Environment Agency

Arun and Western Streams Catchment Flood Management Plan

Summary Report December 2009

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Introduction

I am pleased to introduce our summary of the Arun and Western Streams Catchment Flood Management Plan (CFMP). This CFMP gives an overview of the flood risk in the Arun and Western Streams catchment and sets out our preferred plan for sustainable flood risk management over the next 50 to 100 years.

The Arun and Western Streams CFMP is one of 77 CFMPs for England and Wales. Through the CFMPs, we have assessed inland flood risk across all of England and Wales for the first time. The CFMP considers all types of inland flooding, from rivers, groundwater, surface water and tidal flooding, but not flooding directly from the sea (coastal flooding), which is covered by Shoreline Management Plans (SMPs). Our coverage of surface and groundwater is however limited due to a lack of available information.

The role of CFMPs is to establish flood risk management policies which will deliver sustainable flood risk management for the long term. This is essential if we are to make the right investment decisions for the future and to help prepare ourselves effectively for the impact of climate change. We will use CFMPs to help us target our limited resources where the risks are greatest.

This CFMP identifies flood risk management policies to assist all key decision makers in the catchment. It was produced through a wide consultation and appraisal process, however it is only the first step towards an integrated approach to flood risk management. As we all work together to achieve our objectives, we must monitor and listen to each others progress, discuss what has been achieved and consider where we may need to review parts of the CFMP.

The Arun and Western Streams CFMP has a history of fluvial, surface water, groundwater flooding and tidally influenced flooding. Flood risk is located in Arundel, Littlehampton and Horsham.

We cannot reduce flood risk on our own, we will therefore work closely with all our partners to improve the co-ordination of flood risk activities and agree the most effective way to management flood risk in the future. The key partners we have worked with to carry out the actions to reduce flood risk include Arun District Council, Chichester District Council, East Hampshire District Council, Natural England, Hampshire County Council, Havant Borough Council, Horsham District Council, Mole Valley District Council, Southern Water, Waverley Borough Council, West Sussex County Council.

This is a summary of the main CFMP document, if you need to see the full document an electronic version can be obtained by emailing **enquiries@environment-agency.gov.uk** or alternatively paper copies can be viewed at any of our offices in Southern Region.

Toby Willison
Regional Director, Southern Region

Contents

The purpose of a CFMP in managing flood risk

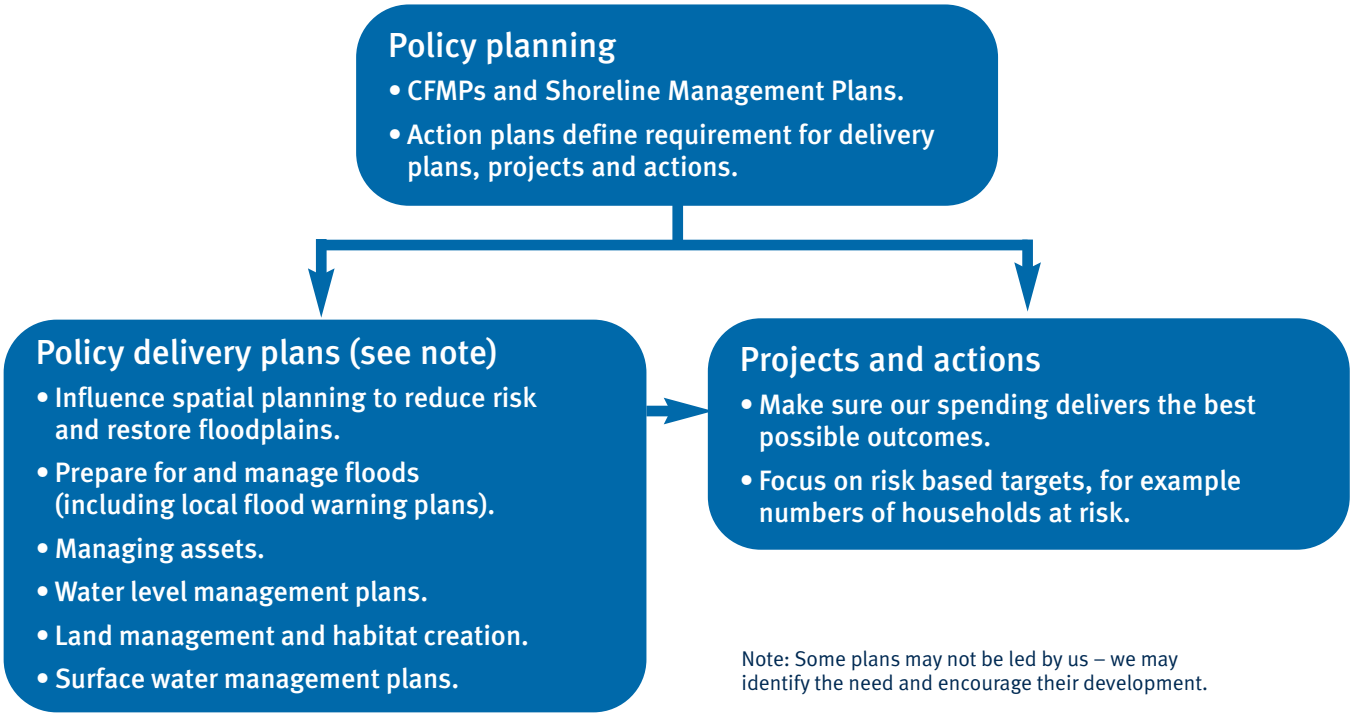
CFMPs help us to understand the scale and extent of flooding now and in the future, and set policies for managing flood risk within the catchment. CFMPs should be used to inform planning and decision making by key stakeholders such as:

- The Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions;
- Regional planning bodies and local authorities who can use the plan to inform spatial planning activities and emergency planning;
- IDBs, water companies and other utilities to help plan their activities in the wider context of the catchment;
- Transportation planners;
- Land owners, farmers and land managers that manage and operate land for agriculture, conservation and amenity purposes;
- The public and businesses to enhance their understanding of flood risk and how it will be managed.

