Managing flood and coastal erosion risk for the Exe Estuary

Final Strategy May 2014

Environment Agency · Devon County Council · East Devon · Natural England · Teignbridge District Council South Devon · Exeter City Council · Network Rail · LiCCo Living with a Changing Coast Littoraux et Changements Côtiers

Foreword

‘Over 150,000 people live close to the Exe Estuary. Many more visit, attracted to the traditional seaside resorts and to the significant natural features which provide interest all year round. Much of the estuary has a very high level of environmental protection under European and UK wildlife law because of its international importance.

Communities and businesses have developed along the coastline and many now rely upon defences to reduce the risk of flooding and erosion to property and to agricultural land from the sea.
The estuary is bounded on both sides by railway lines including the mainline connecting London to Exeter and Penzance.

This Strategy considers all these interests and ensures that we will protect what is most valued. The coastline will change, as it has in the past, but we must take opportunities to influence how this happens. The effects of climate change are challenging to predict, but the best way for us to protect the things we value as a society is to engage with the issues and add our voices to the strategic decisions. The comments that have been received strengthen this Strategy which will shape the future of our coast.’

James Morrish

Chairman
South West Regional Flood and Coastal Committee

Philip Rees

Chairman
South West Coastal Group

The Exe Estuary Strategy - Holcombe to Sandy Bay

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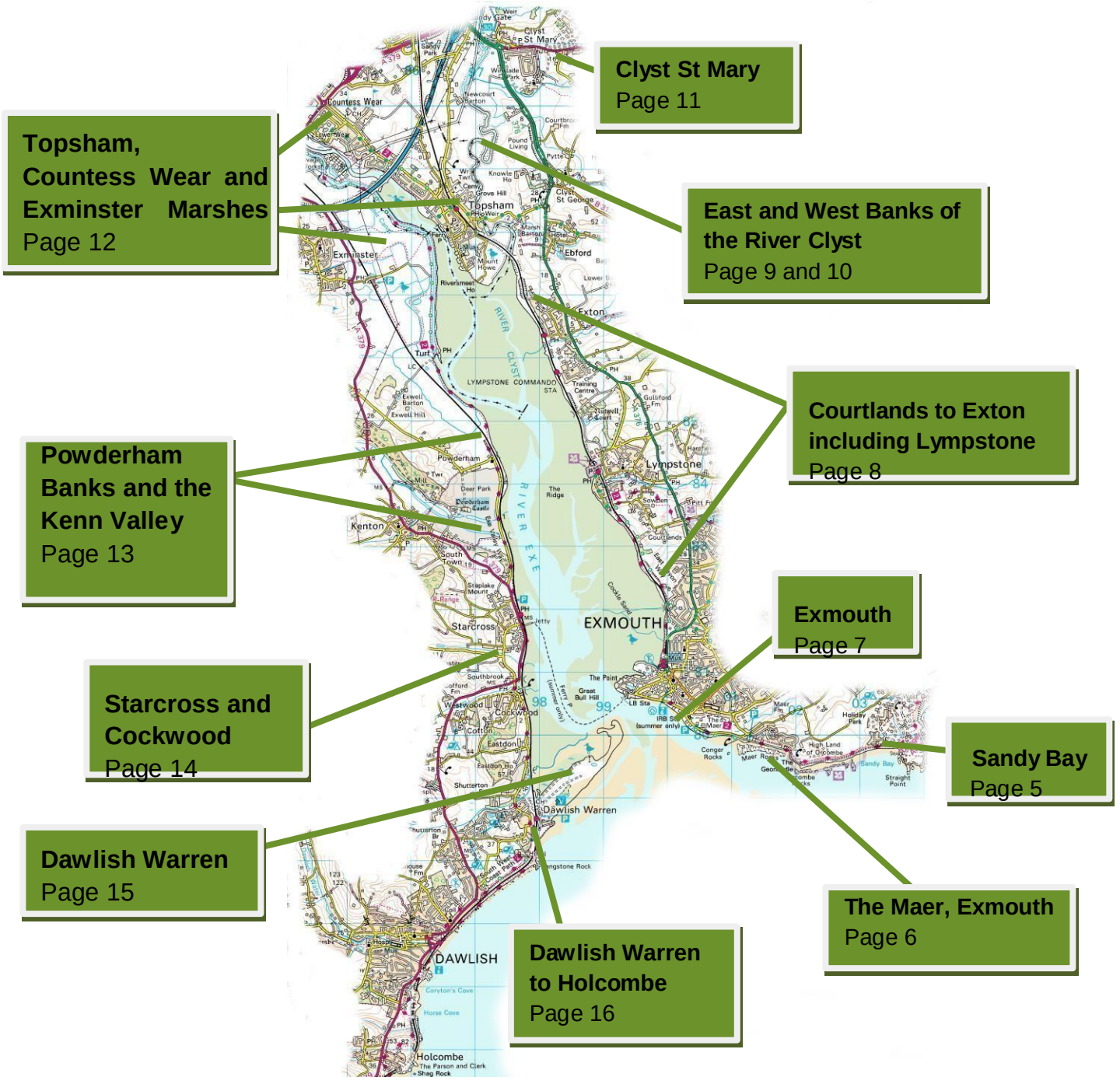


Introduction

This Strategy has been developed by the Environment Agency in partnership with other organisations which share coastal interests in the area. These include the local authorities of Devon County, Teignbridge, Exeter City and East Devon. Natural England and Network Rail are also closely involved. Participation in the development of the Strategy has not been limited to these organisations and contributions have been welcomed from any organisation or individual with an interest. This approach has been taken to ensure that the Strategy is widely understood and jointly supported.

