

# Bexhill Town Council Wild Domesday Project



## FUTURE RISES IN SEA LEVELS AND HOW THEY MIGHT AFFECT BEXHILL-ON-SEA

### Introduction

**This PDF is long and detailed. Please take your time to read the contents and conclusion slowly. It sets out the current situation for climate change affecting the level of the sea off Bexhill-on-Sea in East Sussex. What the sea does directly affects what happens on land. Some aspects are complex and hard to understand. Even with the greatest effort to save the coast, it is inevitable that some amenities will be lost. The changes will be slow, over many years, but they will be inexorable, and action will have to be taken if the town and its people are to be kept safe.**

There are many factors affecting the sea level and these are set out below. The policies of the various agencies watching and acting to remedy any land flooding are also detailed here. As you read through the paragraphs you should be able to see how things will go over the next five years, ten years and even one hundred years and more, because children alive today and children to be born in future will all be affected by the problems described below. The data is dismaying but human ingenuity has recovered vast areas of land from sea flooding and no doubt we will have to do that again.

**Implications.** Can we give the sea room to spread? Any concession to the sea, such as allowing river valleys and marshes to flood with salt water would lessen the risk to homes and amenities, but the government feels that the cost to existing wildlife and farming landscapes make this sea concession unacceptable.

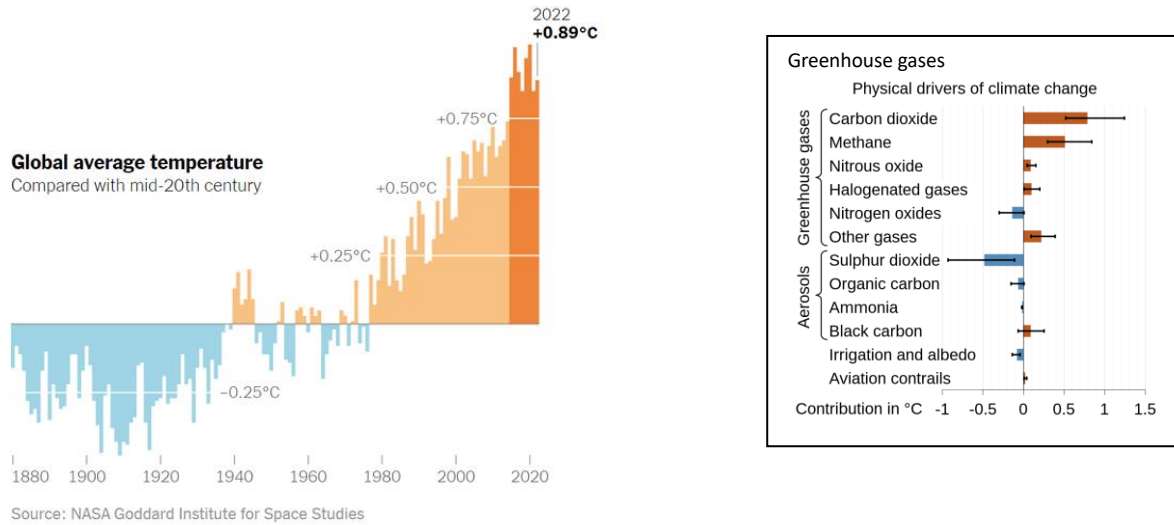
However, to abandon the coast would also mean the loss of thousands of homes, roads, railways and key infrastructure such as hospitals, schools, nuclear power stations and railways. So the only concession to the sea in our area will be the eventual loss of amenity beaches, sands and low-level coastal paths. The tide will come in more quickly and there will be less time to escape if caught on rocks or at the tide's edge. Eventually there will be no sand. The risk of flooding inland will increase as will the number of days, especially in winter, when the sea might reach homes on the edges of beaches or sea fronts.

**Planning.** Consequently, there is no intention to abandon the coast in the area of Bexhill-on-Sea, nor the land either side of it, but as time goes on there will have to be quite a fight to stop the sea from affecting our town. The government and local authorities are tasked with saving the coast and this PDF shows how they intend to do it. These plans will be updated periodically, and the Bexhill Wild Domesday Project will keep updating this PDF as more facts are known. Nothing is going to happen very fast, but we do need to plan ahead.

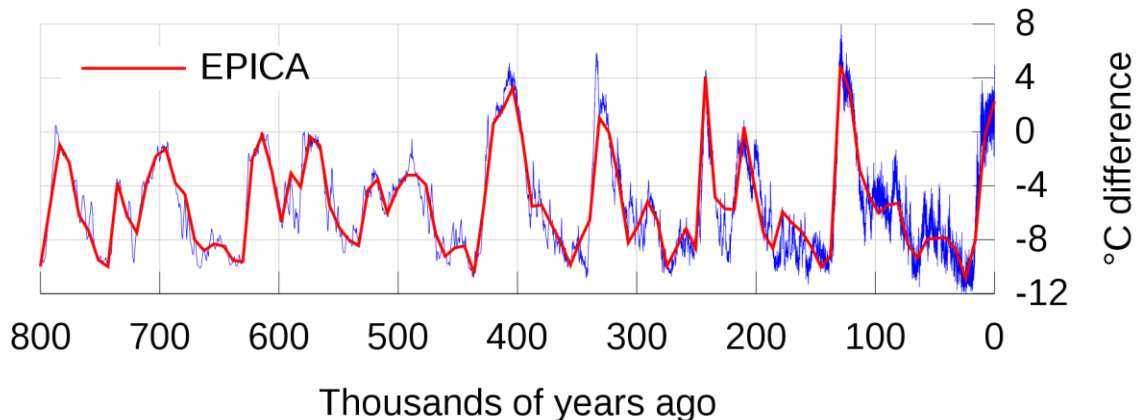


## The Problem of Global Warming

Due to a range of factors, including so called greenhouse gases, the Earth is warming.



People who do not believe that human beings are causing climate change point to this graph below which shows how the climate temperature rises and falls naturally over thousands of years. We were headed for another Ice Age until the temperature started to rocket again. This graph shows the results of analysis of Antarctic Ice Cores for the last 800,000 years.



However, whether or not people believe that humans are causing climate change is **completely irrelevant**.

From the Bexhill Domesday Project's point of view, the argument is not about who caused the rise in temperature, but what to do about it, because it is happening while we argue. The sea is rising and will continue to rise for the next several hundred years and if nothing is done it will overwhelm vast areas of the coast. London and Cambridge will be underwater and all the homes in lower Bexhill will be submerged by many feet - so naturally to protect our homes and livelihoods, something has to be done. Changes in lifestyle and reduction of greenhouse gases are a necessary means of slowing global warming, whatever the cause of it, to preserve the current state of civilisation.

'Climate change' simply means the world's climate is changing and so what are we going to do about it? The whole world is warming, the ice is melting, and the sea continues to rise up across the world. In the worst-case scenario detailed by government, by 2300, it will have risen by 50 feet (15 metres). The average height of a two-story house is between 20 to 35 feet in height, depending on the pitch of the roof and the height of the ceilings.

## Met Office and Local Sea Level Data

Scientists measure the way the tide heights are increasing. The two official tide gauges are at Newhaven and Dover, but a new tide height radar was fitted to Hastings Pier in 2017 and those readings are available to everyone. What they show is discussed later in this PDF.

