

managing flood risk

Hull and Coastal Streams Catchment Flood Management Plan

Draft main stage summary document,
June 2008

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Managing flood risk

We are pleased to introduce our Catchment Flood Management Plan summary document for the River Hull and Coastal Streams.

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Past flood events remind us of the hardship and devastation that flooding can cause, especially in the populated areas where floods impact upon our homes and livelihoods. They also reveal the challenges we face when confronted by the forces of nature.

This plan will allow us to use a scientific approach to better understand flood risk now and in the future, describe how the river catchment behaves and what the most sustainable flood risk management policies may be over the next 50 to 100 years. We can use this direction to plan the most appropriate ways of managing flood risk for the long term, taking into account potential climate change and other pressures that may be placed upon the natural water system.

We will use this plan to steer our future investment, policies and overall flood risk management activities for the catchment. We hope that our public and private partners will find it useful in adopting the principles of flood risk management in their decision making, especially where it can guide the planning of land use and avoid inappropriate development.

This document provides a summary of the main message for the Hull and Coastal Streams CFMP area.

If you have any comments or feedback on this summary document, please contact us on the following:
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The purpose of Catchment Flood Management Plans

Catchment Flood Management Plans provide the policy direction for managing the long-term flood risk within a catchment over the next 50 to 100 years.

Flooding is a natural process.

We can never stop it, but we can prepare for it. Tackling flooding is about more than just defending against floods. It means understanding the complex causes of flooding and acting in a co-ordinated way with others to reduce the chance of flooding happening and the effects it will have.

A Catchment Flood Management Plan (CFMP) is a high level planning tool. Our objective in preparing this plan was to develop long-term policies to guide the management of flood risk within the Hull and Coastal Streams catchment now and in the future. In the past we have sought to control flooding through flood defence, mainly through building structures to control rivers. This was often done in a reactive manner. This approach to flood risk is unsustainable in the long term and we need to be proactive in our planning and management of flood risks.

The plan uses ‘flood risk assessment’ to understand the causes, size and locations of the flood risk throughout the catchment. The more that we understand this the better placed we are to establish what effects possible changes in land use, urban development, climate change and rising sea levels may have in the future. With this information, we can start to plan for a more sustainable future that works with nature wherever possible.

We have sought to understand, work with, and influence the social, economic and environmental characteristics of the catchment to manage the risk of flooding. We will look to work with nature where possible. We also identify and plan alternative measures for areas where we can no longer protect using our current unsustainable approach.

A continued reliance on building new defences to defend all areas against flooding is not sustainable. We need to move towards an approach to flood risk management that considers the catchment as a whole. To do this we need to work together with our partners to manage and target resources effectively and sustainably.

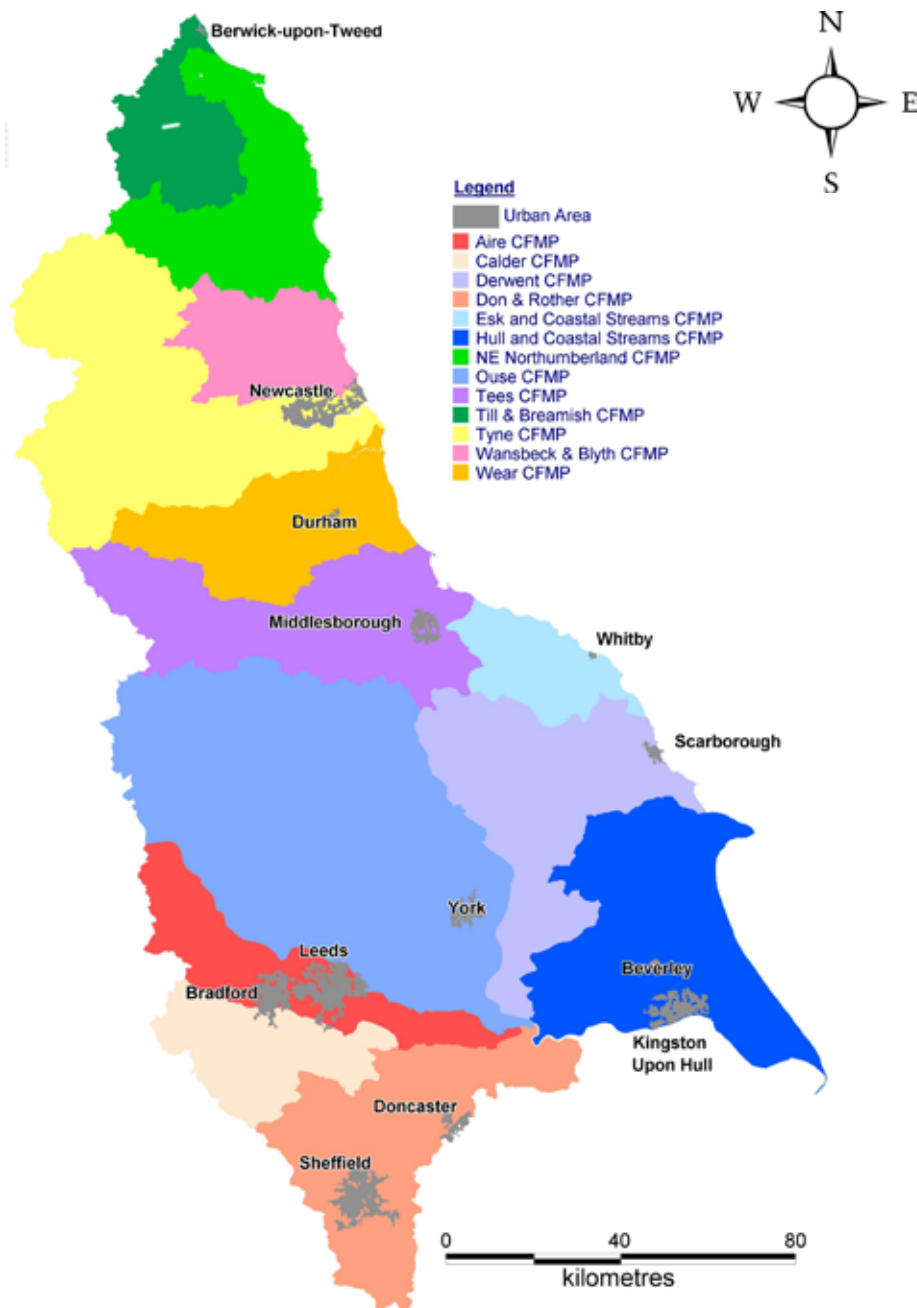
Planning for the region

Within the Environment Agency's north east region we are preparing 13 CFMPs covering all of the region's river catchments. Nationally, we are producing 76 CFMPs covering all catchments in England and Wales.

The CFMPs will contribute to a sustainable planning framework. We will both consider and build our partners' plans and policies into the decision making process and provide information on the development of external plans and policies.

CFMPs will provide important information on flood risk to inform both the Regional Spatial Strategy and Local Development Frameworks.

We will be using our CFMPs to inform the programme of measures through the Water Framework Directive. They will also form the basis on which we will develop future plans required by the emerging EU Floods Directive.



Introducing the River Hull and Coastal Streams Catchment Flood Management Plan

Our plan covers many rivers between the Vale of York in the west to the North Sea coast in the east. The northern boundary is the southern slopes of the North York Moors with the southern boundary being the Humber estuary shoreline

The Hull and Coastal Stream CFMP area covers approximately 2,226 square kilometres and includes seven sub-catchments; the Gypsy Race catchment, Upper Hull catchment, Barmston Sea drain catchment, Lower Hull catchment, Foulness catchment, Lower Ouse catchment and the Southern Coastal Streams catchment. For the purposes of this CFMP we have split these into nine policy units.

In general the catchment is rural with a number of settlements scattered through the area. The largest settlement in the CFMP area is the city of Kingston upon Hull which is located in the south.

Around 508,000 people live within the Hull and Coastal Streams CFMP area. Of this, 301,000 are located within Kingston upon Hull. Other principal towns within the CFMP area include Bridlington, Beverley, Hornsea and Brough.

Within the catchment area, Kingston upon Hull and its adjoining urban area is the predominant centre of economic activity. The area has experienced an industrial decline and current activities are closely linked to the ports, fishing communities and agriculture.

The majority of land within the CFMP area is arable, based around cereal production. The last 10 years has also seen an increase in the production of outdoor vegetables.

The Hull CFMP area has a rich natural environment and includes one Special Area of Conservation (SAC) and three Special Protection Areas (SPA). These are important not just locally but nationally. The CFMP area also contains 44 Sites of Special Scientific Interest (SSSI).

In terms of the historic environment, there are 449 Scheduled Monuments in the Hull and Coastal Stream CFMP area. These include moats, dykes, medieval settlements, churchyards and castles. There are also nine Registered Parks and Gardens and a large number of conservation areas and listed buildings.



