage Schemes.

6.4 High Level Strategic Policies

North Northamptonshire Flood Incident Management Plan

- 6.4.1 Due to the wide range of flooding from fluvial sources, surface water and the under capacity of some drainage systems combined with a number of geographical, political and economic pressures, it is not possible to protect all of North Northamptonshire to a uniform standard. As a result some areas of existing development will be at greater risk of flooding than others and all the subsequent development proposed under the emerging approach will face a unique set of development pressures. Therefore flood risk management which combines traditional flood defences with more accurate flood warning and mitigation measures that incorporate the idea of resilience and resistance is now considered more appropriate than flood defences alone.
- 6.4.2 In all areas where flooding is unavoidable Flood Incident Management (FIM) comes into effect to reduce the risks. FIM operates by alerting the public, either individually or through the media so that appropriate action can be taken. It has therefore been proposed that the implementation of a FIMP either for North Northamptonshire as an area, or singularly within each settlement i.e. Corby, Kettering, Wellingborough and the 'four towns' combined can both enhance existing flood defences whilst keeping the general public safe following the failure or lack of flood defences.
- 6.4.3 Potential options that would be addressed in a FIMP are described in Table 6-1. Note: The EA have recently revised the flood warning stage names and descriptions issued to the public as described in Table 6-1 although the basic warning stages are effectively the same. The updated stages of flood warning issued by the EA can be found within Appendix D of this report.

TABLE 6-1 FLOOD INCIDENT MANAGEMENT PLAN POTENTIAL OPTIONS

Potential Option	Description	Current and planned action
The identification of high risk flood areas	Identify areas most at risk of flooding thereby enabling current and future policy to best allocate resources to the future prevention of flooding. Enable the effective allocation of resources such as the distribution of emergency services following a flooding incident.	NCC as the LLFA are undertaking this as part of the LFRMS (local flood risk management scheme)
The identification of where FIM can be successful whilst identifying additional measures to improve FIM	Identify areas where FIM may be an adequate substitute to more traditional flood defence methods and mitigations, particularly if funding is not available for mitigation measures as this may determine both sources and allocation of subsequent funding. For example, given the location of Corby within the Willow Brook catchment there is limited potential for FIM, as the time to peak is extremely short. From rainfall being experienced to flooding occurring could take as little as 4 minutes. This places the onus on effective weather warning which could be linked to a pre-emptory programme of inspections by CBC when severe weather is expected. These would ensure that culverts are clear so that the system can perform. It does assume that the culverts are clear in the first place and is therefore reliant upon maintenance being undertaken to the existing system.	
A policy to implement Resistance and Resilience measures into new developments within areas under pressure from fluvial and surface water flood sources	Resilience is the ability of a house to recover after a flood has occurred. Flood resilient measures include replacing timber floors with concrete, and carpet with tiles. Perishable materials such as MDF or chipboard kitchens can be replaced with plastic or steel alternatives. Gypsum plaster is susceptible to water damage and can be replaced with more water resistant materials such as lime plaster or cement render. Items which can be damaged by flooding and which are expensive to replace or repair (such as boilers, wall sockets and meters) can be raised above the likely flood levels. One-way valves on drainage pipes decrease the risk of sewage backing up into a building during a flood. The Association of British Insurers (ABI) provides an information guide detailing suitable types of flood resilient measures, the likely cost of installation and potential cost savings for repair after a future flooding event.	NCC as the LLFA are undertaking this as part of the LFRMS (local flood risk management scheme) to make people aware of measures they can take. Inclusion in a design policy within the CSS would help with new developments
Education – Public education about how to access information in relation to the EA provision of flood warnings.	There are now five stages of flood warning: <ul style="list-style-type: none"> • Online flood risk forecast - Be aware. Keep an eye on the weather situation • Flood Alert – Flooding is possible. Be prepared • Flood Warning – Flooding is expected. Immediate action required • Sever Flood Warning – Severe Flooding. Danger to life • Warning no longer in force – No further flooding is currently expected for your area Advise the local public where there nearest monitoring station lies and how to get hold of information.	NCC as the LLFA are currently working with the EA on raising public awareness through a variety of measures including a Northamptonshire Flood Fair held at locations throughout the County.

- 6.4.4 As noted within Table 6-1, the Association of British Insurers (ABI) provides an information guide detailing suitable types of flood resilient measures, the likely cost of installation and potential cost savings for repair after a future flooding event. This report can be found and downloaded as a PDF online at the following URL;

http://www.abi.org.uk/Publications/Flood_Resilience_and_Resistance_Factsheet_for_Insurers_and_Loss_Adjusters1.aspx

North Northamptonshire Surface Water Management Plans

- 6.4.5 To improve understanding of flood risk within the urban environment it has been recommended that Surface Water Management Plans (SWMPs) be considered for the urban centres that are known to have surface water flood risk issues. Previous technical work within the North Northamptonshire Detailed WCS Flood Risk Investigation Technical Section (Halcrow 2009) has identified Kettering Town Centre and Wellingborough would benefit from a SWMP, along with the 'Four Towns' area of Rushden, Higham Ferrers, Irthlingborough, and Raunds. Corby is also known to have some significant surface water flooding issues and therefore CBC would also benefit from an SWMP.
- 6.4.6 The SWMPs should be managed by the Local Planning Authority (LPA) with support from NCC as the LLFA. LPAs should apply to Defra and the EA for funding towards the preparation of their SWMPs. The SWMPs should assess development in terms of flood risk posed to and from the existing sewer network whilst identifying a program of works to mitigate against additional flood risks designed to the appropriate scale of development proposed under the emerging approach. The risk of flooding from sewers should be considered if this spatial option is taken forward, as new development is likely to place additional pressure on existing sewer systems and drainage infrastructure given issues of sewer flooding within the growth focus areas under the emerging approach. Historical sewer flooding issues has been identified in the relevant SFRA, WCSs and during Workshop 1 although it is recommended that careful management of runoff from new developments, through policy and sustainable drainage design, would manage the potential increase in flood risk to and from the sewer system.
- 6.4.7 Within the policy frameworks for the North Northamptonshire SWMPs, it is essential that all developers in the North Northamptonshire area abide by the findings of the SWMP as they become available and in the interim period, attenuate surface water runoff to greenfield rates and volumes using on-site SUDS measures. There may be opportunities for developers to contribute to the preparation of SWMPs, which could include master planning of site drainage, in return for a reduced need to prepare their own site specific drainage strategies, including SUDS, source control and attenuation requirements. It is recommended that in the initial stages of the SWMPs, major local developers are invited as stakeholders into the SWMP process to ensure that the maximum potential of development to improve flood risk elsewhere is realised.
- 6.4.8 Given the above, it is also proposed that a SUDS framework policy be incorporated into each of the North Northamptonshire SWMPs, outlining the use of source control and attenuation techniques within all major SUE's to reduce the pressure on existing drainage and sewer systems. It is understood that Northamptonshire County Council, acting as the LLFA, will be producing a SuDS SPD.

Kettering Town Centre, Corby and Wellingborough

- 6.4.9 The Kettering SFRA and Corby WCS have highlighted significant risk to both Kettering and Corby from sewer flooding, whilst surface water flooding in relation to inadequate drainage systems has also been cited as a factor within the Kettering Town Centre Level 2 SFRA.

- 6.4.10 Surface water flooding known to be a risk in Kettering and Wellingborough when surface water sewers become unable to discharge into the river. It is therefore recommended that a surface water management plan study is carried out for the Wellingborough by the district council to map areas of surface water flooding and identify a plan for necessary improvements.
- 6.4.11 In order to improve understanding of existing flood risk in the towns and the potential effects of development, it is expected that a SWMP will consider the areas of Kettering and Wellingborough, identify and assessing the risk of flooding from all urban drainage sources and suggest potential mitigation solutions.

Four Towns

Rushden and Higham Ferrers, Irthlingborough and Raunds, East Northamptonshire

- 6.4.12 The North Northants WCS highlights that although records on surface water flooding and sewer flooding are available from Anglian Water, not all sewer flooding is reported, particularly in remote areas and it is proposed therefore that an SWMP would further investigate the existing capacity of the network, given that future development is proposed and that climate change will affect rainfall intensities. In these cases, developments should be preceded by improvements to existing systems, to mitigate any effects on flood risk.
- 6.4.13 Numerous small and medium-sized developments are planned for the Rushden and Higham Ferrers area. The towns are drained by Skew Bridge Dyke and other minor watercourses, which are mainly culverted through the urban areas. Historically, culverts have been constructed in urban areas where space is limited. Culverts can exacerbate flood risk during high flows as the entrances or the culvert itself can become blocked as a result of debris that is washed into them.
- 6.4.14 Irthlingborough is situated on the northern bank of the River Nene and is drained via a number of minor watercourses and drainage ditches. The main flood risks to the town are from the River Nene. However the East Northamptonshire SFRA also indicates that drainage systems within the town may be inadequate for current and future demands and that surface water / pluvial flooding is also a significant flood risk. Sewer flooding occurs when the capacity of a sewer is exceeded due to heavy or prolonged rainfall or as a result of a blockage in the sewer network. Detailed analysis of Anglian Water sewer flooding incidents within the East Northamptonshire SFRA level 2 (2006) highlights surface water flooding on the 27th / 28th / 29th November 2000 within Irthlingborough along Portland Road.
- 6.4.15 Raunds is drained eastwards towards the River Nene by the Raunds Hog Dyke. The SoP in the town is low: the East Northants SFRA estimates that the probability of flooding from the Hog Dyke is greater than 1 in 10 years, although a programme of de-silting and clearing has reduced this risk in recent years.
- 6.4.16 In order to improve understanding of existing flood risk in the towns and the potential effects of development, it is expected that a SWMP will consider the areas of Rushden and Higham Ferrers, Irthlingborough and Raunds. This will identify risks of flooding from all urban drainage sources and suggest potential mitigation solutions. It is recommended that the developers in Rushden and Higham Ferrers abide by the findings of that study and in the interim period, attenuate surface water runoff to greenfield rates and volumes using on-site SUDS measures.

Thrapston and Oundle

- 6.4.17 The East Northamptonshire Update Level 1 SFRA highlights that sewer and pluvial/surface water flood risk is identified as an issue in the settlement of Oundle whilst Anglian Water data shows that Thrapston has also historically experienced sewer flooding. Where future

development is proposed, sewer networks may need to be upgraded to ensure sufficient capacity is maintained. The effects of climate change may also place further pressure on sewer systems with predictions of milder wetter winters and increased rainfall intensity in summer months. This combination is likely to result in more frequent sewer flooding.

- 6.4.18 It is expected therefore that a SWMP will consider the areas of Thrapston and Oundle, identify and assessing the risk of flooding from all urban drainage sources and suggest potential mitigation solutions. In addition, a framework should be set up to ensure that developers consult with the local Water Company to establish what capacity there is and provide evidence as part of their FRA's of any agreements.
- 6.4.19 Allowing a more rapid run-off of locally generated surface water could reduce flood risk in the River Nene, because the time between arrival of flood peaks would be increased and greater floodplain storage volume would be available for the later main river peak. Therefore, if it can be shown that direct discharge to the River Nene will have no adverse effects on local flood risk, urban drains and watercourses, it may be possible for developments to discharge directly to the River Nene without on-site attenuation. However, careful consideration will have to be given to managing the water quality of the run-off. Developments not providing on-site attenuation would instead contribute a commuted sum towards future projects to enhance floodplain storage along the River Nene corridor.

Alledge Brook, Kettering

- 6.4.20 5,500 homes are allocated for development in the Kettering East SUE, which although in close proximity to the River Ise, is indicated to fully drain into the Alledge Brook catchment by LiDAR (topography) data. As the site overlies permeable geology, source control, attenuation and infiltration SUDS may be used, depending on more detailed site investigations. Source control methods aim to reduce the rate and volume of surface water runoff through infiltration methods or storage, thereby reducing the impact on receiving drainage systems.
- 6.4.21 To date, the Kettering East SUE has extant outline planning permission which is subject to the production of a drainage masterplan and various conditions and it has been highlighted that there will be scope to investigate specific measures as part of the detailed planning of the site.
- 6.4.22 It has been therefore recommended that an SWMP will consider investigations into the management of runoff from new developments within the Kettering East SUE, delivered through the use of LPA policy (e.g. the code for sustainable homes), sustainable drainage design and source control of runoff (consisting of a combination of green roofs, soakaways, swales, permeable paving, and rainwater harvesting), would manage the potential increase in flood risk to the development proposed under the emerging approach.
- 6.4.23 In addition to sustainable drainage techniques, there may also be potential for strategic flood mitigation storage to be included on the site. The Kettering East SUE overlays the most westerly tributary of Alledge Brook, which contributes approximately 40% of flows from the upstream catchment to Cranford St. Andrew and Cranford St. John. Flood risk to these villages is currently unknown, but a hydraulic study of the watercourse has been recently commissioned by the EA to improve flood mapping along the 'Main River' section. It was recommended that this study is extended to examine options for strategic flood storage within the Kettering East SUE. The scheme could provide benefits to the downstream settlement of Thrapston and also benefit the mid to upper reaches of the River Nene through reduced contribution of discharge from the Alledge Brook.
- 6.4.24 Potential options that would be addressed in an SWMP are listed in Table 6-2.

TABLE 6-2 OPTIONS CONSIDERED IN AN SWMP

Description		Standard Measures Considered
Do Nothing	Make no intervention / maintenance	None
Do Minimum	Continue existing maintenance regime	None
Improved Maintenance	Improve existing maintenance regimes e.g. target improved maintenance to critical points in the system.	<ul style="list-style-type: none"> Improved maintenance regimes Other 'Pathway' measures
Planning Policy	Use development control policies to direct development away from areas of surface water (and sewer) flood risk or implement flood risk reduction measures to the development site and any other land affected by the development	Planning policies to influence development
Source control, attenuation and SUDS	Source control methods aimed to reduce the rate and volume of surface water runoff through infiltration or storage, and therefore reduce the impact on receiving drainage systems.	<ul style="list-style-type: none"> Green Roofs Soakaways Swales Permeable paving Rainwater harvesting Detention basins Ponds and wetlands Land management practices Other 'Source' measures
Flood Storage / Permeability	<p>Large-scale SUDS that have the potential to control the volume of surface water runoff entering the urban area, typically making use of large areas of green space.</p> <p>Upstream flood storage areas can reduce flows along major overland flow paths by attenuating excess water upstream.</p>	<ul style="list-style-type: none"> Detention basins Ponds and wetlands Managing overland flows (online storage) Land management practices Other 'Source' measures Other 'Pathway' measures
Separate surface water and foul water sewer systems	Where a Critical Drainage Area CDA is served by a combined drainage network, separation of the surface water from the combined system should be considered. In growth areas separation creates capacity for new connections.	<ul style="list-style-type: none"> Separation of foul and surface water sewers What about retro fitting?
De-culvert / increase conveyance	De-culverting of watercourses and improving in-stream conveyance of water.	<ul style="list-style-type: none"> De-culverting watercourse(s) Other 'Pathway' measures
Preferential and / or designated overland flow routes	Managing overland flow routes through the urban environment to improve conveyance and routing water to watercourses or storage locations (i.e. blue corridors).	<ul style="list-style-type: none"> Managing overland flows (preferential flow paths) Temporary / Demountable flood defences Other 'Pathway' measures
Community Resilience	Improve community resilience and resistance of existing and new buildings to reduce damages from flooding, through, predominantly, non-structural measures.	<ul style="list-style-type: none"> Improved flood warning services Temporary / Demountable flood defences Social change, education and awareness Improved resilience and resistance Measures to new and existing properties Other 'Receptor' measures

TABLE 6-2 OPTIONS CONSIDERED IN AN SWMP

Description		Standard Measures Considered
Infrastructure Resilience	Improve resilience of critical infrastructure in the CDA that is likely to be impacted by surface water flooding e.g. electricity substations, pump houses.	<ul style="list-style-type: none"> Improved resilience and resistance measures e.g. temporary/demountable flood defences Other 'Receptor' Measures
Other - Improvement to Drainage Infrastructure	Add storage to, or increase the capacity of, underground sewers and drains and improving the efficiency or number of road gullies.	<ul style="list-style-type: none"> Increasing capacity in drainage systems Other 'Pathway' measures
Other or Combination of Above	Any alternative options that do not fit into above categories and any combination of the above options where it is considered that multiple options would be required to address the surface water flooding issues.	

6.5 District Level Strategic Policies

Channel Clearance and Maintenance Programme

- 6.5.1 Within the Corby WCS, of the 21 potential flood mitigation schemes identified for consideration in its flood mitigation strategy to alleviate flooding, regular basic routine maintenance of the existing system is the most important. The Corby WCS sets out a localised scheme for the removal of debris from existing channel network, including the removal of all debris from the channel and the subsequent maintenance of the system. Channels should have rubbish removed, overhanging vegetation cleared, accumulated silt removed, and trash screens should be kept clear and be made easy to rake in a flood event.
- 6.5.2 The WCS states that it is far better and easier to have a regular basic routine maintenance regime that works rather than to try to mitigate a failed system during a flood event. A key recommendation of the WCS is that the EA and the LLFA, Northamptonshire County Council, take the lead to establish and implement a programme of maintenance that addresses the existing problems and prevents them from recurring to such an extent in the future.
- 6.5.3 Without a maintenance programme for the existing system it is likely that all the benefits of the proposed mitigation measures will be undone and the standard of protection (SoP) throughout North Northamptonshire will be far lower than it need be.
- 6.5.4 The implementation of a routine channel maintenance programme within each of the four development foci for North Northamptonshire would provide a number of economic and social benefits. The programme would provide a cost effective solution to flooding issues over a wide geographical area whilst the resulting channel maintenance work would be visible to the general public (often important in gaining public approval and government / council funding for mitigation works). Any maintenance programme would likely be ongoing thereby creating sustainability in terms of jobs over a wide number of communities.
- 6.5.5 Exact costs have not been included as part of the strategy as they would not be funded by Developers. Instead they represent ongoing maintenance that should be undertaken by the relevant LPA for ordinary watercourse and by the EA for main rivers. It is envisaged that the focus on channel maintenance would be within the urban centres rather than in the rural areas. The Corby WCS states that annual maintenance costs have been estimated at £7,000/km of

open channel for de-silting, cutting back of vegetation and the clearing of trash screens, although this depends upon the complexity of the system, size of the watercourse and availability of access. An indication as to the potential costing of providing channel maintenance has been outlined within Section 6.3 of this report although it should be noted that it has subsequently been proposed that a targeting of channel maintenance and improvement is required to minimise costs and maximise benefit given that the area under study area contains nearly 400 km of river reach.