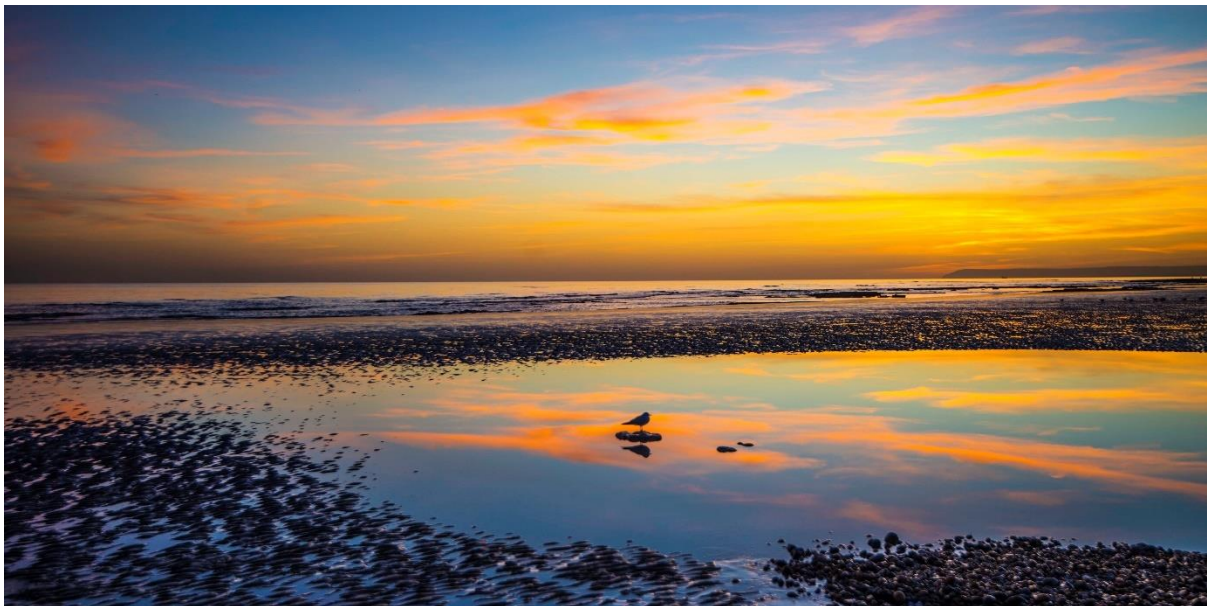
The National Meteorological Office known popularly as the Met Office, is the scientific department used by the Environment Agency to assess how high the tides will become. The Met Office study centre for climate change is called the Hadley Centre. It draws its data from many global and local sources.

### The Met office states that:

New sea level projections developed by the Met Office Hadley Centre have been published in a report by the Environment Agency. They show a **continued rise beyond 2100 under all climate change scenarios.**

Sea level rise is the dominant driver of increased coastal flood risk, both historically and in future projections of climate change. Individual UK flood events are usually associated with extreme weather conditions, particularly the generation of storm surges, which can be compounded by the action of wind-generated surface waves.

However, projections of changes in frequency and severity of future coastal extreme water levels are dominated by the long-term increase in coastal water levels associated with climate change.’



*Bexhill beach at low Tide*

### Some Factors affecting sea levels:

- The bulking up of the sea (molecular expansion) caused by higher climate temperatures known as global warming, account for 40% of the rise in sea levels. This is a large component of the problem. There is more sea than there was before because the molecules are vibrating slightly faster due to increased heat and so they need more room to move. If you try to compress water, you get steam. The more the climate heats up, the greater the mass of the sea.
- Ice melting from the Antarctic, Himalayan and Andean mountain ranges and the Greenland Ice Cap affect the sea level in different ways and locations. Having been on the Greenland Ice Cap and having lived on a glacier in North Norway, I can confirm from personal experience that the water from melted ice is roaring away underneath the glaciers, lubricating them so they slide and melt into the sea at a much faster rate.
- Humans take too much water from underground. The water taken from the ground via artesian and deep pumping extraction by humans is then released into the sea as sewage and drainage water across the world.
- Changes in local gravitation (Saravanan Effect) as the Greenland Ice Cap shrinks and the land rises. The nearer to Greenland you are, the better for sea levels. Since Britain is around 2000 kilometres from Greenland, the Saravanan effect means we will be worse off. (See Appendix 1)
- Normal cycles of the natural rise and fall of the tides caused by the varying proximity of the moon and sun.
- How coasts are affected by their geology and landscape, including the rising angle of the beach land and progressive narrowing of inlets.
- Storms from the West driving the sea onshore especially in winter gales. Any increase in tide height will allow the bulk of the sea to be forced against the coast.
- North Sea gale-blown surges of water through the Straits of Dover. These huge surges or domes of seawater have caused many deaths through coastal flooding in England, Holland and Germany. The Thames Barrier was built to try and stop London from being flooded.
- Longshore drift of shingle and its possible elimination. The factors affecting shingle are discussed in detail below. They will be a key factor in coastal protection.
- The effectiveness of the beach groynes in holding shingle banks. Many groynes are in a state of disrepair. Near Waller's Haven, Norman's Bay, inside the Bexhill ward of St Marks, some groynes have almost disappeared.



The sorry state of the groynes at Waller's Haven, Bexhill-on-Sea.

- The ground water table underlying the town of Bexhill. As sea levels rise so it will take longer to drain away surplus surface and deeper ground water.
- Hinterland flooding. This aspect of the flooding of the countryside around Bexhill is dealt with in great detail below.

## Future Assessment

The Met Office states that:

‘Finite computational resource means that sea level projections based on climate model simulations are often only available to the year 2100. However, there is an increasing demand for information beyond 2100 to aid adaptation planning for coastal infrastructure. In order to meet this need, the Environment Agency commissioned the Met Office to develop a new set of sea level projections that extend to 2300.’

### Simple climate model

‘The new research makes use of a simple climate model that has been used extensively in the context of understanding future surface temperature rise and climate sensitivity in more complex climate models’.

### Exploratory projections

‘The outputs from the model were used as the basis of projections of global sea level rise. These global projections were translated into regional projections by accounting for additional effects, including: the spatial “fingerprints” of change associated with ice melt; changes in local currents; and the influence of ongoing vertical land motion related to the last de-glaciation (see Saravanan Effect at Appendix 1).

**Substantially larger future sea level rise cannot be ruled out and decision makers are advised to make use of other strands of evidence where there is a high degree of risk aversion.’**

What does the Met Office mean by ‘high degree of risk aversion’? It simply means - do you want to give up your bit of the coast to the sea, or not? Are you content to allow the sea back into Pevensy Marshes, Bulverhythe Medieval Harbour and Romney Marsh, like it was in 1066?

### All rise

The Met Office states: ‘One of the main outcomes of the research was the demonstration that **UK sea levels will continue to rise well beyond 2100 under all future emissions scenarios**, although the severity of the future rise is strongly dependent on the assumed future greenhouse gas emissions, or emissions scenario, used.’

### What this means

This means that the emissions of greenhouse gases will continue to cause the climate to heat up and the ice to melt. The weather will become more turbulent, and the waves may become larger and penetrate inland further. Artificial tide gates currently preventing salt water from entering Pevensy Marshes, Combe Valley and the River Tillingham at Rye, will be shut for longer, with resultant inland flooding during periods of high rainfall and with a consequent rise in the water table.