Current flood risk

Flood risk in the Hull and Coastal Streams CFMP comes about through a complex interaction of rivers, surface water, drainage networks and the tides.

Location of risk

The Hull and Coastal Streams CFMP region has experienced widespread flooding in the past. The area at greatest risk is Kingston upon Hull where the majority of the damages and property at risk are located. The risk of flooding is also significant in other areas, such as Hedon, Burstwick, Beverley and Driffield but when compared to Hull they are at relatively low risk. Many smaller settlements are at risk of 'flash flooding' due to the steep sides of the Yorkshire Wolds. The extensive chalk aquifers within the CFMP area have also been the source of groundwater flooding.

Prior to the floods of summer 2007, the main source of flooding in Kingston upon Hull was thought to be from the rivers and the sea. The floods in 2000 highlighted this when water backed up in the River Hull because it was not able to drain into the Humber Estuary due to high tides. The flooding in 2007 however, highlighted a new threat to the area from surface water and sewer flooding. The low-lying nature of Kingston upon Hull and its surrounding settlements means that they rely heavily on pumps to carry water away from built up areas. If the pumps capacity is exceeded or they fail, then widespread flooding can occur.

Consequences of flooding

The consequences of flooding can be measured by the number of people and properties that are likely to flood and the hazard that the water presents. Flooding from rivers could affect 33 per cent of the total people living within the catchment area. Within Kingston upon Hull alone, 47 per cent of the population are at risk of river flooding. This figure is very high and means that in total 147,000 people are at risk of flooding during a high magnitude flood event.

We measure flood hazard as a combination of depth and speed of flood water. This gives us a scale of flood hazard to people that ranges from low to extreme. The majority of people at risk would be exposed to a low flood hazard. However, a small number of people would be exposed to a higher hazard.

Flooding affects the economy of the catchment as well. The average yearly damage to agriculture is substantially lower than the damage to property. Average property damages throughout the CFMP area reach over £52 million while damages to agriculture are expected to be £317,000. Much of this damage occurs to high quality agricultural land. The main economic impacts of flooding in the area are damages to both residential and commercial property. Industry within the port area on the Humber in Kingston upon Hull is particularly important and therefore significant damages can be expected to commercial properties.

There are a total of ten Scheduled Monuments at risk within the catchment. These include vulnerable features such as Hedon Medieval Town and numerous World War II features. There are also a number of environmental designations within the flood extent including SSSIs, SPAs and SACs. These sites could be affected both positively and negatively by flooding depending on habitat type and the duration of flooding, particularly as some designations such as the Humber Estuary SSSI are part of the river system.

What we currently do

Our current flood risk management is focused to address the risk that is present in the catchment. Our work is focused around the four areas of flood risk mapping, development control, asset system management and flood incident management.

Our flood risk mapping teams improve our knowledge of flood risks through programmes of detailed mapping and modelling of the catchment. The outputs of this work are available to the public via our website (www.environment-agency.gov.uk). We share this risk information with our partners to help us plan and prioritise our other areas of works.

Our development control teams work to influence the planning and location of new developments. Our role in the planning process has been strengthened through recent government planning guidance.

Our powers allow our asset system management teams to undertake works to build, maintain and repair flood defences on designated main rivers. We have built up our activities over the years to tackle where flooding has occurred. We spend over £514,000 per year on regular maintenance activities, in addition to larger one off projects such as new or replacement defences. Over the years defences have been constructed to reduce the risk of flooding in areas such as Kingston upon Hull with the construction of the Hull Tidal Surge Barrier.

We also regularly undertake channel maintenance activities, which reduces risk by helping the river to flow freely through the catchment.

The flood incident management team operate our free flood warning service. This is an opt in service and only one per cent of properties that could receive a warning have taken up this service for all types of flood warning offered in the area.

The risk of flooding will increase in the future and we need to prepare and begin to act now. We need to coordinate with external partners and make use of the natural processes in the catchment. In doing so we can remove the burden of unsustainable actions on current and future generations.

Future flood risk

To develop our plan for flood risk management we have considered how climate change, land use management and urban development might change in the future.

What will affect future flood risk?

Future flood risk is influenced by changes within the catchment and changes in the climate.

The catchment specific issues that we have considered are; how forest cover, land use, farming practices and urban development can modify the way floods are generated.

We have also considered the impact of climate change on the catchment, looking ahead to what our climate is expected to be like in 2100.

These changes were fed into our model of the catchment's rivers. This shows us how sensitive the rivers are to these catchment and climatic changes and provides us with a picture of possible future flood risk. This also enables us to see what will help reduce flood risk but also what might increase flood risk in the future.

Changes we considered by 2100 were as follows:

- climate change:
 - 20 per cent increase in flood flows
 - 30 per cent increase in rainfall intensity
 - rising sea levels of over one metre
- land use:
 - changes to woodland cover
 - changes to land drainage
 - changes to farming practices
- urban development:
 - industry and housing demands increasing

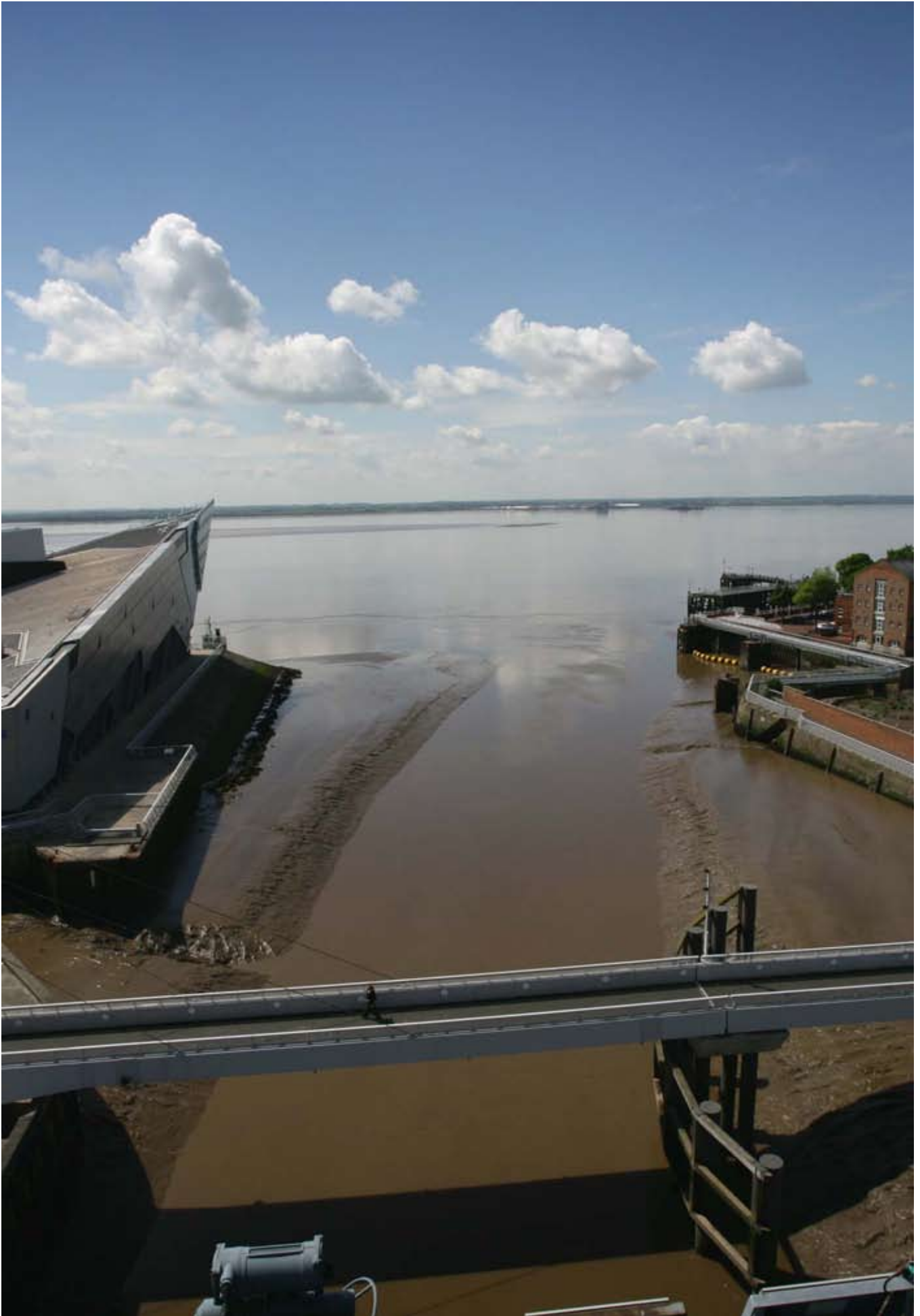
What are the consequences of this future flooding?

The future will not bring the same increases in risks to all parts of the areas. Future actions need to reflect this. Rising sea levels will result in rivers being tide locked for a greater duration. Increased rainfall intensity will raise the risk of surface water flooding.