CFMPs aim to promote more sustainable approaches to managing flood risk. The policies identified in the CFMP will be delivered through a combination of different approaches. Together with our partners, we will implement these approaches through a range of delivery plans, projects and actions.

The relationship between the CFMP, delivery plans, strategies, projects and actions is shown in figure 1.

Figure 1. The relationship between CFMPs, delivery plans, projects and actions.



Note: Some plans may not be led by us – we may identify the need and encourage their development.

Catchment overview

The river catchments of this CFMP lie mainly in the West Sussex Districts of Chichester, Arun and Horsham, together with small parts of East Hampshire and of the Waverley and Mole Valley in Surrey.

The landscape varies from the hills and steep scarp slopes of the South Downs, to the gently rolling hills of the Low Weald and the wide Arun valley flood plain south of Pulborough. Flow characteristics of the rivers vary correspondingly, with fast flowing streams emerging from the High Weald area to the north, flowing into the low-lying coastal plain where the gradient is less and the river flows are much slower.

Tidal influence affects the character of the lower parts of the River Arun and extends to above Pulborough.

Although largely rural, the area is home to approximately 300,000 people, with urban centres including Littlehampton, Chichester, Bognor Regis and Arundel on the coastal plain, and Petersfield, Midhurst, Pulborough and Horsham to the north of the South Downs.

Much of the area is recognised for its environmental and cultural value, with the South Downs being an Area of Outstanding Natural Beauty (AONB) and a proposed National Park.

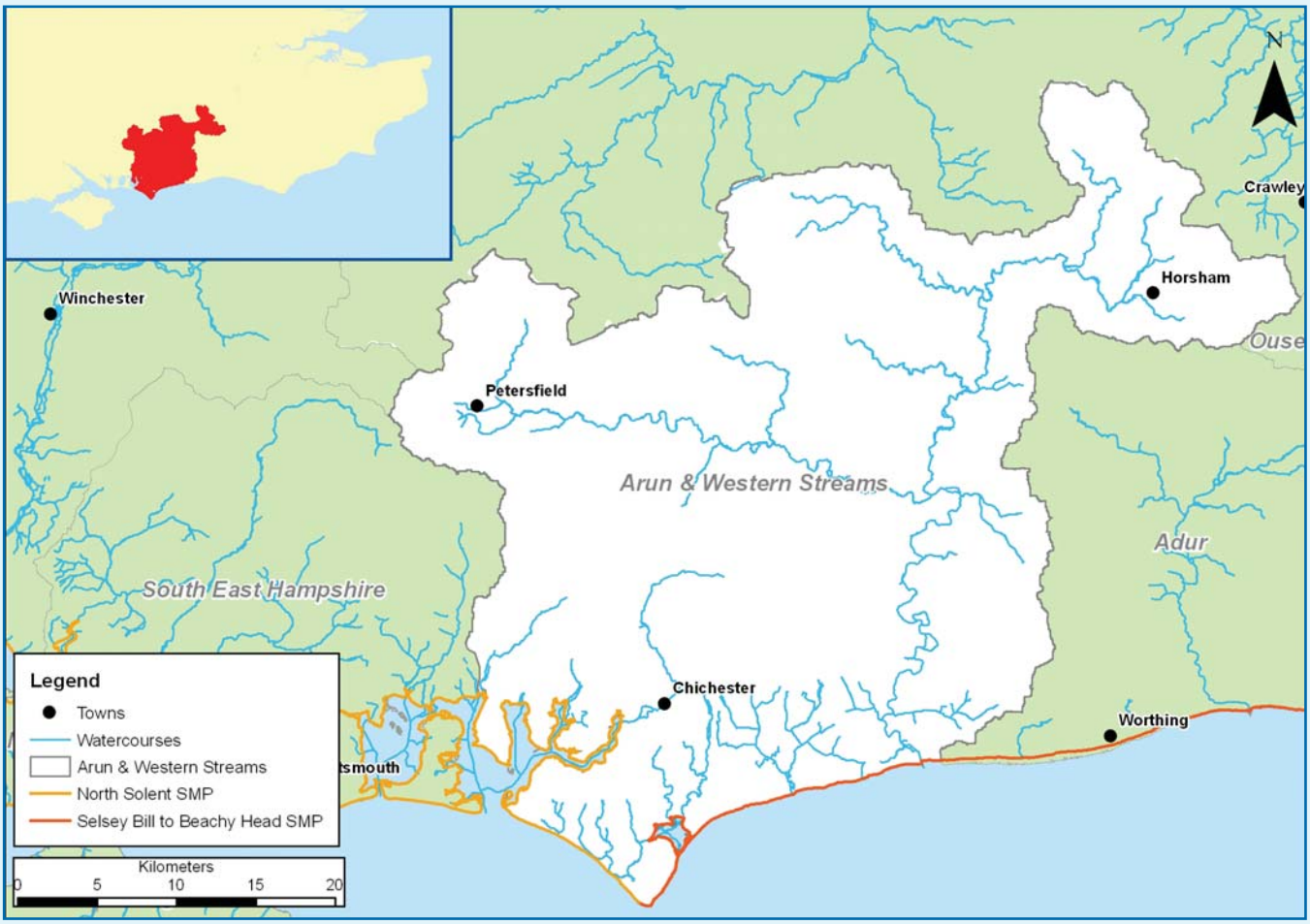
There are many valuable natural habitats in the area, such as the Arun Valley south of Pulborough, which contain spring fed floodplain marshes and wetlands designated by national, international and European conservation law.

The CFMP covers an area approximately 1400km^2 drained by the River Arun and its tributary the Rother, together with the catchments of several smaller streams to the west of the River Arun that discharge directly into Chichester Harbour. These include the Aldingbourne Rife; the Rifes surrounding Selsey and East Wittering; the River Lavant, the Bosham Stream and the River Ems.