The Met Office predictions to 2100 and 2300 are set out here:

**‘For projections to 2100**, the low-likelihood, high impact storyline could lead to an **additional metre** (3.2 feet) of global mean sea level rise and is associated with loss from both the Greenland and Antarctic ice sheets. The implications for uncertainty in UK sea level projections will need further work because the impact of ice loss from Antarctica is more important for sea level rise around the UK than ice loss from Greenland.’

**‘For projections to 2300**, the low likelihood, high impact scenario could lead to global mean sea level rise of up to about 15m (50 feet). This storyline is based on possible widespread loss from the Antarctic ice sheet. Under this storyline, large ice loss from Antarctica would have an even larger impact on UK sea level rise. This highlights that we need to work with scientists around the world to better understand and monitor the Antarctic ice sheet.’

## How much higher will the sea get at Bexhill on a calm day with no wind or storms?

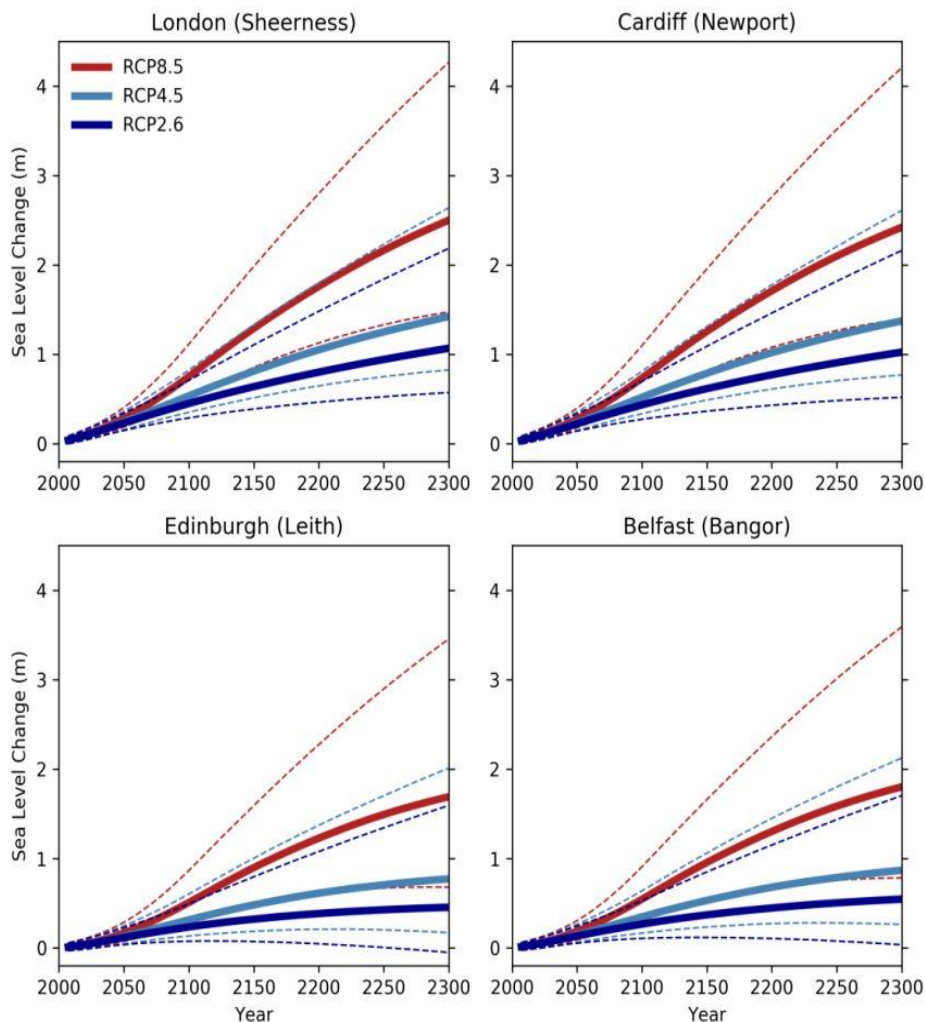
Under a **low emissions scenario**, the approximate Met Office projected ranges at Year 2300 (that means in 277 years time) are 0.5-2.2 m for London. This is an increase over 277 years of half a meter (0.5) to 2.2 metres which is 20 inches to 87 inches (87 inches is 7.25 feet).

Under a **high emissions scenario**, this increases to 1.4-4.3 m. For London the lower number is 55 inches and the higher is 169 inches (169 inches is 14 feet).

Obviously, these figures will be much worse in winter when storms direct the wind onshore, especially during natural high tides and North Sea surges. We cannot afford to plan for calm weather. In order to be safe over the years we have to plan for the worst combination of circumstances.

The Met Office states that:

‘The new research provided similar projections for tide gauge locations around the UK coastline and combined them with statistics on extreme coastal water levels. The research found that at some locations the 1 in 10,000-year flood event of today could be expected **more than once per year by 2300.**’



*Time series of the time-mean relative sea level change for UK capital cities based on the nearest Class A tide gauge location (indicated in brackets). Notes: Solid lines indicate the central estimate and dashed lines indicate the 5th to 95th percentile range for each RCP scenario as indicated in the legend (top left panel). All projections are presented relative to a baseline period of 1981 to 2000.*

## What is the Plan to Save Bexhill-on-Sea?

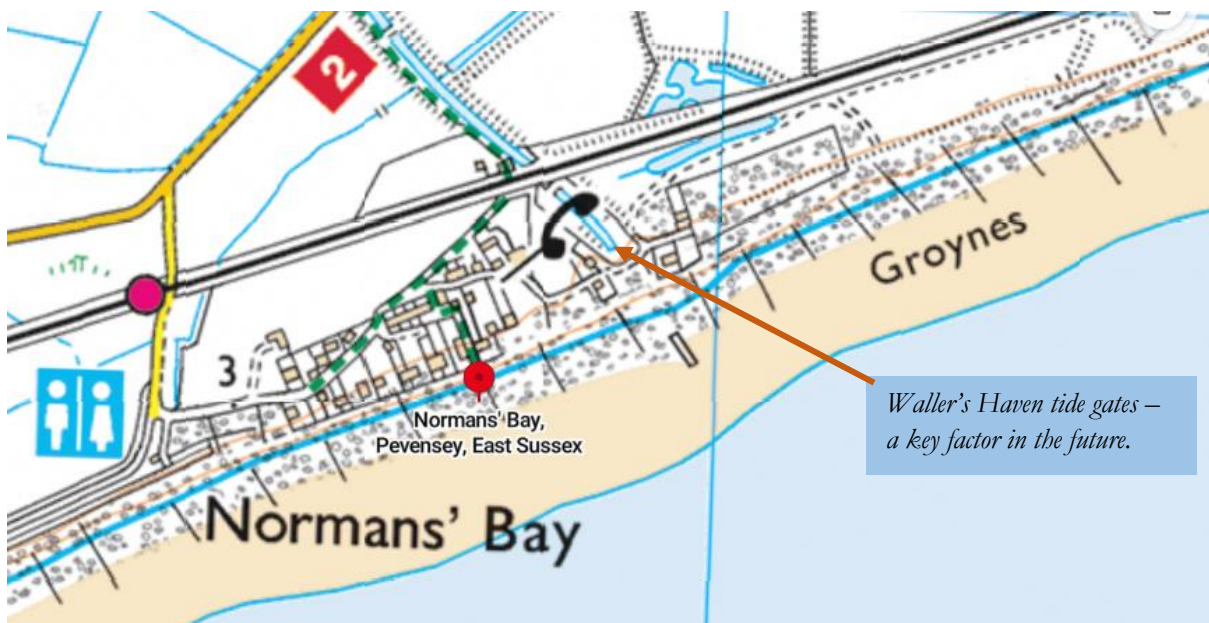
It is certain that the authorities are never going to let the town be destroyed. But who is responsible? Bexhill-on-Sea is divided into nine wards. Only part of one ward will be directly protected by the Environment Agency using the Eastbourne to Cooden Beach Plan; the remainder needs to be protected by Rother District Council who own the land, together with other local authorities and with advice from the Environment Agency.