Strategic Flood Storage Schemes

6.5.6 The North Northamptonshire Detailed WCS Flood Risk Investigation Technical Section (Halcrow 2009) provides a thorough review of the modelling evaluation of strategic storage schemes in the River Ise Catchment. The options considered were;

- Attenuating flows on the River Ise upstream of Geddington, through construction of a new flood storage facility.
- Attenuating flows on Slade Brook upstream of the railway culvert, through construction of a new flood storage facility to remove pressure on the railway embankment.
- Attenuating flows in the Thorpe Malsor and Cransley reservoirs catchment. This could be achieved either through adaptation of the existing disused public water reservoirs, or through construction of new flood storage facilities.
- Increasing the spillway height at the existing Slade Brook Leisure Village reservoir to store additional flows.
- Combinations of the above measures.

6.5.7 For each option, flows downstream of the proposed storage location were reduced to 75%, 50%, and 25% of the peak 100 year flow. This broad-brush approach gives an indication of the potential benefits of each scheme. Each option was initially tested using the River Ise tributary hydraulic model. Results were examined to identify firstly whether the scheme successfully alleviated the impacts of development on flood levels, and secondly to identify any increased flood protection compared to pre-development levels. Schemes that were shown to provide benefit at the local level were then tested for their wider catchment implications using the Middle Nene model.

Nene Catchment Modelling Position Statement

March 2011

It should be noted that the NCSM model (the River Nene Catchment Strategic Model, *The River Nene Models*, EA, 2007) used for this analysis represents a snapshot of the catchment in Autumn 2006. When the flood maps generated by the model were analysed, a number of modifications were made to areas which have had flood defence schemes constructed more recently than the model survey input information. This includes a number of critical locations on Slade Brook. Before any detailed design of strategic flood storage facilities takes place, an update to the NCSM will be required to ensure the model accurately represents current conditions. Nevertheless, the model is considered suitable for the broad-scale evaluation of schemes presented below.

- 6.5.8 Although 5 schemes have been outlined within the technical review, only a brief summary of the Slade Brook FSR and the Thorpe Malsor and Cransley reservoirs are included below based on the feasibility and outcomes of the initial modelling results. In addition, a third option of combining the two schemes mentioned has also been discussed as the initial options appraisal suggests that storage on Slade Brook upstream of the railway culvert and storage in the Thorpe Malsor and Cransley reservoirs catchment offer the most potential as strategic flood risk mitigation measures in the River Ise and Slade Brook catchment.

Slade Brook Flood Storage Facility at Glendon Hall, Kettering

- 6.5.9 The River Nene CFMP recommends increased floodplain storage on the upstream catchments of Slade Brook and the River Ise corridors to benefit Kettering and Wellingborough.
- 6.5.10 As detailed within the North Northamptonshire Detailed WCS Flood Risk Investigation Technical Section (Halcrow 2009), a Pre-Feasibility study for Kettering (EA, 2004) showed that providing of a flood storage facility upstream of the existing railway culvert located on Slade Brook as both a preferred option and the most cost effective measure for reducing flood risk in Kettering and preventing erosion of the railway embankment. However, in previous prioritisations by the EA of flood management schemes, the Slade Brook FSR did not score a sufficiently high priority score to warrant Defra funding at the time. A broad cost estimate of the scheme of £2.3m was given in the Kettering SFRA Level 2 report (April 2010).
- 6.5.11 The potential of the scheme for alleviating the effects of upstream development were tested by limiting flows to 25% (1 m³/s), 50% (2 m³/s) and 75% (3 m³/s) of the peak 1 in 100 year discharge. From the results, It is proposed that the facility be designed to restrict flood flows within Slade Brook to 2 m³/s (i.e. 50% of the 100 year peak discharge) requiring an additional storage volume of 200,000 m³. This figure has been approximated as increasing to 300,000 m³ for the 1 in 100 year event including climate change. Mitigation of this nature would negate the impact of upstream development and offer an improved standard of flood protection in most locations along the Slade Brook. It is proposed that proposed scheme would directly benefit the Slade Brook and River Ise corridors, whilst reducing flood risk to Kettering, Wellingborough and the Wellingborough North SUE and the Wellingborough East SUE areas which are located downstream of the proposed scheme.
- 6.5.12 A review of the housing district policies under the emerging approach reveals a development focus on the three growth towns of Corby, Kettering and Wellingborough which have development target housing distributions of 14,200, 10,700 and 7,700 houses respectively. As part of the emerging approach, the SUEs deliver the majority of the housing and employment: Priors Hall and West Corby contribute 5000 and 4000 dwellings respectively; Kettering East contributes 4,400 dwellings; North-west Wellingborough and Wellingborough East contribute 1500 and 3100 respectively.
- 6.5.13 The scheme therefore has the potential to mitigate overall flood risk targeted within the development areas where the most significant proportion of future housing is to be allocated under the emerging approach. In addition, the construction of this facility and the provision of additional storage could relax requirements for developers in the River Ise and Slade Brook catchments to attenuate flows to greenfield rates through the use of SUDS for new developments, provided there is sufficient capacity in the sewer system to transport surface water to the river without flooding. However, if the scheme is to replace the need for site-specific source control and attenuation design then developers within the SUEs which directly benefit from the scheme should be asked to contribute toward the funding for its development, maintenance and upkeep – for example, reservoirs will require annual grass cutting,

vegetation maintenance, trash screen clearing, inspections and occasional de-silting and this could cost from £5,000 to £25,000 per annum depending upon the size and works required.

- 6.5.14 It has been proposed that a design study should be commissioned to assess in more detail the required volumes and costs of the facility, sized to restrict flows to the order of 2 m³/s with a variable control structure for real-time response to different duration events and rainfall sequences. As suggested, restricting flows to 2m³/s could mitigate the impacts of existing and proposed development within the Wellingborough and Kettering SUEs and offer an improved SoP in most locations along Slade Brook. This would require approximately 300,000 m³ storage volume for the 1 in 100 year event including climate change.
- 6.5.15 The scheme may result in an increase in flooding duration and depths in the River Isle upstream of Kettering due primarily to development in Desborough. The current analysis has indicated that peak flood levels would not be affected, as additional run-off from development will pass through the watercourse before the main inflows from upstream arrive although this effect should be examined in more detail in the detailed design study. The additional depth and duration of flooding may offer opportunities for increased wetland habitat creation along the upper River Isle corridor. This effect should be examined in more detail in the design study.

Thorpe Malsor and Cransley Reservoirs Catchment Storage Facility

- 6.5.16 Flooding downstream of the Slade Leisure Village Detention Reservoir is a particular concern as land use there includes a residential care home. Residential institutions are classed as 'more vulnerable' in PPS25 and should have an indicative flood protection standard of between 1 in 100 and 1 in 1000 year probability of flooding.
- 6.5.17 The Leisure Village reservoir is located at the confluence of the Slade Brook with a main tributary which drains an area of 27 km² to the east of Kettering, including the villages of Thorpe Malsor, Great Cransley and Broughton. This tributary contributes a peak flow of 9.6 m³/s in the 100 year event which increases to 10.3 m³/s when the effects of unattenuated developments are added. This is significantly larger than the 4.1 m³/s peak flow in the Slade Brook upstream of the railway culvert, and therefore restricting flows in this catchment may have a more beneficial impact on flood levels in the Slade Brook downstream of the Leisure Village.
- 6.5.18 The results from the NSCM modelling showed that restricting flows from this catchment to 50% of the original peak could mitigate the effects of development on flood levels downstream of the Leisure Village reservoir, requiring approximately 220,000 m³ storage for the 100 year event (330,000 m³ when climate change is included). Restricting flows to 25% reduced pre-development flood levels by 0.1 – 0.2 m, requiring an additional 210,000 m³ storage (250,000 m³ including climate change). However, there was also no amelioration of flood levels upstream of the Leisure Village. Therefore this option in isolation could not be used to mitigate the effects of unattenuated discharge from developments in Kettering on flood levels in the Slade Brook.

Slade Brook Flood Storage Facility & Thorpe Malsor and Cransley Reservoirs Catchment Storage Facility Combination

- 6.5.19 Attenuating flows within Slade Brook to a discharge of 2 m³/s or lower should mitigate the effects of unattenuated runoff from existing and proposed development. However, further improvement to flood levels can be achieved through a second flood storage facility in the Thorpe Malsor and Cransley reservoirs catchment, adding both significant benefit to the Slade

Brook Storage Facility and the proposed urban extensions located downstream in the catchment.

- 6.5.20 Therefore, a combined option was tested, whereby flows were restricted in both locations, in order to give maximum improvement to flood levels. When flows through the railway culvert were restricted to 50% and when inflows from the reservoirs catchment were restricted to 75%, the effects of development could be mitigated and flood levels reduced by up to 0.1 m compared to pre-development levels. Modelling results indicated that this would require approximately 200,000 m³ of storage upstream of the railway culvert and 67,000 m³ of storage in the reservoirs catchment for the 100 year event (300,000 m³ and 160,000 m³ respectively including climate change).

Further Investigation Work Undertaken

- 6.5.21 The River Nene CFMP indicates that the phasing of tributary discharges may be critical to the magnitude of flood flows further downstream in the catchment. A particular concern for the EA is that development in the tributaries may modify this phasing. There is concern that the emptying of storage reservoirs constructed to mitigate additional runoff may in fact exacerbate flooding further downstream if the timing of flood peaks changes. This was investigated using the NCSM Middle Nene model.

Potential Effects of Slade Brook storage on the Middle Nene

- 6.5.22 The potential effects of flow attenuation in Slade Brook on flood risk downstream were investigated using the NCSM Middle Nene model. The results showed that peak water levels were not increased, and in some locations, were reduced by up to 0.05 m. However, the total volume of water passing through the system was increased in the longer duration storms. This is a result of the changes in hydrograph shape with storm duration. Longer duration storms have a more elongated shape and a smaller peak compared to shorter duration storms. This means that in longer duration storms, there is less flow over the threshold for attenuation (e.g. the 2 m³/s maximum flow limit at the Slade Brook railway culvert), and therefore a smaller volume of water is stored (see Figure 6.3).

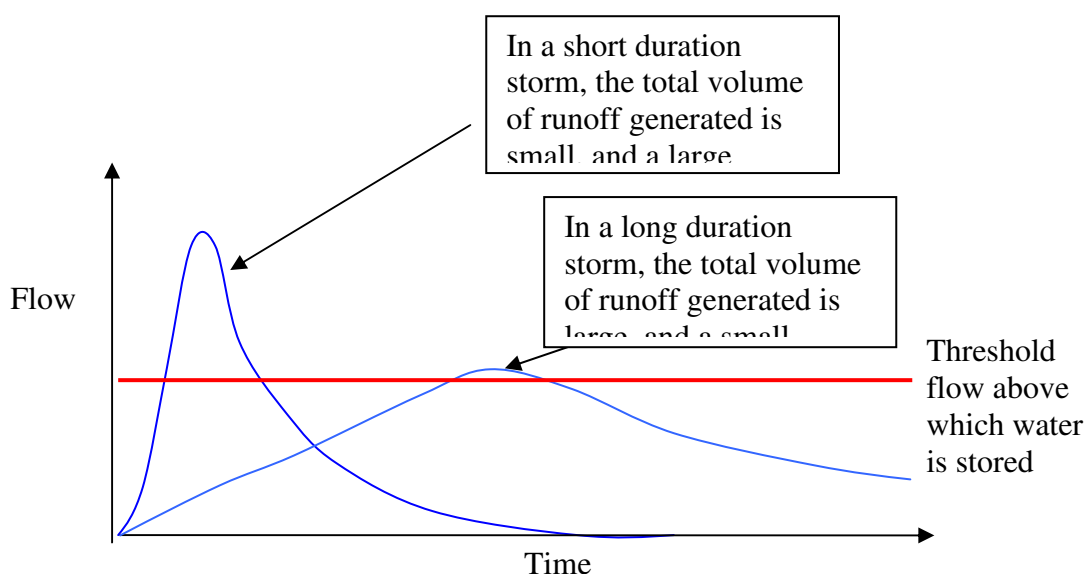


Figure 6.3: Effects of hydrograph duration on volume of runoff storm

- 6.5.23 For the Middle Nene, the increase in volume is not critical as there is no overall increase in peak water level. However, the additional water passed downstream could have negative impacts on the Lower Nene flood levels. In order to mitigate the increase in runoff volume due to development during longer duration storms, flow should be limited to a lower threshold during those events. This would require a flow control structure such as a sluice gate that can be easily adjusted to attenuate to different flow rates depending on the storm duration anticipated.

Harrowden Brook, Wellingborough

- 6.5.24 The catchment of Harrowden Brook rises within the Wellingborough North SUE which includes the Harrowden Road Flood Storage Reservoir (FSR) before flowing east and subsequently discharging to the River Ise upstream of the Wellingborough East SUE. A number of other minor developments are located on the Hatton Park Stream tributary of Harrowden Brook, including Wellingborough Park Farm, Hardwick Park and the remaining properties at Redhill Farm. In addition, approximately 6,100 dwellings have planning permission in Wellingborough at the two SUEs: Wellingborough North SUE and the Wellingborough East SUE; development within these urban extension areas is therefore under significant pressure due in part to the existing capacity limitations of Harrowden Brook for conveyance of flood water to the River Ise. Unattenuated discharge from the development sites is not acceptable, and instead facilities should be provided on-site to restrict run-off to greenfield rates or better. The North Northamptonshire Detailed WCS Flood Risk Investigation Technical Section (Halcrow 2009) states that the following recommendations were made for strategic flood risk management in Harrowden Brook :

- Further investigations should be made by the developers and EA into the potential opportunities for reducing flood levels downstream by enhancing the Harrowden Road FSR. The existing model constructed by Peter Brett Associates for WBC (December, 2002) should be updated and extended with additional downstream survey to the confluence with the River Ise in order to include critical locations in the industrial estate. Possible backwater effects from the River Ise should be considered and the residual risks of a series of extreme events should also be accounted for.
- This study should be extended to examine the impacts of relative timings of inflows from the Hatton Park tributary. The residual effects of SUDS measures on the tributary hydrographs should be examined to ensure the phasing of inflows is not altered so as to unintentionally increase peak flood levels downstream.

Swanspool Brook

- 6.5.25 Approximately 3,000 homes and 12 hectares of commercial development are currently allocated for development in the Swanspool Brook catchment, including large sites at Park Farm Way, Wellingborough Town Centre, and the Eastfield Urban Quarter. Currently, Swanspool Brook has a limited capacity for the conveyance of flood waters through Wellingborough. Under development proposals within the emerging approach, the unattenuated discharge of surface water runoff from proposed development sites would not be acceptable and on-site attenuation to restrict run-off to greenfield rates or better would be required. In addition, there may be potential for strategic flood mitigation measures upstream of Wellingborough: The Park Farm Way site includes a small tributary of Swanspool Brook which joins the main watercourse immediately upstream of the A509 roadbridge. Flooding in the village of Wilby occurs when water in Swanspool Brook backs up behind this road bridge. Reducing flows in the small tributary from Park Farm Way may therefore reduce this backwater effect and improve flood risk in Wilby. However, initial analysis indicates that the

relative size of the catchments (2.23 km² compared to 13.66 km² for Swanspool Brook) means that strategic storage may have little impact.

- 6.5.26 An FSR, known as Wilby FSR currently exists on Swanspool Brook and is located upstream of the A4500. The EA have confirmed that the FSR has a standard of protection of 2% (i.e. 1 in 50yr) AEP. In addition, BCW has balancing ponds on the tributaries to Swanspool Brook near Napier Close and upstream of Park Farm Way on Hatton Brook and Upstream of the A509 on Harrowden Brook.

Willow Brook Culvert and Channel Improvement Works and Weldon Flood Storage Reservoir (FSR) Enlargement

- 6.5.27 The Weldon FSR enlargement is part of a wider scheme involved with the channel enlargement of Willow Brook and the improvement of a railway culvert along the brooks reach which currently constricts flood flows and contributes to localised flooding downstream of Corby Sewage Treatment Works (STW). Currently, the increased discharges from the STW is giving rise to flood risk at Weldon as the railway culvert immediately downstream of the STW outfall is no longer large enough to convey flood flows. The Weldon FSR only offers a 1 in 50 year SoP, whilst the Willow Brook Central West has a low SoP along most of its length. At the downstream end the brook enters a long culvert that flows into Willow Brook South / Main. This culvert has an SoP of 1 in 10 years with excess flows travelling south via overland flow. All the available floodplain has been in-filled and recent developments have further exacerbated the situation. Investigation into the design of mitigation measures within the Weldon area has been highlighted as a matter of urgency within the Corby WCS (2006) and should be the subject of a further modelling study and subsequent detailed design of mitigation measures. Corby is the largest of the three growth centres identified under the emerging approach, aiming to deliver 14,800 houses and a number of commercial and employment opportunities.
- 6.5.28 The Weldon scheme should include the provision of additional storage at Weldon FSR to improve the current standard of protection beyond that of the current 1 in 50 year return period. Additional storage at Weldon FSR will allow improved protection downstream in Weldon and will also allow additional capacity for the easing of channel constrictions upstream in Willow Brook Central West. In order to increase the capacity of Weldon FSR, gabions or sheet piles would probably be required to stabilise the banks in order to allow additional excavation.
- 6.5.29 To alleviate pressure on the culvert located at the downstream end of Willow Brook Central West it is proposed that the provision of a cascade down the old Steel Works railway cutting along the line of the current culvert can mitigate overland flows impacting upon recent developments within the floodplain to the south. The existing culvert could stay in place with the cascade coming into action in flood events; alternatively the culvert could be returned to open natural channel. In order to provide space for this additional flow the Weldon FSR would require upgrading, otherwise the SoP afforded to Weldon and the downstream villages would be reduced.
- 6.5.30 The southern extent of Corby STW suffers from limited local flooding due to capacity issues relating to the culvert conveying the Willow Brook under the railway line downstream of the STW and it is proposed that this could be exacerbated by increased discharge from the STW. It would be possible to reduce the flooding upstream of the STW but with a loss of storage that will require compensating. Weldon FSR would need enlarging and the capacity of Willow Brook downstream of Weldon FSR would need increasing, by channel widening (and possible bridge works), all the way to Deene Park Lake, a total channel distance of 4.9km.