As a result of the predicted changes the risk of flooding is expected to increase to people and properties within the CFMP area. In most areas this increase is expected to be modest with less than a 10 per cent increase in the number of people at risk. However, flood risk is expected to increase significantly in the Kingston upon Hull and Hedon areas. Here, the risk of flooding to people and property is expected to increase by 45 per cent.

The economic damage caused by flooding to people and businesses will increase in the future. There is also likely to be increased disruption as a result of flooding with more roads and critical infrastructure at risk.

Agriculture will also be affected by increased flood risk. The effects of more intense rainfall will result in greater surface water flooding on agricultural land, damaging crops. Higher groundwater levels will also potentially affect the suitability for some of the crops currently grown in the area.



Setting the appropriate policy

To manage flood risk we need to know what we want to achieve. We have considered the physical catchment, predicted flood risk and social, economic and environmental factors.

This document is a summary of a more detailed technical report. Using all the information contained in this report, along with local knowledge, we have been able to set policies and action plans that will be necessary to implement our flood risk management approach.

In order to understand the competing social, economic and environmental factors that need to be taken into account we have reviewed legislation and other policies, plans and strategies and identified our partners' targets which were relevant to the CFMP area. This has helped us identify a number of opportunities for flood risk management. Opportunities include non-flood related benefits that could be achieved from the way we manage flood risk.

An increase in flooding is not necessarily a bad thing. Some of the most important environmentally designated sites in the catchment depend on flooding for their existence. Some of these sites would benefit from an increase in flooding which would improve their condition.

On the other hand, some catchment activities may constrain our future flood risk management techniques. The need to maintain landscapes and historic sites may prevent or make it very difficult for us to carry out some forms of flood risk management activities. We have taken this into account during our policy appraisal process and the setting of our action plan.

Catchment objectives

- Reduce the exposure to high and extreme flood hazard.
- Ensure that key community services remain available during and after flood events.
- Ensure that critical infrastructure remains operational throughout the catchment during extreme flood events.
- Reduce the proportion of the total residential and commercial properties at risk.
- Reduce the direct economic damages to property and land.
- Ensure that flood risk management expenditure remains proportional to the level of risk in the catchment in the future.
- Ensure that flood risk management activities are sympathetic to the historic setting and landscape of the catchment.
- Use soft engineering options available to flood risk management to enhance and expand the range and condition of habitats within the catchment whilst reducing flood risk to people.
- Allow natural hill slope and river channel processes to operate within the catchment.
- Ensure there is no adverse impact on water quality as a result of flooding.

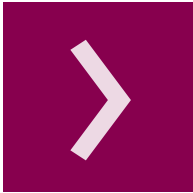
Not all parts of the catchment are alike, we need to adopt the correct approach for different ‘policy units’

Each part of the catchment is different; we need an appropriate approach for each different area. We also need to treat the catchment as a whole whilst considering its different characteristics and risks. This will ensure that we are best placed to take advantages of the natural processes within the catchment.

In order to address each flooding issue, we have divided the River Hull and Coastal Streams CFMP area into policy units. Policy units are sub-areas that have similar processes, sources of flooding and level of risk. In total there are nine distinct policy units within the CFMP area and these will allow us to promote flood risk management policies and actions that are most appropriate to the flood risk character of the unit. These distinct units are shown on the map in the back of this document. We have scoped out and assigned the sort of generic actions that can be implemented in the catchment using the opportunities and constraints that exist in each policy unit. This provides us with a package of possible measures that can be used to meet the catchment objectives. These measures include things like new flood defences, improved flood warnings and the greater use of the flood plain as a natural store within the catchment.

So what are we going to do?

The following pages give an overview of the policies and actions that will drive our flood risk management actions in the catchment. Whilst we are the lead operating authority for flood risk management from rivers we need the support and partnership approach of others to achieve the objectives. We strongly encourage other named organisations to adopt the actions given in this plan. The policies and actions in this plan will be updated when required to take account of any major changes that may occur in the catchment and to ensure that the correct course of action is being followed.



Upper River Hull

Policy unit overview

The upper drainage network of the River Hull catchment in the Yorkshire Wolds drains into the low-lying Holderness plain area. The River Hull Headwaters is a SSSI, has good water quality and provides prime trout habitat. The site contains extensive areas of wet woodland and supports

Key messages

- Ground and surface water flooding are the biggest flood risk sources in the area.
- Groundwater flooding can last for several months at a time. Once groundwater levels have risen there is little that can be done to reduce high levels until they naturally fall.
- Agricultural productivity of the area is dependent on pumped drainage. The area would naturally be waterlogged much of the time.
- Work on the development of a strategy for the River Hull is well advanced.

Summary of flood risk

There are over 1,100 people at risk of flooding within the policy unit. This, however, makes up only four per cent of the total policy unit population. The majority of the people and properties at risk can be found in the town of Driffield, with smaller numbers located in the villages of Beeford, Langtoft and Thixendale. The number of commercial properties at risk (around five per cent of the total commercial properties) changes very little between differing flood events. There is little change to the area at risk of flooding in the future scenario.

Strategic vision

The risk of flooding is expected to increase over time. We will work with nature to allow natural river habitats to develop. The risk of flooding to people and property will be maintained in order to manage the risk to life. By working with nature we will create a safer and healthier environment for people to live and work for years to come. We will also ensure that inappropriate development is avoided and promote the use of the flood warning service.

Strategic action plan

Action	Indicator	Target
Development and implementation of the Hull Flood Risk Management Strategy.	<ul style="list-style-type: none"> Funding gained for the implementation of the Hull Strategy. 	
Produce a system asset management plan for the future management of flood risk management assets.	<ul style="list-style-type: none"> Publication of plan. Identification of locations for asset removal or improvements. Improved knowledge of pumping regime and future requirements. Detailed action plan for future maintenance regime. 	
Carry out feasibility study for the creation of flood storage areas to reduce flood risk both locally and elsewhere. Additional opportunities should also be identified e.g. habitat benefits. This is to be done as part of Hull Flood Risk Management Strategy.	<ul style="list-style-type: none"> Identification of possible sites to take forward to feasibility study. Publication of feasibility study and opportunities plan. Future implementation of flood storage within the policy unit. Other opportunities realised through working with partner organisations. 	
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25).	<ul style="list-style-type: none"> Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments. Inclusion of flood risk management policies with emerging local and regional development documents. Number of new developments going ahead against our advice. 	<ul style="list-style-type: none"> Sustainable urban drainage systems incorporated into all new major developments. Reduction in number of developments going ahead against advice.
Significantly improve flood awareness within the policy unit and increase registration on Floodline Warning Direct, particularly where percentage registration is below 55 per cent.	<ul style="list-style-type: none"> Percentage take up. Number of people taking effective action. 	<ul style="list-style-type: none"> 100 per cent registration. 100 per cent effective action.
Employ a sustainable land management officer to work with landowners and our partners to promote sustainable land management in order to reduce the consequences of flooding on the agricultural sector and local economy.	<ul style="list-style-type: none"> Sustainable land management officer in post. Increased number of agri-environmental schemes within the policy unit with flood risk management aspect. Reduction in agricultural damaged caused by flooding. 	
Ensure the River Hull Headwaters SSSI is not negatively affected by flood risk management works and where possible is improved.	<ul style="list-style-type: none"> Condition of SSSI. 	

Strategic action plan

Action	Indicator	Target
Ensure Skipsea Bail Mere is not negatively affected by flood risk management works and where possible is improved.		
Install level and flow recorders on the Driffield Canal to improve our knowledge of canal and river interaction and enable future monitoring and forecasting of canal flooding.	<ul style="list-style-type: none">• Installation of equipment and configuration with telemetry.	<ul style="list-style-type: none">• Improved forecasting of canal flooding.• Procedures developed for the response to canal flooding.





Middle River Hull

Policy unit overview

Flood embankments are present along both banks of the middle reaches of the River Hull. The river is perched above and disconnected from its natural flood plain. Water from the flood plain has to be pumped into the river. The majority of the river has also been realigned and resectioned to produce an over-wide and over-deep channel. There is a complex network of existing artificial field drains regulated by a series of pumping stations on the main drains; Beverley and Barmston Drain and Holderness Drain. This policy unit contains the town of Beverley and surrounding villages including Tickton, Brandesburton, Skirlaugh and Leconfield.

Key messages

- Groundwater flooding in eastern Beverley is due to groundwater rising above low points in land.
- Historically some groundwater has entered the Beverley sewerage system helping to prevent this flooding, However, the operation of this system is not fully understood.
- We are only empowered to provide a warning about flooding from groundwater and we do not have the powers, duties or resources to control groundwater flooding.
- There are flash flooding issues where water ponds due to the low gradient and impermeable geology.
- Our work on the development of a strategy for the River Hull is well advanced.