### Saving part of St Marks Ward

The Environment Agency is legally responsible for ensuring that the coastal part of St Marks Ward is protected as shown in this map below:



This part covers the western boundary of the ward near Waller's Haven – the main drainage system for Pevensey Marsh at Normans Bay and the Cooden Beach Hotel. The whole of Cooden Beach hotel is inside the Environment Agency remit but nothing else in St Mark's Ward or anywhere else in Bexhill-on-Sea is protected by them directly in the Eastbourne to Cooden Beach Plan.



## **Pevensey Bay to Eastbourne Coastal Management Scheme**

The Environment Agency organisation responsible for Eastbourne to Cooden Beach Hotel is the Pevensey Bay to Eastbourne Coastal Management Scheme. I have been in correspondence with them for several months now (starting 1 June 2023) to find out what will happen to the coast of St Marks Ward. Here are my questions to them and their replies.

- 1. First of all, please can you check to see if Cooden Beach Hotel is to be defended against sea level rises by you as EV at your expense, or will Rother DC have to do it at their expense?**

**EV answer:** ‘The Cooden Beach Hotel is within the boundary of the Pevensey Bay to Eastbourne Coastal Management Scheme. This new scheme is currently in development and will be taking over from the current flood defence management project. To provide you with a bit of background the Pevensey Bay to Eastbourne Coastal Management Scheme is one of the largest flood coastal and erosion risk management schemes (FCERM) in the country.

(FCERM means: Flood and Coastal Erosion Risk Management).

The new scheme is looking to provide resilience and adaptability to coastal flooding and coastal erosion to over **10,000 properties**, investing 100 million+ over the next 100 years.

The area of coastline the new scheme covers is **15 km** from Holywell Gardens in Eastbourne to the Cooden Beach Hotel.

There are further details about the scheme on our website which also provides a map:

[Project overview | Pevensey Bay to Eastbourne Coastal Management Scheme \(pevenseyandeastbournecoast.co.uk\)](https://pevenseyandeastbournecoast.co.uk).

There are 3 parts to the new scheme:

- The interim project which continues to provide FCERM management solutions until we start phase 1, between 2025 – 2027.
- Phase 1 of the Pevensey Bay to Eastbourne Coastal Management Scheme **starts in 2027**, likely to be for 10 years.
- Pevensey Bay to Eastbourne Coastal Management **100-year flexible Plan**. This is developing in parallel to phase 1 and is a strategic flexible 100 year phased delivery plan of how to deliver resilient, adaptable and sustainable FCERM solutions across this 15km area of coastline.

Sea level rise and climate change are central to the appraisal process of developing the FCERM solutions in both the interim, phase 1, and flexible plan. There is further information on this located on our website and in the FAQs.

[How we will manage the project | Pevensey Bay to Eastbourne Coastal Management Scheme \(pevenseyandeastbournecoast.co.uk\)](https://pevenseyandeastbournecoast.co.uk)

In terms of funding all Flood Risk Management Projects will be **seeking funding** from the government. This pot of monies is known as **Flood Defence Grant in Aid monies**, and is from the public purse, effectively money from taxation which is assigned by government to fund delivery of flood risk solutions across the country. There are strict government treasury guidelines which projects have to follow to apply for this funding.



The Pevensy Bay to Eastbourne Coastal Management Scheme is currently in that process of developing the options and business case to apply for this funding to deliver future solutions. We will be undertaking a full public consultation. If you are interested in finding out more about the scheme and consultation, please sign up to our mailing list on our website.

Currently the beach in front of the Cooden Beach Hotel is maintained and managed to provide protection from coastal flood risk by the Environment Agency. The Environment Agency manage the Pevensy frontage for coastal flood risk **through a contract with Pevensy Coastal Defence Limited**, they are contracted to undertake this work on our behalf. This contract is **coming to an end in 2025** which is why we are developing a new scheme.

Here is a link to a project film which provides a good overview.

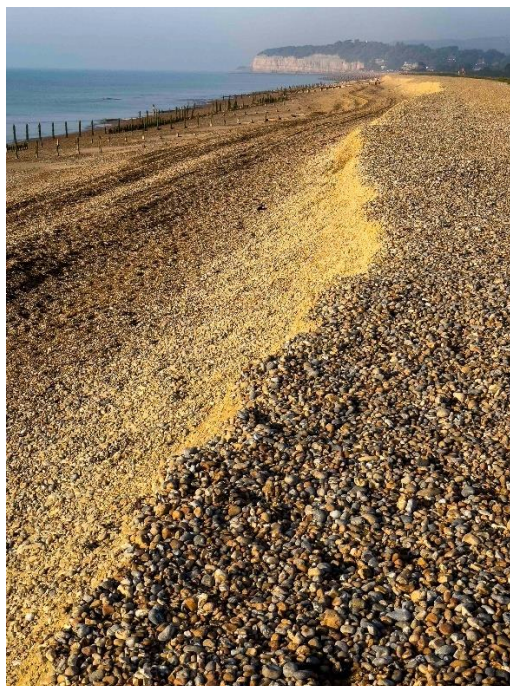
<https://www.pevenseyandeastbournecoast.co.uk/scheme-overview/widgets/45753/videos/3099>.

The current flood risk management activities for that area of coastline are predominantly beach shingle recycling and recharge. This effectively means managing the beach profile with plant (diggers etc) to move shingle into a predetermined beach height and width to prevent the sea from breaching and flooding the land behind. More information about how the beach is currently managed can be found here:

[PCDL - Pevensy Coastal Defence Ltd \(pevensey-bay.co.uk\)](http://www.pevensey-bay.co.uk).

The current standard of protection provided by the current flood risk management activities on the beach for Pevensy provides protection against flooding from the sea by breaching the shingle defence for any storm with a return period of 1 in 400 years or less.

- I have just been to Waller's Haven to see the shingle defence situation as it has been reported that the sea did enter a house there. The shingle near to the homes and the Waller's Haven outfall and tide gates is not banked up very much compared to Pett Level - see photo of Pett/Winchelsea Beach attached.**



**So the questions are - will we end up with different standards of defence along the coast?**

**Answer:** We are in the process of appraising all of the options and updating all of our technical data required to determine what are the most sustainable FCERM solutions for this area of coastline. There are a number of factors which impact how options are appraised, for example, what is the standard of protection they provide, how many houses will the options protect, what's the cost, the environmental impacts.

These are not all of them. I just wanted to provide a steer on the different factors the project team will consider when appraising options. All of this process is dictated by strict government treasury guidelines which we have to follow to build a business case to unlock funding. At this stage in the projects development I am unfortunately unable to answer your question around standard of defence for the Pevensey Bay to Eastbourne Coastal Management Scheme in the future as we are in the process of determining what that will be.