- 6.5.31 It should be noted that given the importance of Corby as an option for development within the emerging approach, Corby BC (via Atkins) are in the process of carrying out a model comparison project to establish sensitivity of WwTW discharges to climate change and subsequent growth of discharges in different storm return periods. The project is to include solution options to be funded by developers throughout the Corby development region.
- 6.5.32 The Corby WCS (2006) provides a detailed overview of the broad costings involved with delivering the infrastructure for the Weldon mitigation works. To increase the Weldon FSR by 21,000m³, it is estimated that a land plot of 150m by 150m would be required to be impounded to a depth of 3m to give sufficient storage and freeboard. Land purchase for the scheme has been estimated at £100,000, with capital works costs estimated at £2.2 million and design, supervision and EA costing a further £300,000 giving the Weldon FSR scheme a total of £2.6 million. Weldon channel improvements would involve the widening of the channel by 0.5m all the way to Deene Park Lake, a total reach length of 4.9km costing a further £250,000. To provide an additional culvert downstream of the Corby STW, land costs have been estimated at £100,000, with £850,000 required for capital works cost, whilst design and EA costs would be approx £350,000 giving a total of £1.3 million. To implement all 3 mitigation options the scheme would equal approximately £4 million. Funding would be required from a number of sources to implement this scheme. However, as suggested, Corby is the biggest development area and therefore significant funds could be raised from developers.

Flood Storage Opportunity at Finedon

- 6.5.33 It has been identified in the recent Nene Flood Storage Study (NFSS) carried out by the EA (Feb 2011) that the strategic flood storage opportunity at Finedon would provide online storage upstream of Wellingborough on the River Nene. The scheme would benefit the Finedon Road Industrial Estate and Wellingborough as well as further afield on the River Nene. It has been identified within the NFSS that storage space is constrained due to the presence of existing properties and a railway track on the west boundary which may require some protection works to be undertaken.
- 6.5.34 The scheme has been very broadly estimated by the EA in the NFSS at a indicative cost of £7 million, comprising an FSR of approximately 3,660,000m³ to provide a present day indicative maximum potential SoP of 1 in 25 years, although this SoP drops to 1 in 10 years when taking into account climate change. The scheme is therefore potentially very costly when compared to the SoP that can be achieved through other schemes assessed within this report. As an additional potential issue, the site is also stated to fall within a Minerals Safeguarding Area which may prohibit or delay immediate planning consent should this scheme be deemed as necessary. Further investigation and assessment of this potential scheme was recommended by the EA in order to determine with greater confidence the benefits and costs of the scheme. Currently there are thought to be 13 properties in Flood Zone 2 locally that would benefit directly from the scheme.

Wellingborough to Thrapston Gravel Pits Storage Opportunity

- 6.5.35 The flood storage opportunity within the gravel pits located between Wellingborough and Thrapston is essentially aimed at maximising the volumes of flood storage to be made available within the floodplain. The implementation of this scheme would essentially rely on ensuring that none of the gravel pits are protected by bunds such that floodwaters can spread out as much as possible. There is an opportunity within this scheme for the dual advantageous exploitation of Mineral extraction and the subsequent lower level restoration for the further creation of flood storage opportunities. This could be further explored by the EA and NCC during the next submission of the minerals and waste plan.

- 6.5.36 However constraints of this flood storage opportunity include that:
- The area falls in a Minerals Safeguarding Area,
 - The upper Nene Valley Gravel pits are designated as a Site of Special Scientific Interest (SSSI) and a Special Protection Area (SPA).
- 6.5.37 However, despite these constraints, the scheme does offer wider flood risk benefits with a maximisation of flood storage within the floodplain helping to reduce peak flows reaching the main settlements of Thrapston, Oundle and Peterborough downstream although the direct impacts of the scheme cannot be quantified readily at this stage.

Floodplain Storage Opportunities

- 6.5.38 It has been recommended that the floodplain storage opportunities identified at Finedon and along the reach of the River Nene between Wellingborough and Thrapston be appraised in further detail. The appraisal should consider:
- A detailed hydrological and hydraulic assessment of the sub-catchment to confirm the flood volumes to be stored, the acceptable discharge to be released from the reservoir and the expected impact on water levels further downstream. The analysis should give particular consideration to the impacts of climate change (i.e. allowance for a 20% increase in flood flow rates),
 - An economic assessment of the scheme which would include costs (construction costs, maintenance costs over the design life of the asset and potential landowner compensation), as well as the anticipated benefits delivered by the scheme (in terms of downstream development options enabled by the scheme). The combination of the hydrological assessment and the economic analysis will enable the SoP which will achieve the most cost effective solution,
 - A geotechnical desk study to assess ground conditions,
 - Identification of and consultation with affected landowners,
 - Discussion with developers regarding the opportunities for financial contributions to the schemes.
- 6.5.39 It is proposed that following the undertaking of this investigation, and provided the scheme can justify significant development as a result of the Finedon Storage scheme, then it may be possible for the further discussion with developers regarding the opportunities for financial contributions to the scheme to aid in its implementation.

6.6 Workshop Overview of Schemes and Actions

- 6.6.1 The schemes and actions outlined within Section 6.3 and 6.4 of this report were discussed at Workshop 2 with all present stakeholders. A MCA was undertaken during the second workshop held in the Council Chamber of the offices of ENC on the 18th August 2011. As part of the workshop, four working groups were set up to discuss and appraise the various options and from the discussions it was clear from a number of the projects selected that the Economic, Environmental and Social categories implemented to rank the projects were open to a substantial and wide variety of interpretation. Following further discussion, a number of limitations were raised by the stakeholders involved with Workshop 2 and have been further outlined within Appendix E1.

6.6.2 Following the discussion of the MCA undertaken within the workshop, it was confirmed that there are a number of limitations within the MCA and as such, the MCA is not considered to be a perfect scoring system. However, based on the discussions following Workshop 2, the following changes have been incorporated within the MCA to improve the selection process and the major updates to the MCA have been summarised below:

- A new section, 'Deliverability', has been added to the fields of Economy, Environment and Society. The additional field represents the options of scheme criticality, scheme funding and scheme politics which will provide a positive weighting to schemes that promote the most development under the emerging approach. It is these schemes that are likely to attract more funding opportunities, are more politically acceptable and are generally considered most critical. This field has therefore been added to take into account wider spatial and downstream benefits thereby off setting poor scoring for high monetary outlays of the larger FSR schemes.
- In addition, weighting factors have been included within the analysis to give preferential distinction from the key fields such as implementation cost, local economy, scheme criticality, funding and scheme politics.
- The initial scoring system that was used at Workshop 2 has been modified with schemes now scoring within the range -2 to +2. Schemes that are judged to provide the most positive benefit in any given field will score a +2 whilst schemes providing the poorest benefits will score -2. Under this system, the schemes that score the highest total could to be put forward as priority schemes.

6.7 Flood Risk Management Update

6.7.1 Following the discussions and undertaking of scheme MCA at the second workshop, a number of additional schemes and measures have been included here as an update to the schemes highlighted within the previous section of this report, taken from a review of the preceding studies to this report. A review of the additional schemes, studies and policies are documented below.

West Corby Sustainable Urban Extension Alternative Surface Water Drainage Outfall to River Welland

6.7.2 The West Corby SUE is a proposed mixed use development that consists of 4,000 dwellings and a number of commercial developments. The SUE is located upstream of well documented fluvial and surface water flooding in Weldon as a result of a number of constrictions upon flood flows, including a railway culvert along a reach of Willow Brook which currently prohibits the conveyance of flood flows and contributes to localised flooding of Corby Sewage Treatment Works. To reduce the additional pressure on the surface water drainage network in Corby it may be possible that surface water runoff from the West Corby SUE could be directed to the River Welland located further to the north rather than discharging to its nearest natural watercourse which is a tributary of Willow Brook. This would need to be explored by the landowners, developers and the EA.

6.7.3 Topography constraints would require this scheme to utilise a low level pipe but the implementation of such a scheme would ease pressure on further development and may mean that the Flood Storage works to be undertaken within Weldon downstream of the site does not have to be designed to mitigate flood levels at such a large magnitude. This is particularly

beneficial when taking into account the great costs involved with providing new FSRs or enlarging existing FSRs.

- 6.7.4 It would be worth investigating the size and scale of this type of project, although it should be noted that a study would be required to determine whether this additional runoff would significantly impact upon the downstream catchment of the River Welland as schemes are not deemed appropriate if flooding issues are to be made more severe elsewhere within the catchment. The transfer of flood flows to the River Welland catchment would therefore require careful consideration within any further investigations and significant mitigation measures would be required to compensate for this.

Channel Clearance and Maintenance Programme

- 6.7.5 As previously stated within this report, a figure of £7,000/km has been quoted for the maintenance of a stretch of watercourse. However, no estimation of costs have been provided within the Corby WCS (2006). Subsequently, Table 6-3 outlines estimated figures for a channel maintenance/improvement programme based on the full reach length of each river within North Northamptonshire.

TABLE 6.3: POTENTIAL CHANNEL CLEARANCE/MAINTENANCE COSTS		
Watercourse	Total Reach Length (km)	Reach Cost (£) per annum
Willow Brook	45	300,000
River Ise	52	364,000
Slade Brook	15	105,000
Harrowdens Brook	3	21,000
Swansool Brook	6	42,000
River Nene	135	945,000
Raunds Hog Dyke	2	14,000
Harpers Brook	22	154,000
River Welland	76	532,000
Alledge Brook	16	112,000
Total	375	2,589,000

- 6.7.6 As an example, the three tributaries of Willow Brook have a combined length of 45km before discharging to the River Nene, costing an estimated £300,000 (per annum) to maintain along its length. For the total main river network within the North Northamptonshire area it has been estimated that maintenance would total approximately £2.6m. It is therefore proposed that targeted channel maintenance and improvement is undertaken to minimise costs but maximise benefit as maintaining the entire reach length has been shown to be, potentially, a significant cost.
- 6.7.7 Whilst the EA and the LPAs would be the main stakeholders there is a need to engage all riparian land owners within an integrated maintenance programme.
- 6.7.8 The strategy for developing a maintenance programme could be initiated in conjunction with the LPAs, the LLFA and EA maintenance programmes through the following actions:
- Given the indication of costs within Table 6-3, an initial study to assess, identify and target the reaches of river channel that require the most urgent channel management and improvement should be developed to reduce costs and make any channel maintenance as effective as possible.
 - It is therefore recommended that the maintenance programme focus upon upstream river reaches, culverts and trash screens where the often constricted channel profile is prone to

vegetation growth, silting, blockages and reduced channel capacity. The County Council are currently compiling an asset register detailing the location and efficiency standard of all assets (i.e. culverts, bridges and trash screens) within the District's river network with the aim of identifying and targeting river reaches where there is an inability to maximise flood conveyance. It is therefore proposed that this register be used to help target maintenance requirements with the programme should also focus upon existing and proposed urban development areas.

- A funding scheme should be developed to provide the necessary funds for both the undertaking of the maintenance program and the initial study to identify potential and targeted maintenance/channel improvement hotspots. It is recommended that private riparian land owners and potential developers are involved within the planning stage undertaken by the EA and the LPAs to identify funding opportunities. Maintenance costs are ongoing so the management plan will need to identify sustainable sources of funding to allow ongoing and routine maintenance works to be undertaken at intervals. Further funding will also be required to continually re-assess and identify new or emerging maintenance hotspots to maintain the programme's efficiency.
- A works schedule will be necessary to detail when and where maintenance works are to be undertaken and who is responsible for undertaking the maintenance work.

North Northamptonshire Flood Incident Management Plan

- 6.7.9 Following application of the Sequential Test and as part of the Exception Test it is proposed that, as part of any FIMP, all commercial and residential development to be located within Flood Zone 3 or within known locations of surface water flooding should have a Flood Evacuation Plan (FEP) to identify safe access and egress routes to and from the property following the undertaking of the sequential and Exceptions test. The plan should detail what to do in an emergency and what action to take at each warning level issued by the EA. Developers, particularly commercial, should be encouraged to produce and display this FEP within the development to keep staff and visitors safe in the event of an emergency.

Alledge Brook

- 6.7.10 For proposed development within the Allege Brook catchment, it has been previously recommended that any new development be undertaken following the assessment of infiltration capacity for the implementation of source control systems and the subsequent attenuation of runoff. The British Geological Society (BGS) is able to provide Geological Map Extracts designed for users carrying out preliminary site assessments that include geological maps for the area around their development site. Reports range from between £50 to £300 depending on the scale and detail of the site investigation.
- 6.7.11 The reports contain geological map extracts taken from the BGS Digital Geological Map of Great Britain at the 1:50,000 scale (DiGMapGB-50). The various geological layers – artificial (manmade), landslip, superficial and solid (bedrock) geology - are displayed separately as 10cm by 10cm extracts. Figure 6.3 is taken from a site investigation report for a development site within the Normanton Wolds, which shows a detailed analysis of the sites local geological characteristics. Further to outlining the geology of the site area, the reports also highlight a number of issues, such as whether the land is suitable for the use of infiltration techniques. It is therefore proposed that a site investigation report be undertaken for all new developments within the Alledge Brook catchment to identify the possibility for the use of source control and attenuation techniques.

6.8 Flood Management Strategy Projects & Plans - Costings

- 6.8.1 Strategic Flood Management Infrastructure Schemes, strategic Plans and further recommended investigations/studies described in Sections 6.4 and 6.5 have been assigned indicative costs and are given in Table 6-4 and Table 6-5. In most cases, strategic infrastructure schemes have not yet been studied in sufficient detail to enable robust detailed cost estimates to be quoted or used for applying for scheme funding. Fee estimates for scheme studies/appraisals have been quoted as a fee range. Where scheme cost estimates have been given these should also be regarded as broad estimates only and are subject to revision pending further assessment.

TABLE 6.4: ESTIMATED INVESTIGATION COSTS

Investigation	Estimated Cost	Cost Source
West Corby SUE Alternative Surface Water Drainage Outfall to River Welland Investigation	£20k to £50k	URS
Thorpe Malsor and Cransley Reservoirs Catchment Storage Facility Investigation	£50k to £75k	URS
Swanspool Brook Flood Storage Reservoir Investigation	£50k to £100k	URS
Alledge Brook SUDS and Storage Scheme Investigation	£50k to £100k	URS
Harrowden Brook FSR Enlargement Study, Wellingborough	£75k to £150k	URS

TABLE 6.5: ESTIMATED PROJECT COSTS

Project	Estimated Cost	Cost Source
Watercourse Channel Clearance & Maintenance Programme Study for each urban area e.g. Corby, Kettering, Wellingborough, 4 Towns)	£10k to £30k per urban centre	URS
North Northamptonshire FIMP	£20k to 50k	URS
North Northamptonshire SWMPs (one for each urban area)	£20k to 50k per urban centre	URS
Wellingborough to Thrapston Gravel Pits Flood Storage Opportunity Appraisal	£20k to £50k	URS
Slade Brook Flood Storage Facility at Glendon Hall, Kettering	£20K to £50K (Design Study) £2.3 million (Scheme)	URS (Design Study) Kettering SFRA Level 2 (April 2010)
Weldon Flood Storage Reservoir Enlargement and Downstream Mitigation Works, Corby	£5.4 million	Corby WCS (2006)
Flood Storage Opportunity at Finedon on River Ise	£20k to £50k(Appraisal) £7 million (Scheme)	URS (Appraisal) Nene Flood Storage Study (2011) (Scheme)

6.9 MCA

- 6.9.1 A number of schemes have been presented and costed above. All of the previously identified projects are in practise, applicable to achieving the aim of sustainable development proposed

under the emerging approach. However, the implementation of all projects is unachievable due in part to a wide ranging variety of political, monetary and temporal factors affecting delivery of the schemes. MCA has therefore been used to aid in identifying priority projects, as well as projects that can be implemented over longer time scales, and if required, can act as contingency projects if the priority schemes are delayed.

6.9.2 There are three main areas where current practice of flood risk management/assessment is often deficient:

- Current practice of risk assessment and cost-benefit analysis (CBA) still focuses on damages that can be easily measured in monetary terms. Social and environmental consequences are often neglected. MCA allows the inclusion of social and environmental consequences without having to translate these in monetary terms,
- The spatial distribution of risks as well as the benefits of flood mitigation measures is rarely considered. Therefore, it is often unknown which areas benefit most from a measure and which areas do not. The multi-criteria risk mapping approach shows the spatial distribution of the different risk criteria,
- Uncertainties in the results of risk assessment are often ignored and not communicated to the decision-makers and this could lead to a solution that is not optimal. The MCA approach allows for the documentation of uncertainties in the risk criteria.

6.9.3 There are broadly three types of impact: Economic, Environmental and Social.

- **Economic** - reflect impacts that affect goods and services that can be readily valued or that affect the local, regional and national economy,
- **Environmental** - reflect impacts that affect the natural and built environment,
- **Social** - reflect impacts that affect the general public and their quality of life.

The Economic, Environmental and Social impacts can be broken down into further categories and a full breakdown of the impacts of each of these factors can be found within Appendix E2. In addition, it should be noted that arising out of the second stakeholder workshop held on 18th August 2011, an additional impact of 'deliverability' has been added, reflecting the criticality, funding and political ramifications of schemes under consideration. Appendix E1 shows the full breakdown of the deliverability impact into each of the factors identified under critical scheme; funding; and political.

6.9.4 The following strategic infrastructure schemes have been evaluated using the Multiple Criteria Analysis as outlined within section 6.8;

- MCA channel maintenance/improvements,
- Slade Brook FSR,
- Thorpe Malsor and Cransley Catchment reservoir;
- Weldon FSR,
- Finedon FSR,
- River Nene Storage Opportunities, and
- Harrowden Brook

- 6.9.5 It is deemed unnecessary to include the SWMP or FIMP recommendations within the MCA as the ranking of infrastructure projects against policy development is not considered appropriate.

Multi Criteria Analysis Results

- 6.9.6 Table 6-6 shows the MCA results of the seven strategic infrastructure schemes proposed. The full MCA can be found within Appendix D of this report.

TABLE 6-6: MCA SCORES AND RANKING OF STRATEGIC INFRASTRUCTURE SCHEMES

Strategic Infrastructure Scheme	Total Score	Weighted Score	Rank
Channel clearance and maintenance programme	9	18	1
Weldon FSR enlargement and additional mitigation works, Corby	9	18	1
River Nene Flood Storage opportunities	11	16	3
Slade Brook FSR (opportunity at Glendon Hall), Kettering	8	15	4
Harrowden Brook (FSR enlargement)	7	12	5
Thorpe Malsor and Cransley reservoirs catchment storage facility Investigation	4	5	6
FSR opportunity on River Ise near Finedon	1	3	7

High weighted scores show that the scheme has scored well within the MCA and are therefore associated with a higher scheme ranking. Priority schemes are considered those with the highest ranking.