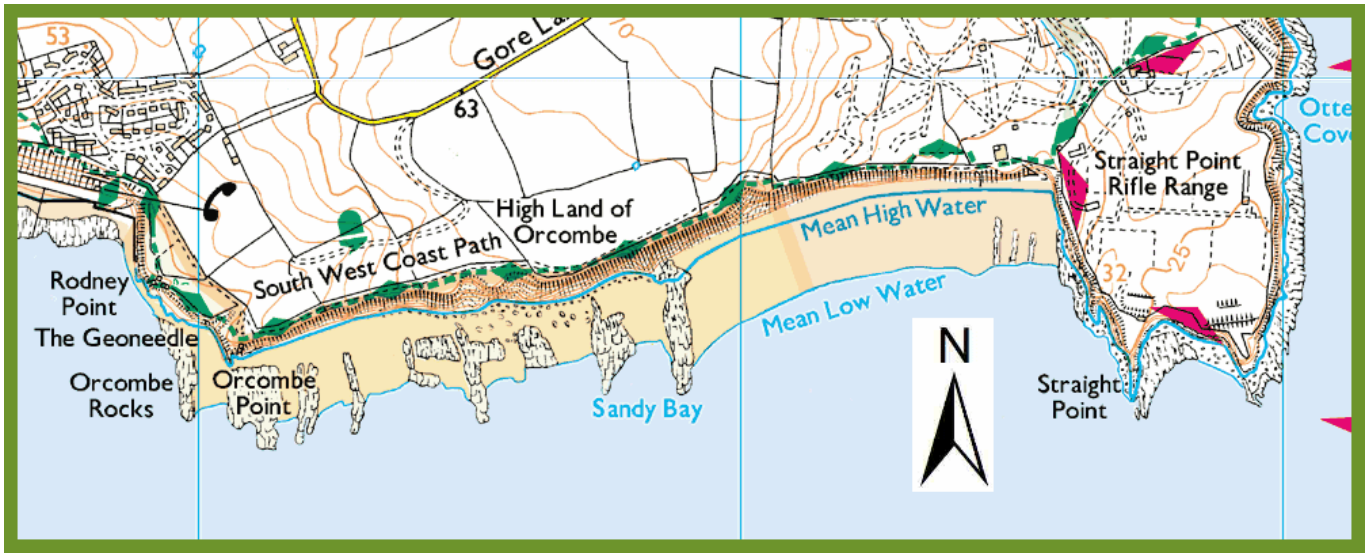
The Strategy area comprises the whole of the Exe Estuary, from Exmouth and Dawlish to Exeter, including adjacent coastline between Holcombe and Sandy Bay (Straight Point).

The Strategy follows and has reviewed the policies that are set out in the South Devon and Dorset Shoreline Management Plan (SMP) which was finalised in June 2011. This plan concluded that we should continue to defend most of the developed coastline, although we might need to move or alter some defences. It also recognised the uncertainty about how some areas, in particular around Dawlish Warren, will evolve. The Strategy is needed to enable these policies to be developed and then delivered. Any changes to the SMP policies arising from this Strategy have been identified.

A period of open consultation was held between 21 January and 4 March 2013. Changes to the Strategy following the consultation have been incorporated and are highlighted in ***bold italic*** text.

The Strategy needs to be sustainable in the future and therefore covers the next 100 years. We cannot be certain about future changes and so the Strategy will be reviewed as new information becomes available. The greatest focus is therefore placed on actions needed by 2030.

1 Sandy Bay



What is at risk?

There is no tidal flood risk and erosion risk is very limited until towards 2110, when around 60 caravans could be threatened.
The cliff and beach system will evolve naturally to climate change.

Our strategy

No Active Intervention is needed.
This means that no future flood defences are recommended for here. Regular monitoring should be undertaken and the situation reviewed at approximately 10 year intervals.

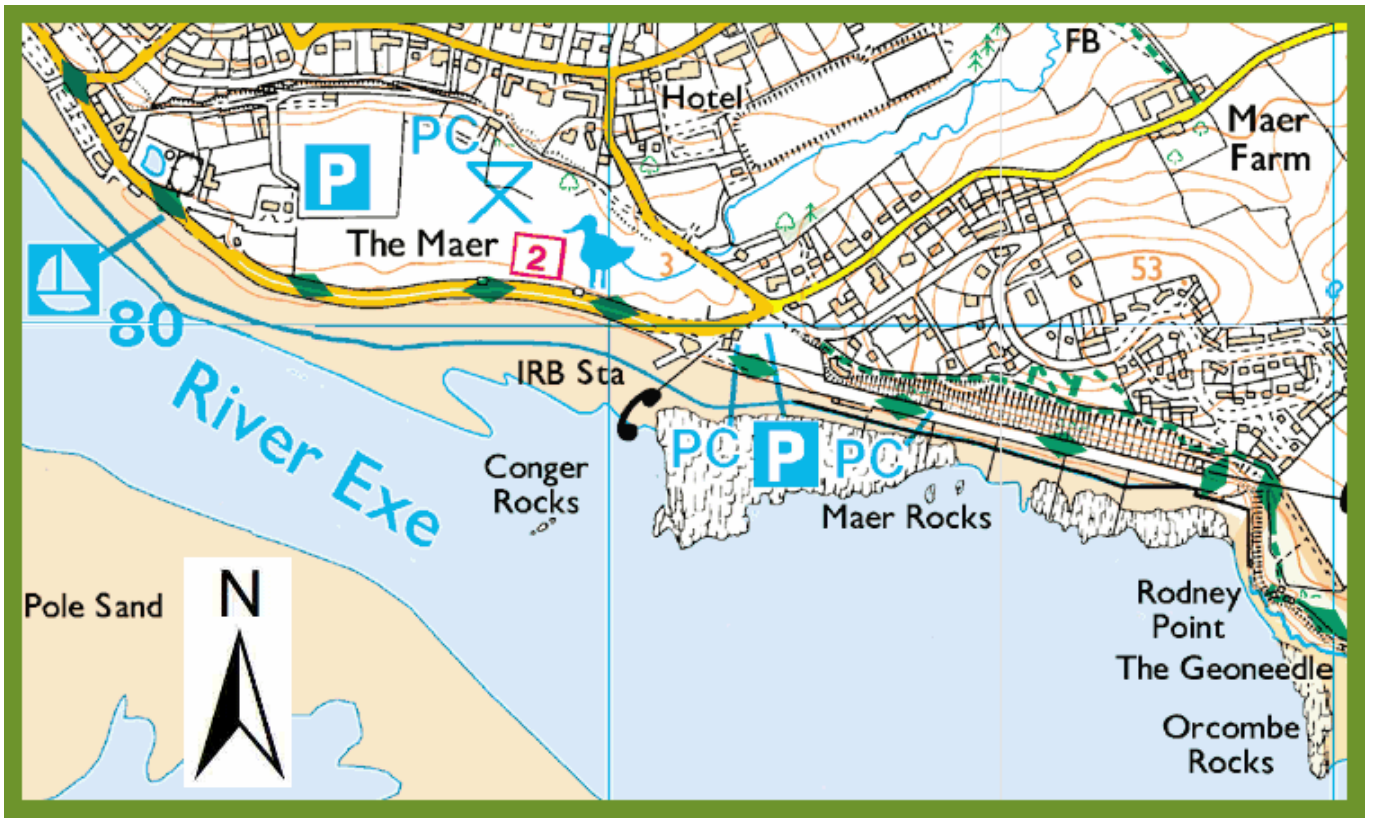
Other considerations

This section is within the Dorset and East Devon World Heritage Site which has been designated for its special geological features.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 (SDAD SMP2) policy in the short to long term of *No Active Intervention* for Policy Unit 6a43.

