

Parrett Catchment Flood Management Plan

Summary Report December 2009



managing
flood risk

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Introduction



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

The Parrett 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, ground water, 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 ground water 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 Parrett catchment has a history of flood risk. Over the last 70 years numerous engineering schemes have been implemented to reduce flood risk in the catchment. At present 3,300 properties are at risk in the catchment in a 1% annual probability flood event. This takes account of flood defences already in place. This is expected to increase to over 6,600 properties in the future.

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 manage flood risk in the future. We have worked with others including: South Somerset, Taunton Deane and Sedgemoor District Councils, Natural England, Wessex Water and the National Farmers Union to develop this plan.

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 South West Region.

A handwritten signature in black ink that reads "R. Cresswell". The signature is written in a cursive, flowing style.

Richard Cresswell
South West Regional Director

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The purpose of a CFMP in managing flood risk

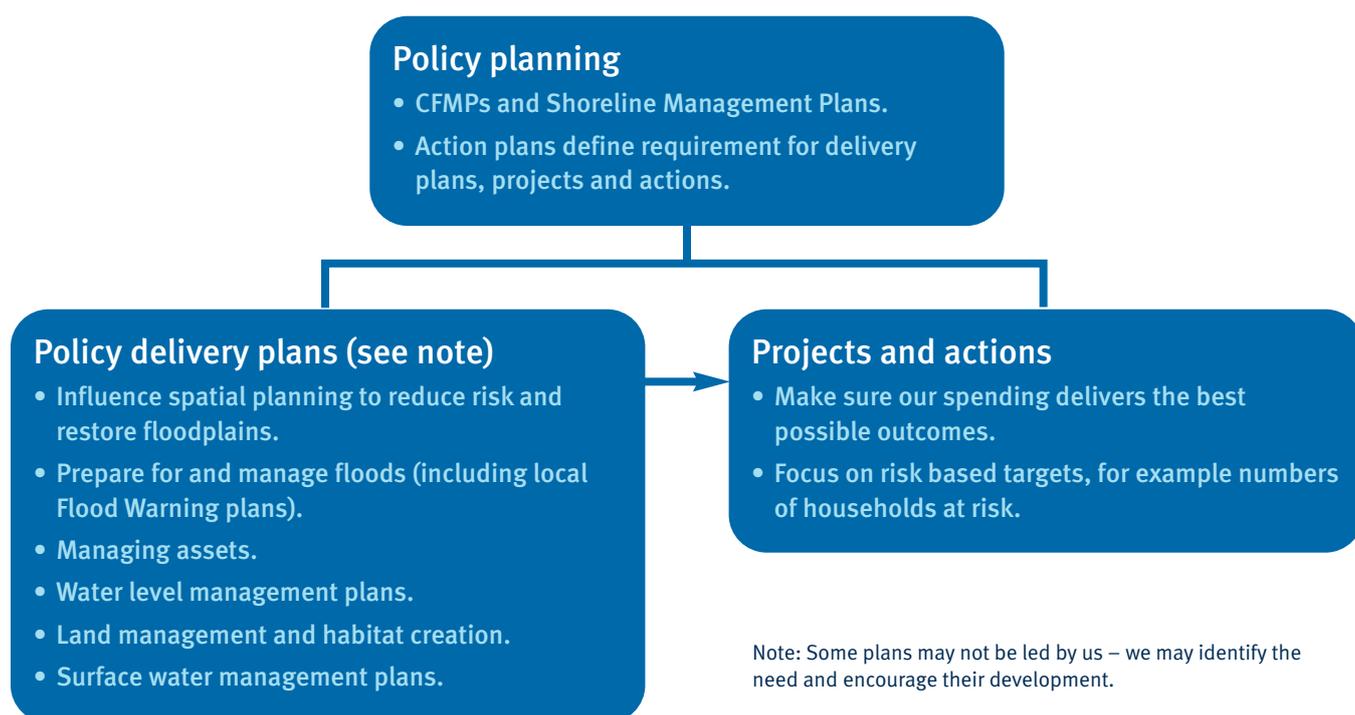
CFMPs help us to understand the scale and extent of flooding now and in the future, and set policies for managing flood risk within the catchment. CFMPs should be used to inform planning and decision making by key stakeholders such as:

- the Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions;
- Regional Assemblies and local authorities who can use the plan to inform spatial planning activities and emergency planning;
- Internal Drainage Boards (IDB), 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



Catchment overview

The catchment of the River Parrett is located in the south west of England. It drains from the Quantocks, Blackdown Hills and Mendips, flowing through the low-lying Somerset Levels and Moors to the Bristol Channel at Bridgwater Bay.

Map 1 shows the location and extent of the River Parrett CFMP area. It includes the tributaries of the rivers Isle, Tone, Yeo and Cary. Below Bridgwater, the downstream limit of the CFMP area overlaps with the upstream boundary of the North Devon and Somerset Shoreline Management Plan (SMP) boundary.

The North Devon and Somerset SMP deals with coastal flood management, while the CFMP considers tidal flood risk along the Rivers Parrett and Tone to the tidal limits at Oath and Newbridge respectively.

The overall catchment area is about 1,700 square kilometres, and has a population of around 300,000. It's a rural catchment, with urban areas making up only four per cent of the total. Its main urban areas include Taunton, Bridgwater and Yeovil.

The rivers and streams flow from their source in the hills in the southwest and east of the

catchment. They flow in a north and westerly direction down into an extensive lowland floodplain, before flowing out into the Bristol Channel through the Parrett Estuary. The major rivers start in the steep uplands, then flow through flat lower moors, where they are embanked and in some places perched above the surrounding floodplain. The lower reaches of the rivers Tone and Parrett are tidal for some 30km (18.6miles) from the Severn Estuary. The steepness of the uplands, coupled with the geology and soil conditions, generates quick run-off from short intense rainfall. In the Somerset Levels and Moors, flooding is caused by longer duration storms or a series of storms of low intensity. The high-level embanked channels overflow and floodwater is stored in the moors before it can reach the estuary. The capacity of these channels can be significantly reduced by high tidal conditions backing up the Parrett.