Discussion of Results

- 6.9.7 Following the MCA, the channel maintenance and improvement programme and the Weldon FSR scheme provided the best total scores of the seven schemes considered.
- 6.9.8 The channel maintenance and improvement programme scores well throughout the analysis with the scheme delivering wide ranging social and economic benefits at the district scale. In addition, the monetary costs involved with the scheme are significantly lower than that of the strategic flood storage schemes and the on-going nature of the maintenance programme will provide jobs in the community.
- 6.9.9 Despite a high score for monetary value, the Weldon FSR scheme to be undertaken on Willow Brook in Corby scored well throughout the MCA. The scheme scored well in terms of Local Economy and Community, as the scheme was perceived to mitigate flood risk over a wide spatial scale enabling both commercial and residential development thereby reflecting the way forward in terms of the emerging approach. In addition, the monetary value of this project may be phased into two separate projects which may benefit the implementation of this scheme in terms of funding sources, and thereby scores preferentially over the Slade Brook FSR.
- 6.9.10 The River Nene Storage Opportunities have also scored well. Monetary Value has been assessed as being relatively cheap, due in part to much of the earthwork having been already undertaken in the gravel mining process. The scheme scores well for local economy benefits as the flood storage within the Nene corridor is considered to be of significance. The scheme scores particularly well in the fields of habitat, land use and landscape heritage and promotes the return to a more natural flood plain from its previous commercial use. However, it should

be noted that at this stage, further investigations are required into the positioning and siting of schemes within the Nene catchment corridor and their potential impact on the current SPA and RAMSAR status along the river corridor.

- 6.9.11 The Slade Brook Flood Storage Facility at Glendon Hall provided a good weighted MCA score based on the factors of Economy, Environment and Society. The scheme scored poorly in terms of overall cost although it should be noted that the cost ranking is offset by good scores within the deliverability section due to wide spreading downstream benefits involved with the scheme. The scheme scored well on society benefits, with the mitigation measures providing significant alleviation of flooding within the key downstream development centres of Kettering and Wellingborough and, in terms of cost to benefit ratio, provides a significantly reduced expense when compared to the Finedon Flood Storage Opportunity located further downstream.
- 6.9.12 The Harrowden Brook FSR enlargement appraisal provided a creditable MCA score following assessment. The scheme scores well in terms of cost and development of the local economy whilst being of significance to the wider community. The Harrowden Brook scheme performs less favourably in respect of the weighted sectors within deliverability due in part to its location within the catchment with the scheme deemed to provide a smaller range of benefits than some of the larger FSR schemes such as those proposed in Table 6.6. Despite this, and the fact that further work is needed before any FSR enlargement can be undertaken, it is recommended that the Harrowden Brook FSR enlargement investigation should be undertaken as a priority investigation project.
- 6.9.13 The Thorpe Malsor and Cransley reservoirs catchment storage facility investigation was scored average to poor throughout the MCA. Monetary costs are deemed to be relatively low due to the size of the reservoirs although this is offset by the poor scoring within the deliverability section of the analysis. This is due in part to the fact that the scheme alone is not applicable without the prior implementation of the Slade Brook facility.
- 6.9.14 The Flood Storage Opportunity at Finedon scored poorly throughout the MCA, primarily due to the high monetary costs involved with the project and large land use requirements. In terms of community and local economy benefits, it was deemed that the project delivers poor benefits in these sectors due in part to a poor SoP for the projects high capital outlay which means the scheme scores poorly in the weighted field of deliverability. It is therefore proposed that the Finedon Flood Storage Scheme does not provide sufficient benefits in line with the emerging approach and has not been considered as a priority scheme at this time.

6.10 Priority Projects

- 6.10.1 From the discussions held at Workshop 2 and the results of the MCA, the following strategic flood risk management measures are recommended to be implemented as priority schemes or studies within the next 5 years:
- Channel clearance and maintenance programme for the Urban areas,
 - SWMPs for North Northamptonshire,
 - Alledge Brook SUDS investigation and FSR study,
 - Slade Brook FSR facility at Glendon Hall, Kettering and Design Study,
 - Weldon FSR enlargement and additional mitigation works, Corby (Atkins Study pending),

- River Nene flood storage opportunities investigation,
- Harrowden Brook (FSR enlargement) investigation.

6.11 Contingency Projects

6.11.1 Along with the identification of primary schemes, the remaining schemes have been assessed as being beneficial to management of flood risk within North Northamptonshire are listed below:

- North Northamptonshire FIMP,
- West Corby SUE alternative drainage option to River Welland investigation,
- Thorpe Malsor and Cransley reservoirs catchment storage investigation,
- Swanspool Brook FSR Investigation,
- Finedon FSR.

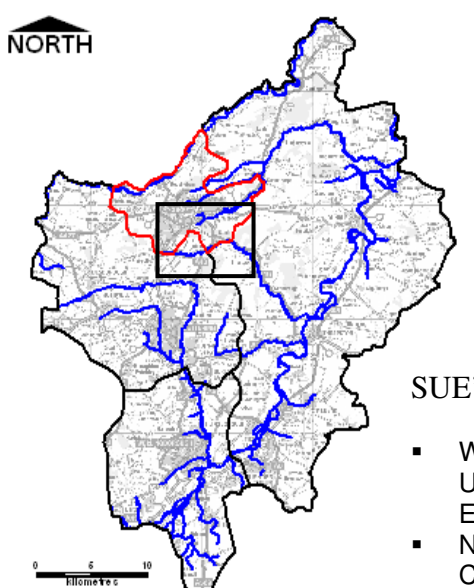
At this stage, all projects are generally at the further investigation stage so would not provide contingency schemes for the Infrastructure projects identified as priority projects.

7 Action Plan

7.1 Action Plan

- 7.1.1 This section assesses the options described in Section 6.6 and 6.7 and translates them into actions for flood risk management in specific locations within North Northamptonshire. It focuses on the four main development centres of Corby, Kettering, Wellingborough and the Rushden/Four Towns area as designated within the emerging approach. Each of these areas has been included within the tables below; these tables outline specific flood risk management measures which will be taken forward within each of these locally important flood risk areas. Where scheme cost estimates have been given, the source and date of the estimate has been stated. Study cost estimates are based on previous similar studies undertaken in other parts of the country.
- 7.1.2 The Action Plans include separate FIMP schemes for the four main development areas noted above. A North Northamptonshire wide FIMP could be undertaken if all the councils were in agreement to contribute. This would almost certainly result in an overall cost saving to the Councils.
- 7.1.3 NCC has recently produced a Multi Agency Flood Plan (MAFP) for Northamptonshire on behalf of the Northamptonshire Local Resilience Forum (LRF) which supersedes the Northamptonshire Multi-Agency Flood Response Plan (2006). The Plan addresses river, coastal and surface water flood risk (as defined in the Community Risk Register) and the associated emergency response arrangements which includes North Northamptonshire. This document accompanied by a complimentary set of emergency plans produced for Northamptonshire may be deemed to be sufficient by NNJPU to decide that FIMP schemes for each main development area are unwarranted.
- 7.1.4 In the Corby Action Plan, the Water Framework Directive is a driver for Willow Brook Channel Widening Scheme and could be a source of funding for this element of the overall scheme.

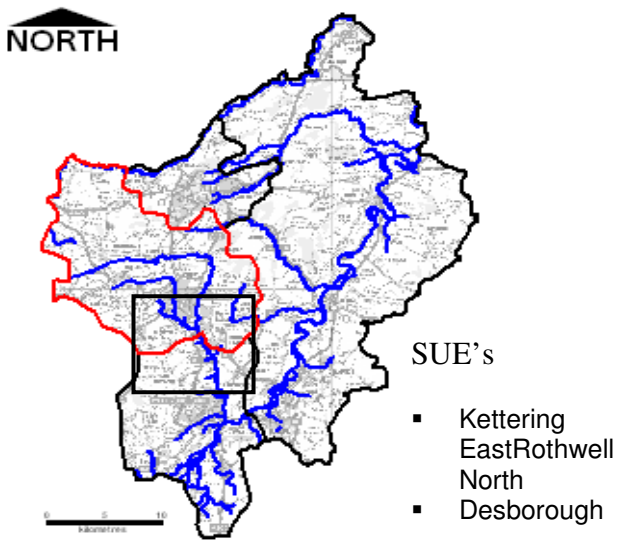
7.1.5 Action plan for locally important flood risk areas within Corby

<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  </div> <div style="width: 65%;"> <p>Corby Summary: Corby has been assigned 2 main development areas under the emerging preferred option - the West Corby SUE, the Northeast Corby SUE (which already has planning permission and is under construction in part). The primary development aim is the delivery of approximately 12,000 houses. Mitigation of flood risk to the Corby SUEs is therefore critical to achieving long term and sustainable development.</p> <p>Summary of Flood Risk: the flood risk to existing and proposed development within Corby comes from a number of sources. The primary source of flood risk is fluvial and arises from capacity issues along Willow Brook and its tributaries rising within the Corby urban area. In addition, increasing demand for housing and subsequent development within the Corby urban extent has put a significant pressure on the functionality of the existing drainage and sewer system therefore leading to a significant risk from surface water flooding. Overloading of the current drainage and sewer system within Corby will be exacerbated by further development and it is therefore essential that development is undertaken in line with adequate flood risk management and mitigation measures.</p> </div> </div>				
Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Carry out Corby SWMP	<p>NN JPU, CBC, NCC, EA, AWS</p> <p>Core Lead Partner: CBC</p>	<p>Priority Project: 2012; the Corby SWMP should be undertaken soon in order to plan and progress alleviation actions where risk from surface water flooding is greatest</p>	<p>To gain a better understanding of surface water flooding mechanisms within Corby, the identification of critical Drainage Areas and potential schemes for the subsequent development of priority flood alleviation measures</p>	<p>£20k to £50k</p>

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Corby Culvert and Willow Brook Flood Alleviation Scheme (see phased scheme options below)	NN JPU, CBC, NCC, EA, Tartar Steel, Network Rail (NR), AWS Core Lead Partner: see below	Priority Scheme: Immediate works required to alleviate flood risk from increase in WTW discharge to allow for development, from 2011, if and when funding is made available. Scheme could be implemented in two phases (as set out below) as development in Corby progresses.	Phase 1 - Primary objective is to reduce the current flood risk arising from increases in discharge from the Corby STW and enable growth to take place in Corby. Mitigation measures - increase in watercourse capacity downstream of WTW. Phase 2 - To enlarge the Weldon FSR and widen approximately 4.9km of the Willow Brook channel downstream to alleviate channel capacity issues on Willow Brook	£5.425m (see phased options below) Source - NNWCS Flood Risk Investigation Technical Section, (Sept 2009)
SCHEME ELEMENTS 1. Culverting Works	Core Lead Partner: Tartar Steel	1 st Phase of the scheme	To increase the conveyance of the Willow Brook under the railway embankment to reduce flood risk from backing up	£1.169 million
2. Willow Brook Channel Improvement Works (widen by 0.5m over 4.9km length)	Core Lead Partner: CBC	1 st Phase of the scheme	To increase the capacity and conveyance of the Willow Brook	£1.725 million
3. Weldon FSR Reservoir Capacity Enlargement by 21,000m ³ 2 nd Phase of the scheme	Core Lead Partner: CBC	2 nd Phase of the scheme	To provide more strategic flood storage as new development goes ahead in Corby	£2.531 million

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Initial Study to identify targeted maintenance and improvements to ordinary watercourses / channels within key areas of Corby to ensure their drainage capacity is fully utilised	NN JPU, CBC, EA, local residents and riparian owners Core Lead Partner: CBC	Priority Project Initial Study to identify where channel Improvements are required and prepare a routine Maintenance Management Plan: 2011 onwards – this should be initiated as a priority	To improve the condition of ordinary watercourses in urban areas of Corby and set up a mechanism for future management and routine maintenance	£10k to £30k
North Northamptonshire FIMP (Corby)	CBC, NCC, EA, AWS, local residents and businesses, emergency services personnel (fire and ambulance services) Core Lead Partner: CBC	2012 to 2013 - prioritise the education of the local community about the flood risks within North Northamptonshire. 2013 to 2016 – delivery of a scheme to encourage residents to undertake flood resilience measures with a review after 5 year period	To raise awareness of flood risk within North Northamptonshire by improving community understanding of flood risks, encouraging residents to take action in protecting their property whilst ensuring that communities and businesses implement clear emergency planning procedures through the implementation of FEPs	£20k to £50k, depending on level of detail
Study to investigate feasibility of draining surface water runoff from West Corby Urban Extension to River Welland	NN JPU, CBC, NCC, EA, AWS, land owners/developers Core Lead Partner: CBC	2012 - this investigation should be initiated straight away	To investigate discharge of surface water from west Corby SUE to the River Welland. Would lessen pressure on Willow Brook which has documented capacity issues	£20k to £50k

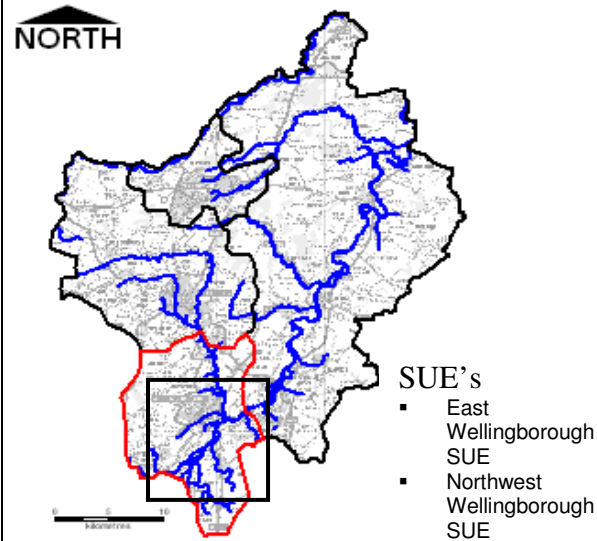
7.1.6 Action plan for locally important flood risk areas within Kettering

				
<p>Kettering Summary: Located within the western extent of North Northamptonshire, the development priority of the Kettering East urban extension is primarily focused upon the delivery of commercial, industrial and educational development approximating to 33ha, and 5,500 homes. This is in line with the priority's outlined within the Preferred Option which seeks to strengthen the employment, services and retail sectors in Wellingborough and the Four Towns area to ensure that they do not become more dependent upon Northampton and other urban centres.</p>				
<p>Summary of Flood Risk: the River Ise and Slade Brook flow through the eastern and western flanks of Kettering town and are the primary source of fluvial flooding within the urban centre. Surface water management is also an issue within the town centre and is likely to be exacerbated by the scale of commercial and industrial development prioritised for Kettering within the emerging option. Careful management of development and additional mitigation measures will therefore be required to successfully implement the strengthening of the employment, services and retail sectors of Kettering.</p>				
Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Carry out Kettering SWMP	KBC, NCC, EA, NR, AWS Water. Core Lead Partner: KBC	Priority Project: 2012; the Kettering SWMP should be undertaken soon in order to plan and progress alleviation actions where risk from surface water flooding is greatest	To gain a better understanding of surface water flooding mechanisms within Kettering for the subsequent development of priority flood alleviation measures	£20k to £50k

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Initial Study to identify targeted maintenance and improvements to ordinary watercourses/channels within key areas of Kettering to ensure their drainage capacity is fully utilised	NCC, KBC, EA, local residents and riparian owners. Core Lead Partner: KBC	Priority Project to identify channel Improvements/clearance measures and routine Maintenance Management Plan: 2012 onwards – this should be initiated as a priority	To improve the condition of ordinary watercourses in urban areas of Kettering and set up a mechanism for future management and maintenance.	£10k - £30k,
Slade Brook Flood Storage Reservoir Facility	NN JPU, KBC, NCC, EA, NRI Core Lead Partner: EA	Priority Scheme: 2012 to 2015	To provide a flood storage facility designed to restrict flows within the Slade Brook to 2m ³ /s and provide an additional 300,000m ³ of flood storage during the 1 in 100yr plus cc flood event	£2 to £3 million Source: £2.3m estimated cost given in the Kettering SFRA Level 2 Update Report, April 2010)
North Northamptonshire FIMP (Kettering)	KBC, NCC, EA, AWS, local residents and businesses, emergency services personnel (fire and ambulance services) Core Lead Partner: KBC	2012 to 2013 - prioritise the education of the local community about the flood risks within North Northamptonshire. 2013 to 2016 – delivery of a scheme to encourage residents to undertake flood resilience measures with a review after 5 year period	To raise the awareness of flood risk within North Northamptonshire by improving community understanding of flood risks, encouraging residents to take action in the protection of property from flooding whilst ensuring communities and businesses implement clear emergency planning procedures through implementation of FEPs	£20k to £50k, depending on level of detail.

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Alledge Brook SUDS Investigation and Potential for Strategic Flood Mitigation Storage	NN JPU, KBC, NCC, EA Core Lead Partner: KBC	2012 onwards – this should be initiated as soon as possible	To investigate management of runoff from new developments within the Kettering East SUE, delivered through the use of local planning policy, sustainable drainage design and source control techniques i.e. SUDS. Investigate additional potential for strategic flood storage to be included within Kettering	£50k to £100k
Thorpe Malsor and Cransley Reservoir Catchment Storage Facility Investigation	Key Partnership: NN JPU, KBC, NCC, EA	2015 – 2030 (dependent upon completion of Slade Brook storage facility)	To investigate the further improvement to flood levels on the Slade Brook through a second flood storage facility in the Thorpe Malsor and Cransley reservoirs catchment	£50k to £75k

7.1.7 Action plan for locally important flood risk areas within Wellingborough



Wellingborough Summary: the development priority of the Wellingborough urban extensions are primarily focused upon the mixed delivery of commercial, industrial and educational development approximating to 65ha and a further residential programme of approximately 6,100 dwellings within the East Wellingborough SUE and the Northwest Wellingborough SUE.

Summary of Flood Risk: Wellingborough town centre lies within close proximity to the confluence of the River Ise and River Nene. Subsequently the East Wellingborough SUE, along with the town centre, is at significant risk from fluvial flooding. Fluvial flood risk in Wellingborough has historically been the dominant source with significant flooding occurring in March 1947, Easter 1998 and July 2007. Surface water flooding has also been identified as a key constraint on development. New developments will therefore need to address surface water management, ensuring that runoff from new development is not increased and, if possible, is reduced.