Most watercourses have been heavily modified over the years, for example the land beside the middle reaches of the Arun and Rother was drained to provide fertile agricultural land from the original marshes and the lower reaches of the Arun were trained and dredged for navigation. In Roman times the River Lavant was diverted through Chichester to provide water.

← Amberley Wildbrooks – part of the Arun Valley SPA and Ramsar site.

Map 1. Overview of Arun and Western Streams CFMP.



‘The CFMP covers a large catchment drained by the River Arun and its tributary the Rother, together with the catchments of several smaller streams to the west of the River Arun that discharge directly into Chichester Harbour.’

Current and future flood risk

Overview of the current flood risk

Flood risk is the combination of the probability of flooding and its impact, that is, the chance of it happening and the consequences if it does happen. We have assessed flood risk across the CFMP area using broad-scale computer modelling, though making best use of existing knowledge and models where appropriate. Flood risk figures take into account current flood defences.

The Arun and Western Streams CFMP area has a history of fluvial, surface water, groundwater flooding and tidally influenced flooding.

Notable flood events have occurred seven times in the last 40 years, with the most serious being in December 1993 when over 200 properties were flooded across the catchment, and in Autumn 2000 when over 150 houses flooded.

Flood risk is likely to increase in the future, as climate change increases the magnitude and frequency of flood events. We expect winters to be wetter and for heavy rainfall to become more common.

Where is the risk?

The map on page 10 illustrates the consequences of a 1% annual probability event (1 in a 100 year) occurring within the CFMP area.

The areas with the highest concentration of properties at risk from river flooding are tabulated opposite:

↑ River Arun floodplain at Pulborough.

How we currently manage the risk

Our activity is prioritised on a risk basis. Our main activities include:

- **The maintenance of existing and the construction of new and replacement flood defences or structures.** Examples include the flood alleviation scheme on the Lavant. The scheme is implemented before flooding, as we monitor the groundwater levels from the River Lavant around Chichester.
- **Flood forecasting and warnings.**
- **Development control** to influence spatial planning so that new developments are sited away from flood risk areas, or take appropriate mitigation measures.
- **Flood risk mapping.**
- **Strategic planning** to plan long term investment.
- **Environmental improvements.**

Table 1. Locations of towns and villages with 25 or more properties at risk in a 1% annual probability river flood.

Number of properties at risk	Locations
>1000	None
500 to 1000	Lower River Arun (Arundel and Littlehampton)
100 to 500	Manhood Peninsula and Chichester Harbour, Lower Chalk Streams
50 to 100	Weald, Horsham, Bognor Regis
25 to 50	Pulborough

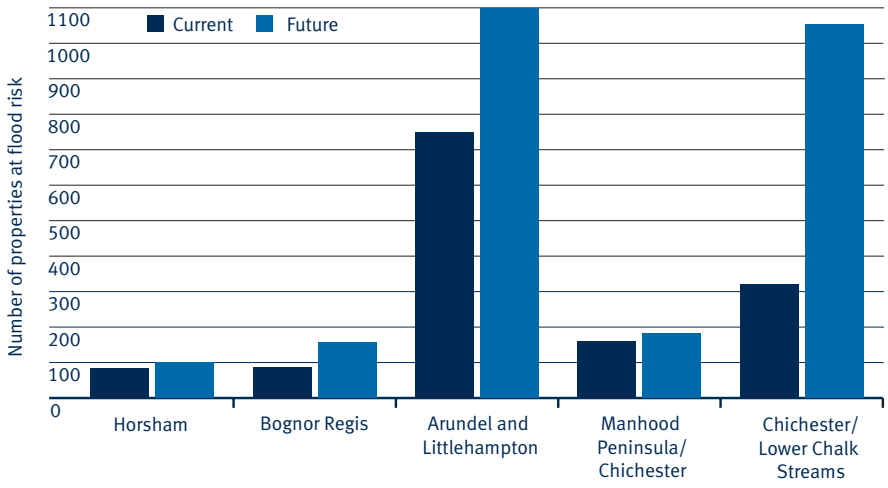
Table 2. Critical infrastructure at risk:

2 emergency services, 6 schools, 4 sewage/water treatment works, 9 electricity sub stations, 4 hospital/clinics