Internal Drainage Boards have an important role in managing land drainage within these low-lying moors.

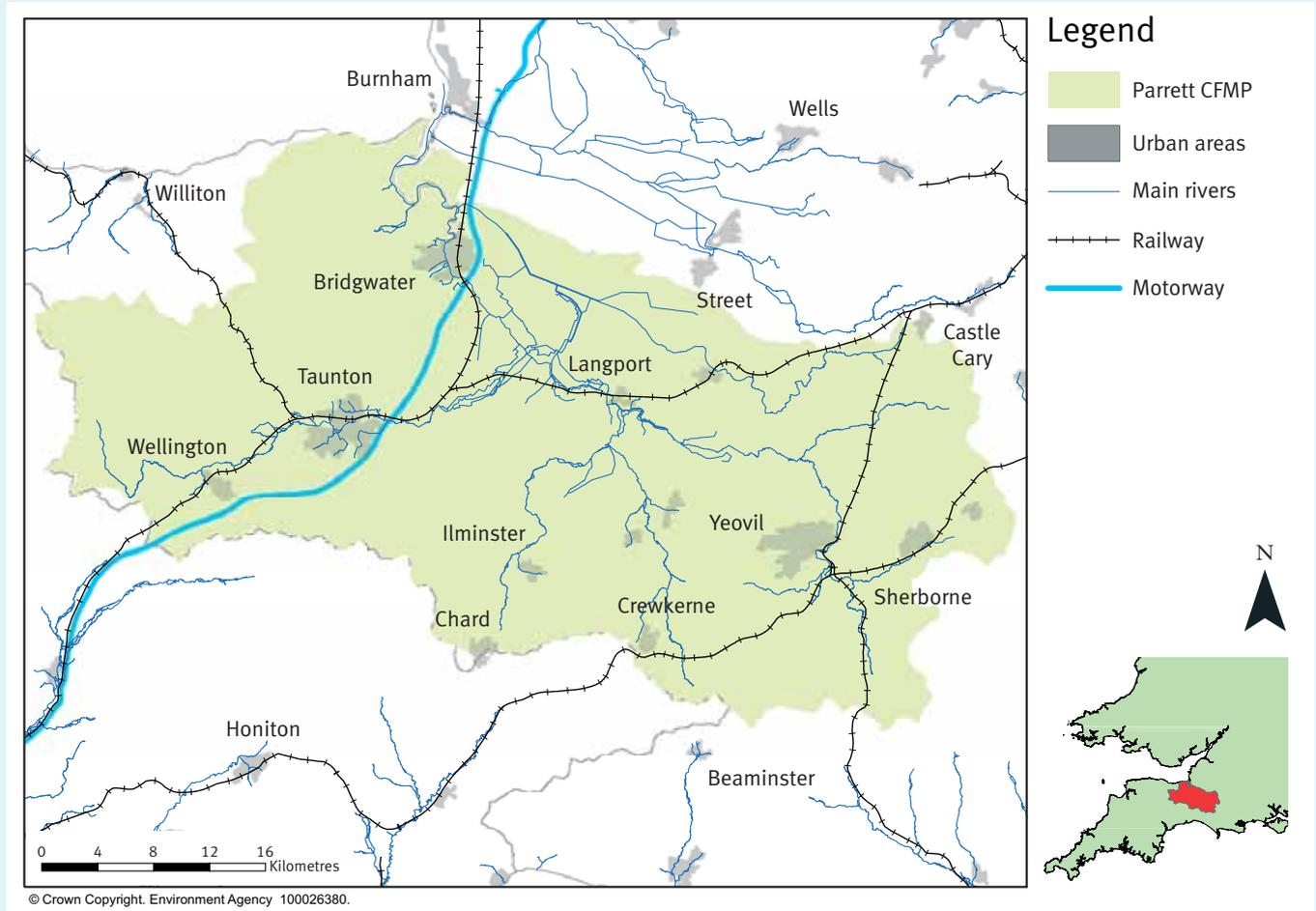
The underlying rock has a significant influence on the catchment's response to rainfall, with high run-off

from the impermeable uplands in the east and waterlogging of the lowlands. The area does not have any major aquifers so groundwater flooding is not a major risk.

The catchment contains a number of designated sites of national and international importance. A significant part of the low-lying Somerset Moors are designated Special Protection Areas and a Ramsar site, which depend upon flooding. The area is also rich in archaeological sites that depend on waterlogged conditions for their preservation.

Important environmental sites in the catchment include 104 square kilometres of Areas of Outstanding Natural Beauty, 0.8 square kilometres of Special Areas of Conservation (SAC), 43 square kilometres of Ramsar, 72 square kilometres of Sites of Special Scientific Interest and 112 Scheduled Monuments.

Map 1. Location and extent of the Parrett CFMP area



↑ Strengthening the historic Baltmoor Wall on the River Tone, one of many flood defences we manage in the catchment

Current and future flood risk

Overview of the current flood risk

Flood risk has two components: the chance (probability) of a particular flood and the impact (or consequence) that the flood would have if it happened. The probability of a flood relates to the likelihood of a flood of that size occurring within a one year period. It is expressed as a percentage. For example, a 1% annual probability flood has a 1% chance or 0.01 probability of occurring in any one year, and a 0.5% flood has a 0.5% chance or 0.005 probability of occurring in any one year. The flood risks quoted in this report are those that take account of flood defences already in place.

Since Roman times, attempts have been made to evacuate floodwater from the low-lying areas of the Parrett catchment, where once the rivers overflowed. The floodplains would be under water for months if left to drain by gravity alone. In the last 60 years, many flood defence schemes have been built, including the Sowy River, taking overflow from the River Parrett to the King's Sedgemoor Drain, and new pumping stations assisting the evacuation of floodwater from the Moors.