Please do sign up to our mailing list as engagement and stakeholders' views are one of those factors which will shape what those FCERM solutions look like into the future. We will be undertaking shortlisting engagement activities in November, and it would be great to get your views.

**Are you happy with the state of the beach at Waller's Haven?**

I have forwarded this onto our local flood risk team to answer as this relates to the current FCERM project.

**Do you know who did the Pett work - was it EV?**

I have forwarded this onto our Kent and South London flood risk team as this is in their area.

3. **While I was at Waller's Haven talking with local people, I noted that just past the houses the groynes were worn so badly that they had ceased to work at all, and a huge mass of shingle had gone. Who should repair these groynes - EV or Rother DC?**

I have forwarded this onto our local flood risk team to answer as this relates to the current flood coastal defence project. In terms of the future Pevensey Bay to Eastbourne Coastal Management Scheme groynes are one of the solutions which are currently being considered and appraised. There is further information on all of the options found on our website.

[Possibilities for the coastline | Pevensey Bay to Eastbourne Coastal Management Scheme \(pevenseyandeastbournecoast.co.uk\)](http://pevenseyandeastbournecoast.co.uk)

4. **Lastly, I am in touch with Southampton University for the data from the tide height recorder fixed to Hastings Pier since 2017 but with only six years of data showing a slight increase in the overall Mean, it is not much help for future interpolation. Which sea level rise statistics do you at the EV rely upon when you do your shingle work along the coast?**

In general the climate change data which informs our projects is from the UKCP [UKCP data - Met Office](#). UKCP data is from the Met Office which will inform our revised flood modelling and coastal processes assessments. Pevensey Bay to Eastbourne Coastal is adopting an adaptive pathway approach. This is a new approach which allows us to adapt to the uncertainties that we are facing with climate change. Over the next 100-year period we can't be precise in our understanding of sea level rise. The data we have is predictions so what an adaptive management plan allows us to do is monitor the situation and adopt new data along that period.

We will develop triggers and thresholds, some of these will be around Sea Level Rise. If these triggers are met, then the strategy will review our preferred FCERM solution currently being delivered and determine whether there is a more sustainable effective solution. There is further information on this on our website:

[How we will manage the project | Pevensey Bay to Eastbourne Coastal Management Scheme \(pevenseyandeastbournecoast.co.uk\)](http://pevenseyandeastbournecoast.co.uk)

End of question set.

### **What about the Rest of Bexhill-on-Sea?**

Apart from the coastal part of St Marks Ward to be protected by EV, we have a long sea front to protect, the area of Galley Hill with its rare wildlife, and our beautiful low tide sands. Not only that but Bexhill's wards include a large part of Combe Valley Countryside Park SSSI including almost all of the land to the west of the Combe Haven river. All this has to be protected by Rother District Council in liaison with other local authorities such as Hastings Borough Council, and so it has teamed up and is a part of:

<https://se-coastalgroup.org.uk/>

### **All about South-East Coastal Group**

Rother DC explains:

'As 'Coast Protection Authority' we manage the district's coastline.

The shoreline is a dynamic system where stability is maintained despite the continued movement of waves, tides, wind and sediment. The present configuration of the shoreline is now controlled by the various coastal defences which humanity has put in place over the last 100 – 200 years.

These have stopped or slowed the transport of sediments and reduced the ability of the shoreline to respond to natural forcing factors.

### **Who is responsible for the coastline?**

Responsibilities are split according to the nature of the ground behind the seashore where the ground lies lower than the seashore and would flood if sea defences failed.

The Environment Agency is the body responsible for carrying out works to prevent that flooding where the ground lies higher than the seashore and would erode if attacked by the sea.

### **Rother District Council is the Coastal Risk Management Authority.**

As a coastal risk management authority the Council has permissive powers under the Coast Protection Act 1949 to protect the coast from erosion and encroachment by the sea. The legislation does not make it a statutory requirement to defend the coast, but most coastal councils chose to be active in coast protection.

Councils can apply to the Environment Agency for grant aid towards the development of plans and strategies for carrying out a scheme of works to protect the coast. Grant may be forthcoming on the basis of a number of 'tests' a scheme would have to meet. These might include such factors as cost, benefit of the works, meeting environmental criteria, nature and appropriateness of the works, their projected lifespan, etc.

The Environment Agency acts as an executive agent of the government department Defra which has the overall policy responsibility for coastal defence.

## Strategic Planning

A key component in managing the coast has been the development of Shoreline Management Plans (SMP) which set out a strategy for the coastal management of a section of the coastline.

Each SMP covers an area of coastline known as a sub-cell within a littoral sediment cell; there are eleven littoral sediment cells on the England and Wales coastline. A sediment cell is defined as a length of coastline, which is relatively self-contained as far as the movement of sand or shingle is concerned, and where interruption to such movement should not have a significant effect on adjacent sediment cells. Each major littoral cell is divided into a number of sub-cells, based on the best available knowledge of large-scale processes.

In order to encourage improved co-operation between authorities a series of Coastal Groups have been established based on the littoral cell boundaries. Rother District Council is a member of the South-East Coastal Group which extends from Beachy Head to the Isle of Grain.

The preparation of SMPs has been an example of the benefits which can be achieved by closer working between authorities. The first generation of SMPs were produced in the mid 1990's; One SMP covers South Kent and extends from Beachy Head to Dover Harbour (1995) and the North Kent Plan (1996) extends from Dover Harbour to the Isle of Grain on the River Thames. Work is now in hand to review these plans.

The South Foreland to Beachy Head Plan was published as a consultation draft in January 2005. The consultation continued until 8 April 2005; details can be seen at [South East Coastal Group](#).

The production of each SMP involved the appointment of expert firms of consulting engineers to undertake a detailed study of all the issues affecting the coast such as land use, environmental protection, economics and the action of the coastal processes. The final report establishes the management policy for the coast defences by dividing it into separate Management Units and making specific recommendations for each unit based on four alternative options:

- **Do Nothing,**
- **Hold the Line,**
- **Advance the Line or**
- **Retreat the Line.**

Further Information: If you require further information on the Council's coastal defences, please contact the Contracts Services Manager: Neighbourhood Services Manager, Rother District Council, Town Hall, Bexhill-on-Sea TN39 3JX



## **ROTHER PLAN DETAILS - Moving on to the Details of Coastal Defence (from Rother DC)**

### **Area Plan: 4c25 Bulverhythe and Glyne Gap**

The area has a largely low-lying frontage with extensive residential and industrial developments, together with important road and rail links. The frontage is backed by the Combe Haven Valley, which is of environmental importance and at flood risk.

### **SUMMARY OF THE PLAN AND JUSTIFICATION**

#### **Plan:**

Defended since the 1800's, the largely low-lying developed frontage backed by the Combe Haven Valley is of environmental importance. To prevent flooding of the extensive coastal developments, which include commercial and residential areas, infrastructure (such as the Eastbourne to Hastings railway line), heritage assets, and internationally important freshwater habitats of Combe Haven Valley, the plan is to implement protection. This will be achieved through the construction of hard defences, which are the subject of an ongoing scheme. A long-term consequence will be narrowing of the beach, which will have implications for the amenity value of this frontage (beach huts, which date from the 1930's, stretch along the shingle beach, which is used by locals and tourists for recreational purposes), thus copious amounts of beach nourishment will be required if this facility is to be maintained.