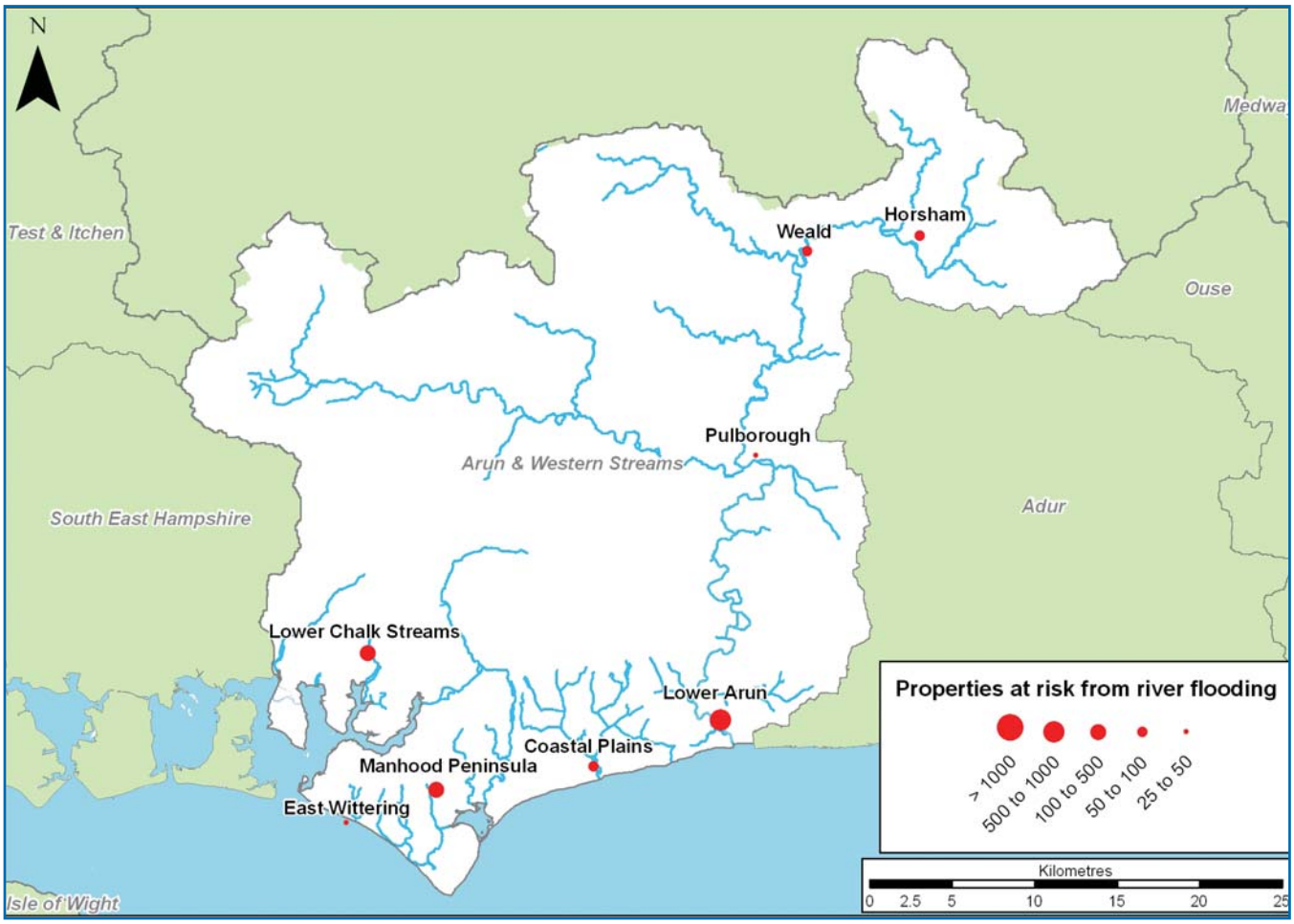
Table 3. Designated sites at risk:

Arun Valley SPA and RAMSAR, The Mens SAC

Figure 2. Current and future (2100) flood risk to property from a 1% annual probability river flood, taking into account current flood defences.



Map 2. Flood risk to property in a 1% annual probability river flood, taking into account current flood defences.



The impact of climate change and future flood risk

The effect that flooding will have in the future is influenced by a range of issues such as climate change, changes in land use such as development, and changes in how land is managed.

Predictions of future change are based on understanding the existing condition of the catchment, an extrapolation of trends over the long term (up to 100 years), and a high level review of likely future change based on research findings and knowledge. Within the Arun catchment, the predicted increase in urban development relative to the catchment area is relatively small and, as a result, the impact on flooding at the catchment scale is small. With respect to land use, due to economic pressures, parts of the Rother valley are currently intensively farmed which due to local conditions may result in more rapid run-off and soil erosion. These conditions are unlikely to be replicated elsewhere in the catchment so we have, therefore, only looked at more intensive land use as a component of our future scenario for the River Rother. There is an increase of 17% in flows in this part of the catchment. The scenario which has the greatest effect on future flood risk is climate change with up to 20% increase in peak flood flows. This scenario is used to assess likely impacts in the catchment. In the Arun catchment the future flood risk is likely to be from river flooding and tide-locking events caused by sea level rise. Our appraisal of the future risk in the catchment reveals the number of properties at risk to the 1% annual probability event will increase from 1576 to 3066 properties by the year 2100. The majority of these properties are located in Arundel, Littlehampton, Bognor Regis, Horsham, Bosham and Westbourne.

The key trends are:

- More frequent and intense storms causing more widespread and regular flooding from drainage systems and some rivers.
- More rain in winter, increasing the likelihood of large scale flood events.

Future direction for flood risk management

Approaches in each sub-area

We have divided the Arun and Western Streams catchment into nine distinct sub-areas which have similar physical characteristics, sources of flooding and level of risk. We have identified the most appropriate approach to managing flood risk for each of the sub-areas and allocated one of six generic flood risk management policies, shown in Table 4.

To select the most appropriate policy, the plan has considered how social, economic and environmental objectives are affected by flood risk management activities under each policy option.

Map 3. Sub-areas and flood risk management policies.