2 The Maer, Exmouth



What is at risk?

There is no tidal flood risk to the human environment. The existing beach, sand dune and seawall system prevent erosion to the promenade, road and Local Nature Reserve.

Our strategy

Beach recharge, recycling of beach material and groyne maintenance to protect the road and amenities from erosion.

Other considerations

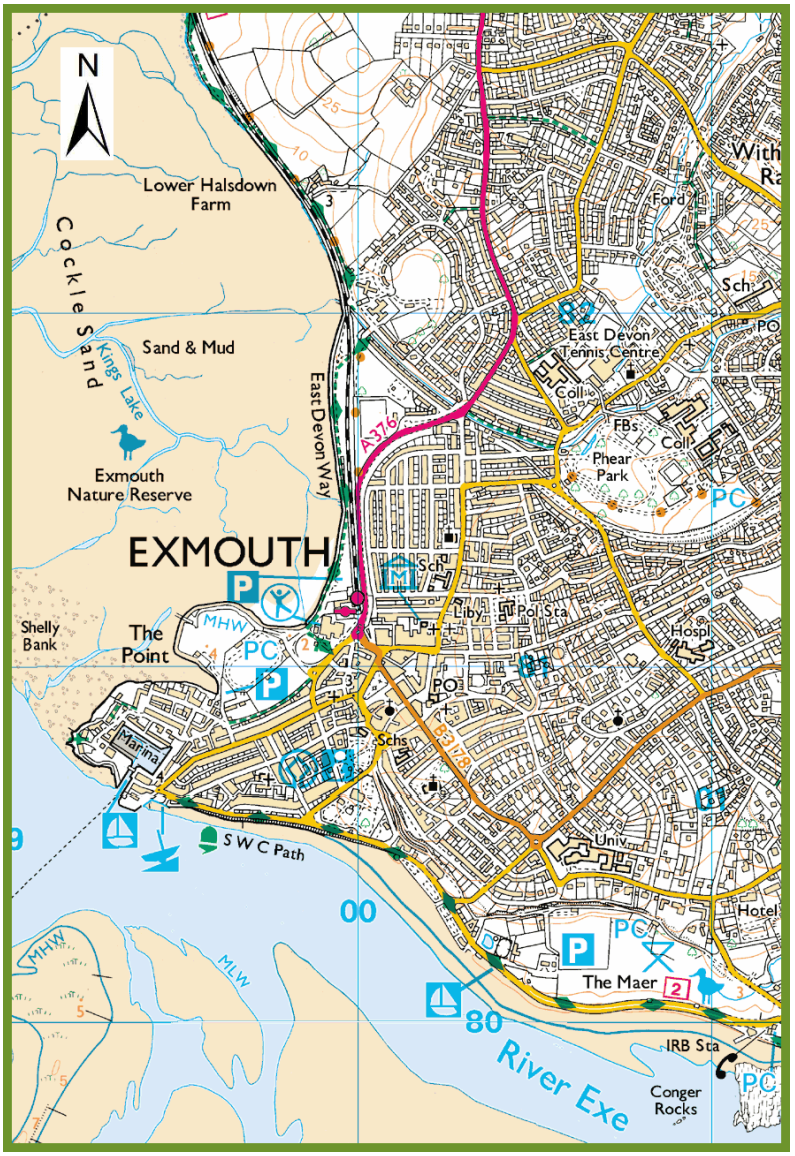
Beach recharge/recycling (i.e. bringing additional sand onto the beach) should be considered in conjunction with works at Dawlish Warren and will be subject to detailed appraisal and licencing.

There is insufficient public benefit to justify central government funding and any work would need local partnership funding

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy of *Hold the Line* in the short term for Policy Unit 6a45, but is a change to the policy of *Managed Realignment* in the medium to long term.

3 Exmouth



What is at risk?

There is a local 1 in 25 (4%) annual tidal flood risk around Camperdown Terrace and the Imperial Recreation Ground. Existing defences currently limit the annual tidal flood risk to 1 in 1,000 (0.1%) for up to 2,000 residential and commercial properties.

Our strategy

Improvements to revetments and raising walls by up to 0.5m, within the next five years.

Local improvements could include road/pavement raising and individual resilience measures for around 20 properties.

More extensive wall-raising by 0.5-1.2m will be required between 2030 and 2110 to keep pace with climate change.