#### **Preferred policies to implement Plan:**

**From present day:** The present-day policy for Bulverhythe and Glyne Gap is to continue protecting the assets along the shoreline and in the backing, low-lying hinterland. This will be achieved by maintaining and **upgrading the existing defences, a seawall, groynes and shingle recharge**, under a policy of **hold the line**. Rates of sediment feed and transportation along this frontage are low, therefore very little change in coastal processes or impacts on evolution is likely to occur within this epoch or indeed the confines of the SMP.

**Medium-term:** The medium-term policy for Bulverhythe and Glyne Gap is to **hold the line**. In response to sea level rise it is anticipated that the **defence structures will increase at some point during this period**. Whilst any upgrading will impact on the character of the frontage (e.g. the reduction of foreshore exposures and the impeding of the seascape), this will be offset by the necessary flood and coastal erosion protection provided.

**Long-term:** The long-term plan for Bulverhythe and Glyne Gap is **to hold the line and protect socio-economic and environmental assets**. This will be achieved by **maintaining and upgrading the existing defence structures**. With an increase in sea level rise and a lack of beach building material entering the system, **it will become increasingly difficult to retain a beach** along this frontage.

A lack of sediments on the foreshore will result in scour (at the toe of the defences) therefore more substantial structures may need to be constructed (which will impact on foreshore exposures, although the effect of this can be mitigated if their study is facilitated) or more frequent maintenance may be required at some point during this epoch. Thus the character of this frontage will increasingly change, from one with an amenity value to one that is heavily defended. Despite the likelihood of **no beach remaining by the end of this epoch**, this recommendation is deemed to be sustainable, for Bulverhythe and Glyne Gap, as rates of sediment feed and transport into and along this frontage are low and therefore downdrift impacts are minimal and the assets remain protected from coastal erosion and flooding.

## Area Plan 4c26 Bexhill to Cooden

Dense urban area extending to the edge of low coastal cliffs and slope. The fronting shingle beach is important for its amenity/tourist use.

### SUMMARY OF THE PLAN AND JUSTIFICATION

#### Plan:

Dense urban areas extending to the edge of the coastline, including low cliffs and shallow coastal slope. The long-term plan for this frontage ensures the protection of extensive residential, commercial (crab and lobster catches) and tourism/amenity related assets (golf course) along this frontage. This will largely be achieved through the maintenance and improvement of existing defence structures. In the long term, this approach will result in significant narrowing of the beaches due to rising sea levels, which could impact upon the tourism economy of the town.

#### Preferred policies to implement Plan:

**From present day:** Groynes and a seawall have halted the historic erosion of this shoreline and the present-day policy for Bexhill and Cooden is to continue with this, protecting the substantial assets. This will be achieved by **maintaining and upgrading the existing defences**, under a policy of **hold the line**. Some localised erosion of the low cliffs does occur but the sediment this yields is insufficient to retain an adequate beach at this and neighbouring frontages. Rates of sediment feed and transportation along this frontage are low, therefore very little change in coastal processes or impacts on evolution, is likely to occur within this epoch or indeed the confines of the SMP.

**Medium-term:** The medium-term policy for Bexhill and Cooden is the same as the short and long term policies i.e. **hold the line**. In response to sea level rise it is anticipated that the **defence structures will increase** at some point during this period. This will impact on the character of the frontage but will protect significant assets from flooding and erosion. 'Coastal squeeze' will result which will impair foreshore form and potentially impact features like the dinosaur track way, present on the foreshore, close to the seaward edge of the shingle fronting the sailing club.

**Long-term:** The long-term plan for Bexhill and Cooden is to **hold the line** and protect predominantly anthropogenic assets. This will be achieved by maintaining and upgrading existing defence structures. With an increase in sea level rise and a lack of beach building material entering the system, **it will become increasingly difficult to retain a beach along this frontage as the foreshore steepens under the phenomenon of 'coastal squeeze'**. A lack of sediment on the foreshore will result in scour (at the toe of the defences) therefore **alternative structures may need to be constructed** at some point during this epoch. Thus the character of this frontage will increasingly change, from one with an amenity value to one that is **heavily defended**.

Despite the likelihood of **no beach remaining** by the end of this epoch, and assets like the dinosaur track way being impaired, this recommendation is deemed to be sustainable for Bexhill and Cooden as rates of sediment feed and transport into and along this frontage are low. As such, impacts on evolution downdrift are negligible and the assets remain protected from coastal erosion and flooding.

## Area Plan 4c27 Hooe and Pevensey

Heavily managed barrier beach fronting the environmentally important Hooe and Pevensey Levels. There are developments along/behind sections of the beach ridge, together with scattered development and infrastructure in the flood risk area.

### SUMMARY OF THE PLAN AND JUSTIFICATION

#### Plan:

Low lying frontage with residential developments backing much of the coast and areas of international environmental importance within the flood risk area. The plan here is to protect the numerous properties behind the existing beach and important infrastructure such as the railway line and A259 road. The land backing the coast and throughout the backing flood risk area, is very low, such that any inundation could potentially be huge. Thus the benefits of continuing to provide flood protection include protecting large areas of agricultural land, numerous important heritage sites, properties throughout the Level and large areas of internationally important freshwater habitats, on the Pevensey Levels, from tidal inundation.

The potential flood area also extends into Eastbourne's urban area so flooding risks to this are also reduced. This section of coast is already heavily managed and, in the future, due to sea level rise, it is likely that **hard defences will be required** to provide an adequate standard of protection in the long term. This would result in a narrowing of the beach such that **those properties currently built upon the crest of the beach may be lost**.

#### Preferred policies to implement Plan:

**From present day:** The present-day policy for Hooe and Pevensey Levels is to hold the line and continue protecting the low-lying hinterland and shoreline settlements by maintaining the seawall, groyne and shingle recycling. Presently the shoreline is retreating, thus without ongoing beach recharge and maintenance of these defence structures all foreshore sediments would be lost very quickly. This situation will be exacerbated in the future; with sea level rise it will become increasingly probable that hard defences will be required to provide the adequate standard of protection in the long term.

**Medium-term:** The medium-term policy for Hooe and Pevensey Levels is to continue to hold the line, although the position at which this is achieved will become increasingly difficult with sea level rise and a continually diminishing sediment supply. To accomplish this, management practises may need to change to a more heavily engineered frontage at some point during this epoch.

**Long-term:** The long-term policy for Hooe and Pevensey Levels is to continue protecting the assets through a hold the line policy which may require substantial engineering structures. With numerous socio-economic, environmental and heritage assets at risk and the need to protect them, the character of this frontage will change, from one that offers a beach and associated amenities to **one that does not**, due to sea level rise and a lack of contemporary sediment entering the system.

## Shingle

**The issue of shingle is key to the whole future of Bexhill-on-Sea.**

The simple facts are these:

No shingle can get past Beachy Head from further up the coast towards Brighton. The sea's longshore drift waves scour the beaches of Eastbourne and since there is no shingle resource coming from elsewhere, the authorities have to pay have it dredged from mid-Channel undersea banks left over from the Ice Age flood of material when the English Channel finally opened.



If the Environment Agency continue with their current policy, they will heap up the shingle using diggers and slowly, even if the groynes were effective (which many are not), the shingle would arrive at Bexhill beaches.

However, as you can see from the above details, eventually there may have to be a recourse to hard landscaping with walls and revetments to stop the sea from flooding Eastbourne and Pevensey Marshes. Once the Environment Agency stop using shingle as a defence, so Bexhill's shingle will move slowly to Hastings, and we will be left with no shingle protection.