The most recent significant flood in the Parrett catchment was the autumn/winter flooding of 2000, the worst since October 1960. Flood defences built in Taunton and elsewhere since 1960 have reduced the risk of flooding. Despite these works approximately 350 properties were flooded in the River Parrett catchment and extensive flooding of the Somerset Levels and Moors occurred.

Currently the main sources of flood risk for people, property, infrastructure and the land are:

- river flooding from the River Parrett and its tributaries, particularly in Taunton and Langport;
- tidal flooding from the River Parrett in Bridgwater;
- breaching/failure of embankments, which could be a problem along rivers across the levels and moors of the catchment;
- surface water drainage and sewer flooding, which has occurred in parts of Bridgwater and Taunton, and rural upland slopes. Other towns have the potential to be at risk from surface water flooding.

What is at risk?

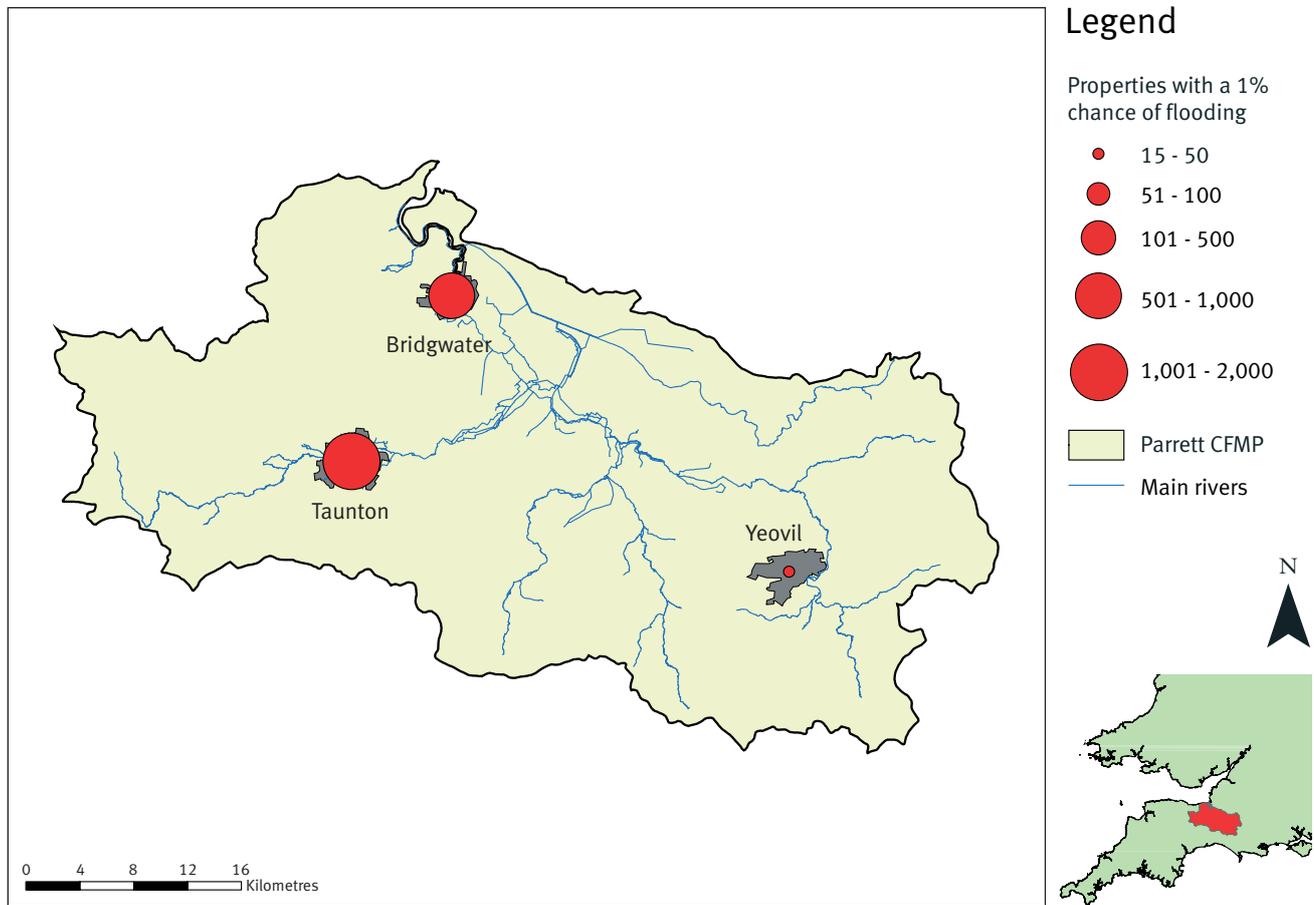
At present there are around 17,000 people and 4,000 commercial and residential properties at risk in the whole catchment from a 1% annual probability river flood taking into account current flood defences.

This means that 6% of the total population living in the catchment are currently at risk from flooding.

It is difficult to assess the current impact of flooding to environmental features. Many designated sites at risk have a positive benefit from winter flooding and would not actually be damaged by the inundation. 16 Scheduled Monuments are at risk of flooding, but again, the actual risk of damage from flooding is limited.

‘The oldest man living does not remember such great floods and so much water. Everything beyond Bridgwater is like a sea.’ 1809

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



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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
>1,000	Taunton
500 to 1,000	Levels and Moors
100 to 500	Bridgwater
50 to 100	None
25 to 50	None

Table 2. Critical infrastructure at risk:

1 ambulance station, 2 fire stations, 1 police station, 66 electricity substations, 3 water treatment works, 2 waste water treatment works, 1 care home, 30km main roads, 8km motorway, 36km mainline railway, and 16 schools

Where is the risk?