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Carry out Wellingborough SWMP	NN JPU, WBC, NCC, EA, NR, AWS Core Lead Partner: WBC	Priority Project: 2012; the Wellingborough SWMP should be undertaken soon in order to plan and progress alleviation actions where risk from surface water flooding is greatest	To gain a better understanding of surface water flooding mechanisms within Wellingborough for the subsequent development of priority flood alleviation measures	£20k to £50k

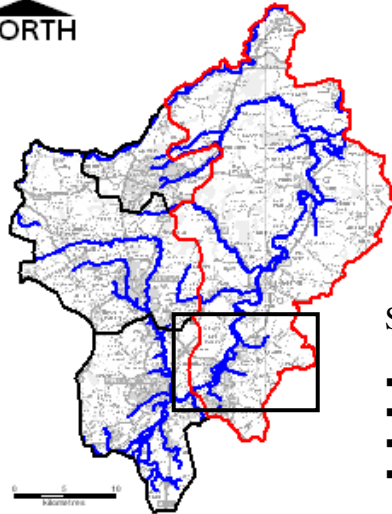
Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Initial Study to identify targeted maintenance and improvements to ordinary watercourses / channels within key areas of Wellingborough to ensure their drainage capacity is fully utilised	WBC, EA, local residents and riparian owners. Core Lead Partner: WBC	Priority Project to identify channel clearance measures and a routine Maintenance Management Plan: 2012 onwards – this should be initiated as a priority	To improve condition of ordinary watercourses and set up a mechanism for future management and maintenance	£10k - £30k
Harrowden Brook FSR Enlargement Study	NN JPU, WBC, EA, AWS Core Lead Partners: EA and WBC	Priority Investigation: 2012 - 2013	To reduce flood levels downstream by enhancing the Harrowden Road FSR. Would benefit North West Wellingborough SUE and Wellingborough East SUE	£75k to £150k
Swanspool Brook Flood Storage Reservoir Investigation	NN JPU, WBC, EA, AWS Core Lead Partners: EA and WBC	2012 - 2015	Investigate operation / SoP of Swanspool Brook FSR upstream of A4500 to determine improvement options	£50k to £100k
North Northamptonshire FIMP (Wellingborough)	WBC, NCC, EA, AWS, local residents and businesses, emergency services personnel (fire and ambulance services) Core Lead Partner: WBC	2012 to 2013 - prioritise the education of the local community about the flood risks within North Northamptonshire. 2013 to 2016 – delivery of a scheme to encourage residents to undertake flood resilience measures with a review after 5 year period	To raise awareness of flood risk by improving community understanding of flood risk, encouraging residents to take action in the protection of property from flooding whilst ensuring communities and businesses implement clear emergency planning procedures (i.e. FEPs)	£10k to £50k, depending on level of detail.

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Flood Storage Opportunity at Finedon	<p>NN JPU, WBC, EA, AWS</p> <p>Core Lead Partners: RNRP and NCC</p>	Medium to long term objective - 2015 to 2030	To provide online storage upstream of Wellingborough on the River Ise to benefit the Finedon Road Industrial Estate and Wellingborough including Wellingborough East SUE	<p>£6 – 8 million</p> <p>Source: EA's Nene Flood Storage Study, Feb 2011 quoted £7.0m</p>

7.1.8

Action plan for locally important flood risk areas within the Four Towns and East Northamptonshire

NORTH



SUE's

- Rushden
- Higham Ferrers
- Raunds
- Irthlingborough

East Northamptonshire Summary: The Four Towns area including Rushden, Higham Ferrers, Raunds and Irthlingborough contain the main areas with development potential (around 6,100 dwellings plus new services and commercial development). The rural area around Oundle and Thrapston contributes much less (around 1800 dwellings).

Summary of Flood Risk: the Four Towns area lies within the immediate catchment and floodplain of the River Nene and its many tributaries, including the Skew Bridge Dyke and the Raunds Hog Dyke. The River Nene also receives discharge from Slade Brook and River Ise, along which flows from the Harrowden Brook and Swanspool Brook are also conveyed. The Four Towns area is at the mid point of a number of fluvial catchments and therefore flooding from fluvial sources are both multiple and are at significant risk of being exacerbated by developments upstream within Kettering and Wellingborough.

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Carry out Four Towns SWMP	ENC, NCC, EA, NR, AWS	Priority Scheme: 2012; the Four Towns SWMP should be completed soon in order to progress alleviation actions in areas where pressure from surface water flooding is greatest	To gain a better understanding of surface water flooding mechanisms within the Four Towns for the subsequent development of priority flood alleviation measures	£20k to £50k per study.

Action / Measure	Partners	Timescale	Main objectives	Approximate cost
Targeted maintenance of ordinary watercourses within key areas to ensure drainage capacity is fully utilised	NN JPU, ENC, EA, local residents and riparian owners. Core Lead Partner: ENC	Priority scheme: 2011 onwards, this should be initiated straight away	To improve the condition of ordinary watercourses and set up a mechanism for future management and maintenance	£50k to £100k to undertake study to identify level of maintenance.
Opportunistic studies to identify floodplain storage opportunities along River Nene Corridor	NN JPU, NCC, ENC, WBC, EA, Local Wildlife Trust, RNRP Core Lead Partner: NCC, Local Wildlife Trust	Wider Opportunity: As opportunities arise	To identify opportunities for flood storage along the River Nene Corridor by increasing natural floodplain storage through gravel extraction and restoration schemes.	£10k to £50k, depending on level of detail.
Four Towns alternative surface water discharge strategy – investigate as part of the SWMP	NN JPU, ENC, EA Core Lead Partner: ENC	To be implemented following development of upstream FSRs	To assess discharge of surface water runoff unattenuated into the River Nene	Included in cost of SWMP
North Northamptonshire FIMP (Four Towns)	NN JPU, ENC, NCC, EA, AWS, local residents and businesses, emergency services personnel (fire and ambulance services)	2011 to 2012 - prioritise the education of the local community about the flood risks within North Northamptonshire. 2011 to 2016 – delivery of a scheme to encourage residents to undertake flood resilience measures with a review after 5 year period	To raise awareness of flood risk by improving community understanding of flood risk, encouraging residents to take action in the protection of property from flooding whilst ensuring communities and businesses implement clear emergency planning procedures (i.e. FEPs)	£20k to £50k, depending on level of detail.

8 Funding Mechanisms and Partnerships

8.1 Overview

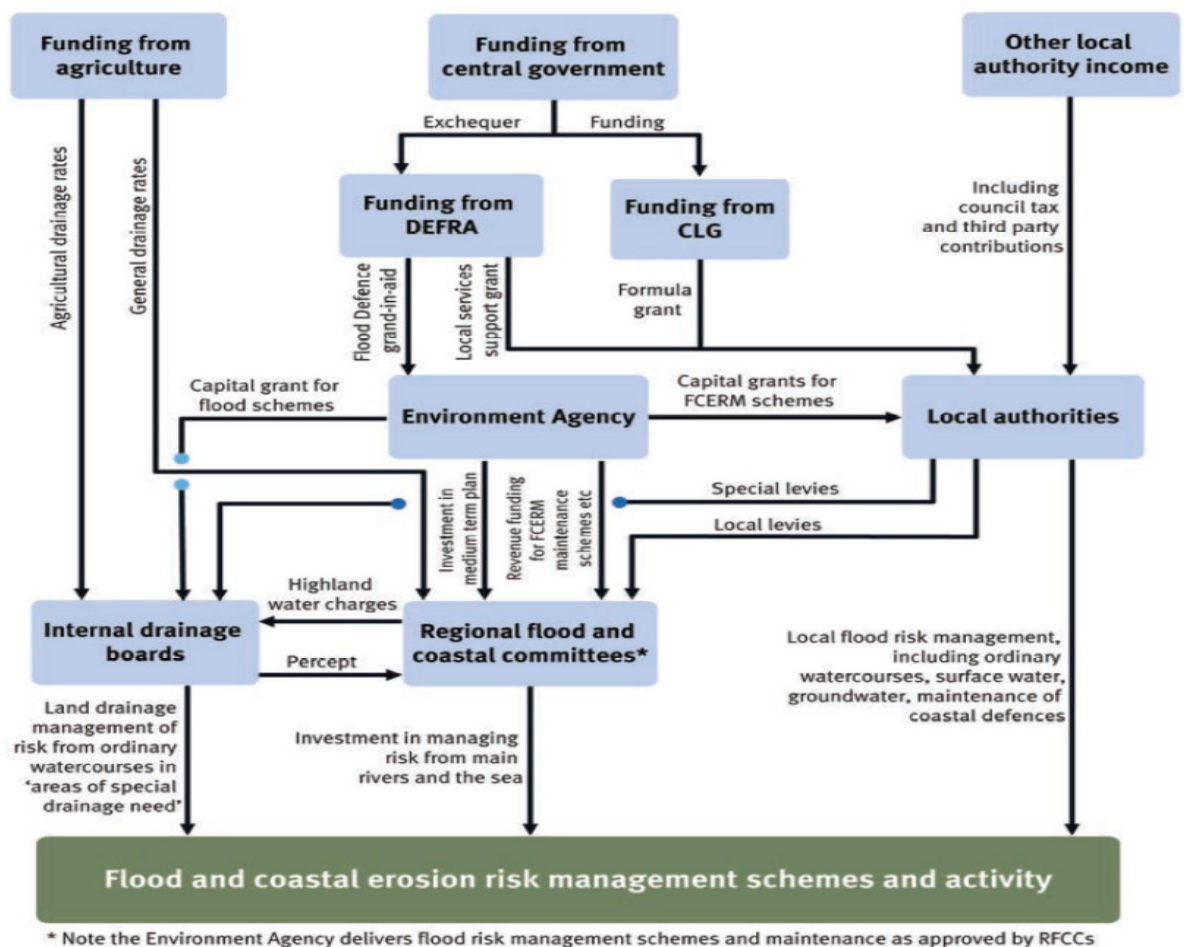
8.1.1 It is important that the infrastructure delivery plan supporting the core strategy sets out how the proposed priority actions and measures will be funded and resourced within North Northamptonshire. It is also important to identify what funding mechanisms are available to the NN JPU and NCC to pay for the flood risk management measures that are set out in the strategy. Effective practical implementation of flood policy objectives requires adequate resources both for the management and response activities of the lead local flood authority as well as for capital projects.

8.1.2 The following section provides a summary of available forms of funding and will also help to identify any further actions that will be needed to ensure that particular funding alternatives are feasible.

8.2 Current Funding Mechanisms

8.2.1 Figure 8-1 below identifies the various streams of funding open to risk management authorities. These are discussed further below.

Figure 8-1: Funding Streams for Risk Management Authorities



Public Funding

8.2.2 With less direct government funding available, it is clear that changes are needed to the traditional approaches to funding flood risk management. The current situation of government flood risk management funding is summarised below:

- Defra expects to spend around £2.16 billion on flooding and coastal erosion over the next four years (this includes funding provided to the EA). Although the exact budgets are still being finalised, this will lead to an average of £540 million a year for the next four years,
- This is approximately 8% less than the spend by Defra over the previous four years (an average of £590 million a year). These savings will be partly offset through efficiencies in delivery and procurement and better risk-based prioritisation of work,
- The £2.16 billion consists of roughly £1 billion capital (approximately £250 million per year) and around £1.16 billion resource which includes 'programme' spend, such as maintenance, flood forecasting and incident response and administration spend, such as staff and back office costs,
- Defra remains committed to fully funding LLFAs (including NCC) to carry out their new responsibilities under the Flood and Water Management Act (FWMA). Up to £36 million a year will be provided directly to LLFAs (this will start at £21 million in 2011/12 due to a phasing-in process). The funds have been allocated based on the individual risk that each local authority has. For Northampton CC the fund allocation has been set at £150K for 2011/12 and £290K for 2012/13,
- On top of the £2.16 billion from Defra, LPAs will have money available through a formula grant from the (Department for) Communities and Local Government (CLG). This is expected to be around £100m in 2010/2011. This money will support the ongoing flood risk management responsibilities, including drainage activity and the maintenance of ordinary watercourses and coastal defences, and payments of levies to the EA (local levy) and internal drainage boards (special levy),
- CLG have indicated that local authorities are spending around £30million each year on additional schemes funded through the RFDC's local levy. To date this has only been available for coastal or fluvial schemes, but since the FWMA and the creation of Regional Flood and Coastal Defence Committees (RFCC's), this money is now also available for surface water schemes.

Note: All of the financial figures outlined above have been sourced from a presentation on Local Flood Defence and Risk Management presented by Anne McIntosh MP, Chair of the Select Committee on Environment, Flood and Rural Affairs, September 2011. These figures are a guide and may be subject to change.

Funding to LLFAs through Area Based Grants

8.2.3 Funding for LLFAs to meet their new responsibilities has been allocated through Area Based Grants or local services support grants. The money is not ring fenced so individual LLFAs must decide how much of this grant to spend, subject to limits on overall budgets and the need for investment on other priorities.

8.2.4 The amount of money allocated to individual LLFAs varies based on the overall risk within the relevant area. This money has been made available to support NCC with its ongoing local flood risk management activities. Northamptonshire County Council receives funding for flood

risk management work through a variety of sources and at different levels, the main ones being Flood Defence Grant in Aid, Local Levy and Defra Grant funding.

Capital Funding through ‘Payment for Outcomes’ and ‘Flood Defence Grant in Aid’ Schemes

8.2.5 The Pitt Review recommended that:

“Government should develop a scheme that allows and encourages local communities to invest in flood risk management measures” (Recommendation 24)

8.2.6 Defra has national policy responsibility for flood and coastal erosion risk management and provides funding through grant in aid to the EA, who also administer grant for capital projects to Local Authorities.

8.2.7 This new approach is proposed for all capital maintenance and defence projects seeking funding from April 2012. The scheme aims to encourage communities to take more responsibility for the flood risk that they face and aims to deliver more benefit by encouraging total investment to increase beyond the levels that Defra alone can afford. The new approach will see funding levels for each scheme (provided by Defra through Flood Defence Grant in Aid) relating directly to benefits, in terms of the number of households protected, the damages being prevented plus other scheme benefits such as environmental benefits, amenity improvement, agricultural productivity and benefits to business. In addition to these elements, payment rates for protecting households in deprived areas will be higher so that schemes in these areas are more likely to be fully funded by the Government.

8.2.8 Under this system some schemes will receive complete funding, if the benefits significantly outweigh the costs, and for others partial funding would be available. It is hoped that this approach would encourage people to find cheaper ways to achieve positive outcomes and/or find other funding mechanisms to pay the remaining cost of the scheme.

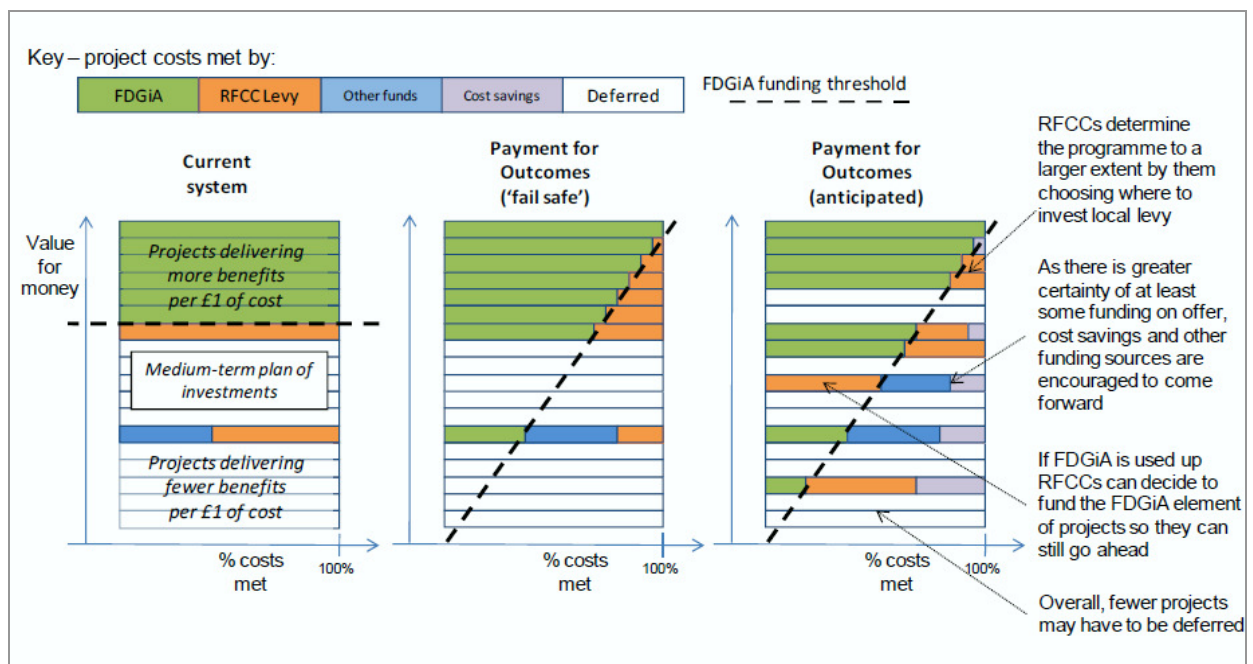
8.2.9 The underlying principles and objectives behind the new national funding system include:

- Encourage an increase in total investment in flood risk management by operating authorities, beyond levels provided by central Government alone, as recommended in the Pitt Review;
- Enable more local choice within the system and encourage innovative and cost-effective options to be promoted;
- Rather than some projects being fully funded and others not at all, now some funding will be available to all potential projects;
- Funds from central government should prioritise protecting those most at risk and least able to help themselves;
- All flood and coastal erosion projects should be treated equally based on the benefits delivered and damages avoided, regardless of the type of risk of the risk management authority involved;
- The general taxpayer should not pay to protect new development in areas at risk of flooding, now or in the future;
- Greater local input and decision making should not come at the expense of creating a stable pipeline of projects;

- All investment should be made within a nationally consistent framework to take account of policies and findings within CFMPs;
- Maintain the widespread take-up of flood insurance by helping to keep insurance affordable through risks being managed properly.

8.2.10 Figure 8-2 illustrates the 'Payment for Outcomes' approach and the importance of the local levy in fully funding flood defence and maintenance schemes.

Figure 8-2: The 'Payment for Outcomes' Approach and Importance of the Local Levy



Source: Defra Consultation Document (page 19)

8.2.11 Payment for outcomes puts a strong emphasis on the need for external contributions. The NN JPU and NCC will continue to establish partnership working with key stakeholders including:

- Defra and the EA,
- Local Planning Authorities,
- Water Companies and OFWAT,
- Internal Drainage Boards,
- European Union funding streams,
- National Government Organisations,
- Private sector developers,
- Highways Agency,
- Network Rail.

8.2.12 NCC will take the lead partner role and will:

- Identify projects,

- Plan projects,
- Establish fees required,
- Outline responsibilities,
- Present to RFDC.