Other considerations

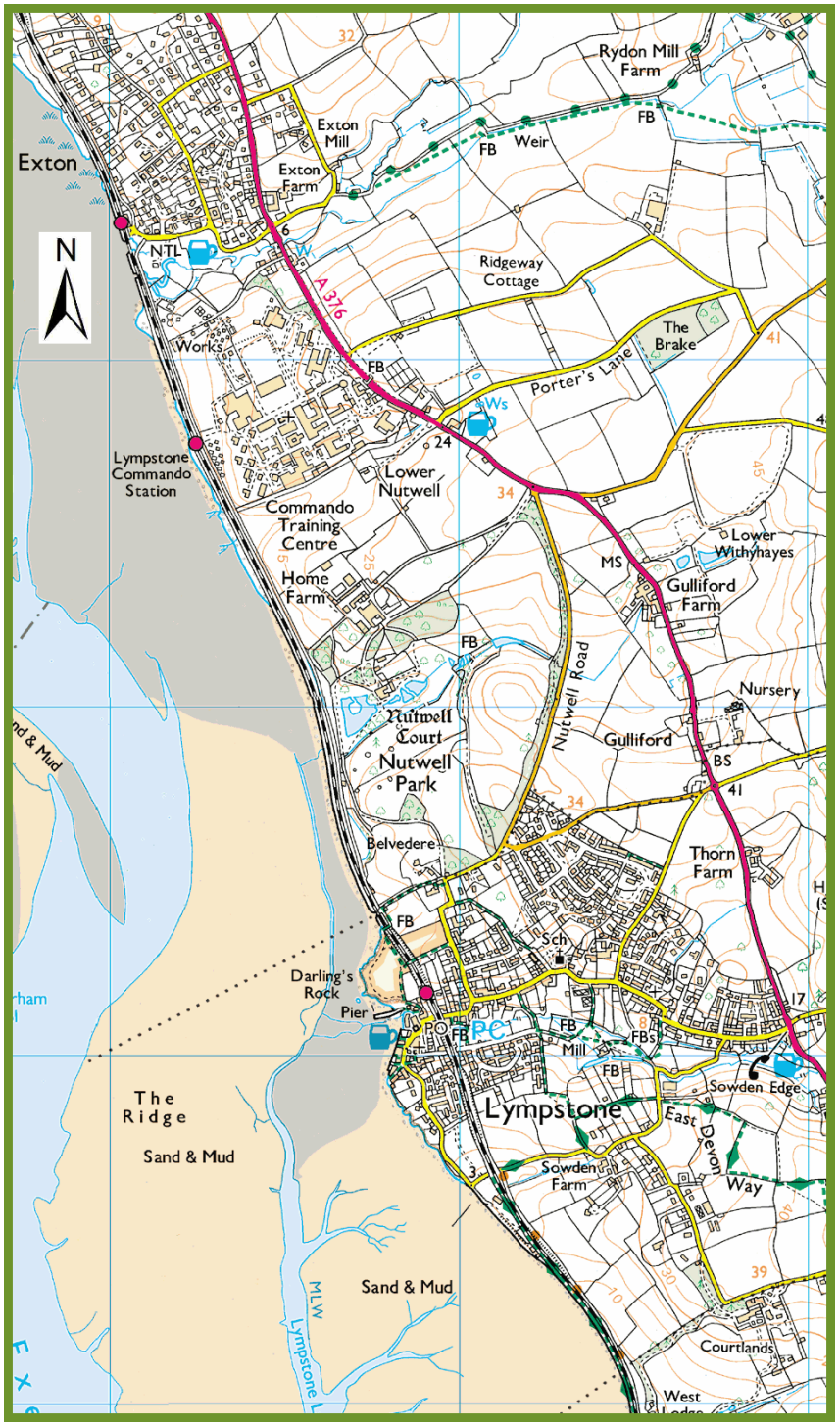
Improvement works are likely to be supported by government funding, because of the number of properties at risk.

Surface water flood risk to properties in Exmouth is also of concern, and the Strategy recommends further detailed studies.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy in the short to long term of *Hold the Line* for Policy Units 6a46 to 6b01.

4 Courtlands to Exton including Lympstone



What is at risk?

Around 200 properties currently have a less than a 1 in 100 (1%) annual risk of tidal flooding.

Our strategy

Continued maintenance of existing defences. Wall raising of 0.6m-1.4m will be needed between 2030 and 2110 at Lympstone to keep pace with predicted sea level rise.

Other considerations

Dawlish Warren provides some shelter to this shoreline.

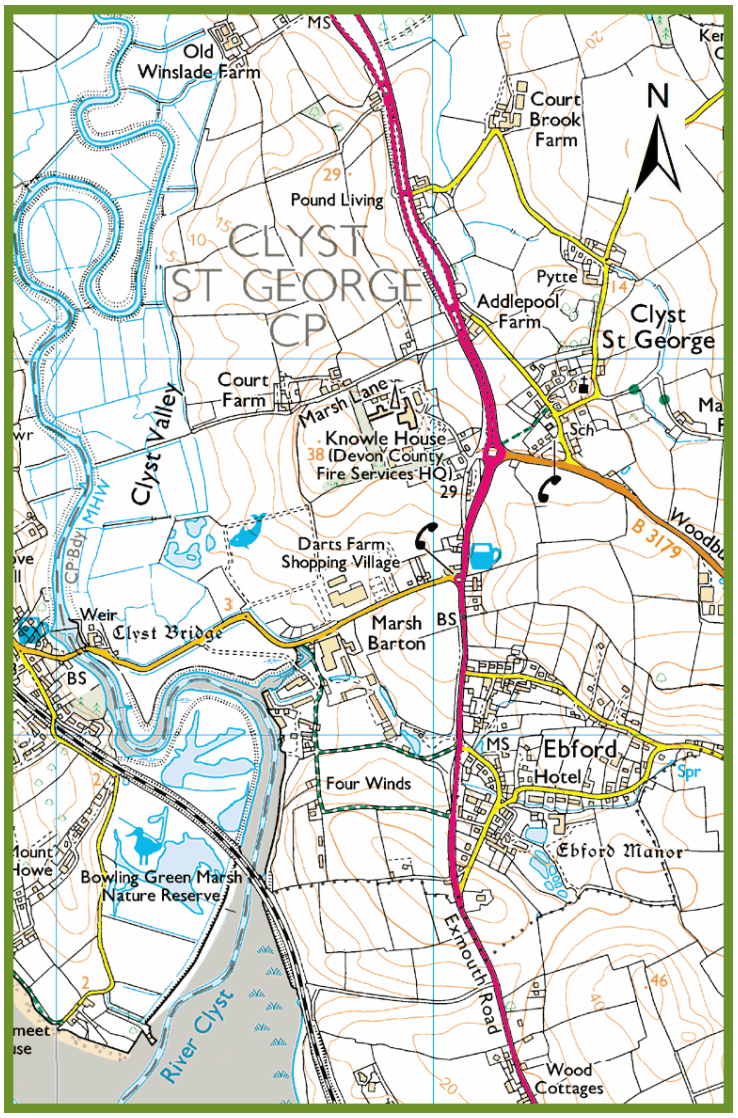
The majority of this shoreline is protected by the branch line railway and a higher standard of protection may be justified to protect this.

At Lympstone the recent tidal defence scheme protects around 150 properties, with wall improvements and flood gates.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy in the short to long term of *Hold the Line* for Policy Units 6b02 to 6b07.