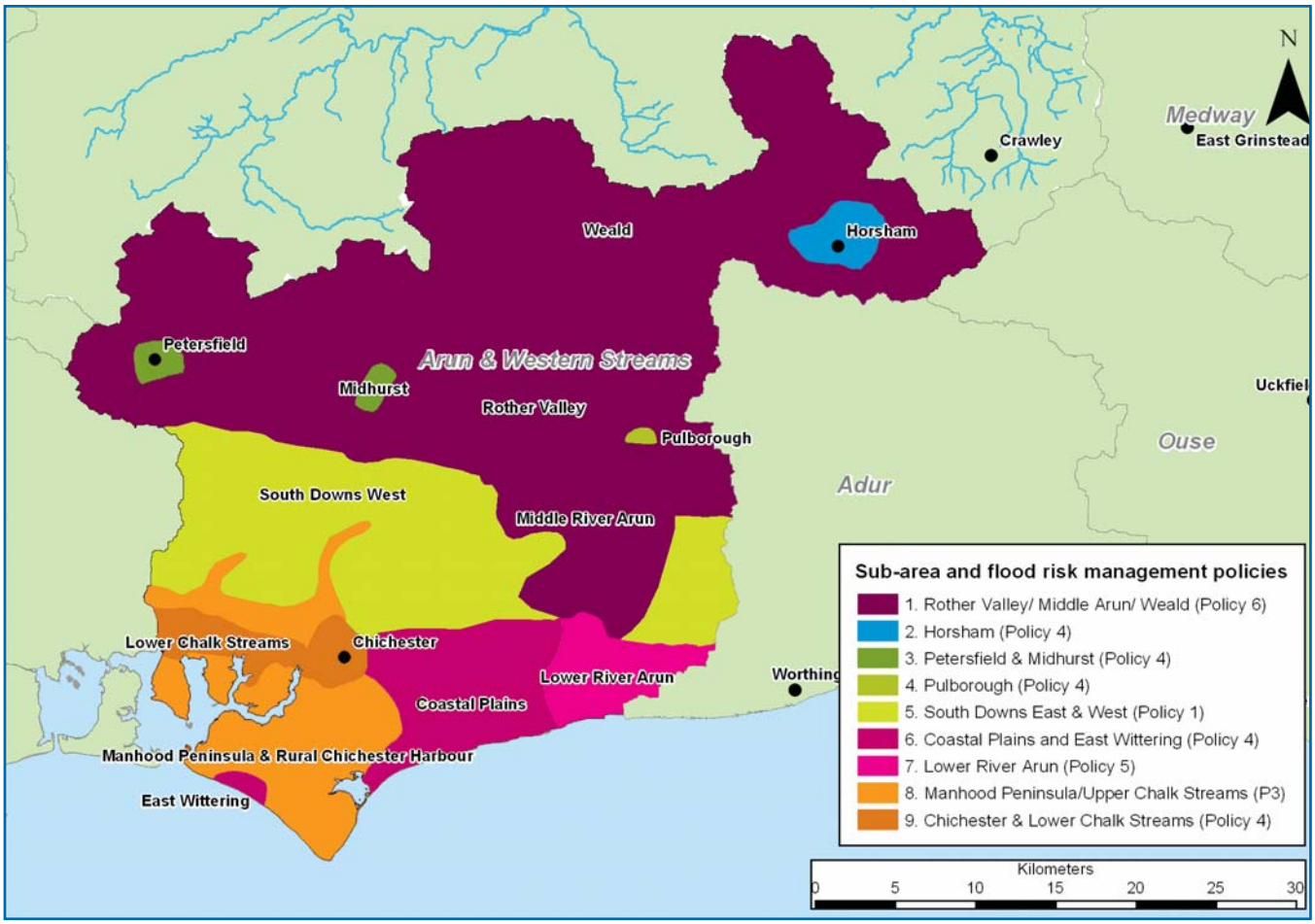


Table 4. Policy options.

→ Policy 1

Areas of little or no flood risk where we will continue to monitor and advise

This policy will tend to be applied in those areas where there are very few properties at risk of flooding. It reflects a commitment to work with the natural flood processes as far as possible.

→ Policy 2

Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions

This policy will tend to be applied where the overall level of risk to people and property is low to moderate. It may no longer be value for money to focus on continuing current levels of maintenance of existing defences if we can use resources to reduce risk where there are more people at higher risk. We would therefore review the flood risk management actions being taken so that they are proportionate to the level of risk.

→ Policy 3

Areas of low to moderate flood risk where we are generally managing existing flood risk effectively

This policy will tend to be applied where the risks are currently appropriately managed and where the risk of flooding is not expected to increase significantly in the future. However, we keep our approach under review, looking for improvements and responding to new challenges or information as they emerge. We may review our approach to managing flood defences and other flood risk management actions, to ensure that we are managing efficiently and taking the best approach to managing flood risk in the longer term.

→ Policy 4

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

This policy will tend to be applied where the risks are currently deemed to be appropriately-managed, but where the risk of flooding is expected to significantly rise in the future. In this case we would need to do more in the future to contain what would otherwise be increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

→ Policy 5

Areas of moderate to high flood risk where we can generally take further action to reduce flood risk

This policy will tend to be applied to those areas where the case for further action to reduce flood risk is most compelling, for example where there are many people at high risk, or where changes in the environment have already increased risk. Taking further action to reduce risk will require additional appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

→ Policy 6

Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits

This policy will tend to be applied where there may be opportunities in some locations to reduce flood risk locally or more widely in a catchment by storing water or managing run-off. The policy has been applied to an area (where the potential to apply the policy exists), but would only be implemented in specific locations within the area, after more detailed appraisal and consultation.

Rother Valley/Middle Arun/ The Weald

Our key partners are:

- National Farmers Union
- Rural Development Service
- Natural England
- Sussex Landcare Project
- West Sussex County Council,
- RSPB

The issues in this sub-area

This large rural sub-area has opportunities for changing land use and possible flood storage to reduce some of the current rapid run-off due to soils, slope and land use. The Middle Arun has raised defences in the form of embankments. Originally designed to protect the farmland and natural habitats on either side of the river up to a 2% annual probability flood event. This level is now considered to provide protection from 3% annual probability event.

The vision and preferred policy

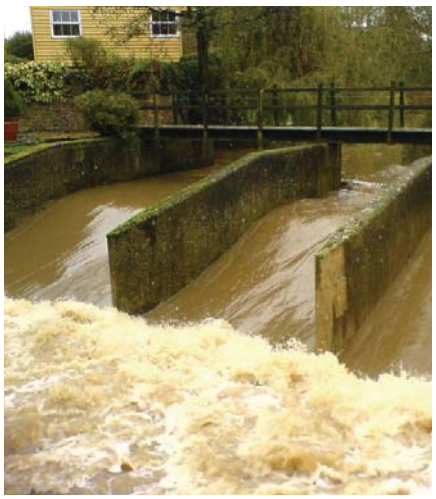
Policy Option 6 – areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	95	131

The key messages

In many instances flooding has a positive influence on the environment and the chosen policy supports increased flooding, or at least keeping water on the land for longer. With a low flood risk within this sub-area, there is action required to significantly reduce flood risk, however, applying the chosen policy here will reduce flood risk downstream. There are large areas of existing wet woodlands which would benefit or be increased in area through increased flooding.