The effect of this can be seen at Rye Harbour, where the hard landscaping of the Rye Harbour wall of the River Rother has stopped the shingle and so Camber Sands is all sand blowing in the wind.

If Rother DC cannot afford to dredge for shingle at that point, then we will have to go for a new sea front with walls to keep the sea out. The beach shingle will be gone, and the tides will come in faster across the sands. The hard landscape types are shown at Appendix 2. We have to choose.



## Combe Valley Flooding

Just like Waller's Haven, there is a tide gate controlling the incoming tide risk at Filsham/Bo-Peep beach. The sea used to reach up the River Stordisdale (Valley of Brushwood) in the Iron Age, then River Asten (as the Combe Haven was called) as far as where Filsham Reed Beds is now. Bulverhythe was the medieval landing place of the people of Bullington, shown in the Domesday Book.

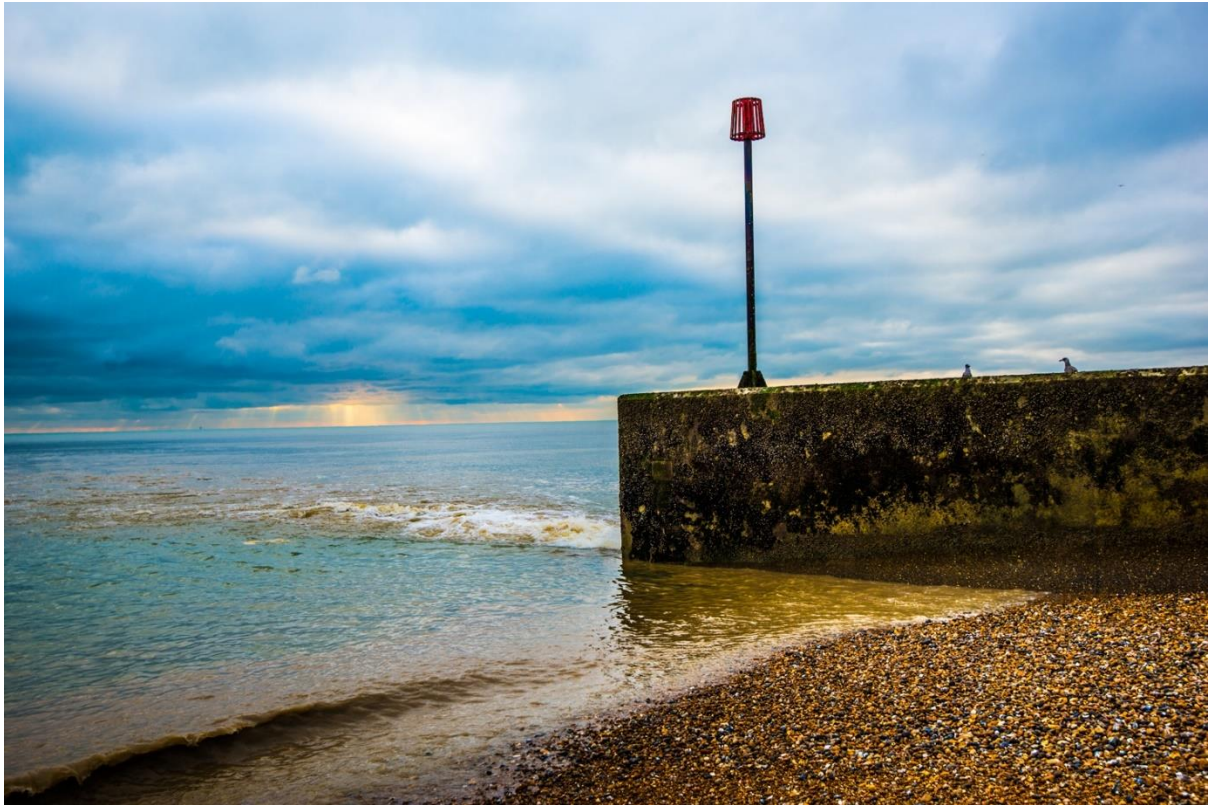


Combe Valley is a remarkable wildlife haven with thousands of birds in winter, of around 70 kinds. It is a unique winter-flooded valley, and it is also a place where beef herds graze in summer. It has to be kept from the invasion of the sea not only because of the above factors but also because there is a giant rubbish tip full of leachate which is now around 80 feet high and 1.5 kilometres wide.

As the tide comes in, so the tide gates shut. In heavy winter or summer rain, the valley streams, Watermill and Powdermill, fill up and flow into the Combe Haven river which then flows out of its banks and all over Bulverhythe Recreation Ground. This happens on a regular basis now.



*Combe Haven overflows causing the Caravan Site to put up emergency revetments.*



*The outflow of the Come Haven River at Filsham/Bo Peep, St Leonards-on-Sea*

Imagine then what things will be like when the tide gates are shut for longer because the tides are higher. Even though coastal defences will (hopefully) stop the sea, the Valley's natural water will flow over the A259 on a regular basis. It already does this from time to time and I can remember when the Army put a Bailey Bridge over the flood as it was so deep along Bexhill Road that cars could not progress without it.



*Bulverhythe Medieval Harbour is now a Recreation Ground*

I have put forward a formal written paper to the Environment Agency **at their request**, suggesting that because we have to deal with drought as well as flood, that a radio-controlled weir be set up at Filsham Reed Beds and that pumping by mechanical jetting into the sea should take place when flooding occurs at high tide and the gates are shut. I have also written to Southern Water about this, but they have not replied.



*We also have to think about the water table as the higher the sea is, the slower the water under streets and homes can drain away.*

*This is a typical scene at Bulverhythe in winter now.*

## Conclusion

The authorities are fully aware of the eventual rise in sea levels. No matter what we do to change our lifestyles and cut down greenhouse gas emissions, the Earth's processes will run on, like some oil tanker with huge kinetic energy – hard to turn or stop. People have been warning as far back as 1918 about the amount of coal we burned – hundreds of thousands of tons a year. Then in the 1960s, Rachel Carson gave a warning about wildlife loss in her book *Silent Spring*. It was politically unacceptable to heed these warnings and so we must now take remedial action for many years. The best policy is to be strong-minded and face up to the future. Regret is pointless unless it makes us reduce human mistakes.

**Homes at Risk.** There is still a difference in points of view that needs to be resolved. The Environment Agency says that 10,000 homes will be protected. Rother DC plan says that some homes on the crest of the beach may be affected. I will resolve this by the time of the next edition of the PDF.

**Local tides.** To monitor the change in tides, we can use the Hastings Pier tide radar. I have been in touch with the operators and here is their reply:

“The Hastings Pier tide gauge has been deployed since January 2017. While a time series of 6 years is not long enough to support conclusions about long-term trends in mean sea level, we do create annual reports based on the available data which include the mean sea level (Z0) for each year of deployment.



## The Way Ahead

The Bexhill Wild Domesday Project is funded for one year. Bexhill Town Council's Climate Committee will consider its future on 11<sup>th</sup> October. I hope they will find that the project is useful in advising the people of Bexhill how various aspects of the conservation of wildlife and landscape are progressing – and also allow it to continue for two more years to make conservation changes and enhancements.