5 East Bank of the River Clyst



What is at risk?

Agricultural land, the C527 road between Clyst St George and Topsham, and fewer than 20 properties currently have a 1 in 5 (20%) annual risk of tidal flooding. The number of properties at risk will rise to over 40 by 2030.

Our strategy

Continue the existing position on maintenance of embankments and outfalls in the Clyst Valley, where these assets protect highways or other infrastructure in addition to agricultural land, in the short term or until alternative measures are decided. In most cases it will not be possible to continue to maintain these defences in the longer term due to sea level rise and we will look at ways to manage this change.

Other considerations

Although there is currently insufficient economic justification to increase the standard of protection to the C527 road, Devon County Council, the Environment Agency and partners will continue to work together to seek a long term solution to manage the likely increase in flood risk to this important asset, including monitoring the expected increased river and tidal flows and their effect on downstream highway infrastructure. Depending on relevant permissions and landowner agreements such long term solutions to reduce the likely increase in flood risk to the road could be combined potentially with habitat creation, thus opening the opportunity to access central government funding.

Shoreline Management Plan

The South Devon and Dorset Shoreline Management Plan 2 policy unit combines both banks of the River Clyst in Policy Unit 6b08. There is no change to this policy (see West Bank).

6 West Bank of the River Clyst

What is at risk?

Up to 20 properties are at risk of tidal flooding in the long term, although there is currently only a 1 in 1,000 (0.1%) annual risk.

Our strategy

Realign some defences on the west bank within the next five years, by locally breaching embankments in agreement with landowners, to create new intertidal habitat.

The physical condition of the local embankments and structures will be monitored and, if necessary action taken, to ensure that there is no increased risk of flooding or erosion damage to property or to the road as a result of these measures.

Other Considerations

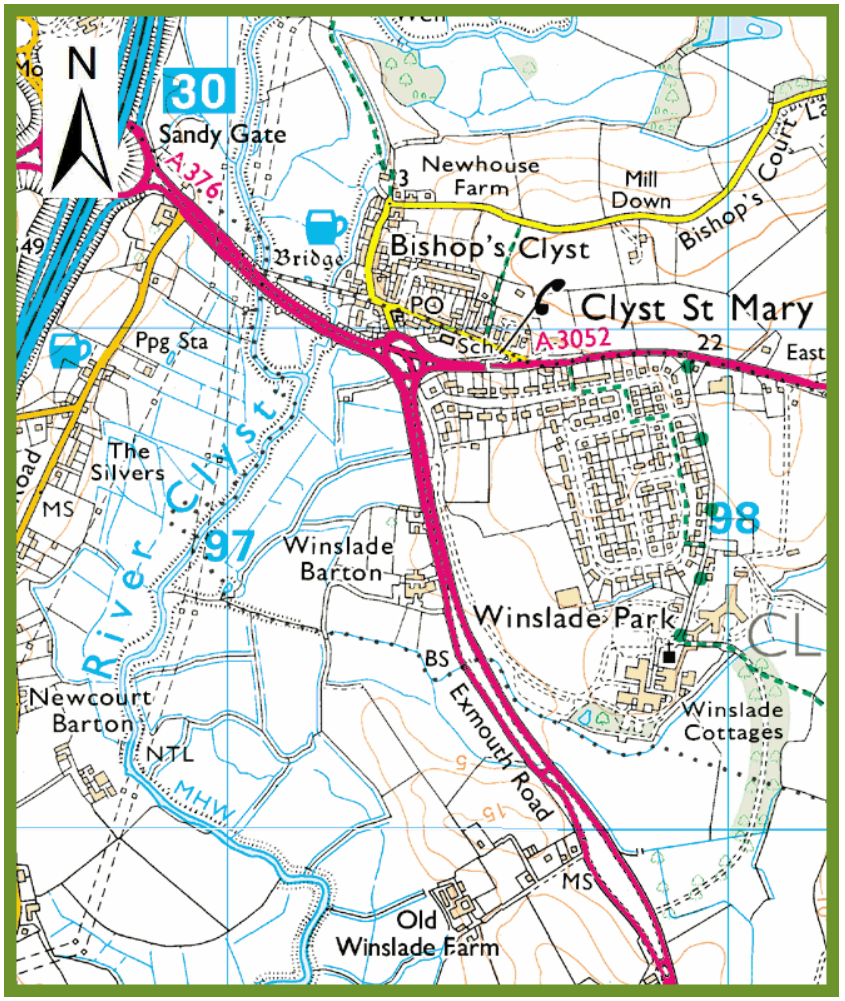
The existing embankments along the west bank of the river Clyst provide a low standard of protection against flooding for the adjacent agricultural land. Realigning embankments would create 21 ha of new inter-tidal habitat.

There is no economic justification to maintain the existing embankments at public expense but there is a strong case for funding from central government to create habitat. This will compensate for losses caused by flood and coastal defences that protect communities elsewhere in the estuary.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy in the short to long term of *Managed Realignment* for Policy Unit 6b08.

7 Clyst St. Mary



What is at risk?

The embankments around Winslade Barton and Frog Lane currently protect 30-70 local properties and the A376 from tidal flooding with an annual risk of 1 in 1000 (0.1%). The risk from fluvial flooding is greater than this.

Our strategy

Continued maintenance of the Winslade Barton to Frog Lane embankments.

However, the Strategy proposes further studies to reduce the risk of fluvial flooding, which will include a review of this strategy.

Other considerations

Economic justification is sufficient to maintain the flood embankments protecting Winslade Barton, the A376 and Frog Lane but not the other embankments in this area that only protect agricultural land to a low standard.

The standard of protection will reduce as sea levels rise but the tidal risk for property will remain below 1 in 50 (2%) up to 2110 and before this time improvements are unlikely to be justified on economic grounds.

However, as the Strategy proposes further studies to review fluvial flood risk here, subsequent recommendations could result in improvements earlier than indicated above.

Shoreline Management Plan

There is no SMP policy as this area is outside of the South Devon and Dorset Shoreline Management Plan 2 boundary.

8 Topsham, Countess Wear and Exminster Marshes

What is at risk?

Most properties are high enough to avoid being at risk of flooding. However up to 30 properties, mainly in Topsham adjacent to the recreation ground and along the Strand, have up to 1 in 10 (10%) annual risk of tidal flooding.