Almost half of the people and properties that are at risk within the catchment from a 1% annual probability river flood, are located in Taunton. A further 4% are located in Bridgwater.

The distribution of properties at risk from a 1% annual probability river flood, is illustrated in Map 2. Table 1 summarises where there is flood risk to more than 25 properties. We recognise that there is also a potential risk from surface water and groundwater flooding. However, further studies identified in the CFMP are required to be taken by us and our partners to quantify this potential risk.

How we currently manage the risk

The catchment has a history of flood risk, generally due to the high rainfall that can lead to extensive flooding of the river valleys. Over the last 70 years, numerous engineering schemes have been implemented to reduce flood risk in the catchment, including

- widening and deepening of rivers in Taunton, and Hillfarrance;
- building a flood bypass channel; the Sowy River Parrett Relief channel reducing flood risk between Langport and Bridgwater by bypassing flood flow direct to the Parrett Estuary at Dunball;
- improving flood banks of the Tone through Ham, Creech St Michael, Ruishton and Stanmoor.

These measures have all reduced flood risk.

In addition to these engineering schemes, other flood risk management activities are carried out in the catchment. These include activities which help to reduce the probability of flooding and those that address the consequences of flooding.

Activities that reduce the probability of flooding include:

- maintaining and improving existing flood defences and structures, especially tidal banks of the River Parrett;
- maintenance of drainage networks by Internal Drainage Boards and landowners;
- maintaining river channels;
- maintenance of road drainage and sewers;
- working with local authorities to influence the location, layout and design of new and redeveloped property and ensuring that only appropriate development is allowed on the floodplain through the application of Planning Policy Statement 25 (PPS25).

Activities that reduce the consequences of flooding include:

- understanding where flooding is likely by using flood risk mapping;
- providing flood forecasting and warning services;
- promoting awareness of flooding so that organisations, communities and individuals are aware of the risk and are prepared in case they need to take action in time of flood;
- promoting resilience and resistance measures for those properties already in the floodplain.



← View from Burrow Mump of floods at Burrowbridge in January 2001

The impact of climate change and future flood risk

In the future, flooding will be influenced by climate change, changes in land use (for example urban development) and rural land management. In the West Somerset catchment, climate change will have the greatest impact on flood risk. The following future scenario for climate change was used in the CFMP:

- 20% increase in peak flow in all watercourses. This will increase the probability of large-scale flood events;
- a total sea level rise of 500 mm by the year 2100. This will increase the risk of flooding at Minehead, Porlock and Watchet.

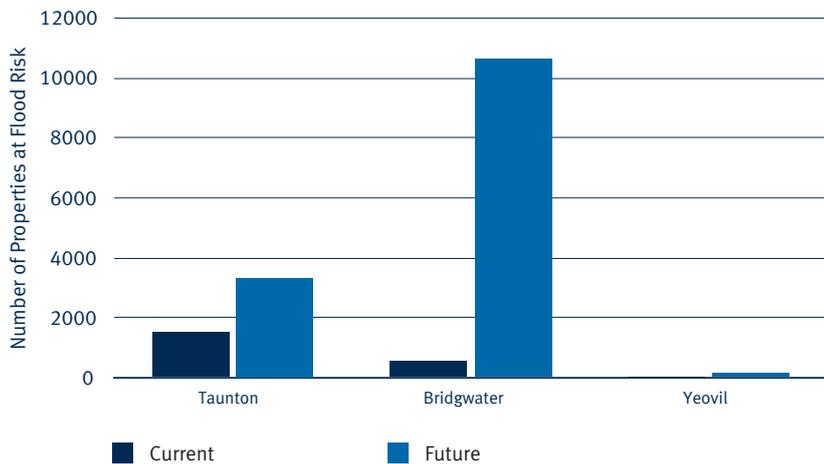
Using river models we estimate that by 2100, around 3,500 people and 2,040 properties across the catchment may be at risk from a 1% annual probability flood. Flood risk from rivers increases mainly in Minehead, Watchet and Dunster.

The sensitivity testing undertaken showed that river flooding in the catchment is not sensitive to changes to the predicted urban development, but is very sensitive to climate change, as flood depths and extents increased. Land use changes was also found to have a widespread affect on the CFMP area.

Figure 2 shows the difference between current and future flood risks from a 1% annual probability river flood at key locations in the catchment. Following on from the CFMP, organisations need to work together to investigate flood risk from other sources (e.g. surface water and ground water flooding) in more detail.

In general, it is unlikely that the impact of flooding on environmental sites will change significantly in the future.

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



Future direction for flood risk management

Approaches in each sub-area

We have divided the Parrett catchment into eight 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 3.

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.