Summary of flood risk

There are almost 5,000 people at risk in the middle Hull policy unit, many of the people and properties are concentrated around the towns of Beverley, and to a lesser extent, Leven. Many of the properties will be at risk during even the most frequent flooding. Risk to infrastructure is high, with over eight kilometres of roads and five kilometres of railway at risk during an extreme event. There is a one per cent probability of this type of event occurring in any given year. There is a risk of flooding for up to seven sewage treatment works and thirteen gas and electricity installations.

Many of the flooding issues come from the tidal influence on the watercourse, and flash flooding issues, particularly in Beverley, where water ponds due to the low gradient and impermeable geology.

Strategic vision

We will continue to maintain the defences along the watercourse to provide continued flood protection for this area. We will seek to achieve this in the most efficient and appropriate ways by considering alternative approaches to the existing regime. We will also look to work with the natural system to enable us to continue providing a similar level of protection into the future.

Strategic action plan

Action	Indicator	Target
Development and implementation of the Hull Flood Risk Management Strategy.	<ul style="list-style-type: none"> Funding gained for the implementation of the Hull Strategy. Reduction in flood risk and consequences due to improved flood risk management. 	
Produce a system asset management plan for the future management of flood risk management assets.	<ul style="list-style-type: none"> Publication of plan. Identification of required standard of protection and condition. Improved knowledge of pumping regime and future requirements. Detailed costed action plan for future maintenance regime. 	
Carry out feasibility study for the creation of flood storage areas within the policy unit. The findings of this study should feed into a habitat creation plan for the area which is developed through close partnership with Natural England and the RSPB.	<ul style="list-style-type: none"> Publication of feasibility study and habitat creation plan. Identification of possible sites to take forward to feasibility study. Future implementation plan for habitat creation within the policy unit. Area of new habitat being created. 	
Produce a detailed water level management plan for both Lambwath Meadows and Leven Canal SSSI.	<ul style="list-style-type: none"> Publication of water level management plan. Detailed costed actions which support the findings of the CFMP and local flood risk management proposals. 	<ul style="list-style-type: none"> Improvement to SSSI condition.
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25).	<ul style="list-style-type: none"> Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments. Inclusion of flood risk management policies with emerging local and regional development documents. Implementation of sustainable urban drainage systems within major development. 	<ul style="list-style-type: none"> Sustainable urban drainage systems incorporated into all new major developments. Reduction in number of developments going ahead against advice.
Significantly improve flood awareness within the policy unit and increase registration on Floodline Warning Direct, particularly where percentage registration is below 55 per cent.	<ul style="list-style-type: none"> Percentage take-up. Number of people taking effective action. 	<ul style="list-style-type: none"> 100 percentage registration. 100 per cent effective action.
Identify the risk of flooding to critical infrastructure and ensure emergency plans are in place where necessary.	<ul style="list-style-type: none"> Improved awareness by the emergency services and other key bodies as to the risk of flooding to critical infrastructure. Feasibility of providing protection to critical locations. Evacuation procedures in place. Reduction in community disruption caused through flooding. 	<ul style="list-style-type: none"> No loss of life. Time taken for return of occupancy to community infrastructure i.e. schools and health facilities.



Lower River Hull

Policy unit overview

The policy unit includes Kingston upon Hull and also contains the town of Cottingham and the suburbs of west Hull including Kirk Ella, Willerby, Anlaby and Hessle. Through Kingston upon Hull the river banks are reinforced with hard engineering works.

The River Hull flows through the city before it joins the Humber. At the mouth of the River Hull, the Hull Tidal Surge Barrier has been built to prevent flood water from the Humber overtopping defences along the River Hull. The barrier is currently operated on average eight times per year.

Key messages

- Surface water, drainage networks, rivers and tides all come together to contribute to the flood risk in Kingston upon Hull.
- There are many organisations and individuals with different responsibilities and accountabilities that will need to work together to reduce flood risks in Hull.
- Reducing flood risk will be a long and expensive process. We need to start to work together now and openly share information with one another.
- There have been occasional groundwater flooding events in the Cottingham area.
- The River Hull Flood Risk Management Strategy is well advanced.

Summary of flood risk

This policy unit has the greatest risk of flooding within the catchment. The risk to this unit is from a variety of sources including river, tidal, sewer and surface water flooding. Tidal flooding represents the greatest risk to Kingston upon Hull. Almost the whole of the city is below highest tide levels. Water levels in the estuary are currently rising at a rate of approximately two millimetres per year, and that rate is expected to increase in the future. The event in summer 2007 highlighted the key role sewer and surface water flooding play for flood risk within the city. Due to the low-lying nature of Kingston upon Hull the drainage system is reliant on pumps and if these fail, or their capacity is reached, then widespread flooding can occur.

Strategic vision

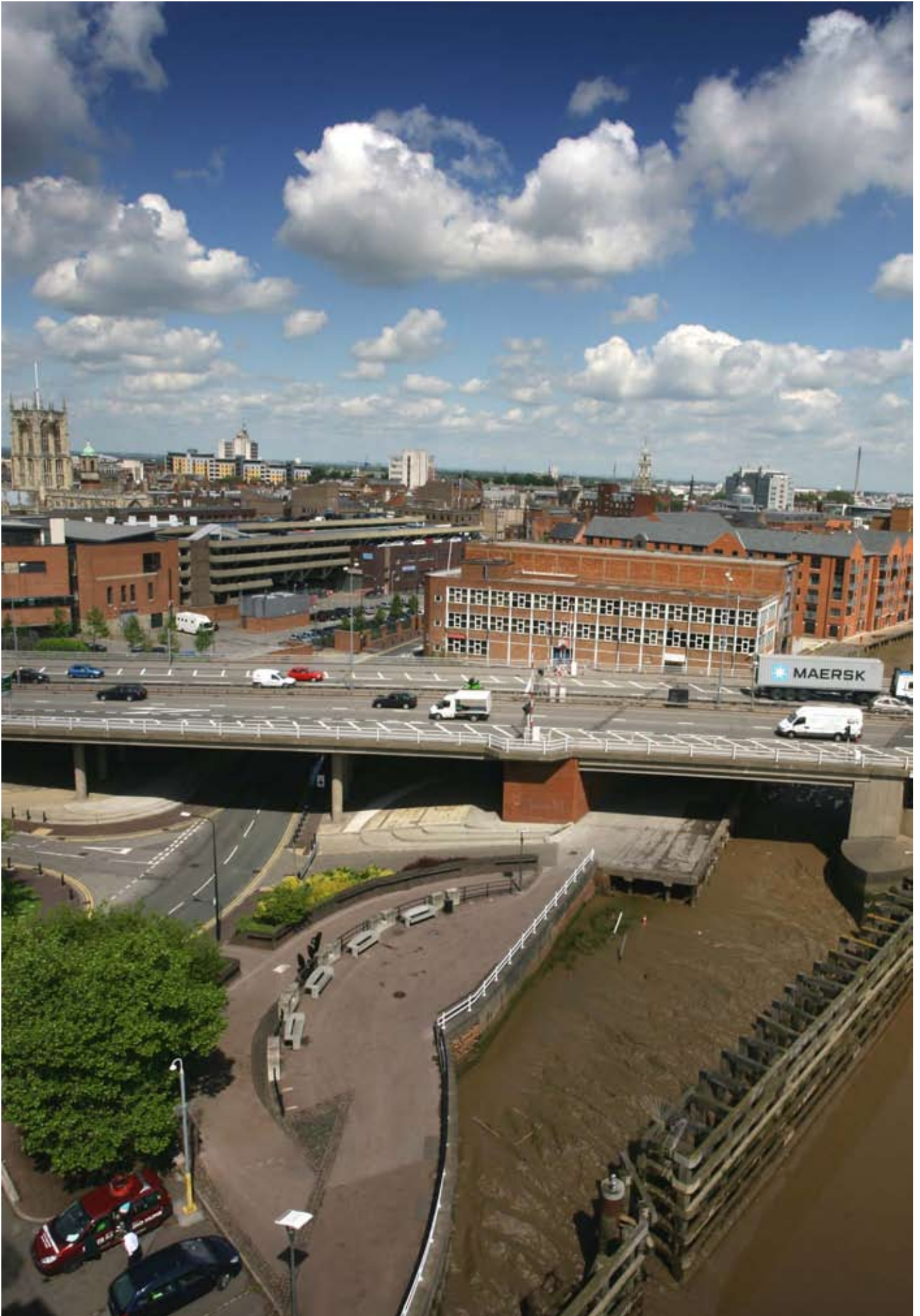
We will improve the standard of flood protection now and into the future. We will create an environment where all the organisations and individuals involved can deliver integrated approaches to reducing flood risk from all sources of flooding. We will look to using natural flood plain in both this and adjacent policy units to reduce the potential impacts within Kingston upon Hull.