On the west bank of the estuary, the Exeter canal banks help to provide protection from tidal flooding for around 200 properties in Exminster, the mainline railway, the M5 motorway and the Exminster Marshes freshwater site.

Our strategy

Local ground raising and individual property protection, up to 2030 for the Topsham recreation ground area. To keep pace with climate change, wall raising or individual property protection for around 200 properties in Topsham is recommended. Raising of the Exeter canal banks, by around 300mm is also recommended between 2030-2110 to maintain the standard of protection for properties.

Other considerations

There is economic justification for the recommendation but the cost will need to be supported by local partnership funding.

Surface water flood risk to properties in Countess Wear and Exminster is also of concern, and the Strategy recommends further detailed studies on this.

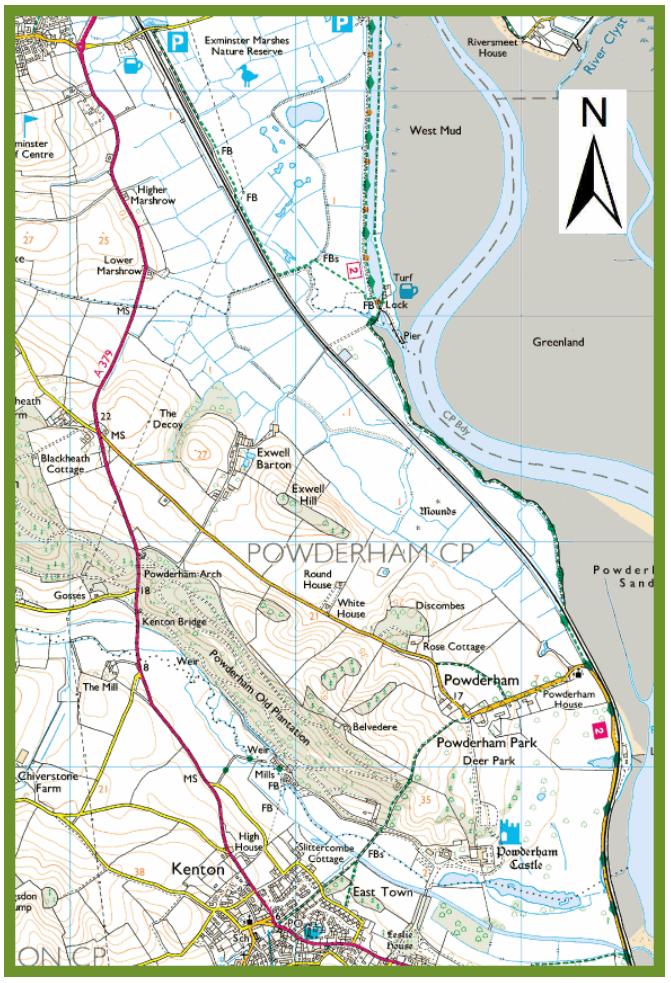
Some local property resilience has already been undertaken by Exeter City Council at Countess Wear.

Exminster Marshes are part of the Special Protection Area that has been designated for its bird interest.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy in the short to long term of *Hold the Line* at Policy Units 6b09 to 6b13.

9 Powderham Banks and the Kenn Valley



What is at risk?

There is a risk to agricultural land and the railway from erosion due to the proximity of the estuary low water channel to the Powderham Banks. There is a 1 in 50 (2%) annual risk of tidal flooding to the mainline railway and Exminster Marshes freshwater site.

30-50 properties will be at regular risk of tidal flooding in the Kenn Valley by 2030.

Our strategy

Powderham Banks to be raised by 0.5m and strengthened before 2030. Further raising will be needed between 2030-2110, to keep pace with climate change.

For the Kenn Valley a regulated tidal exchange device to the existing River Kenn culvert is recommended before 2030.

Secondary embankments, to improve protection to local properties, are also possible. Raising of the mainline railway defences of up to 1.1m is likely to be needed between 2030-2110 to keep pace with climate change.

Other considerations

The mainline railway borders the estuary south of Powderham and protects local properties, infrastructure and agricultural land including the Kenn Valley.

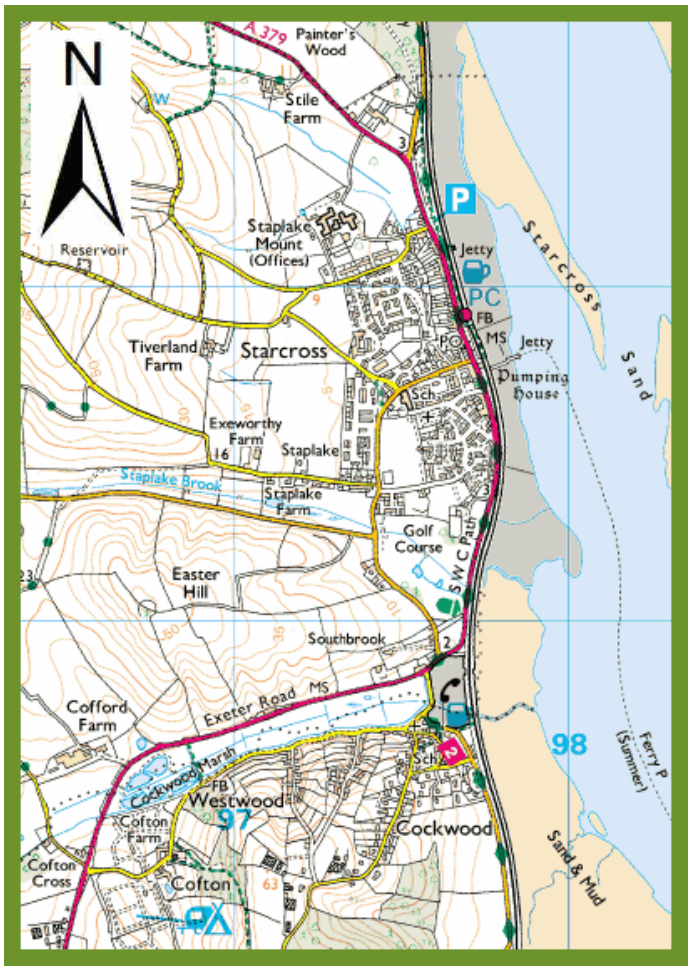
The cost of works in the Kenn Valley should receive central funding but other improvement works will need to be supported by local partnership funding.