↑ Iping Mill in the Rother Valley.

Proposed actions to implement the preferred approach:

- Develop a System Asset Management Plan (SAMP) to review maintenance regimes.
- Investigate opportunities to work with landowners to create wetland habitat throughout the sub-area.
- Work with the National Farmers Union and Natural England to develop a Land Management Plan exploring the potential for changes in land use and land management practices throughout the sub-area. This would aim to reduce run-off from surrounding countryside, to reduce soil erosion and to achieve local flood risk benefits.
- Prepare Lower Tidal River Arun Strategy to address the gap in understanding of tidal flood risk in Lower and Middle Arun. The strategy will investigate the feasibility of lowering the flood banks on the lower tidal Arun to allow more use of the extensive flood plain for flood storage.

Horsham

Our key partners are:

Horsham District Council

Southern Water

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	82	100

The issues in this sub-area

Urban development and increased flows will place considerably more pressure on the existing drainage network and will result in more surface water flooding, urban drainage capacity being exceeded with greater frequency, and more extensive flooding from urban watercourses. There are no raised flood defences in this sub-area, but there are significant control structures that modify the flow.

The vision and preferred policy

Policy Option 4 – 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

Climate change and urban development will increase future levels of risk.

Flooding from surface water has not been quantified but is known to be significant and is expected to increase significantly in the future.

We will take increasing action to ensure that the level of protection offered for Horsham remains the same despite increased risk due to climate change and urban growth.

Proposed actions to implement the preferred approach:

- Work with Horsham District Council to influence spatial development with the aims of ensuring no net increase in run-off from new developments and to encourage the use of Sustainable urban Drainage Systems (SuDS).
- Develop System Asset Management Plans (SAMPs) to review maintenance regimes, ensuring that the current standard of protection is maintained into the future.
- Work with Horsham District Council and the Water Companies to prepare Surface Water Management Plan (SWMP) for Horsham. This should address the effects of climate change and development.

↑ Provender Mill. Horsham.

Petersfield and Midhurst

Our key partners are:

East Hampshire District Council

Southern Water

Chichester District Council

The issues in this sub-area

We have not been able to model the small streams and drainage network that runs through Petersfield, however from analysis of local ground and water levels, we estimate that around 20 residential properties are at risk from a 1% annual probability flood event and 15 properties in Midhurst.

There are water control structures, sluice gates and by-pass channels in Midhurst, managed and operated by the Environment Agency. These are not principally flood defence structures, however they do play an important role in water level management.

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	35	50*

*Future scenario figure extrapolated from similar catchment modelling in Southern region.

The vision and preferred policy

Policy Option 4 – 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

The current level of flood risk is assessed as relatively low, although we have not quantified the risk associated with surface water flooding. This policy would achieve the economic and social objectives making sure that flood risk does not increase in the future as a result of climate change and urban development.

Proposed actions to implement the preferred approach:

- Work with Chichester District Council and East Hampshire District Council to influence spatial development with the aims of ensuring no net increase in run-off from new developments and to encourage the use of Sustainable urban Drainage Systems (SuDS).
- Undertake System Asset Management Plans (SAMPs) to review maintenance regimes, to assess future investment needs and to maintain current level of risk.
- Work with East Hampshire District Council and the Water Companies to prepare Surface Water Management Plan (SWMP) for Petersfield. This should address the effects of climate change and development.
- Improve flood warning service to properties in Midhurst and surrounding villages through more accurate flood forecasting and more timely warnings.

← Urban drainage ditch in Petersfield.

Pulborough

Our key partners are:

Horsham District Council

Arun District Council

West Sussex District Council

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	41	64

The issues in this sub-area

There are embankments along the river Arun throughout this sub-area and sections of vertical stone/masonry walls protecting the town of Pulborough. There is also a small pumping station within this sub-area which discharges excess water. This tends to collect behind the main river defences when the Arun water levels are high.

The vision and preferred policy

Policy Option 4 – 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

The current level of flood risk is assessed as relatively low, although we have not quantified the risk associated with surface water flooding. This policy would achieve the economic and social objectives making sure that flood risk does not increase in the future as a result of climate change and urban development.

↑ Old Swan Bridge at Pulborough.

↑ Riverside development at Pulborough.

Proposed actions to implement the preferred approach:

- Work with Horsham District Council to provide development control advice to ensure no increase in run-off from new developments and seek opportunities to reduce current run-off rates where possible.
- Improve flood warning service to properties in Pulborough and surrounding villages through more accurate flood forecasting and more timely warnings.
- As part of Lower Tidal River Arun Strategy, assess the integrity and long term sustainability of existing tidal defences in and around Pulborough.
- Undertake System Asset Management Plans (SAMPs) to review maintenance regimes, to assess future investment needs and to maintain current level of risk.

The South Downs (East and West)

Our key partners are:

Arun District Council

Chichester District Council

Horsham District Council

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	0	0

The issues in this sub-area

There are no rivers in this sparsely populated chalk downland sub-area, so no properties are at risk from river flooding. There is a chance of surface water run-off across the South Downs, however no residential property is affected in these sparsely populated sub-areas. Agricultural land is at risk of soil erosion.

The vision and preferred policy

Policy Option 1 – areas of little or no flood risk where we will continue to monitor and advise.

The key messages

We do not need to carry out any flood risk management activities here.

Proposed actions to implement the preferred approach:

- Continue to monitor and advise.

← Harting Down, south of Petersfield.