Strategic action plan

Action	Indicator	Target
Development and implementation of the Hull flood risk management strategy.	<ul style="list-style-type: none"> • Funding gained for implementation of the Hull Strategy. • Reduction in flood risk and consequences due to improved flood risk management. 	
Develop detailed design for the preferred option scheme in the Lower Hull and include on the Local Levy programme.	<ul style="list-style-type: none"> • Funding gained for the implementation of the scheme. • Reduction in flood risk and consequences due to improved flood risk management. 	
Produce a system asset management Plan for the future management of flood risk management assets.	<ul style="list-style-type: none"> • Publication of plan. • Identification of required standard of protection and condition. • Improved knowledge of pumping regime and future requirements. • Detailed cost action plan for future maintenance regime. 	
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25) and the strategic flood risk assessment. Ensure that tidal, river, surface water and groundwater flood risks are managed in a consistent and integrated way.	<ul style="list-style-type: none"> • Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments. • Review of housing figures for Hull City Council and East Riding of Yorkshire. • Inclusion of flood risk management policies with emerging local and regional development documents. • Implementation of sustainable urban drainage systems within major development. 	<ul style="list-style-type: none"> • Sustainable urban drainage systems incorporated into all new major developments. • Reduction in number of developments going ahead against advice.
Significantly improve flood awareness within the policy unit and increase registration on Floodline Warning Direct, particularly where percentage registration is below 55 per cent.	<ul style="list-style-type: none"> • Percentage take-up. • Number of people taking effective action. 	<ul style="list-style-type: none"> • 100 per cent registration. • 100 per cent effective action.
Identify the risk of flooding to critical infrastructure and ensure emergency plans are in place where necessary.	<ul style="list-style-type: none"> • Improved awareness by the emergency services and other key bodies as to the risk of flooding to critical infrastructure. • Feasibility of providing protection to critical locations. • Evacuation procedures in place. • Reduction in community disruption caused through flooding. 	<ul style="list-style-type: none"> • No loss of life. • Time taken for return of occupancy to community infrastructure i.e. schools and health facilities. • Flood response plan is deliverable and reduces risk.

Strategic action plan

Action	Indicator	Target
Ensure that the Kingston upon Hull City Council flood response plan is deliverable to those at flood risk.	<ul style="list-style-type: none"> Review of the Kingston Upon Hull City Council flood response plan. 	
Produce a register of culverts and detailed management plan, including locations where culverts have the potential for removal and improvements.	<ul style="list-style-type: none"> Publication of culvert register. Implementation of culvert improvements on Western Drain. Number of properties flooded due to incapacity of culverts. 	
Identify areas where there is an opportunity for attenuation to reduce water levels during a flood event as part of Hull Strategy.	<ul style="list-style-type: none"> Area of flood storage. Area of new habitat. 	<ul style="list-style-type: none"> Increase in the area of wetland habitat providing flood storage benefits.





Market Weighton

Policy unit overview

The Market Weighton Canal is fed from groundwater and rises as Mill Dike and flows in a southerly direction becoming main river just north of Market Weighton. Downstream of Market Weighton the watercourse continues southwards and becomes the Market Weighton Canal before being joined by the River Foulness from the west. The Market Weighton Canal and the western streams and drains flow through flat arable land to their outfalls with the Humber Estuary.

Key messages

- There are problems with groundwater flooding in Market Weighton.
- The policy unit is heavily reliant on pumping draining water from the arable areas into Market Weighton Canal.
- Further problems have been recorded on Mill Beck from aging culverted sections of the main channel overflowing when the culverts can no longer hold the capacity of water.
- There is a lot of development pressure within Market Weighton and therefore this may increase properties at risk in the future.

Summary of flood risk

Risk is primarily located around the Market Weighton Canal and the River Foulness. In addition the watercourses of Mill Beck and North Cave Beck are at risk. A large proportion of the population are at risk, located primarily around the towns of Market Weighton, Gilberdyke and parts of Howden. There are a total of over 6,600 people at risk during an extreme event, which is 17 per cent of people living within the policy unit. There is a one per cent probability of an extreme event occurring in any given year. The risk of flooding to infrastructure is also high with seven gas and electricity installations at risk and 9.7 kilometres of road.

There are also problems with groundwater flooding in Market Weighton. The area does not drain naturally and therefore heavy pumping into watercourses must take place.

Strategic vision

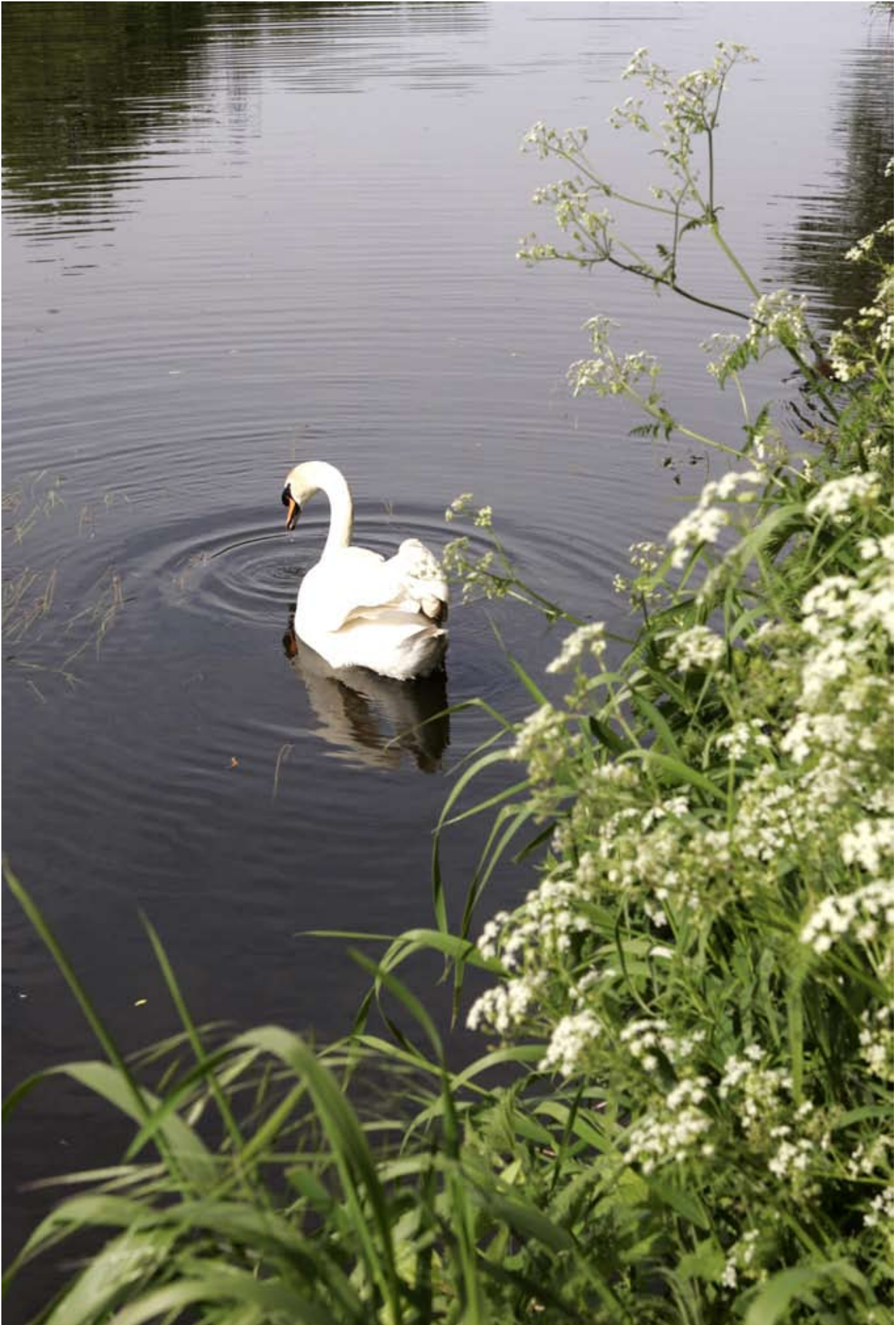
We will work with our partners to further understand the risk of flooding in this area. Regeneration will take place taking into account flood risk to ensure that the risk to future communities does not increase. We will work together with land owners and organisations to reduce the risk from all sorts of flooding and work with the emergency services to ensure that the impacts of flooding on critical infrastructure is minimised.