Controlled tidal flooding of the Kenn Valley will create up to 35 Ha of habitat to compensate for losses caused by flood and coastal defences that protect communities elsewhere in the estuary.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy in the short term of *Hold the Line* at Policy Unit 6b14, but is a change from *Managed Realignment* to *Hold the Line* in the medium to long term. The policy remains *Hold the Line* in the short to long term for Unit 6b15 except locally, where Regulated Tidal Exchange is now proposed to create local intertidal habitat.

10 Starcross and Cockwood



What is at risk?

The mainline railway is at limited tidal flood risk and protects over 600 properties and infrastructure in Starcross. Cockwood harbour walls are lower and allow a 1 in 25 (4%) annual risk of tidal flooding, with a potential flood route to Starcross. There are also local low spots at Generals Lane and near Starcross Fishing & Cruising Club.

Our strategy

Raising of Cockwood harbour walls or adjacent roads, and other local low spots, by up to 0.5m by 2030.

Further raising of the defences and the addition of a 1.2m-1.6m wave recurve wall to the mainline railway embankment will be required between 2030-2110 to keep pace with climate change.

Other considerations

Groundwater flood risk to properties in Starcross is also of concern, and the Strategy recommends further detailed studies on this.

The Starcross and Cockwood frontages are sheltered from southerly storms entering the estuary by Dawlish Warren sand spit. Predicted changes to the sand spit will result in reduced shelter and hence greater reliance on local coastal defences, which will then need to be improved.

These works have a high level of justification and should therefore be supported by government funding**.**

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy in the short to long term of *Hold the Line* at Policy Units 6b16 to 6b18.

11 Dawlish Warren

What is at risk?

The seaward facing sand dunes and beach are eroding significantly along the majority of the sand spit length. The Special Area of Conservation (SAC) is being damaged by the gabions that were installed in the 1960-70s.

Our strategy

Continued maintenance of the coastal revetment and wave wall at the near end. Groyne maintenance, local ground raising and removal of some existing gabions are also recommended in the period up to 2030.

This will provide protection for Dawlish Warren village and for the tourist and environmental interests. Beach recharge and recycling will improve the quality of the beach and help it to act as a natural wave barrier into the medium term (towards 2060).

Between 2030-2110 the coastal revetment will need to be maintained and improved, with the sand spit being allowed to evolve naturally.

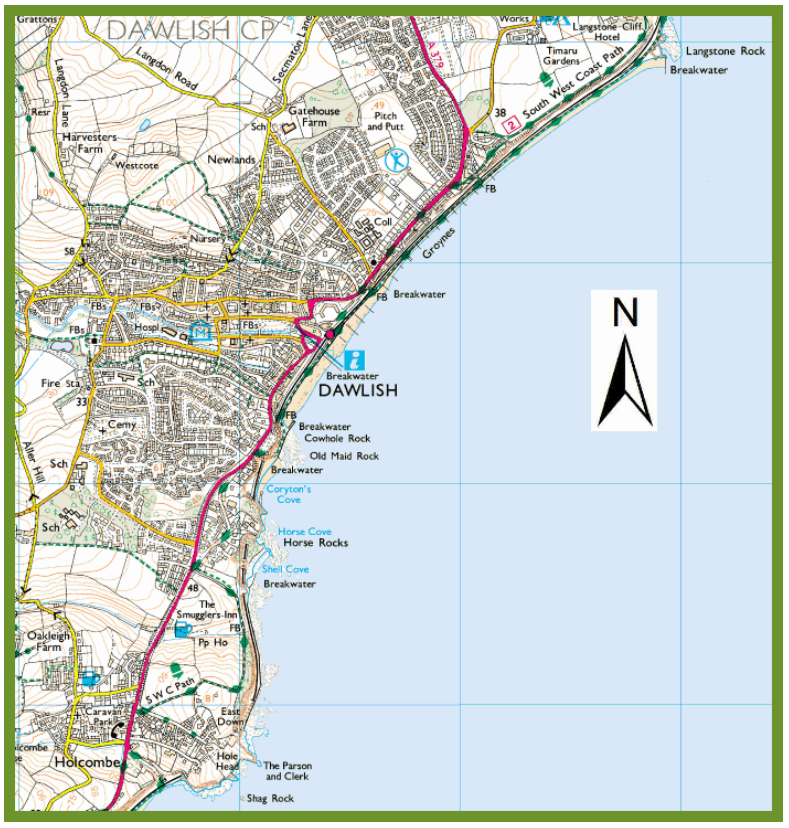
Other considerations

It is predicted that that towards 2060 continued engineered control of the sand spit will become too difficult and costly. We also then expect the sand spit will partly lose its sheltering function, requiring further defence improvements within the estuary. Some of this work will require local partnership funding.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy for Policy Units 6b19 in the short term and extends it to the medium and long terms. For Policy Units 6b20 and 6b21 the Strategy changes the policy from *Hold the Line* in the short term to *Managed Realignment*. The policies for the medium and long terms are now *Managed Realignment* and *No Active Intervention* respectively. (Note that policies for Dawlish Warren sand spit for the medium and long terms were not previously determined).

12 Dawlish Warren to Holcombe



What is at risk?

Around 100 properties in Dawlish Warren village have an annual tidal flood risk of between 1 in 25 (4%) and 1 in 1,000 (0.1%).

South of Langstone Rock, most risk is to the mainline railway and services can be disrupted. The existing risk is 1 in 25 (4%).

There is also the risk of coastal erosion/landslip along this coastline.

Our strategy

Improvements to the mainline railway revetment in the short term.

Network Rail is carrying out its own studies to develop the approach to this, which the Strategy supports. Resilience works for local properties, adjacent to where Dawlish Water discharges to the sea, will be required between 2030-2110 to keep pace with climate change.

The improvement works would improve protection and reduce operational impacts on the mainline railway, and limit tidal flood risk to property into the future.

Other considerations

The drainage of low-lying areas, particularly during tide-lock, and the flood risk to properties due to groundwater are also of concern, and the Strategy recommends further detailed studies on these.

See also Dawlish Warren sand spit.