Joint Defra and Environment Agency FCERM R & D Programme

- 8.2.13 NCC is one of several LLFAs taking part in a Defra & EA Case Study (FD2656) which will guide NCC through the process of developing a strategic investment plan for their county to fund flood risk management schemes considering all sources of flooding. The purpose of the investment plans will be to prepare strategic options for local investment, balancing the benefits of tackling each source of risk over time against the national and local costs of doing so.
- 8.2.14 The results of the study are due to be available in April 2012 and should provide a good steer as to the best approach to funding the North Northamptonshire Strategic Flood Risk Management Schemes.

Funding through the Community Infrastructure Levy

- 8.2.15 The Community Infrastructure Levy (CIL) allows local planning authorities to raise funds from developers to pay for the infrastructure that is or will be needed as a result of new development. It came into force on 6th April 2010 and has been subject to various regulation changes since then.
- 8.2.16 Funds raised through the CIL will be used to help pay for a wide range of strategic infrastructure required to support the needs of sustainable development within the Charging Authorities Area, in this case the individual local authorities in North Northamptonshire.
- 8.2.17 The receipts raised will not fund 100% of the costs of the infrastructure requirements and will therefore be one element in a range of funding opportunities that need to be used to ensure that community and strategic infrastructure is delivered.
- 8.2.18 Local authorities are required to use this funding for infrastructure needed to support the development of their area; it can be used to construct new infrastructure, increase the capacity of existing infrastructure or repair failing existing infrastructure if new development is making it worse.

The Growing Places Fund

- 8.2.19 The Growing Places Fund aims to help address this constraint; enabling targeted investment in pieces of infrastructure which unlock development, allowing places to realise development values which can be recycled to provide a longer term solution to infrastructure provision.
- 8.2.20 The Growing Places Fund will provide £500m to enable the development of local funds to address infrastructure constraints, promoting economic growth and the delivery of jobs and houses.
- 8.2.21 Communities whose ambitions for economic growth have been constrained could benefit from a multi-million pound boost to help get their building projects off the ground.
- 8.2.22 The £500 million Growing Places Fund will be available to help boost economic growth by getting the required infrastructure built to enable the creation of new jobs and homes by getting stalled projects moving again.
- 8.2.23 The Fund will put local businesses and organisations in the driving seat, with the 38 Local Enterprise Partnerships able to apply for the funding and then take decisions about what to prioritise locally.
- 8.2.24 Councils will support these plans with their technical and financial expertise - leaving Local Enterprise Partnerships free of red tape and better able to focus their attentions on ensuring the funds go to where they will be used most effectively.
- 8.2.25 And to ensure work can start straight away to help get Britain building again, all £500 million will be allocated from the end of January 2012.
- 8.2.26 The Growing Places Fund can be used to establish revolving funds to take forward a range of projects that can help facilitate economic growth, jobs and house building in the local area, providing returns which can be re-invested locally. Through this, Local Enterprise Partnerships will be able to offer secure funding to developers in their area, making it quicker for projects to get off the ground but also securing a return on that investment for the local area.

Types of projects could include:

- early development of strategic link roads and access works to unlock major mixed-use developments, enabling the delivery of homes and commercial space - leading to the creation of jobs and securing private investment
- provision of flood storage capacity to enable development of homes, employment space and retail space; and
- works to improve local connectivity and reduce congestion through interventions such as extending dual carriageways, enabling developments to be taken forward sustainably

Funding through the European Union

- 8.2.27 European Union funding is available through the Interreg scheme from the European Regional Development Fund (ERDF).
- 8.2.28 LIFE+ initiative is a limited but focused funding programme providing specific support for the implementation of European environmental policy and legislation. The budget for the 2007-2013 period totals €2.143 billion and the programme comprises three strands:

1. **LIFE+ Nature and Biodiversity:** supports environmental and nature conservation projects which aim to protect birds and habitats and prevent the loss of biodiversity.
2. **LIFE+ Environmental Policy and Governance:** aims to contribute to the implementation, updating and development of European Union environmental policy and legislation, including the integration of the environment into other policies, thereby contributing to sustainable development. The Commission welcomes proposals that address one of the 12 principle objectives (1. Climate Change, 2. **Water**, 3. Air, 4. Soil, 5. Urban Environment, 6. Noise, 7. Chemicals, 8. Environment and Health, 9. Waste and Natural Resources, 10. Forests, 11. Innovation and 12. Strategic Approaches).
3. **LIFE+ Information and Communication:** supports projects which raise awareness of environmental, nature protection or biodiversity conservation issues. There are two types of Information and Communication projects under LIFE+. The first type delivers communication actions and awareness raising campaigns on environmental issues. The actions and campaigns should be linked to the implementation, updating and development of EU environmental policy and legislation.

Private funding

Section 106 Funding – Developer Contributions

- 8.2.29 Section 106 of the Town and Country Planning Act 1990 allows an LPA, to enter an agreement with a landowner or developer in respect of the granting of planning permission. A Section 106 agreement is used to address issues that are necessary to make a development acceptable, such as supporting the provision of services and infrastructure.
- 8.2.30 One of the recommendations of ‘Making Space for Water’ (Defra, March 2005) was that LPAs should make more use of Section 106 agreements to manage flood risk. This means that any flood risk which is caused or increased by new development should be resolved and funded by the developer.

Northamptonshire Arc - A Prosperity Plan for Northamptonshire (October 2011)

- 8.2.31 The concept of the Northamptonshire Arc was born in 2009 as part of ‘The Big Idea’. Northamptonshire County Council recognised that a single spatial concept and top-level strategy is needed to help deliver strong and sustained economic growth, reduce carbon emissions, and improve the environment.
- 8.2.32 The Northamptonshire Arc: Background Report was launched for consultation in May 2010. Following extensive engagement on this document, the Northamptonshire Arc: Prosperity Plan for Northamptonshire has been developed to provide the top-level strategy covering economic development, the environment and connectivity.
- 8.2.33 This builds on the evidence base provided by the Northamptonshire Local Economic Assessment and has been adopted as a key policy document for the County Council and replaces the Background Report.
- 8.2.34 The Northamptonshire Arc involves a new approach to spatial planning bringing together transport, broadband, environmental issues, biodiversity, and economic regeneration.
- 8.2.35 It is underpinned by the pursuit of three high level outcomes. These are transformed connectivity, a naturally resilient and low carbon Northamptonshire and a stronger and greener economy.
- 8.2.36 Ten long-term priorities have been identified which provide the framework for specific initiatives and prioritising investment and activity. These have been informed by the evidence and

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- analysis provided by the Northamptonshire Local Economic Assessment and feedback from the public consultation and other discussions.
- 8.2.37 A key priority is creating a naturally resilient Northamptonshire (including a network of accessible and connected green spaces).
- 8.2.38 The Northamptonshire Arc Prosperity Plan is accompanied by a series of more detailed documents which focus on particular themes. These are:
- Northamptonshire Arc: Connecting Northamptonshire;
 - Towards naturally resilient and low carbon Northamptonshire.
- 8.2.39 Building a naturally resilient environment and lowering carbon emissions is imperative to future prosperity. Investment in Northamptonshire's natural environment is essential to meeting the county's growth aspirations, protecting communities from inevitable climate change and providing a range of economic, social and environmental benefits.
- 8.2.40 The main thrust of this approach is the relationship between biodiversity and adapting to climate change, and the economic benefits that the use of 'natural interventions' such as reinstatement of floodplains, tree planting, green roofs, and sustainable drainage systems can bring to Northamptonshire. The natural environment can also provide us with potential energy sources that can be used to reduce the carbon emissions we produce, and to provide electricity and heat for homes and businesses.
- 8.2.41 This requires action across a number of themes including agriculture and food production, bio-fuels and renewable energy, protecting and reconnecting habitats, flood and water management, recreation and tourism, microclimate control, and community and place-making. It requires co-ordination and prioritisation at a more strategic scale, as well as more detailed and site specific projects and interventions.
- 8.2.42 The main thrust of this approach is the relationship between biodiversity and adapting to climate change, and the economic benefits that the use of 'natural interventions' such as reinstatement of floodplains, tree planting, green roofs, and sustainable drainage systems can bring to Northamptonshire. Linkages are made with; the County Council's new responsibilities regarding flood and water management under the Flood and Water Management Act (2010) with opportunities for more natural flood attenuation schemes rather than more expensive hard engineered defences, the governments new work on the 'value of nature', as well as existing projects such as the national carbon sink forest pilot funded by the DEFRA (Rockingham Forest - For Life), and the partnership 'Improved Biodiversity' project. The document also complements and fits with the new Natural Environment White Paper 'The Natural Choice: securing the value of nature'.
- 8.2.43 It promotes the concept of creating and developing pilot innovative areas for naturalised flood prevention and habitat creation (including potential for river naturalisation / de- culverting (important for place-making and regeneration).
- 8.2.44 It also promotes integrated SuDS that seek to manage, cleanse and store stormwater as part of the strategic ecological network within all new major developments. Ensures integration of 'natural resilience' projects with the NCC local Flood Risk Strategy in planning to meet the requirements of the Flood and Water Management Act.
- 8.2.45 The development of the strategic infrastructure programme and delivery plan for county will identify the imminent priorities in detail and will:

- Feed into the Core Spatial Strategies and run to the same timetables;
- Be robust and complete enough to feed into CIL charging schedules that will need to be created by the district and borough councils;
- Run alongside and influence Northamptonshire County Council's capital programme and priorities;
- Identify a list of project priorities which can be used to plan and align funding streams making the best possible use of government grants, 106 funding and any other opportunities that become available. These schemes will be strategic in nature and hence should equate to £50,000 and above.

Other sources of funding

- 8.2.46 Defra is currently producing a good practice guide to support LPAs called 'Solutions for Joint Funding of Surface Water Schemes' which is due to be published in Autumn 2011. This project will explain the funding mechanisms and time cycles, the approval processes of key partners and the benefits of joint funding of local flood risk management.
- 8.2.47 The following fictitious example is taken from Defra's consultation document on 'Future Funding for Flood and Coastal Erosion Risk Management'

Case Study 2: Rural Defence project

A small market town is at a 1 in 20 annual risk of being flooded, and a £2million scheme has been prepared by the LLFA that would protect 75 homes to a 1 in 200 year standard, achieving £10 million in long term benefits.

The comparatively low cost benefit ratio means that the project has in the past been deferred and remains low priority.

Under payment for outcomes, the scheme has the potential to attract approximately £900,000 of the necessary funds through Flood Defence Grant in Aid (rather than the full £2 million). In addition, the scheme will be supported by the Regional Flood and Coastal Committee whose members vote to provide a further £500,000. With a reduced and clear funding goal to aim for the LLFA and local community groups work hard to raise the remaining £600,000 required to allow the scheme to go ahead.

For the £600,000 local investment, £10million in long term benefits is realised.

Information and Skill Sharing

- 8.2.48 It is essential that risk management authorities work together to achieve the functions set out in recent legislation. Effective sharing of information between risk management authorities can go a long way towards this aim.
- 8.2.49 Section 14 of the FWMA gives NCC, as the LLFA, the power to request information in connection with its flood risk management functions. It also states that information requested must be provided in the manner and within the period specified in the request.
- 8.2.50 The EA and Defra have prepared a draft guidance document on information sharing, which aims to facilitate effective partnerships and ensure information is shared between relevant authorities. NCC should use the principles of this document for future data requests to other risk management authorities within North Northamptonshire.

- 8.2.51 'Information' can cover any data, documents or facts recorded in any form and includes paper files, notes, reports, databases, spreadsheets, drawings and plans, photographs and videos, electronic documents, emails, etc. There is a vast amount of data, in these different forms, held by a number of different risk management authorities within Northamptonshire; the challenge will be identifying what information exists and where it is held. This process was initiated through the work completed as part of the NCC Preliminary Flood Risk Assessment (PFRA) where a large amount of data was collected from different risk management authorities within Northamptonshire. This data has provided the overall evidence base of flood risk information which will inform future flood risk management work. As part of the NN JPU, data sharing agreements are in place between key stakeholders.

Way Forward

- 8.2.52 This Strategy cannot dictate what form of charging is used. Ultimately this will be the remit of the planning authority. However, it is suggested that the solution combines traditional and more recently introduced funding sources and models.. In the meantime Section 106 agreements should continue to be considered based on the needs of each development.
- 8.2.53 This in itself will not be enough; government funding will still be required in the initial stages to ensure that key infrastructure improvements (strategic flood risk mitigation) are provided.
- 8.2.54 The Investment Management Plan being prepared by NCC under the FCERM Defra Case Study should also provide a good insight into preparing a Plan for North Northamptonshire.
- 8.2.55 Schemes which may require the collection of money from local residents and changes to business rates or a levy would require political decisions to be agreed.
- 8.2.56 Working in partnership with other organisations to secure funding for both structural and non-structural solutions to flooding, including communities and the Regional Flood and Coastal Committee.
- 8.2.57 Every opportunity should be taken to secure national and regional funding. Where appropriate Northamptonshire County Council will lead on combined applications for funding.
- 8.2.58 More properties will require flood resistance and resilience measure in the future and the funding supplied through Government will not be sufficient. This is why a partnership approach to funding related to areas, should be given high priority.

9 Summary and Next Steps

- 9.1.1 URS was commissioned to undertake an update to the Flood Risk Management Strategy for North Northamptonshire with the aim of providing a sound basis for further developing local policy through the identification of project priorities and the delivery of flood mitigation management actions. Key objectives to the delivery of the study aims have been the identification of key future priorities and mitigation projects; provision of policy recommendations; assessment of requirements arising from proposed strategic land allocations and the estimation of costs and potential funding mechanisms to support priority infrastructure projects.
- 9.1.2 CBC, ENC, KBC and BCW are working through the NN JPU to prepare a JCS for North Northamptonshire. The way forward, or 'emerging approach' as it has been termed within this report, is currently based on a hybrid of the best elements of the four identified spatial options. The emerging approach has included a focus of development on the three main towns, Kettering, Corby and Wellingborough, which will be delivered in large part through already identified, and committed, SUE's. The revised core strategy will seek to strengthen the offer in the Four Towns (Rushden, Higham Ferrers, Irthlingborough and Raunds) and the Rural North, Oundle and Thrapston area to ensure that they do not become more dependent upon Northampton and other larger centres.
- 9.1.3 As stated within this report, the replacement JCS will not be introduced until the existing regional plans have been formally withdrawn by the government and there is currently uncertainty over when this will take place. In light of this uncertainty, it is necessary to view this study update as a "living document" which is subject to future changes following the withdrawal of the existing regional plans. Subsequently, further updates to the policy recommendations outlined within the 'way forward' under the emerging approach may be required in the future. Following finalisation of the emerging approach, a clear strategy for Flood Risk Management should then be agreed for embedding within the replacement JCS. It is proposed that following the issue of a clear strategy for Flood Risk Management, this study update should be used by the Lead Local Flood Authority (LLFA) to inform decisions within the Local Flood Risk Management Strategy for the further implementation of the priority schemes outlined within this study update.
- 9.1.4 To aid in the identification of priority flood mitigation measures, two workshops have been held in which previous actions and schemes have been discussed and further suggestions put forward for consideration. A Multi Criteria Analysis was attempted on a number of strategic infrastructure schemes and this was developed further and the outcomes included within this report.
- 9.1.5 The Core Strategy contains seven key spatial planning policies which are relevant to the Flood Risk Management Strategy and are summarised in chapter 3.
- 9.1.6 PPS25 is due to be superseded by the National Planning Policy Framework (NPPF) which will set out the government's requirements for the planning system. The NPPF was published in draft form in July 2011, and is expected to be finalised in spring 2012. The NPPF consists of a framework within which councils and local people can produce local and neighbourhood plans that reflect the needs and priorities of their communities. The principles of PPS25 will still form part of the new NPPF, however the indications are that the advice contained in it will be less detailed.

9.1.7 Until the NPPF is released PPS25 should be followed. The ethos of PPS25 will remain in NPPF. Following the release of the NPPF, NNJPU should consult with the EA before reviewing their policies on Flood Risk Management.

9.1.8 **Flood Risk Management Policies** – The following recommendations are taken from the North Northamptonshire Flood Risk Management Study (Royal Haskoning, 2007) which are still relevant :

1. Implementation of strategic flood risk management measures in advance or in parallel with the proposed developments with the intent of obtaining appropriate financial contributions from the prospective developers through Section 106 Agreements including for long-term management.
2. Continuing to seek opportunities using a partnership approach to reduce flood risk within North Northamptonshire, avoiding the temptation just to manage flood risk within individual administrative areas.
3. Provision of a combination of source control and strategic SUDS measures within individual development sites where the opportunities for catchment wide strategic measures are limited.
4. Incorporation of sufficient capacity in strategic flood management measures allowing for planned growth and future climate change.
5. Rejection of a piecemeal approach to manage runoff from smaller individual sites whilst providing strategic and local green corridors to incorporate SUDS for managing surface water runoff from developments.
6. Restoration of the river floodplains as the land becomes available for redevelopment through set back options and creation of green space.
7. Identification of the locations that are known to have surface water flooding problems from sewers and overland flow routes and exploring possible solutions for them through new development proposals.

Additional Flood Risk Management Policies recommended from this Update:

1. Recognise that avoiding flood risks in some options would have implications for other issues – e.g. avoiding Nene Valley is likely to have transportation and landscape implications
2. Adopt a sequential approach to land allocation.
3. Flood Risk Management approach should remain consistent with the CFMP and the Northamptonshire LFRMS,
4. Piecemeal flood mitigation measures should be avoided by implementing strategic flood risk management infrastructure projects through partnership schemes that will benefit the principal towns of North Northamptonshire and the wider area downstream, taking climate change into account,
5. Carry out SWMP's in all planned growth areas.
6. Reduce surface water runoff where possible using SUDS in consultation with and following the SUDS Approval Body (SAB) guidance for Northamptonshire,

7. Implement targeted watercourse maintenance regimes where shown to be effective in maintaining the standard of service that the channel was originally designed for, in line with EA and LLFA practices, this relates to introducing targeted channel maintenance in urban areas to restore and then subsequently maintain best possible level of service to reduce flood risk.
8. A sequential approach should be applied within site boundaries: Development should be avoided in areas considered to have a high probability of flooding (Flood Zone 3) and directed towards areas of low probability (Flood Zone 1). Where development is required in parts of the site that are at a high risk of flooding, the Exception Test should be applied. The Exception Test considers whether development on that part of the site provides wider sustainability benefits, is on previously developed land, and is safe on the grounds of flood risk. This sequential approach should be applied at all stages of planning for sites that are wholly or partly at risk of flooding, from master planning through to detailed design.
9. Development should be rolled back from watercourses to provide blue corridors, which could link into green infrastructure.
10. Flood risk Resistance and Resilience measures should be introduced into new developments within areas under pressure from fluvial and surface water flood sources. Inclusion in a design policy within the CSS would help with new developments.