↑ Bishops Lydeard, Somerset

Map 3. Parrett sub-areas

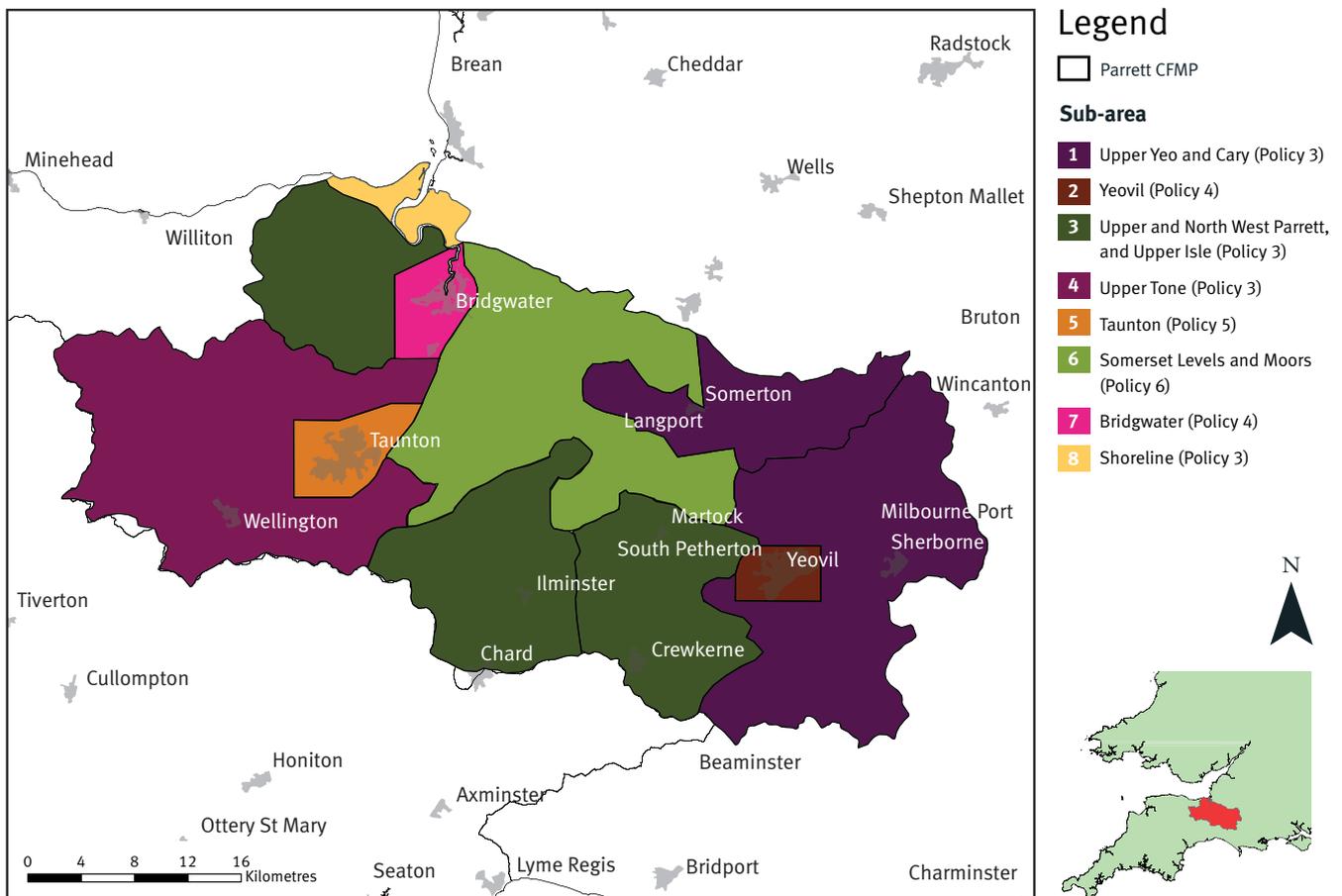


Table 3. Policy options

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.

Upper Yeo and Cary

Our key partners are:

West Dorset District Council

South Somerset District Council

Somerset County Council

The issues in this sub-area

Fluvial flooding is focused on particular isolated communities. This reflects the relatively small and steep watercourses which dominate the sub-area.

Some communities adjacent to the River Yeo, in particular Ilchester, have suffered fluvial flooding. Other villages (such as Queen Camel and West Camel) have suffered from complex fluvial and surface water problems.

In the Upper Cary flooding problems are generally isolated, although the exact mechanism of flooding is often poorly understood, and is probably a combination of surface water, fluvial and sewer problems. Sewer flooding has been recorded specifically in Somerton.

Recent flooding in this sub area has been strongly driven by local surface water problems, exacerbated by some farming practices which have increased field run-off locally.

The number of current properties at risk in the 1% annual probability flood event is 517. This is expected to increase to 825 properties in the future 1% annual probability flood event.

The vision and preferred policy

Policy Option 3 - we are generally managing flood risk effectively

Our current level of investment in this area is low, and in the Upper Yeo area is focussed in areas where we have undertaken works. This maintenance and flood warning role must continue in this sub-area.

As our current investment in the area is relatively low (in the Upper Cary this is generally focussed on reactive debris clearance), it will not be possible to reduce it further without undermining our maintenance and flood warning role or without increasing flood risk.

Many of the risks in the Upper Cary relate to sewer problems.

At the present time we cannot generally justify increasing actions to address climate change or reduce flood risks further. The scattered nature of the problems makes such investment unlikely to be economic.

Proposed actions to implement the preferred policy

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Review maintenance activities to ensure best value for money.
- Investigate ways to support flood resistance and resilience methods to individual properties where other options are not practical. Communities may include Queen Camel, West Camel, Somerton and Bab Cary.

Yeovil

Our key partners are:

West Dorset District Council

South Somerset District Council

Somerset County Council

Natural England

The issues in this sub-area

Yeovil is situated on a relatively high plateau well above the floodplain of the adjacent River Yeo.

Fluvial flooding occurs on various small streams but the majority of the problems are related to surface water and sewer flooding. Historic records show many cases of sewer flooding.

Road access to Yeovil from the A303, a major trunk road into the South West, can be affected by flooding.

The current number of properties at risk in the 1% annual probability flood event is 19. This is expected to increase to 145 properties in the future 1% annual probability flood event.

The vision and preferred policy

Policy Option 4 - we are already managing the flood risk effectively but we may need to take further actions to keep pace with climate change

Given the high density of properties in the town, we envisage that it will be possible to direct further investment to respond to increasing risks due to climate change.

However unlike some policy units, Yeovil is generally at lower risk of major flooding particularly when compared to Taunton and Bridgwater.

In the future the main problems in Yeovil may be related to higher intensity summer storms which overwhelm the local sewers and smaller streams.

Proposed actions to implement the preferred policy

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Investigate the current and future capacity of the existing surface water drainage systems in Yeovil, focusing on the effects of climate change. Develop a surface water management plan with consideration of receiving watercourses and climate change.
- Investigate existing critical transport links into Yeovil and their vulnerability and resilience to flooding. Implement improvements where practical.



↑ The River Yeo avoids the main part of the town, here passing under the A30 to the east.