The Environment Agency has asked me to comment on their plans and I will be working on a response shortly. I will also be checking the coast for changes and monitoring the effects of winter tides on the sea front.

We do have a beautiful town and so we hope that everything will be done to keep access to the beach and sea for as long as possible.



Kind regards from beautiful Bexhill-on-Sea

David  
David EP Dennis BA (Hons) FCIPD AFRHS LCGI RAF  
Bexhill Wild Domesday Project Manager  
Associate Fellow of the Royal Historical Society  
Sea Road Creative Research

Appendix 1 – The Saravanan Effect  
Appendix 2 – Hard Landscaping to stop the sea

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### The Saravanan Effect - Newtonian Gravitation

In addition to volcanoes, El Nino, North Sea chaos, and storms, we also need to face the effect on sea level rises of changes in local gravitation effects. When walking or climbing in the mountains, we think that rainwater will run downhill until it finds its own level, in some lake or in the sea. But when it does get to the sea, things are not that obvious; it is vital to our survival to understand what really happens.

The phrase ‘sea level’ seems to indicate that water will find its own level and that all sea surfaces will be the same height—as though the oceans are a bath of stable and placid cold water. However, although we know that sea levels vary depending on the position of the moon, sun and planets, we also must look at the effect of earthbound gravitational masses upon water. When water is heated it expands, and when it is displaced by a force it may rise up somewhere else.

This is most clearly shown in a deeply impressive, almost awesome way, by Saravanan in his excellent 2022 book *The Climate Demon*. He says on p.103:

‘The sea level will rise due to the thermal expansion of seawater in a warmer ocean and increased melting of glaciers and continental ice sheets.’

He then goes on to say on p.123:

‘Rising sea levels are among the most visible effects of climate change – and sea level rises have accelerated in recent decades ... and by 2300 it may have risen by half a meter, seriously impacting coastal regions...and due to the inertia of the climate system, the sea levels will continue to rise for centuries.’

He then explains the ‘bathwater sloshing effect’ which will cause some areas of the sea to be lower and some to be higher than normal sea level.’ On p.124 he gives what may be his most severe warning:

‘Say the Greenland ice sheet was to melt completely; it would lead to a catastrophic seven-meter rise in global sea levels. We might naively expect the rise in sea levels near Greenland to be about the same as, or even higher than the rise in other regions. But actually, it turns out that the relative sea level near Greenland would fall due to two regional effects. Currently the gravitational pull of the massive ice sheet is pulling the sea level up, and the weight of the ice sheet is pushing the local land level down. Without the ice sheet, not only would the real sea level drop, but the land would rebound upwards, lowering the relative sea level even further. Calculations show that this fall in sea level could reach up to 2,000 km from Greenland, returning land to coastlines from Newfoundland and Labrador to Norway.’

However, ominously, he goes on to say, in a direct warning for southern and eastern English coasts:

‘Further away from Greenland though, the sea level would compensate for this effect and rise much more than seven meters, devastating coastal communities. It is important that we rely on scientific modelling, rather than human experience or intuition, to understand long term climate change.’

Now the distance between London, England and Nuuk in Greenland is, as the crow flies, 2016 miles which is 3,245 kilometres. Since the coast of Sussex is therefore some 1,300 kilometres further from Greenland than the Saravanan ‘2,000 km’ limit detailed above, the implications of the Saravanan findings are that we in the south and east are at very high risk of a sea level rise, far more than we currently believe. Coastal Sussex and London could not survive a rise in sea level of more than seven metres, or 23 feet. Driven on shore by high winds in winter or a North Sea surge, the wave heights would overwhelm all coastal settlements and the London Basin.

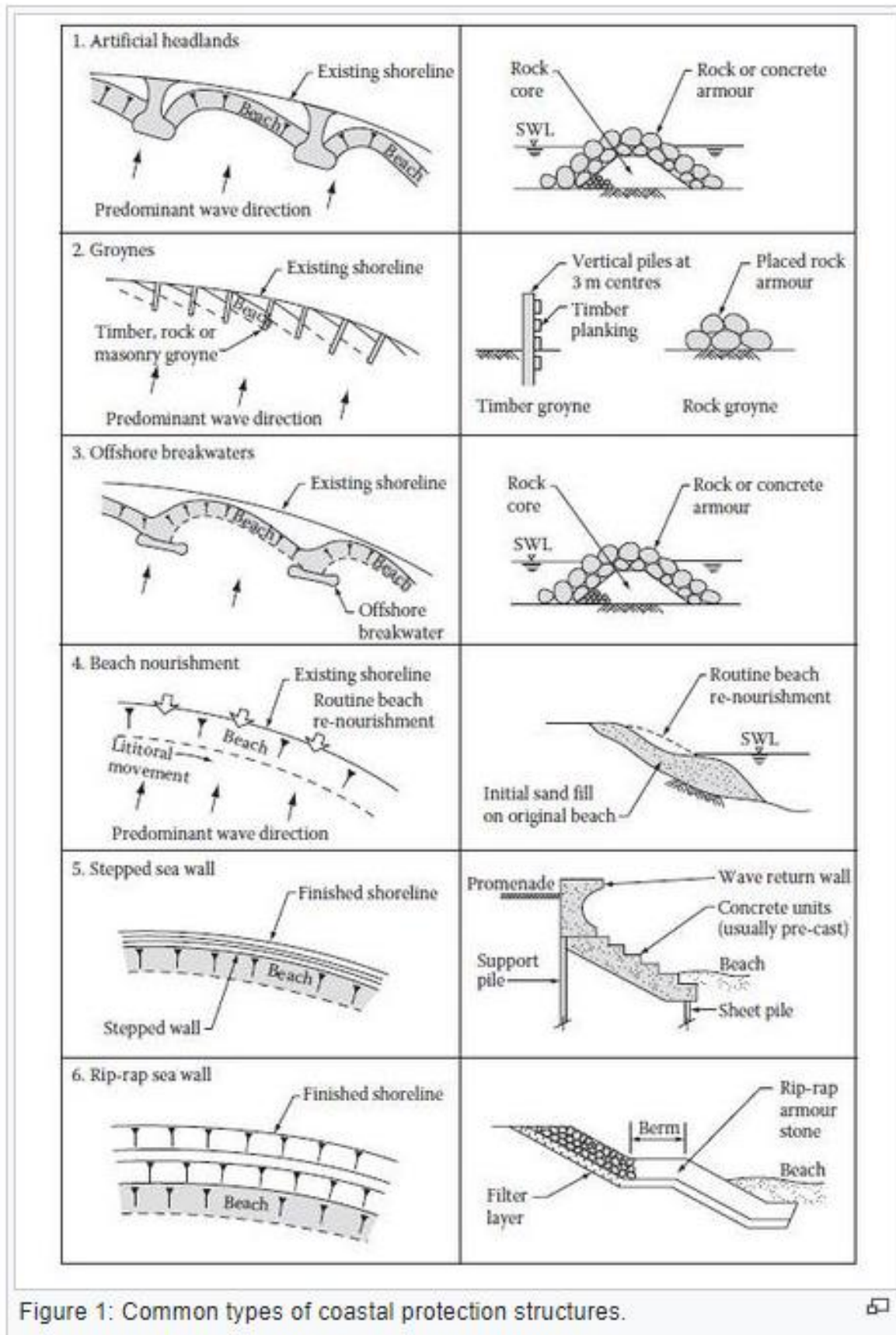


Figure 1: Common types of coastal protection structures.