9.1.9 Following the workshops and a review of the flood mitigation projects detailed within studies which precede this report, MCA has been used to identify the following Priority Schemes and investigations;

- Watercourse Channel Maintenance and Improvement Programme for the principle urban areas,
- SWMPs for North Northamptonshire,
- Slade Brook FSR Facility at Glendon Hall, Kettering,
- Willow brook Channel and Culvert Improvement Works and Weldon FSR Enlargement, Corby,
- River Nene Flood Storage Opportunities and Investigation,
- Harrowden Brook (FSR Enlargement) Investigation.

9.1.10 A number of Contingency Projects have also been recommended. Some of these could be brought forward if priority schemes are unduly delayed. These include:

- West Corby SUE alternative drainage option to River Welland investigation,
- Alledge Brook SUDS investigation and FSR study,
- Thorpe Malsor and Cransley reservoirs catchment storage investigation,
- Swanspool Brook FSR Investigation,
- Finedon FSR Appraisal.

9.1.11 An Action Plan has been prepared to outline the recommended actions arising from the FRM Strategy and stakeholder partnership involvement for each of the four districts of North

Northamptonshire. The Action Plan sets out the main objectives of each action, indicates a timeframe and gives an indication of cost.

- 9.1.12 Available forms and sources of funding have been identified to implement the FRM strategy for North Northamptonshire and the strategic priority schemes and projects in particular. These include funding from:
- Central Government e.g. through Defra & CLG grants
 - Area Based Grants to LLFAs
 - Capital Funding through 'Payment for Outcomes' and 'Flood Defence Grant in Aid' Schemes
 - The Community Infrastructure Levy
 - The European Union
 - Private Developers e.g. S106 Agreements
 - Local fundraising from the local communities and businesses who stand to benefit from the proposed flood defence schemes
- 9.1.13 Case studies have been provided to give examples of how funds were sourced from various sources in other parts of the UK.
- 9.1.14 NCC are currently taking part in a FCERM Defra Case Study which involves preparing an Investment Management Plan for Northamptonshire. The outcomes from this study should prove valuable to preparing a strategic investment Plan for North Northamptonshire.
- 9.1.15 Carefully considered funding strategies should be developed for each of the priority projects recommended within this study following the finalisation of the emerging approach within the replacement JCS. Funding strategies should focus upon the identification of funding streams applicable to each of the priority schemes outlined within this report as not all funding sources will be applicable, or available, to each priority scheme. It is also recommended that funding programmes preferentially focus upon the mitigation of flood risk in relation to the programme of future residential and commercial development, thereby sourcing funding for flood mitigation schemes that will preferentially alleviate flooding based on the growth timeframe of residential and commercial development within the core centres.
- 9.1.16 The Action Plan should be reviewed and then implemented once the revised JCS has been finalised and priority schemes and actions programmed in consultation with key partners including the LLFA and the EA. Early discussions with Developers is important to maximise the potential benefits of the strategic priority infrastructure schemes and which is likely to have implications on the planning process of these developments.

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- Great Ouse Catchment Flood Management Plan*, Environment Agency (2011)

Appendix A: Data Register

	TITLE	DESCRIPTION	DATA CATEGORY	CONFIDENCE
North Northamptonshire	Corby WCS	Corby Water Cycle Strategy Phase 2 Technical Report (2006)	Flood Policy Document	Very good
	North Northants WCS	North Northamptonshire Detailed Water Cycle Strategy, including North Northamptonshire Flood Risk Management Strategy (2009)	Flood Policy Document	Very good
	North Northants Flood Risk Management Study	North Northamptonshire Flood Risk Management Study (2007)	Flood Policy Document	Very good
	AStGWF	Areas Susceptible to Groundwater Flooding Maps (Environment Agency)	Background Info / mapping	Very good
	AStSWF	Areas Susceptible to Surface Water Flooding Maps (Environment Agency)	Background Info / mapping	Very good
	OS Mapping	Ordnance Survey 1:250k, 1:50k, 1:10k	Background Info / mapping	Very good
	Background paper on housing and job requirements for North Northamptonshire Spatial Options	Spatial options background paper May 2011	Planning Documents	Very good
	Spatial Options for North Northamptonshire: Discussion Paper NN JPU	Spatial options discussion paper May 2011	Planning Documents	Very good
Environment Agency	GIS layers	Detailed River Network Hydrometric catchment boundary Main River Ordinary Watercourses Flood Zone 2 Flood Zone 3 Flood Warning Areas Historic flooding	Fluvial Flooding	Very good
	Modelled flood outlines and accompanying reports / documentation	Alledge Brook Grendon Brook Harpers Brook Middle Nene Raunds Hog Dyke River Ise Skew Bridge Dyke Southwick Brook Swanspool Brook Willow Brook River Welland	Fluvial Flooding	Good

	NFCDD	Flood defence and structure database, photographs	Fluvial Flooding	Good
	April 1998 Floods in the Welland and Nene catchment	Report	Fluvial Flooding	Very good
	Nene Flood Storage Study	Environment Agency Nene catchment flood storage study	Fluvial Flooding	Very good
LPAs	Kettering and Wellingborough Level 1 SFRA update	Strategic Flood Risk Assessment	Flood Policy Document	Very good
	Kettering Town Centre Level 2 SFRA	Strategic Flood Risk Assessment	Flood Policy Document	Very good
	Corby Stage 2 SFRA Final Report	Strategic Flood Risk Assessment	Flood Policy Document	Very good
Northants CC	Records of flooding on NCC highway network	Historical flooding records	Highways Flooding	Very good
Anglian Water	Asset Data	GIS layers containing asset data within NN	General Drainage	Very good
	DG5 historical flooding data	Spreadsheet with locations of sewer flooding incidents	General Drainage	Very good

Appendix B: Stakeholder Workshop 1 Material

- Stakeholder Workshop 2 Attendee Briefing Note
- Stakeholder Workshop 1 Plan (June 2011)

North Northamptonshire Flood Risk Management Strategy Update 2011

Stakeholder Workshop Attendee Briefing Note

Background Information

Corby, East Northamptonshire, Kettering and Wellingborough Councils have worked through the North Northamptonshire Joint Planning Unit (NNJPU) to prepare a Joint Core Strategy for North Northamptonshire. The NNJPU reports to a Joint Planning Committee comprised of three Members from each of the four Districts/Boroughs and from Northamptonshire County Council. The current Core Strategy was adopted in June 2008 and is now under review, with a replacement strategy programmed for adoption in late 2012.

Spatial options for the replacement joint core strategy are currently undergoing technical testing. A Preferred Option in the form of a draft replacement core strategy will be reported to the North Northamptonshire Joint Planning Committee before the end of July 2011 and a fully revised core strategy will be reported to committee in December. This requires the implications of the options to be assessed by June and a clear strategy on Flood Risk Management to be developed and agreed by October.

A Flood Risk Management Study was undertaken in 2007 and this formed part of the adopted joint core strategy evidence base. Subsequently, a Flood Risk Management Strategy was devised as part of the Detailed Water Cycle Strategy (WCS), completed in September 2009.

URS Scott Wilson has been commissioned to undertake an update to the North Northamptonshire Flood Risk Management Strategy. The update will be a key part of the evidence base underpinning the forthcoming replacement Joint Core Strategy. The replacement core strategy will identify strategic land allocations that may include housing, employment, sports, tourism and green infrastructure projects. This is a distinct progression from the adopted strategy, which only identified 'broad locations' with land allocations to be subsequently made in detailed development plans at the district level.

Workshop Aims and Objectives

As part of the Flood Risk Management Strategy Update, workshops are being held at two key stages. The aim of the first Workshop, being held on 9th June 2011, is to engage with local stakeholders to achieve the following objectives:

- Initial stock take of the range of already agreed policies and actions in North Northamptonshire in relation to flood risk management and spatial planning.
- Identify the implications of the emerging spatial options.
- Identify potential show stoppers for the joint core strategy.
- Identify potential strategic flood risk management projects.
- Determine existing information about costings.

The Workshop objectives will be achieved through a series of presentations, organised working sessions and group discussions.

Workshop Preparation

In advance of the Workshop, we request that attendees review any policies and actions for flood risk management and / or spatial planning within North Northamptonshire that are relevant to the organisation that individual attendees represent. In addition, please could attendees identify any key personnel and datasets that may be of use to the study¹.

¹ Please note that a number of key datasets have already been requested from key stakeholders, though we are aware that other datasets may be available.



North Northamptonshire Flood Risk Management Strategy **Workshop 1**

Workshop Plan
June 2011

Prepared for



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1 Introduction

1.1 Background to Project

Corby, East Northamptonshire, Kettering and Wellingborough Councils have worked through the North Northamptonshire Joint Planning Unit (NNJPU) to prepare a Joint Core Strategy for North Northamptonshire. The NNJPU reports to a Joint Planning Committee comprised of three Members from each of the four districts/boroughs and from Northamptonshire County Council. The current Core Strategy was adopted in June 2008 and is now under review, with a replacement strategy programmed for adoption in late 2012.

Spatial options for the replacement joint core strategy are currently undergoing technical testing. A Preferred Option in the form of a draft replacement core strategy will be reported to the North Northamptonshire Joint Planning Committee before the end of July 2011 and a fully revised core strategy will be reported to committee in December. This requires the implications of the options to be assessed by June and a clear strategy on Flood Risk Management to be developed and agreed by October.

1.2 Workshop Aims and Objectives

The aim of the first Workshop session is to gather and analyse relevant information relating to spatial planning and existing options for flood risk management. Specific objectives of the session are outlined below:

- Initial stock take of the range of already agreed policies and actions:
 - Spatial planning policies and actions,
 - Flood risk management policies and actions.
- Working sessions to identify the implications of the emerging spatial options.
- Potential show stoppers for the joint core strategy.
- Potential strategic flood risk management projects.
- Any existing information about costing.

2 Approach to Delivery

2.1 Understanding the Target Audience

The confirmed attendees for Workshop 1 comprise a varied cross-section of the industry, including planners, asset managers, flood risk specialists, engineers and environmentalists.

2.2 Workshop Technical Content

As part of the ongoing work for the Flood Risk Management Strategy, we are undertaking a detailed literature review of relevant guidance documents and information. The focus areas of the literature review include the following:

- River Nene Catchment Flood Management Plan (Dec 2009)
- River Welland Catchment Flood Management Plan (Sept 2009)
- North Northants Detailed Water Cycle Strategy
- North Northamptonshire Water Cycle Strategy – Wastewater Capacity Study: Interim Findings
- North Northamptonshire Flood Risk Management Study (June 2007)
- North Northamptonshire Development Study – Outline Water Cycle Strategy Technical Report.
- Background paper on housing and jobs requirements for North Northamptonshire Spatial Options (April 2011)

3 Workshop Content

3.1 Overview of Technical Content

The technical content of the workshop is described below. The key issues which need to be covered in the learning material will cover the following topics and sub-topics:

1 Policies and Actions
a Spatial planning policies and actions
Presentation from Simon Betts to review spatial planning policies and actions identified in literature review.
b Flood risk management policies and actions
Presentation from Fay Tivey to review the flood risk management policies and actions identified in literature review.
c Identifying additional relevant policies and actions
Brainstorming session with the whole group to identify any other relevant planning policies and actions that haven't been covered in 1a and 1b.
2 Implications of the emerging spatial options & potential showstoppers
a Overview of the emerging spatial options
Presentation from Simon Betts providing an overview of the emerging spatial options outlined in the 'Background paper on housing and jobs requirements for North Northamptonshire spatial options' (Options A to D).
b Implications of emerging spatial options
Working sessions to identify the implications of the emerging spatial options. The group will be divided into four working groups, one for each of the emerging spatial options.
c Potential showstoppers for the Joint Core Strategy
Each working group will identify whether their allocated Spatial Option presents any potential showstoppers for the Joint Core Strategy on the grounds of flood risk.

3 Potential strategic flood risk management projects	
a Identified strategic flood risk management options	<p>Presentation from Fay Tivey providing a summary of the flood risk management options that have been identified by previous studies.</p> <p>Working groups to undertake SWOT analysis of these previously identified options in relation to each strategic growth option.</p>
b Identification of alternative flood risk management options	<p>Within each working group identify any additional strategic flood risk management measures that may be appropriate for each of the four strategic growth options.</p>
c Costings	<p>Brainstorming session within working groups to identify potential available funding streams in the study area – including those which have and have not been explored / pursued previously for similar projects.</p>
4 Group discussion	
a Presentation of findings	<p>One nominated person from each working group to report back to the wider group, to include:</p> <ul style="list-style-type: none"> * Re-cap of the spatial option (location, proposed land uses, scale of growth). * Potential flood risk implications of the spatial option and any showstoppers for the Joint Core Strategy on the grounds of flood risk. * Potential flood risk management options for the strategic option (from both the presentation and the working group session). * Information on costings, if possible, and potential funding streams.
b Open discussions	<p>It is anticipated that the presentations will prompt some open discussions and debate.</p>

3.2 Workshop Plan

Timing	Section	Delivery mechanism	Aims	Resources
10:00 to 10:10	Welcome, introduction and aims and objectives of the day	Presentation	Provide an introduction to the workshop and discuss the background, aims and objectives of the FRMS	Karen Gadomski, Fay Tivey Laptop / projector
10:10 to 10:20	1a. Spatial planning policies and actions	Presentation	Provide a brief overview of the existing flood risk management policies and actions from the literature review	Simon Betts Laptop / projector
10:20 to 10:30	1b. Flood risk management policies and actions	Presentation	Provide a brief overview of the existing spatial planning policies and actions from the literature review	Fay Tivey Laptop / projector
10:30 to 10:45	1c. Data gathering exercise for any additional policies and actions	Whole group brainstorming session	Identify additional strategic planning / flood risk options that were not identified in presentations.	White board / flip chart
10:45 to 11:00	2a. Overview of the emerging spatial options	Presentation	Provide an overview of the emerging spatial options for North Northamptonshire.	Simon Betts Laptop / Projector
11:00 to 11:15	---- Coffee break ----			
11:15	---- Split into Working Groups ----			
11:15 to 11:45	2b. Implications of emerging spatial options	Working groups	Identify potential implications of each spatial option on the grounds of flood risk.	Maps, notepads, instruction sheets, flip charts and pens
11:45 to 12:15	2c. Potential showstoppers for the Joint Core Strategy	Working groups	Identify any potential issues that could prevent the Joint Core Strategy from moving forward.	Maps, notepads, instruction sheets, flip charts and pens

Timing	Section	Delivery mechanism	Aims	Resources
12:15 to 12:45	3a. Identified strategic flood risk management options	Presentation Working groups	Outline the flood risk management options that have been identified in previous studies. Working groups to undertake SWOT analysis of FRM options in relation to their Strategic Growth option.	Laptop / projector
12:45 to 13:15	---- Lunch ----			
13:15 to 13:30	3b. Identification of alternative flood risk management options	Working groups	Identify alternative flood risk management options suitable for each strategic option.	Maps, notepads, instruction sheets, flip charts and pens
13:30 to 13:40	3c. Costings	Working groups	Identify potential funding streams.	Maps, notepads, instruction sheets, flip charts and pens
13:40 to 14:40	4a. Presentation of findings	Working groups	Each group to present the findings of the days exercises back to the whole group.	Maps, notepads, instruction sheets, flip charts and pens
14:40 to 15:10	4b. Open discussion	Whole group discussion	A chance to discuss the presentations and generate discussion around key points.	N/A
15:10 to 15:15	Discuss next stages	Presentation	Discuss the future stages of the FRMS, including Workshop 2.	Laptop / projector
15:15 to 15:30	Questions	Q&A	Time for any questions or queries to be made and discussed.	N/A
15:30	---- Close ----		End of workshop.	N/A

Appendix C: Stakeholder Workshop 2 Material

- Stakeholder Workshop 2 Attendee Briefing Note
- Stakeholder Workshop 2 Plan (August 2011)

North Northamptonshire Flood Risk Management Strategy Update 2011

Stakeholder Workshop Attendee Briefing Note

Background Information

Corby, East Northamptonshire, Kettering and Wellingborough Councils have worked through the North Northamptonshire Joint Planning Unit (NNJPU) to prepare a Joint Core Strategy for North Northamptonshire. The NNJPU reports to a Joint Planning Committee comprised of three Members from each of the four Districts/Boroughs and from Northamptonshire County Council. The current Core Strategy was adopted in June 2008 and is now under review, with a replacement strategy programmed for adoption in early 2013.

URS Scott Wilson has been commissioned to undertake an update to the North Northamptonshire Flood Risk Management Strategy (NNFRMS). The update will be a key part of the evidence base underpinning the forthcoming replacement Joint Core Strategy. The replacement core strategy will identify strategic land allocations that may include housing, employment, sports, tourism and green infrastructure projects. This is a distinct progression from the adopted strategy, which only identified 'broad locations' with land allocations to be subsequently made in detailed development plans at the district level.

As part of the Flood Risk Management Strategy Update, workshops are being held at two key stages. The first of two NN FRMS workshops was held on 9th June and involved gathering information and assessing spatial options for future development in North Northamptonshire. This formed part of the technical testing of spatial options.

A preferred spatial option for North Northamptonshire is now emerging. Following the first NNFRMS Workshop, a number of deliverable flood risk management projects have been identified that would benefit the emerging Preferred Option.

Workshop Aims and Objectives

The aim of the second Workshop, being held on 18th August 2011, is to engage with local stakeholders to consider deliverable flood risk management projects that have been identified following Workshop 1. The following objectives will be achieved:

- Working sessions to identify any further project options.
- Agree actions and priority projects.
- Identify any 'contingency' projects that could be brought forward in the event of delivery issues with the priority projects.

The Workshop objectives will be achieved through a series of presentations, organised working sessions and group discussions.

Workshop Preparation

In advance of the Workshop, we request that attendees read the North Northamptonshire Flood Risk Management Strategy Interim Report (dated August 2011) that is enclosed within this package of information.



North Northamptonshire Flood Risk Management Strategy **Workshop 2**

Workshop Plan
August 2011

Prepared for



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1 Introduction

1.1 Background to Project

Corby, East Northamptonshire, Kettering and Wellingborough Councils have worked through the North Northamptonshire Joint Planning Unit (NNJPU) to prepare a Joint Core Strategy for North Northamptonshire. The NNJPU reports to a Joint Planning Committee comprised of three Members from each of the four districts/boroughs and from Northamptonshire County Council. The current Core Strategy was adopted in June 2008 and is now under review, with a replacement strategy programmed for adoption in late 2012.