Upper and North West Parrett, and Upper Isle

Our key partners are:

Sedgemoor District Council

West Dorset District Council

Taunton Deane District Council

South Somerset District Council

Somerset County Council

Natural England

National Farmers Union

Farming and Wildlife Advisory Group (FWAG)

The issues in this sub-area

Fluvial flooding is relatively limited in this sub-area. This reflects the relatively small and steep watercourses which dominate the area.

Some communities, namely Crewkerne, Martock, South Petherton, Ilminster, Donyatt, Sea and Ilton, do have localised problems, exacerbated (particularly in Crewkerne) by small culverted watercourses which are prone to blockage or are undersized. Sewer flooding has been recorded specifically in Ilminster and Chard. Some isolated problems exist elsewhere.

South Petherton flooding has been exacerbated by farming practices,

contributing to localised flooding well outside of the fluvial floodplain area.

Recent flooding in the Upper Isle sub-area has been strongly driven by local surface water problems, exacerbated by some farming practices which have increased field run-off locally.

Flooding in the higher area of the North West Parrett has been limited to local surface water problems. In the lower area there are very limited assets at risk. However the tidal embankments do protect some low suburbs of Bridgwater from flooding as well as the occasional farm.

The current number of properties at risk in the 1% annual probability flood event is 337. This is expected to increase to 712 properties in the future 1% annual probability flood event.

The vision and preferred policy

Policy Option 3 - we are generally managing existing flood risk effectively.

Our current level of investment in this sub-area is low, and is focused in areas where we have undertaken works (especially tidal embankments which protect limited parts of Bridgwater). This maintenance and flood warning role must continue.

As our current investment in these areas is relatively low, it will not be possible to reduce it further without undermining our maintenance and flood warning role. Under the chosen policy, our present activities (primarily reactive maintenance, bank inspection and maintenance and flood warning) will continue and are economically justified when compared to existing risks.

Proposed actions to implement the preferred policy

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Review maintenance activities to ensure best value for money.
- Work with the farming community to encourage best practice farming and soil management. Pay particular attention to water/run-off management on a farm scale and water quality.
- Investigate ways to support flood resistance and resilience methods to individual properties where other options are not practical. Communities may include Martock, Merriott, Ilminster, Ilton and surrounding villages, Cannington and surrounding villages.

Upper Tone

Our key partners are:

Taunton Deane District Council

West Somerset District Council

Somerset County Council

Wessex Water

Natural England,

National Farmers Union

Farming and Wildlife Advisory Group (FWAG)

The issues in this sub-area

Fluvial flooding is relatively limited in this sub-area. This reflects the relatively small and steep watercourses which dominate the area. Some villages, such as Hillfarrance, situated on the lower part of the catchment have suffered fluvial flooding in the past, although work has been undertaken to address this particular risk.

Recent flooding in this sub-area has been strongly driven by local surface water problems, exacerbated by some farming practices which have increased field run-off locally.

Sewer flooding has been recorded specifically in Wellington and Wiveliscombe. Some isolated problems exist elsewhere.

The current number of properties at risk in the 1% annual probability flood event is 232. This is expected to increase to 450 properties in the future 1% annual probability flood event.

The vision and preferred policy

Policy Option 3 - we are generally managing existing flood risk effectively.

Our current level of investment in this sub-area is very low. This maintenance and flood warning role must continue. As our current investment in the sub-area is low (generally focussed on reactive debris clearance), it will not be possible to reduce it further without increasing flood risk.

At the present time we cannot generally justify increasing actions to address climate change or reduce flood risks further. The scattered nature of the problems makes such investment unlikely to be economic.

Proposed actions to implement the preferred policy

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Review maintenance activities to ensure best value for money.
- Investigate the current and future capacity of the existing surface water drainage systems including at Wellington and Wiveliscombe, focusing on the effects of climate change. Develop a surface water management plan with consideration of receiving watercourses and climate change.
- Work with the farming community to encourage best practice farming and soil management. Pay particular attention to water/run-off management on a farm scale and water quality.
- Investigate ways to support flood resistance and resilience methods to individual properties where other options are not practical. Communities may include Wellington, Tonedale and Waterrow.

Taunton

Our key partners are:

Taunton Deane District Council

West Somerset District Council

Somerset County Council

Wessex Water

The issues in this sub-area

Historically flooding in Taunton has been dominated by the River Tone. In the 20th century the 1960 flood event was the most severe, reported to have flooded nearly 500 properties in the town. In response to this flooding the Taunton flood defence scheme was constructed in the 1960s and the scheme was further upgraded in the 1990s.

Since the scheme was built in the 1960s there have been no major flood events in Taunton although the defences were tested in October 2000.

Currently there are 1,500 properties at risk from a 1% annual probability flood event. This is expected to increase to 3,320 properties in the future 1% annual probability flood event.

Most of the remaining risks in Taunton are related to tributary flooding. Areas such as Norton Fitzwarren, Bathpool and areas around Tangier are at risk. The level of flood risk to areas affected by tributary flooding is uncertain although significant.

The vision and preferred policy

Policy Option 5 - we can generally take further action to reduce flood risk.

The policy has been selected for Taunton as significant risks to existing properties adjacent to the tributaries remain.

Work is presently ongoing to address one of the main tributaries (the Halse Water) which flows through Norton Fitzwarren. However risks remain on the other key tributaries.

There are also relative weaknesses in the River Tone defences as identified in recent studies. These should be addressed.

Taunton is subject to major regeneration. Opportunities should, and are, being taken to address the deficiencies in the River Tone defences in connection with the redevelopment of the town.

Tributary flooding is significantly more difficult to address and the risk is spread throughout the sub-area.