Shoreline Management Plan

The Strategy agrees with the South Devon and Dorset Shoreline Management Plan 2 policy in the short to long term of *Hold the Line* for Policy Units 6b22 to 6b23.

Glossary of Terms

Beach recharge / recycling	Beach recharge, also referred to as beach nourishment or replenishment, describes a process by which sediment (usually sand) is replaced on a beach. The process is described as recycling when the nourishment material originated from the affected area.
Erosion	Coastal erosion is the wearing-away of land and the removal of beach or dune sediments by wave action or currents. It can be gradual or dramatic, such as following a major storm or a cliff fall.
Flood resilience measures	Flood resilience measures do not prevent flooding but reduce the damage caused, by using materials that are less affected by water and through measures such as raising electrical sockets.
Gabion	Gabions are wire mesh baskets filled with cobbles or crushed rock and are used in coastal defences.
Groyne	Groynes are like fences built at right angles to the beach, usually of wood or rock. They are used to reduce the movement and build up the beach.
Hold the Line	Coastal defences will be maintained, sustained or improved.
Individual property protection	Individual property protection includes measures such as door barriers, air brick covers, non-return valves, toilet bungs, sealing around service pipes and waterproofing of walls. Grants can be available through local authorities.
Inter-tidal habitat	Inter-tidal habitats are those that occur between low and high water and are therefore alternately exposed to the air and wetting. They include sandbanks and saltmarsh, which can be particularly rich and diverse in species that they support.
(Managed) Realignment	Realignment involves moving existing coastal defences. Whilst this can be forward to "reclaim" land, with sea levels rising it is more usual to move them to a more sustainable inland position that creates valuable new intertidal habitat. This can also be known as managed realignment (MR), retreat or setback.
No Active Intervention	This is a policy, or option, in which natural change is allowed although some work may be necessary for health & safety or environmental reasons.
Regulated tidal exchange	Regulated tidal exchange is the movement of seawater in and out of an area behind fixed sea defences, through engineered structures such as sluices, tide-gates or pipes. These allow the creation of saline or brackish habitats but limit inland water levels.
Revetments	Revetments are sloping structures that are constructed along rivers or coastlines to reduce wave action and erosion, often in front of sea walls or embankments.
Risk	Although the term risk is often used in place of probability it is used technically, in the context of flood and coastal erosion, as the combination of probability and consequence.
Shoreline Management Plan (SMP)	A Shoreline Management Plan sets out the policy for managing our coastline and how we respond to the threat of coastal flooding and the risks of erosion. It is based on large-scale assessment of the risks associated with coastal processes. The South Devon and Dorset SMP extends from Rame Head near Plymouth to Durlston Head near Swanage, and was finalised in June 2011.
Special Area of Conservation (SAC)	Special Areas of Conservation (SACs) are strictly protected sites designated under the European Community Habitats Directive for the quality of the habitat and species. Dawlish Warren sand spit has been designated a SAC for its coastal sand dune habitat and the presence of petalwort.
Special Protection Area (SPA)	Special Protection Areas (SPAs) are strictly protected sites classified in accordance with the EC Birds Directive. They are classified for rare and vulnerable birds and for regularly occurring migratory species. Particular bird species within the Exe Estuary SPA include the Slavonian grebe, dark-bellied brent goose, pied avocet and black-tailed godwit.
Standard of protection	The standard of protection of a flood defence refers to the probability of the largest flood that it is designed to withstand. Hence we can expect a 1 in 100 (1%) standard of defence to be overtopped, on average, once every 100 years.
Sustainable	Sustainability recognises that the economy, environment and society are interconnected and that present needs should not be met at the expense of the future. A decision that commits future generations to excessive costs, or leads to irrevocable environmental damage, is unsustainable.
Tidal flooding	Tidal flooding occurs when sea level is raised, due to tides and usually other factors, above the level of natural or man-made defences. Other factors include the weather, which produces surge tides and waves, tsunamis and sea level rise. Tidal conditions can also exacerbate freshwater and sewer flooding by affecting free drainage.
Wave re-curve wall	A wave re-curve wall is a sea defence designed to reduce wave overtopping by deflecting up-rushing water back seaward. It is sometimes known as a parapet or wave-return wall. Sea defences may combine a wave re-curve wall with revetment and toe defence.

Summary of works planned to be undertaken by 2030

	When recommended	Central funding expected	Change to the SMP policy
1 Sandy Bay	Not required		No
2 The Maer, Exmouth	5-15years	Little or none	Yes[1]
3 Exmouth	0-5 years	Most or all	No
4 Courtlands to Exton including Lympstone	Not required		No
5 East Bank of the River Clyst	***Not required***		***Yes***[2]
6 West Bank of the River Clyst	0-5 years	Most or all	No
7 Clyst St Mary	Not required		N/A
8 Topsham and Countess Wear	5-15 years	Some	No
9 Powderham Banks[A] and the Kenn Valley[B]	0-15 years	Some[A]/Most or all[B]	Yes[3]
10 Starcross and Cockwood	0-5 years	Most or all	No
11 Dawlish Warren sand spit	0-15 years	Some	Yes[4]
12 Dawlish to Holcombe	Not required (subject to Network Rail)		No

[1] Managed realignment had been considered but is now not considered necessary (change in the medium to long term)

[2] ***Change from Managed Realignment in the short to long term***

[3] The Kenn Valley is now being considered as a potential site for habitat creation instead of Powderham Banks

[4] Partial change in the short term (the SMP did not set policies for the medium to long term)

To find out more about the Strategy…

In developing the Exe Estuary Strategy the following technical reports and related documents have been produced and were available during the public consultation on the Environment Agency's e-consult site:

https://consult.environment-agency.gov.uk/portal/

- Baseline Flood and Coastal Risk Assessment Report (pdf 11.9 Mb)
- Options Assessment Report (pdf 25.8 Mb)
- Environmental Report with Appendices (29.0Mb)
- Draft Strategy Consultation Document (pdf 4.8Mb)

The Environment Agency has also maintained webpages at:

www.environment-agency.gov.uk/exe/estuary

This site has provided information and access to background information including fact sheets to help explain the Strategy development stages and the Strategy Consultation Report.

The local Environment Agency Office is:

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Please contact the Environment Agency Customer Services if you want to discuss the Strategy or the Living with a Changing Coast Project (LiCCo).

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