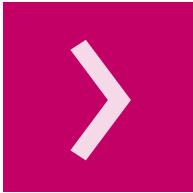
Strategic action plan

Action	Indicator	Target
Produce a system asset management plan for the future management of flood risk management assets.	<ul style="list-style-type: none"> • Publication of plan. • Identification of required standard of protection and condition. • Detailed cost action plan for future maintenance regime. 	
Carry out feasibility study for the creation of flood storage areas to reduce flood risk and identify additional opportunities as part of a flood storage scheme e.g. habitat benefits.	<ul style="list-style-type: none"> • Publication of feasibility study and opportunities plan identifying possible sites to take forward to feasibility study. • Future implementation of flood storage within the policy unit. • Other opportunities realised through working with partner organisations. 	
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25).	<ul style="list-style-type: none"> • Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments. • Inclusion of flood risk management policies with emerging local and regional development documents. • Implementation of sustainable urban drainage systems within major development. 	<ul style="list-style-type: none"> • Sustainable urban drainage systems incorporated into all new major developments. • Reduction in number of developments going ahead against advice.
Employ a sustainable land management officer to work with landowners and our partners to promote sustainable land management in order to reduce the consequences of flooding on the agricultural sector and local economy.	<ul style="list-style-type: none"> • Sustainable land management officer in post. • Increased number of agri-environmental schemes within the policy unit with flood risk management aspect. • Reduction in agricultural damaged caused by flooding. 	
Significantly improve flood awareness within the policy unit and increase registration on Floodline Warning Direct.	<ul style="list-style-type: none"> • Percentage take-up. • Number of people taking effective action. 	<ul style="list-style-type: none"> • 100 per cent registration. • 100 per cent effective action.
Identify the risk of flooding to critical infrastructure and ensure emergency plans are in place where necessary.	<ul style="list-style-type: none"> • Improved awareness by the emergency services and other key bodies as to the risk of flooding to critical infrastructure. • Feasibility of providing protection to critical locations. • Evacuation procedures in place. • Reduction in community disruption caused through flooding. 	<ul style="list-style-type: none"> • No loss of life. • Time taken for return of occupancy to community infrastructure i.e. schools and health facilities.

Strategic action plan

Action	Indicator	Target
Take action to develop a greater understanding of the canal, river and culvert interactions and take action to improve management of system.	<ul style="list-style-type: none"> • Increased flow data for Market Weighton Canal. • Publication of culvert register. 	<ul style="list-style-type: none"> • Improved forecasting of canal flooding • Procedures developed for the response to canal flooding.
Work together to improve our understanding of flooding risk from all sources.	<ul style="list-style-type: none"> • Mapping of surface water and ground water flooding. • Availability of sewer flooding probability and historic data. • Publication of surface water management plan including detailed management options and costs. 	
Manage tidal and flooding from rivers in a consistent and integrated way.	<ul style="list-style-type: none"> • Work closely with the Humber Flood Risk Management strategy. 	





Gypsy Race

Policy unit overview

The Gypsy Race is a chalk, groundwater dominated catchment in the northern part of the CFMP area at the foot of the North York Moors. Gypsy Race flows eastwards to its outfall on the North Sea at Bridlington. The catchment is predominantly rural.

There is very limited risk of flooding from the watercourse in this policy unit as the river upstream of Bridlington is contained within a well defined valley. Due to it being within a chalk catchment, Gypsy Race flows underground for part of its length - between nine and 22 kilometres, depending on previous rainfall conditions.

Key messages

- Flooding from groundwater is the main flood risk issue in this area.
- The effects of climate change and groundwater flooding are not clear. This needs to be looked at in more detail.
- The limited flood plain is vital in the future management of the risk of flooding and economic stability of Bridlington.

Summary of flood risk

The rivers and streams are all groundwater fed. As a result they can be dry channels when the groundwater is low. When the groundwater levels are high enough to create a flow in the river channels, the land surface tends to become flooded. This is a result of the groundwater levels reaching the surface. Our current mapping of flood risk is limited to flooding from watercourses, as is our current flood risk management actions. We do not have flood risk maps based on potential groundwater flooding. Our current actions are not effective at managing risk from groundwater and so do not address what is likely to be the greatest flood risk issue.

Strategic vision

The area will see a reduction in inland flood risk management to create a natural river system where people can live safely alongside nature. We will promote sustainable land management and raise awareness of flood risk within the area by working with the local community. Future development will be carried out in accordance with the appropriate policies.

Strategic action plan

Action	Indicator	Target
Employ a sustainable land management officer to work with landowners and our partners to promote sustainable land management in order to reduce the consequences of flooding on the agricultural sector and local economy.	<ul style="list-style-type: none"> • Sustainable land management officer in post. • Increased number of agri-environmental schemes within the policy unit with flood risk management aspect. • Reduction in diffused pollution through improved land management and reduced runoff. 	
Reduce the consequences of groundwater flooding by controlling possible groundwater contaminants such as Wold Gate Landfill site, Bessingby.	<ul style="list-style-type: none"> • Groundwater quality. 	<ul style="list-style-type: none"> • No reported health issues due to flooding from contaminated groundwater.
Inform individual property owners about flood risk and possible resilience measures.	<ul style="list-style-type: none"> • Awareness of flood risks and hazard to property; • Number of people taking effective action. 	
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25).	<ul style="list-style-type: none"> • Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments. • Inclusion of flood risk management policies with emerging local and regional development documents. • Implementation of sustainable urban drainage systems within major development. 	<ul style="list-style-type: none"> • 100 per cent registration. • 100 per cent effective action. • Sustainable urban drainage systems incorporated into all new major developments. • Reduction in number of developments going ahead against advice.
Engage with the East Riding of Yorkshire Council biodiversity officer to identify actions that may support the local Biodiversity Action Plan whilst improving flood risk management.	<ul style="list-style-type: none"> • Reduction in local flood risk through land management and habitat improvements. 	
Produce a register of culverts and detailed management plan, including locations where culverts have the potential for removal and improvements.	<ul style="list-style-type: none"> • Publication of culvert register. • Number of properties flooded due to incapacity of culverts. 	
Improve awareness of flood risk issues from all sources and identify possible sources of flood risk.	<ul style="list-style-type: none"> • Identification of possible sewer and culvert incapacity. • Identification of highway drainage incapacity. • Management plan for culverts, highway drainage and sewers throughout the policy unit to ensure flood risk does not increase due to climate change or increased urbanisation. 	<ul style="list-style-type: none"> • No flooding caused by sewer or culvert incapacity. • No flooding due to blocked highway and drainage infrastructure.



Bridlington

Policy unit overview

This is an urban policy unit. The Gypsy Race is culverted through the majority of Bridlington and enters the North Sea through an outlet pipe in the sea wall.

Within the Regional Spatial Strategy, Bridlington is noted as a principle town and there is likely to be future development pressure within the town. There are high levels of social deprivation within the policy unit. Most of the town falls within the highest vulnerability category.

Key messages

- Flytipping and inappropriate waste disposal is a big cause of flood risk in Bridlington. This is due to the blocking of culverts and drainage systems. This is easily avoidable.
- Rising sea levels and increased rainfall could result in an increased risk of flooding from surface water in the future.
- The coastal defences that protect the town from tidal flooding are managed by East Riding of Yorkshire Council.

Summary of flood risk

There are no people or properties at risk of river flooding in this policy unit. This is due to the fact that much of the river flowing through the town of Bridlington is culverted.

The main flood risk for this policy unit is from high tides and tidal flooding where water backs up the culverts, overwhelming their capacity. This type of flooding however, is only likely to occur at mid-points along the culvert and would potentially only flood two properties.

Flooding has also been recorded from surface water within Bridlington, particularly during the Summer 2007 floods when parts of Bessingby Road were closed due to flooding. The extent for surface water flood risk within Bridlington however, is unknown at present.

Strategic vision

Bridlington will develop into a principle town within East Yorkshire through carefully placed development. We will continue with our current activities to manage the risk of flooding within the town and work with our partners to develop a shoreline management plan to address the primary source of flood risk in the area.

Strategic action plan

Action	Indicator	Target
Carry out detailed flood risk mapping study for Bridlington and update the flood map.	<ul style="list-style-type: none"> • Implementation of flood mapping study. • Publication of improved of flood map for Bridlington. 	<ul style="list-style-type: none"> • Updated flood map for public use.
Ensure the CFMP boundary aligns with the shoreline management plan and that CFMP policies are integrated into the shoreline management plan process.	<ul style="list-style-type: none"> • CFMP policies noted within the shoreline management plan. 	<ul style="list-style-type: none"> • Integrated shoreline management plan and CFMP policies.
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25)	<ul style="list-style-type: none"> • Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments to include all sources of flooding. • Inclusion of flood risk management policies with emerging local and regional development documents. • Implementation of sustainable urban drainage systems within major development. • Developer contributions towards culvert and sewer maintenance and improvements. 	<ul style="list-style-type: none"> • Sustainable urban drainage systems incorporated into all new major developments. • Improved sewer and culvert capacity through developer contributions.
Produce a register of culverts and detailed management plan, including locations where culverts have the potential for removal and improvements.	<ul style="list-style-type: none"> • Publication of culvert register. • Number of properties flooded due to incapacity of culverts. • Improved awareness of culvert ownership and responsibility. 	
Improve knowledge of flood risk issues from all sources and identify possible sources of flood risk.	<ul style="list-style-type: none"> • Identification of possible sewer and culvert incapacity. • Identification of highway drainage incapacity. • Management plan for culverts, highway drainage and sewers throughout Bridlington to ensure flood risk does not increase due to climate change or increased urbanisation. 	<ul style="list-style-type: none"> • No flooding caused by sewer or culvert incapacity. • No flooding due to blocked highway and drainage infrastructure.
Reduce the number of incidents of flytipping and inappropriate waste management issues throughout Bridlington.	<ul style="list-style-type: none"> • Improved public awareness of the indirect affects of flytipping and inappropriate waste management. • Reduction in number of reported flytipping incidents. • Reduction in flood incidents due to blocked sewers, drains and culverts. 	<ul style="list-style-type: none"> • No flooding caused by sewer or culvert incapacity. • No flooding due to blocked highway and drainage infrastructure.