Proposed actions to implement the preferred policy

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Review maintenance activities to ensure best value for money.
- Prepare development guidance for proposed developments in Taunton, identifying methods to reduce run off rates and include Sustainable Urban Drainage systems (SUDs) in all new developments.
- Investigate the current and future capacity of the existing surface water drainage systems, focusing on the effects of climate change. Develop surface water management plan with consideration of receiving watercourses and climate change.
- Investigate existing critical transport links into Taunton and vulnerability and resilience to flooding. Implement improvements where practical.
- Investigate identified marginal deficiencies in River Tone flood defences and implement improvements in connection with urban regeneration.
- Investigate potential to reduce flood risks from tributary flooding and implement improvements where practical.



↑ Taunton town centre narrowly escaped serious flooding from the River Tone in October 2000

Somerset Levels and Moors

Our key partners are:

Sedgemoor District Council

Taunton Deane District Council

South Somerset District Council

Somerset County Council

Natural England

Internal Drainage Boards

The issues in this sub-area

The flood risks in this sub-area are complex and derive from the low lying topography and the very limited hydraulic gradient. Flood velocities are low, resulting in low flow capacities and extensive fluvial flooding over the lowland area.

The existing internationally recognised species and habitats depend upon the existing flood management assets. Most assets in the Somerset Levels and Moors serve both flood management and water level management functions, which are essential to the environmental interests.

Properties are generally scattered throughout the sub-area, with villages and small communities often situated on land slightly above moor level or on the embankments which separate the

ivers and the moors. Embanked watercourses act as ‘high level carriers’ taking water from the upper catchment through the low-lying moor area.

Across the sub-area, 590 properties are at risk of flooding during the 1% annual probability flood event. This is expected to increase to 1040 properties in the future 1% annual probability flood event.

Agricultural land is frequently flooded in the winter, with roads flooded, disrupting communication across the area. Property flooding occurs because of high flood levels in the moors. However those properties along the top of the high level carriers are also at risk from high levels in the rivers caused by high tides in the Bristol Channel. The extensive network of embankments is necessary to retain the current agricultural system. There is a risk of breaching of the embankments, although works continue to minimise the risk.

Infrastructure across the moors (such as railways and pylons) is reliant on the continued management of the system. It is unlikely that railways would be sustainable across the moors without this protection.

Climate change will have impacts both in terms of higher river levels (due to higher tide levels in the River Parrett and higher flows) and also more frequent and longer flooding of the moors.

The vision and preferred policy

Policy Option 6 - we will take action with others to store water or manage runoff in locations that provide overall flood risk reduction or environmental benefits.

By adopting this policy and redistributing water some areas will be subject to increased flooding while others will benefit from reduced flooding. The aim is to achieve a net overall benefit. The distribution of floodwater between moors can be determined to some extent by the use of sluices and other structures on the rivers.

The distribution of floodwater has developed to some extent by historical ‘accident’ rather than design. When considering the distribution of assets across the sub-area it makes sense to direct water to areas which have limited assets at risk.

By redistributing floodwater, primarily from upstream of Langport to the King’s Sedgemoor Drain, the overall damage and disruption from flooding would be reduced. Other redistribution options may also be possible, although modelling has shown that technically not all options are feasible.

Once it is accepted that the embanked system must be retained then these must be stable and fit for purpose if breach risks are to be minimised. Investment is required to minimise risks today and into the future taking into account the consequences of climate change.

The overall approach is to promote more sustainable flood risk management, by better use of existing flood storage and use of existing gravity systems where possible. This will ensure the long term viability of the system and the associated important conservation interests.

Proposed actions to implement the preferred policy

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Review maintenance activities to ensure best value for money.
- Investigate existing transport links within the Somerset Levels and Moors and vulnerability to flooding. Implement improvements where practical.
- Identify a robust and nationally agreed economic case for investment into the long term sustainability of the Somerset Levels and Moors flood risk infrastructure.
- Investigate, consult upon, and trial redistribution of floodwater within the Somerset Levels and Moors.
- Undertake a comprehensive study of the geomorphology of the River Parrett and River Tone to inform future operations (e.g. dredging) and construction (e.g. tidal sluice).



↑ Flooding on the Levels and Moors

Bridgwater

Our key partners are:

Sedgemoor District Council

West Somerset District Council

South Somerset District Council

Somerset County Council

Natural England

The issues in this sub-area

Flood risk in Bridgwater is dominated by high tides in the Bristol Channel propagating up the Parrett Estuary. The town is relatively low lying. It is protected from tidal flooding by flood embankments and walls.

Currently there are around 135 properties at risk from a 1% annual probability flood. The number of properties is expected to increase to around 10,000 in the future 1% annual probability flood event.

Modelling has shown that existing risks due to high tide levels are low, and the current flood defences in Bridgwater are generally in good condition. However, due to sea level rise and expected deterioration in the standard of the defences, further works will be required within 20-30 years if risks are to be maintained at a low level.

Records have shown some sewer flooding problems and some limited fluvial problems which probably occur during high tides and high intensity rainfall.

The vision and preferred policy

Policy Option 4 - we are already managing flood risk effectively but we may need to take further actions to keep pace with climate change.

Opportunities have and continue to be taken in relation to improving flood walls and banks as part of the regeneration of parts of Bridgwater. Policy 4 is recommended as we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change. However, we are aware that it will become increasingly difficult to raise defences in Bridgwater in the future because of the existing infrastructure levels (e.g. bridges) and there could be potential damage to the urban landscape by constructing high walls along the river frontage.

A step change may be required in the future by excluding high tides from the town, with the use of a tidal sluice. This poses a dilemma in terms of our, and our partners, investment strategy. The step

change is not required from a flood risk management perspective now, and flood risk management investment would not be forthcoming.

We are aware that our partners have an emerging vision which sees a tidal sluice as a component, but there is significant uncertainty regarding funding and the environmental and social implications. We do see the potential for significant improvements associated with a sluice, although the environmental risks are significant.

There is an opportunity to provide resources for a future tidal sluice by using resources deriving from the regeneration of parts of Bridgwater.