Coastal Plains and East Wittering

Our key partners are:

- Arun District Council
- Chichester District Council
- West Sussex County Council
- Southern Water

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	131	251

The issues in this sub-area

This is a highly populated sub-area, which contains the town of Bognor Regis. Towards the west the land is relatively flat land with poorly drained and often waterlogged soils. There is risk from surface water flooding when groundwater is high. Surface water drains can be affected when high tides prevent them from draining water effectively. There are no significant raised flood defences on river reaches in this sub-area, although we own and operate a pump at Felpham which pumps the Aldingbourne Rife through the tidal defence into the sea.

The vision and preferred policy

Policy Option 4 – 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. Although current flood risk is low, it is expected to increase in the future.

The key messages

Climate change, sea level rise and urban growth are likely to increase future levels of risk. Sea level rise will increase the duration of tide locking in the area, which combined with increased rainfall will also increase flood risk within the area. As a seaside holiday resort, there area number of hotels and camping sites in the area which increases the potential harm resulting from flooding. This policy would achieve the economic and social objectives of making sure that flood risk does not increase in the future as a result of climate change and in particular urban development.

↑Aldingbourne Rife, above Bognor Regis.

Proposed actions to implement the preferred approach:

- Work with Arun and Chichester District Councils to provide development control advice on methods to reduce run-off and to implement Sustainable urban Drainage Systems (SuDS) where applicable.
- Work with Arun District Council and Southern Water to develop Surface Water Management Plan (SWMP) for Bognor Regis. Improve understanding of urban drainage and surface water issues within the area, and develop a clear strategy to manage the risks and issues.
- Develop System Asset Management Plans (SAMPs) to review maintenance regimes, focusing on drainage issues at East Wittering, the Rifes and, in particular, the River Lavant flood alleviation scheme and the Aldingbourne Rife outfall.
- Improve flood warning service where feasible, by improving accuracy and warning time ahead of a flood event.

Lower River Arun

Our key partners are:

Arun District Council

West Sussex County Council

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	742	1099

The issues in this sub-area

This sub-area includes the towns of Arundel and LIttlehampton and the wide flat floodplain between. The river is embanked throughout and some repair and maintenance is needed. Embankments were originally designed to provide protection from a 1 in 50 year flood event. This standard of protection is now considerably less, and in places around Arundel may be as low as a 1 in 33 year flood.

The vision and preferred policy

Policy Option 5 – areas of moderate to high flood risk where we can generally take further action to reduce flood risk.

Because the protection offered by the flood defences is lower than designed, further work is required.

The key messages

Future levels of flood risk in this sub-area are high, due to urban growth, climate change and sea level rise.

High level of flood risk in Arundel needs to be addressed - local defences around Arundel will need to be maintained and eventually improved.

Allowing increased flooding of surrounding floodplain could reduce flood risk in developed areas and provide additional environmental benefits.

The selected policy would help achieve the economic, social and environmental objectives by reducing flood risk within the sub-area (as well as in neighbouring sub-areas).

Proposed actions to implement the preferred approach:

- Prepare Lower Tidal River Arun Strategy to address the gap in understanding of tidal flood risk in Lower and Middle Arun and tackle the problem of the condition of parts of the river wall through Arundel. This should also address the standard of protection from Arundel to Littlehampton and this may require us to carry out appropriate works to the river wall defences.
- Develop System Asset Management Plans (SAMPs) to review maintenance regimes, taking action to reduce flood risk where appropriate.

↑ The Lower Arun through Littlehampton.

Manhood Peninsula and Rural Chichester Harbour/ Upper Chalk Streams

Our key partners are:

- Chichester District Council
- West Sussex County Council
- RSPB

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	175	205

The issues in this sub-area

Low lying coastal area, artificially drained by an old drainage network. High tides can prevent flood waters draining to the sea. There are some problems where saturated ground fills isolated septic tanks, which results in foul water discharge into the streams and the local sewerage system being overwhelmed.

Chichester flood alleviation scheme drains into the Pagham Rife which also runs through this sub-area. The sub-area also contains areas of Sites of Special Scientific Interest (SSSI) and RAMSAR sites in Pagham and Chichester Harbours.

An extensive network of drainage ditches provide land drainage for the area. The standard of protection provided by this system is very variable, however it typically provides protection up to a 3% annual probability flood event.

There are 175 residential properties at risk from a 1% annual probability flood event, however these are distributed over a very wide area. Coastal flood risk is dealt with in the Beachy Head to Selsey Bill Shoreline Management Plan and the North Solent Shoreline Management Plan.

The vision and preferred policy

Policy Option 3 – areas of low to moderate flood risk where we are generally managing existing flood risk effectively.

Flood risk is currently managed at an appropriate level.

The key messages

Expenditure on flood risk management is relatively high. Large-scale improvements would be ineffective and cannot be justified. Safe access to coastal communities can still be achieved under this policy.

Economic, environmental, social and landscape objectives can be achieved through this policy by using existing resources appropriately. Climate change and urban development will not significantly increase future levels of risk. The nature of the flooding is such that there is very little at a sub-area scale that can be done to reduce it, so the emphasis should be on adaptation rather than prevention.

Proposed actions to implement the preferred approach:

- Work with Chichester District Council to provide development control advice to influence design and maintenance of sewerage systems in new developments to reduce foul water flooding.
- Work with Chichester District Council to implement tighter development control measures on proposed developments that will not be connected to public sewerage drainage.
- Develop System Asset Management Plans (SAMPs) to review maintenance regimes.
- Develop an emergency response plan for the Manhood Peninsula, identifying risks, actions, responsibilities and triggers.
- Work with landowners including RSPB to create and restore wetlands.

↑ Oving Rife.

↑ River Lavant overflowing at Charlton, December 2000.

Chichester and Lower Chalk Streams

Our key partners are:

Chichester District Council

Impact of a 1% annual probability flood event

	Today	Future (2100)
Number of properties at risk	119	1052

The issues in this sub-area

This is a relatively urbanised area in a flat coastal plain. Watercourses are all chalk-fed streams, including the River Lavant, the Bosham Stream and the River Ems. The River Lavant flows through Chichester City centre. This is a chalk fed stream which flows intermittently. High flows have caused flooding in the past, however, the flood alleviation scheme has been in place since 2003 which diverts excess flows into the Pagham Rife.