Hornsea

Policy unit overview

Hornsea is a small seaside town situated on the East coast of Yorkshire, midway between Flamborough Head and Spurn Point Heritage Coastlines. Hornsea Mere is the largest freshwater lake in Yorkshire and is a SPA due to its importance for breeding and wintering birds. The Mere is also designated as a SSSI and is of national ornithological importance. It consists of a large shallow lake with its associated habitats of reedswamp, fen and carr woodland.

Key messages

- There are a number of different organisations and individuals responsible for the water levels and water control structures of Hornsea Mere.
- A rise in sea levels and increased rainfall could result in greater surface water flood risk in the future.
- The coastal defences that protect the town from tidal flooding are managed by East Riding of Yorkshire Council.

Summary of flood risk

The risk of flooding in the area from Stream Dyke is low with only a small area of Hornsea at risk. There are over 400 people at risk of flooding during an extreme event (one with the probability of occurring once in every 100 years), which represents five per cent of the total policy unit's population. There is no critical infrastructure at risk of flooding.

There is the potential that the rise in sea level and greater quantities of rainfall may create an increase in the risk of flooding in the future from both the sea and surface water. Flooding from the sea is the greatest risk within the area. The flooding that would occur at Hornsea Mere may help to extend the wetland habitat.

Strategic vision

The issues surrounding the responsibility for management of water levels in Hornsea Mere and the problems surrounding the third party ownership of the control structures will be resolved. Following development of a greater understanding of the interaction between the Mere, surface drainage and tide locking we will be in a position to develop a long term direction.

Strategic action plan

Action	Indicator	Target
Investigate the feasibility of providing defences for existing properties at risk, particularly the retirement homes where Social Flood Vulnerability Index is high.	<ul style="list-style-type: none"> • Scheme pre-feasibility report. 	<ul style="list-style-type: none"> • Reduction of risk to vulnerable communities.
Carry out a flood warning feasibility study to address the need to extend our flood warning service coverage.	<ul style="list-style-type: none"> • Publication of flood warning feasibility study for Hornsea. • Number of properties offered a flood warning service. 	
Ensure the CFMP boundary aligns with the shoreline management plan and that CFMP policies are integrated into the SMP process.	<ul style="list-style-type: none"> • CFMP policies noted within the shoreline management plan. 	<ul style="list-style-type: none"> • Integrated shoreline management plan and CFMP policies.
Significantly improve flood awareness within the policy unit and increase registration on Floodline Warning Direct.	<ul style="list-style-type: none"> • Percentage take-up. • Number of people taking effective action. 	<ul style="list-style-type: none"> • 100 per cent take up.
Produce a register of culverts and detailed management plan, particularly between Hornsea Mere and the North Sea.	<ul style="list-style-type: none"> • Publication of culvert register. • Number of properties flooded due to incapacity of culverts. • Improved awareness of culvert ownership and responsibility. 	
Identify the risk of tide locking and potential solutions.		
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25).	<ul style="list-style-type: none"> • Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments to include all sources of flooding. • Inclusion of flood risk management policies with emerging local and regional development documents. • Implementation of sustainable urban drainage systems within major development. • Developer contributions towards culvert and sewer maintenance and improvements. 	<ul style="list-style-type: none"> • Sustainable urban drainage system incorporated into all new major developments. • Improved sewer and culvert capacity through developer contributions.
Work with partners to develop a detailed water level management plan for Hornsea Mere SSSI.	<ul style="list-style-type: none"> • Publication of WLMP. • Detailed costed actions which support the findings of the CFMP and local flood risk management proposals. • SSSI condition. 	<ul style="list-style-type: none"> • Improvement to SSSI condition.
Review and update Hornsea emergency response plans for dealing with flood incidents.	<ul style="list-style-type: none"> • Effectiveness of emergency plan on minimising community disruption. • Community recovery time. 	<ul style="list-style-type: none"> • No loss of life though flooding. • Minimum community disruption.



Burstwick

Policy unit overview

Burstwick Drain flows through flat arable land. The eastern flowing drains in the policy unit only flow into the North Sea at a limited number of locations. This is because the land of the coast is often 10 metres higher than the sea. This policy unit contains the urban areas of Hedon, Elstronwick, and Burstwick. The town of Hedon is a medieval town and therefore contains a number of Scheduled Monuments. This area is a rural region and has a large amount of high quality agricultural land.

Key messages

- The height of the tide is important in understanding the flood levels and duration in the area.
- As sea levels rise the duration of time that water is trapped in Burstwick Drain will increase.
- Long term redevelopment plans should be used to move urban areas towards the higher ground of the area.
- The high number of greenhouses used in agricultural food production may be having an impact on flood generation due to the amount of runoff generated from the buildings.

Summary of flood risk

The area is at risk of flooding from Burstwick Drain, the Humber and surface water. The main areas at risk of flooding are Burstwick and Hedon. In the summer 2007 event, both were flooded but from different sources. Burstwick flooded from the Burstwick Drain and Hedon flooded from surface water. A high proportion of people, between 37 and 45 per cent of the total unit, are at risk of flooding in all events.

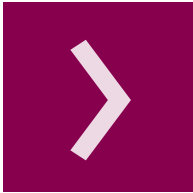
The cost of damages that would occur in a flood are high in this area, reflecting the large quantity of properties at risk. The risk of flooding increases under the future scenario and therefore more people and infrastructure will become at risk.

Strategic vision

We will increase our current level of flood risk management activities. Localised defences will be put in place to reduce the risk of flooding in this policy unit. Existing defences will be maintained and improved. We wish to reduce the impact of the most frequent flooding in urban areas by maintaining conveyance where it is both effective and sustainable to do so. We will also focus our efforts on increasing the awareness of flooding.

Strategic action plan

Action	Indicator	Target
Produce a system asset management plan for the future management of current flood risk management assets.	<ul style="list-style-type: none"> • Publication of plan. • Detailed action plan for future maintenance regime. 	
Carry out a feasibility study to provide localised flood defences to Hedon and Burstwick.	<ul style="list-style-type: none"> • Publication of feasibility study. 	<ul style="list-style-type: none"> • Preferred option identified for reducing the risk of flooding to Hedon
Develop joint management plans for the future management of all watercourses and sources of flooding within the policy unit.	<ul style="list-style-type: none"> • Joint working on all flood risk management strategies including the realignment of Burstwick Drain. • Joint awareness of all sources of flooding between ourselves, Yorkshire Water, Highways Agency and ERoY. 	
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25).	<ul style="list-style-type: none"> • Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments. • Inclusion of flood risk management policies with emerging local and regional development documents. • Number of development going ahead against our advice. 	
Significantly improve flood awareness within the policy unit and increase registration on Floodline Warning Direct, particularly where percentage registration is below 55 per cent.	<ul style="list-style-type: none"> • Percentage take up. • Number of people taking effective action. 	<ul style="list-style-type: none"> • 100 per cent registration. • 100 per cent effective action.
Employ a sustainable land management officer to work with landowners and our partners to promote sustainable land management in order to reduce the consequences of flooding on the agricultural sector and local economy.	<ul style="list-style-type: none"> • Sustainable land management officer in post. • Increased number of agri-environmental schemes within the policy unit with flood risk management aspect. • Reduction in agricultural damaged caused by flooding. 	
Identify the risk of flooding to critical infrastructure and ensure emergency plans are in place where necessary, including the identification of evacuation routes.	<ul style="list-style-type: none"> • Improved awareness by the emergency services and other key bodies as to the risk of flooding to critical infrastructure. • Feasibility of providing protection to critical locations. • Evacuation procedures in place. • Reduction in community disruption caused through flooding. 	<ul style="list-style-type: none"> • No loss of life. • Time taken for return of occupancy to community infrastructure i.e. schools and health facilities.



Holderness

Policy unit overview

This policy unit contains numerous watercourses that drain the eastern and south eastern parts of the CFMP area. This includes Thorngumbald Drain, Keyingham Drain and Winestead Drain. These all flow through flat arable land and have pumping stations to allow the watercourse to run into the Humber estuary at all states of the tide. There are a number of small settlements within the area. Keyingham and Withernsea are the largest. The Humber estuary is designated as a SPA, SAC, Ramsar and SSSI.