Spatial options for the replacement joint core strategy are currently undergoing technical testing. A Preferred Option is being discussed by the North Northamptonshire Joint Planning Committee at its meetings on 8th September and 12th October. An early draft of the replacement JCS will be reported to committee in December. This requires both the implications of the spatial options and the issues and opportunities presented by the preferred option to be assessed by summer 2011. A clear strategy for Flood Risk Management should then be developed and agreed by November.

A Workshop was held on 9th June 2010, the aim of which was to gather and analyse relevant information relating to spatial planning and existing options for flood risk management. Specific objectives of the session were:

- Initial stock take of the range of already agreed policies and actions:
 - Spatial planning policies and actions,
 - Flood risk management policies and actions.
- Working sessions to identify the implications of the emerging spatial options.
- Potential show stoppers for the joint core strategy.
- Potential strategic flood risk management projects.
- Any existing information about costing.

1.2 Workshop 2 Aims and Objectives

The aim of Workshop 2 is to consider deliverable flood risk management projects that have been identified following Workshop 1. Specific objectives to meet this aim are outlined below:

- Working sessions to identify any further project options.
- Agree actions and priority projects.
- Identify any 'contingency' projects that could be brought forward in the event of delivery issues with the priority projects.

2 Approach to Delivery

2.1 Understanding the Target Audience

The following stakeholder groups were represented at Workshop 1:

- North Northamptonshire JPU (NN JPU),
- Environment Agency (EA),
- Corby Borough Council (CBC),
- East Northamptonshire Council (ENC),
- Kettering Borough Council (KBC),
- Northamptonshire County Council (NCC),
- Anglian Water Services (AWS),
- Wildlife Trust (WT),
- URS Scott Wilson.

The attendees for Workshop 2 will represent those organisations that were represented at Workshop 1, thus providing a varied cross-section of the industry, including planners, asset managers, flood risk specialists, engineers and environmentalists.

2.2 Workshop Technical Content

Following Workshop 1, available information and data has been assimilated. The NN JPU has prepared draft documentation to identify an emerging Preferred Option for the draft replacement Joint Core Strategy. URS Scott Wilson is in the process of identifying deliverable flood risk management projects that will be required to allow the emerging Preferred Option to move forward.

The Interim Report provides context of flood risk management issues for the emerging Preferred Option. The technical content of Workshop 2 will centre around the emerging Preferred Option and any deliverable projects that have been identified.

3 Workshop Content

3.1 Overview of Technical Content

The technical content of Workshop 2 is described below. The key issues which need to be covered in the learning material will cover the following topics and sub-topics:

1 Emerging preferred option and flood risk management
a Emerging Preferred Option
Presentation providing explanation of the emerging preferred option and justification for the growth areas. Question and answer session.
b Identified flood risk implications
Presentation providing an overview of the flood risk implications of the emerging Preferred Option.
c Deliverable flood risk management projects
Presentation explaining deliverable flood risk management projects that have been identified for the emerging PO.
d Multi criteria analysis
Presentation explaining MCA approach and methodology. Stakeholders to agree weightings to be used in scoring the FRM projects.
2 Working sessions to identify any further project options
a Working groups: Further project options
Working groups to identify any further project options. Provide flip chart and large plans (A1) showing emerging Preferred Option to allow each group to annotate.
b Presentations and discussion to identify a short list of further project options
Short presentations from each working group to report back to the wider group. Discussions to follow to determine a short list of further project options.
3 Agree actions and priority projects
a Multi criteria analysis
Large charts mounted on a wall to assess short listed project options. Stakeholders to score the FRM projects against a number of economic, environmental and social costs and benefits.
b Agree priority projects




<p>Working groups to assess the projects identified by URS Scott Wilson and the shortlisted projects to determine priority projects. Groups to rank projects in order of perceived priority.</p> <p>Open discussion to agree projects.</p>	
c	Brainstorming session: Actions
<p>Brainstorming session to identify actions required to achieve the agreed priority projects.</p>	
4	Identify any 'contingency' projects that could be brought forward in the event of delivery issues with the priority projects
a	Identification of contingency projects
<p>Open discussion to confirm contingency projects following on from session 3. The non-priority or non-agreed projects are likely to form the contingency projects.</p>	

3.2 Workshop Plan

Timing	Section	Delivery mechanism	Aims	Resources
10:00 to 10:10	Welcome, introduction and aims and objectives of the day	Presentation	Overview of the project to date and objectives of the workshop.	Chris Broome / Michael Timmins Laptop / projector
10:10 to 10:25	1a. Explanation of emerging preferred option	Presentation and Q&A session	Explanation of the emerging preferred option and justification for the growth areas. Followed by a question and answer session.	Karen Gadomski Laptop / projector
10:25 to 10:45	1b. Identified flood risk implications	Presentation	Overview of the flood risk implications of the emerging PO	Chris Broome / Michael Timmins Laptop / projector
10:45 to 11:00	1c. Deliverable flood risk management projects	Presentation	Explanation of four deliverable flood risk management projects that have been identified	Chris Broome / Michael Timmins Laptop / projector
11:00 to 11:20	1d. Multi criteria analysis	Presentation / Whole Group	Explanation of the MCA methodology / Group to agree the weightings to be used.	Neil Williams Laptop / projector / large chart on wall
11:20 to 11:35	---- Coffee break ----			
11:35 to 11:45	---- Split into Working Groups ----			
11:45 to 12:30	2a. Working groups: Further project options	Working groups	Review the four projects presented and identify further project options that could assist the emerging PO	Briefing sheets, pens, paper, large plans

Timing	Section	Delivery mechanism	Aims	Resources
12:30 to 13:15	2b. Group presentations and agreement of further projects	Working groups / whole group	Short presentations from each working group from findings in 2a. Whole group discussion to agree short list of further project options.	Flip chart and pens
13:15 to 13:45	---- Lunch ----			
13:45 to 14:05	3a. Multi criteria analysis	Working groups / Whole Group	Obtain opinions of stakeholders of the relative costs and benefits (tangible and intangible) of each shortlisted project on a four point scale (high to low)	Briefing sheets, large chart on wall, marker pens or post it notes
14:05 to 14:50	3b. Agree priority projects	Working groups / whole group	Working groups to assess both URS SW and shortlisted projects. Working groups to rank projects. Followed by open discussion to agree priority projects.	Briefing sheets, pens, paper
14:50 to 15:10	3c. Brainstorming: Actions	Whole group	Identify actions required to achieve the agreed priority projects	Flip chart, pens
15:10 to 15:30	4a. Contingency projects	Whole group	Discuss and agree contingency projects.	Flip chart. pens
15:30 to 15:35	Discuss next stages	Presentation	Outline next stages	Chris Broome / Michael Timmins Laptop / projector
15:35 to 15:45	Questions			
15:45	---- Close ----			

Appendix D: Environment Agency Flood Warning Codes

	Key Message	Timing	Actions	Channels
Online flood risk forecast	Be aware. Keep an eye on the weather situation.	Forecasts of flooding on our website are updated at least once a day	<ul style="list-style-type: none"> Check weather conditions. Check for updated flood forecasts on our website. 	<ul style="list-style-type: none"> Internet Media
 FLOOD ALERT	Flooding is possible. Be prepared.	Two hours to two days in advance of flooding.	<ul style="list-style-type: none"> Be prepared for flooding. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website. 	<ul style="list-style-type: none"> FWD Floodline Internet
 FLOOD WARNING	Flooding is expected. Immediate action required.	Half an hour to one day in advance of flooding.	<ul style="list-style-type: none"> Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place. 	<ul style="list-style-type: none"> FWD Floodline Internet Sirens Loudhailers Media
 SEVERE FLOOD WARNING	Severe flooding. Danger to life.	When flooding poses a significant threat to life and different actions are required.	<ul style="list-style-type: none"> Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger. 	<ul style="list-style-type: none"> FWD Floodline Internet Sirens Loudhailers Media
Warning no longer in force	No further flooding is currently expected for your area.	Issued when a flood warning is no longer in force.	<ul style="list-style-type: none"> Flood water may still be around and could be contaminated. If you've been flooded, ring your buildings and contents insurance company as soon as possible. 	<ul style="list-style-type: none"> FWD Floodline Internet

Appendix E1: MCA Limitations and Updates

The schemes and actions outlined within Section 6.2 of this report were discussed at Workshop 2 with all present stakeholders. A MCA was undertaken during the second workshop held in the Council Chamber of the offices of ENC on the 18th August 2011. As part of the workshop, four working groups were set up to discuss and appraise the various options and from the discussions it was clear from a number of the projects selected that the Economic, Environmental and Social categories implemented to rank the projects were open to a substantial and wide variety of interpretation. Following further discussion, a number of limitations were raised by the stakeholders involved with Workshop.

- The land use section focuses upon the ranking of schemes upon the likely permanent or temporary flood damage or losses relating to private and public property. The FSR projects are therefore likely to score poorly within this section as the implementation or extension to an existing FSR is likely to impact heavily upon land usage due in part to the size of the schemes. However, within the current MCA analysis, there is no option to offset this high land sacrifice and monetary outlay with the downstream benefits that these schemes provide in terms of residential / economic development potential. For instance, the Weldon FSR and subsequent works program will enable a significant amount of land to be opened up for development without exacerbating flood risk downstream following development. The wider spatial advantages of FSRs upon downstream development opportunities are therefore not well represented within the MCA.
- In terms of monetary value, the cheapest schemes such as that of channel maintenance and improvement will score preferentially over schemes such as Finedon FSR. However, this implies that (and preferentially weights) schemes at the lower end of the price range deliver the most cost effective, temporally and spatially appropriate flood mitigation which is not always the case. For the same reason, schemes should not be immediately discounted based on a high monetary ranking, as costs should to be weighted relative to downstream development potential.
- The current MCA does not incorporate a factor of scheme 'deliverance' which includes an assessment of the criticality, political stance and funding mechanism of the proposed schemes. The larger FSR schemes may provide better capital to mitigation gain but can funding be made available and who is likely to provide this funding? Schemes with large associated costs, both in implementation and maintenance, will suffer if long term funding cannot be attributed to the scheme.
- In terms of Social Impacts, it is difficult to quantify what impact that channel maintenance may impact upon means of entertainment within the Services and Recreation sector whilst the distribution of impacts within community groups also suffers. The scoring of larger storage opportunity schemes may fare better due to quantifiable affects of flood storage, such as lowered river levels, smaller floodplain extents etc.
- It was highlighted that the initial scoring system was confusing, as the best schemes were represented by the schemes with the lowest total score which was considered to be counter intuitive. Following discussions at workshop 2, the scoring system has been modified with schemes now scoring within the range -2 to +2. Schemes that are judged to provide the most positive benefit in any given field will score a +2 whilst schemes providing the poorest benefits will score -2. Under this system, the schemes that score the highest totals have been put forward as priority schemes.

It should be noted that arising out of the second stakeholder workshop held on 18th August 2011, a number of updates have been added to the MCA. An additional impact of 'deliverability' has been added, reflecting the criticality, funding and political ramifications of schemes under consideration. The table below shows the full breakdown of the deliverability impact into each of the factors identified under critical scheme; funding; and political. In addition, a weighting factor has been included within the analysis to give preferential distinction from the key fields such as implementation cost, local economy, scheme criticality, funding and scheme politics. These updates to the original MCA selection criteria have been instigated to increase the efficiency of scheme selection, primarily through the negation of schemes being initially rejected due to high monetary costs whereas these schemes, although initially high in capital outlay and maintenance regimes, often have the most significant impacts upon downstream development and the wider catchment community.

Table: Breakdown of Deliverability Impact

Deliverability	Critical Scheme	Represents the weighting of schemes in relevance to the critical importance of promoting future residential and commercial development within the key development centres of Corby, Kettering and Wellingborough. Reference has been made to the way in which schemes impact upon 'the way forward' as outlined within the NN JPU emerging approach, thereby giving preferential weighting to schemes that are a necessary precursor to future development whilst also providing wider community benefits such as downstream flood alleviation.
	Funding	Represents an assessment of the ability to source funding to implement future flood mitigation schemes, providing a weighting factor to schemes that are likely to provide the widest community benefits in terms of residential, social and commercial development. Reference has been made to the ability of sourcing funds through private funding methods, which weights the funding score based on the schemes direct impact upon potential development, thereby best reflecting funding in terms of representing the development aims set out within the emerging approach.
	Political	Represents a reflection of the political stance taken by the local planning authority to individual schemes based upon the impact upon the local community, thereby giving a preferential weighting factor to schemes that have been identified and recommended as priority schemes within previous investigation and modelling studies. The backing of schemes by the local authority through a wide knowledge base is considered preferable within the generation of initial public and private funding opportunities and for the commencing of mitigation measures following the sourcing of funds.

Appendix E2: MCA

ECONOMIC	Cost of Implementation	Real monetary cost. Includes <ul style="list-style-type: none"> • Planning • Design • Construction • Maintenance
	Land use	Includes flood damages and/or losses relating to (permanent and temporary) private and public property such as: <ul style="list-style-type: none"> • Residential • Industrial • Commercial • Agricultural • Forestry • Public buildings (for example, schools, hospitals) • Transport (roads, bridges, railways, navigation) • Sewage and water supply networks, pipelines, etc.
	Local economy	Includes regeneration/development and competitiveness. Regeneration includes impacts on the creation of sustainable communities, i.e. economic development and development or maintenance of social cohesion. Important indicators include: <ul style="list-style-type: none"> • Creation (or not) of jobs; • Enhancement of local environment; and • Enhancement of social and leisure opportunities. Competitiveness issues include impacts to businesses (their costs, investment, market structure, etc.).
ENVIRONMENTAL	Physical habitats	Includes impacts to terrestrial (including coastal), aquatic and marine habitats and biodiversity, its conservation designations, and its flora and fauna. Includes impacts on flow patterns, sediment transport, geomorphology, etc.
	Water quantity and quality	Includes impacts on the water levels and water supplies (such as drainage and run-off). Includes impacts on biological and chemical quality of surface and groundwater water. Important indicators to consider include: <ul style="list-style-type: none"> • Chemical and biological GQS grades; • River quality objectives; • Consented and un-consented discharges; and • Designated bathing waters.
	Landscape and heritage	Includes impacts on heritage, archaeological and geological features. Includes impacts on the appearance of the land (its shape, colour and particular features), its landscape designations as well as its agreeable nature.

SOCIAL	Services and Recreation	Includes impacts on the processes or means of entertainment. It includes angling, informal recreation (walking, sunbathing, picnicking, sitting, swimming, etc.) and formal recreation (sports and other activities that require specific equipment). Includes impacts on availability and accessibility to public services such as education, housing, emergency and cleaning services, health, cultural facilities and other.
	Health and Safety	Includes impacts such as risk to life or serious injury, stress and anxiety (mental health and livelihood) and other health effects, such as those created during the construction phase of the project (noise and air pollution, for example).
	Community	Includes distribution impacts (consideration of interests of all groups of stakeholders), impacts on vulnerable groups (such as the elderly, children, etc.) and social tensions (rise of serious divisions and conflicts within the community). Includes impacts on the local community, level of satisfaction with neighbourhood, social networks and community expectations.
Deliverability	Critical Scheme	Represents the weighting of schemes in relevance to the critical importance of promoting future residential and commercial development within the key development centres of Corby, Kettering and Wellingborough. Reference has been made to the way in which schemes impact upon 'the way forward' as outlined within the NN JPU emerging approach, thereby giving preferential weighting to schemes that are a necessary precursor to future development whilst also providing wider community benefits such as downstream flood alleviation.
	Funding	Represents an assessment of the ability to source funding to implement future flood mitigation schemes, providing a weighting factor to schemes that are likely to provide the widest community benefits in terms of residential, social and commercial development. Reference has been made to the ability of sourcing funds through private funding methods, which weights the funding score based on the schemes direct impact upon potential development, thereby best reflecting funding in terms of representing the development aims set out within the emerging approach.
	Political	Represents a reflection of the political stance taken by the local planning authority to individual schemes based upon the impact upon the local community, thereby giving a preferential weighting factor to schemes that have been identified and recommended as priority schemes within previous investigation and modelling studies. The backing of schemes by the local authority through a wide knowledge base is considered preferable within the generation of initial public and private funding opportunities and for the commencing of mitigation measures following the sourcing of funds.

Scheme			Weighting Factor	Targeted Channel Maintenance and Improvement Programme	Weighted Score	Slade Brook Flood Storage Facility (Opportunity at Glendon Hall)	Weighted Score	Thorpe Malsor and Cransley Reservoirs Catchment Storage Facility Investigation	Weighted Score	Weldon Flood Storage Reservoir, Enlargement and Additional Mitigation Works	Weighted Score	Flood Storage Opportunity at Finedon	Weighted Score	River Nene Storage Opportunities	Weighted Score	Harrowden Brook (FSR Enlargement)	Weighted Score
Multiple Criteria Analysis	Economic	High Construction Cost	2	1	2	-1	-2	1	2	-1	-2	-2	-4	1	2	1	2
		Land Use	1	2	2	-2	-2	-1	-1	-1	-1	-1	-1	1	1	1	1
		Local Economy	2	1	2	2	4	1	2	2	4	1	2	1	2	1	2
	Environmental	Habitats	1	0	0	0	0	1	1	0	0	0	0	1	1	0	0
		Water Quantity and Quality	1	1	1	2	2	1	1	2	2	1	1	1	1	1	1
		Landscape and heritage	1	0	0	0	0	2	2	0	0	0	0	1	1	0	0
	Social	Services and Recreation	1	0	0	0	0	1	1	0	0	0	0	1	1	0	0
		H & S	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	1	1	0	0
		Community	1	1	1	2	2	0	0	2	2	1	1	1	1	1	1
	Deliverability	Critical Scheme	3	1	3	2	6	0	0	2	6	1	3	1	3	1	3
		Funding	2	1	2	1	2	-1	-2	2	4	0	0	1	2	1	2
		Political	2	1	2	2	4	0	0	2	4	1	2	0	0	0	0
	Score Totals			9	18	8	15	4	5	9	18	1	3	11	16	7	12

Weighted MCA Scoring for Strategic Flood Risk Management Infrastructure Projects

Multiple Criteria Analysis Scoring Key					
Score	+2	+1	0	-1	-2
Scheme Impact	Significant Positive Impact	Positive Impact	Neutral Impact	Negative Impact	Significant Negative Impact