The sub-area can also experience flooding from groundwater which can last up to several weeks. Some local flooding due to the under-capacity of drainage channels and flooding can be made worse (or sometimes caused) when high tides prevent water from draining to the sea. Flooding can be exacerbated by run-off from the A27.

The vision and preferred policy

Policy Option 4 – 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

Although the current level of flood damages is small in comparison to some parts of this CFMP area, there are a number of issues which need to be resolved in the future. We have not accurately estimated surface water and groundwater flooding, which can be relatively frequent, but we expect this to become higher and more damaging in the future. Climate change and urban development are expected to have an effect on flood risk. Flood risk is currently managed to an appropriate level in Chichester. The performance of the flood relief scheme will be monitored over the coming years.

The selected policy would help achieve the catchment objectives by preventing any increase in the economic and social impacts of flooding, whilst recognising the importance of the chalk stream habitat.

↑ The River Lavant through Chichester.

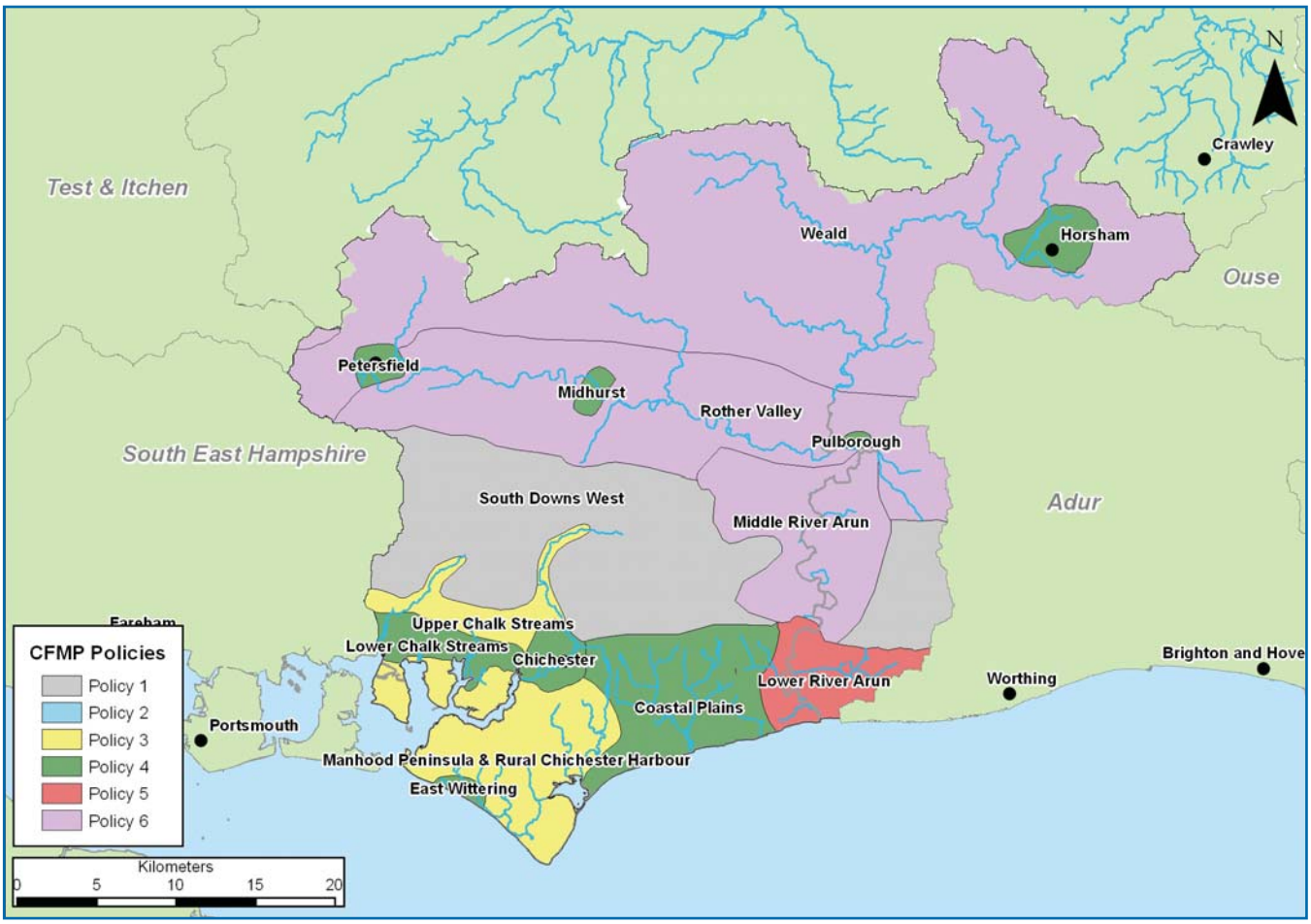
Proposed actions to implement the preferred approach:

- Prepare River Ems, Westbourne and Emsworth improvement scheme to investigate setting back flood embankments. This should also aim to produce guidelines for riparian owners to operate flow and level control structures through Emsworth to improve conveyance at times of high flows.
- Develop System Asset Management Plans (SAMPs) to review maintenance regimes.
- Work with Chichester District Council to provide development control advice on methods to reduce run-off and inappropriate development on the floodplain. In the long term, planners should look for opportunities to open up culverts creating a more natural drainage system and creating green spaces along the river corridor through Chichester.
- Review *River Lavant flood alleviation scheme (FAS)*, looking at the long-term standard of protection it provides against climate change and sea level rise.

↑ Flavian Fields at Fishbourne.

Map of CFMP policies

Map of the policies in the Arun and Western Streams catchment.



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