Key messages

- We have worked closely with our Humber Strategy team in the development of this CFMP. Our policy and actions are consistent with the strategy outputs for the estuary shoreline.
- The risk of flooding will increase in the future. However, it will not be possible to provide continued protection everywhere.
- We will work to reduce the risk of flooding to people and property where it can be justified.
- Flood plains are vital in the effort to reduce the risk to life and property. We must protect undeveloped flood plains from inappropriate development.

Summary of flood risk

The risk of flooding to people and infrastructure in the policy unit is low. There are over 150 dispersed residential properties and just four commercial properties at risk in the unit. There is also a key gas installation adjacent to Thorngumbald drain. A total of over 400 people are at risk within the policy unit. This is two per cent of the total unit population. There is a large amount of arable land at risk. In summer 2007 there was flooding to Thorngumbald and significant areas of arable land. This was due to water flowing into Thorngumbald drain from other drains in the area.

Three kilometres of roads are at risk of flooding and no railways lie within the extent. The risk of flooding from tidal sources has been reduced due to the installation of a pump on the Thorngumbald Drain and an embankment which prevents tidal-locking.

Strategic vision

We will strive to provide continued protection where this can be justified and will work with local communities that may be affected by the increasing risk of flooding in the future. We will work with our partners to ensure that inappropriate development is avoided and encourage key organisations to make key infrastructure more resilient to flooding.

Strategic action plan

Action	Indicator	Target
Produce a system asset management plan for the future management of flood risk management assets.	<ul style="list-style-type: none"> • Publication of plan. • Identification of locations for asset removal or improvements. • Improved knowledge of pumping regime and future requirements. • Detailed action plan for future maintenance regime. 	
Significantly improve flood awareness within the policy unit and increase registration on Floodline Warning Direct, particularly where percentage registration is below 55 per cent.	<ul style="list-style-type: none"> • Percentage take up. • Number of people taking effective action. 	<ul style="list-style-type: none"> • 100 per cent registration. • 100 per cent effective action.
Continue to work with regional and local planning bodies to deliver sustainable development through the implementation of Planning Policy Statement 25: Development and flood risk (PPS25). Where possible deliver a step back approach to regeneration in order to remove people and property from flood risk areas.	<ul style="list-style-type: none"> • Publication and periodic review of regional flood risk appraisals and strategic flood risk assessments. • Inclusion of flood risk management policies with emerging local and regional development documents. • Number of development going ahead against our advice. • Implementation of a step back approach to regeneration. 	
Work with local communities, East Riding of Yorkshire Council and developers to investigate the installation of privately owned flood defences.	<ul style="list-style-type: none"> • Developer contributions to flood risk management. • Development of new defences to protect local communities. • Improved maintenance regime for privately owned flood defences. 	
Employ a sustainable land management officer to work with landowners and our partners to promote sustainable land management in order to reduce the consequences of flooding on the agricultural sector and local economy.	<ul style="list-style-type: none"> • Sustainable land management officer in post. • Increased number of agri-environmental schemes within the policy unit with flood risk management aspect. • Reduction in agricultural damaged caused by flooding. 	
Identify the risk of flooding to critical infrastructure and ensure emergency plans are in place where necessary.	<ul style="list-style-type: none"> • Improved awareness by the emergency services and other key bodies as to the risk of flooding to critical infrastructure. • Feasibility of providing protection to critical locations. • Evacuation procedures in place. • Reduction in community disruption caused through flooding. 	<ul style="list-style-type: none"> • No loss of life. • Time taken for return of occupancy to community infrastructure i.e. schools and health facilities.

Consultation and evidence

In order to produce this high level plan we are working with our partners to capture and address the relevant flood risk issues within the catchment.

We cannot reduce flood risk on our own. So it is vital that all main organisations and decision-makers in the catchment work together to plan and take action to reduce the risks and consequences of flooding.

This document outlines the actions that we feel are necessary to manage flood risk now and into the future. In order to reduce risk in the future, all organisations need to consider how they can contribute to delivering these actions.

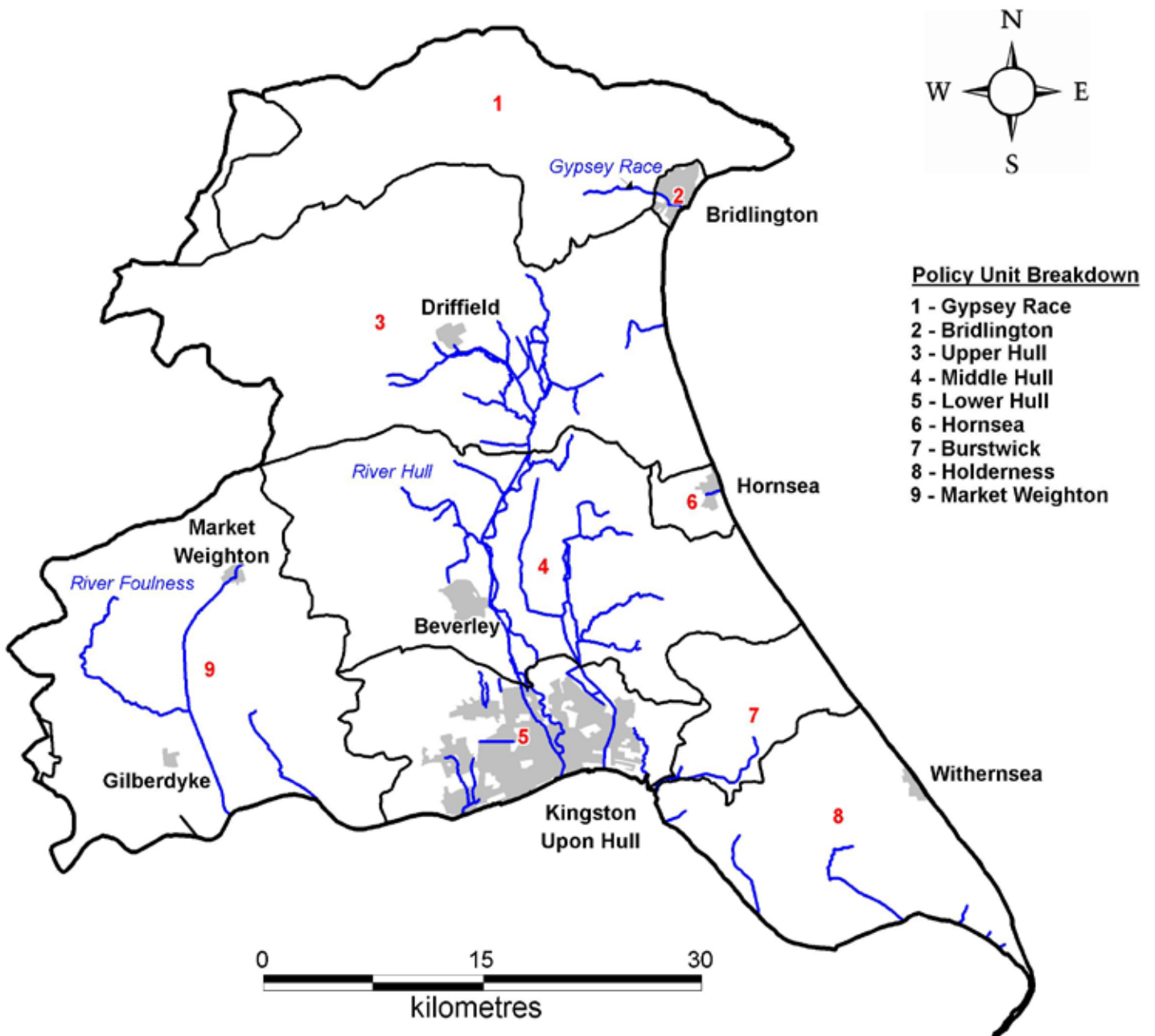
We would appreciate your comments and feedback on how effective you feel that these actions will be in managing flood risk and what your organisation can do to work with us in delivering these actions.

Evidence base

This is a summary document of a detailed, technical analysis that provides the evidence base for our decisions. This analysis covers:

- background to the CFMP process and how it fits in to the planning process;
- details of the physical, environmental and social characteristics of the catchment;
- information on the current flood risks to people, property and the environment and how we are currently managing those risks;
- how flood risk may change in the future;
- the setting of catchment objectives and the opportunities and constraints within the catchment for flood risk management;
- the policy appraisal process details.

This map shows the policy units of the Hull and Coastal Streams Catchment Flood Management Plan.



Key facts

A flood with a **one per cent** chance of happening each year could affect:

Approximately **173,000 people** are at risk of flooding in the Hull catchment, this is **33 per cent** of the catchment total population.

There are approximately **49 kilometres** of road and **32 kilometres** of railway at risk within the catchment.

There are more than **75,188 homes** and **3,890 business** at risk of flooding from the rivers of the Hull and Coastal Streams catchment.

Annual average economic damage to properties is more than **£52 million**.

Flood damage to agricultural land costs on average more than **£317,000 per year**.

The risk of flooding **will increase** with climate change putting people and property at greater risk.

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