Proposed actions to implement the preferred policy

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Review maintenance activities to ensure best value for money.
- Investigate the current and future capacity of the existing surface water drainage systems in Bridgwater, focusing on the effects of climate change. Develop a surface water management plan with consideration of receiving watercourses and climate change.
- Undertake a comprehensive study of the geomorphology of the River Parrett to inform potential future construction (e.g. tidal sluice).
- Undertake studies to address key risks associated with long term flood management in Bridgwater (e.g. in connection with further defence raising or tidal sluice). Implement recommendations in appropriate phases.



↑ High tide on the Parrett at Bridgwater – the town is a focus for future development in the catchment

Shoreline

Our key partners are:

West Somerset District Council

Sedgemoor District Council

Somerset County Council

The issues in this sub-area

Flood risks within this sub-area are dominated by coastal processes and tidal flooding. The area is low lying and protected by tidal embankments. Some of the tidal embankments are in poor condition and continue to deteriorate, but there are very few built assets at risk. At the time of writing there are ongoing strategies which are considering the long term future of this area, where fluvial flood risks are of secondary importance.

There are tidal outfalls in the area which allow rainfall falling on the lowland areas to be evacuated to the Bristol Channel. These assets are maintained and periodically replaced by us and this will continue unless the tidal embankments are realigned.

The vision and preferred policy

Policy Option 3 - we are generally managing existing flood risk effectively. This policy is currently appropriate for this sub-area, until such time as coastal processes dictate a change of approach.

Proposed actions to implement the preferred policy

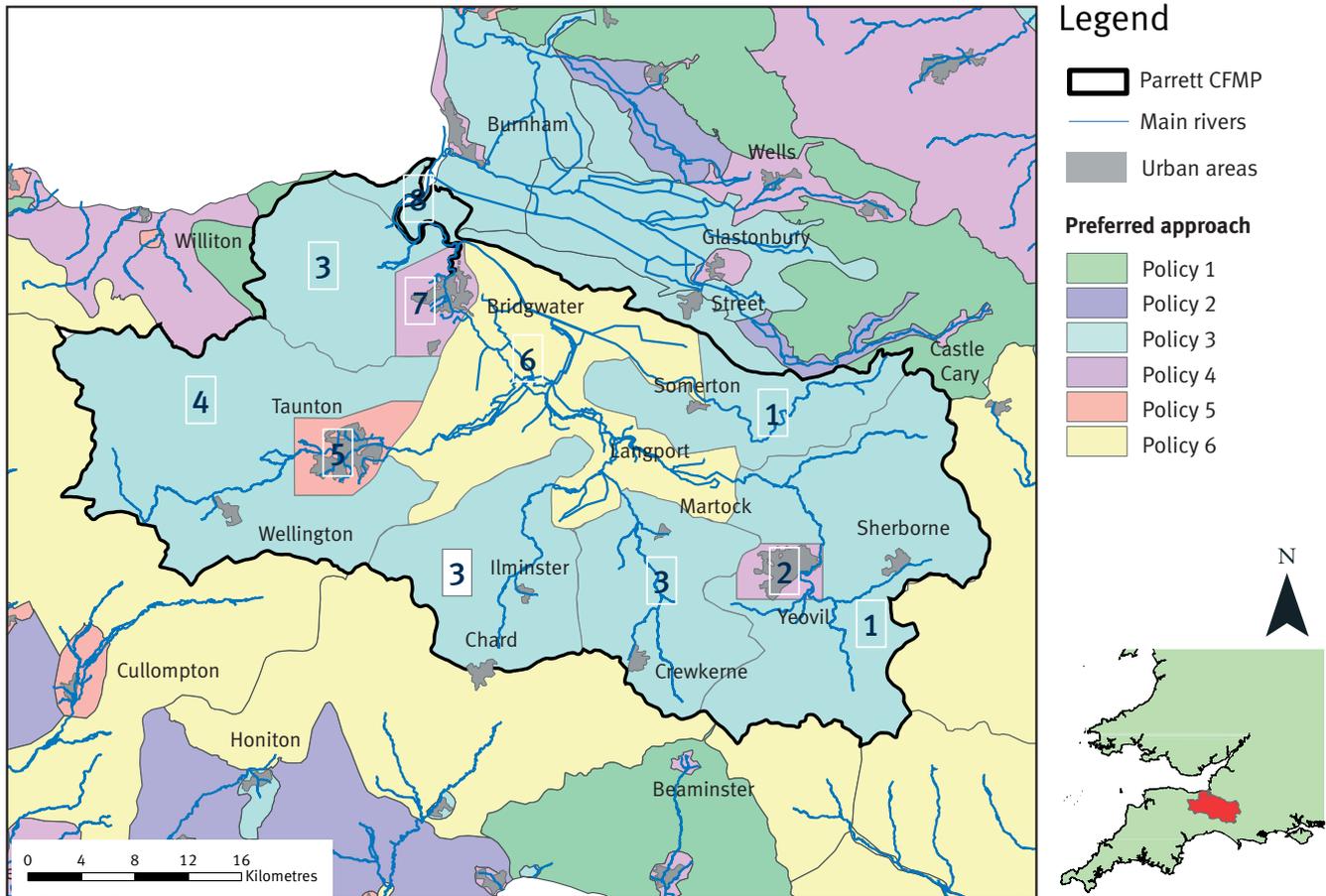
- To continue current practices and reassess as we learn more about the coastal processes.



↑ Past dredging of the tidal Parrett near Bridgwater – we will study natural processes to inform the need for future operations

Map of CFMP policies

Map of the policies in the Parrett catchment



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The sub-areas

- 1 Upper Yeo and Cary
- 2 Yeovil
- 3 Upper and North West Parrett, and Upper Isle
- 4 Upper Tone
- 5 Taunton
- 6 Somerset Levels
- 7 Bridgwater
- 8 Shoreline

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