

Your Ref:

Our Ref: MBG.COP.0

Please ask for: Mr M Goater

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Dear Brett

Erosion of the Purbeck Coastline

Purbeck District Council has a coastline of approximately 100km, which extends from Poole Harbour in the east to White Nothe in the west. The coastline includes the southern boundary of Poole Harbour and the islands within it. Most of the coastline of the district is undeveloped and, in general, the Council does not take any action to combat coast erosion. It is only where the coastline is developed that it is generally economic to carry out coast defence works.

There are two different types of coast defence works. There are works which protect against flooding of the land. These are called sea defence works and are carried out in accordance with the Land Drainage Act 1991. There are also works which protect against erosion. This is where the land behind the works is higher than any tidal flooding level. These works are termed coast protection works and are carried out under the Coast Protection Act 1949. The Government, by way of the Department for the Environment, Food and Rural Affairs, give maritime District Councils grant aid for carrying out works on the coastline provided that it can be shown that the works are technically sound and are environmentally, socially and economically justified.

Along this length of coastline, the only significant area of development, where coast defence works have been carried out, is at Swanage. Here there is a length of approximately 1.8km of coast defence works which principally involve concrete or stone sea walls and timber groynes. The original timber groynes were installed in the 1930's and subsequently a scheme was carried out which extended these along the whole developed beach frontage.

There are slips along the cliffs most years during the winter period, when the cliffs become very wet. The winter of 2000/2001 yielded the highest total rainfall for many years and as a consequence there were more severe and frequent slips on the cliffs.

A survey of the whole length of North Beach was carried out to establish the feasibility of carrying out protection works to prevent material falling on to the promenade, which is used by the public. The estimated cost, in 1987, was in the order of £350,000. As the primary protection by the sea wall had already been carried out, the sum did not attract grant aid and consequently the Council could not afford to undertake the work

In 1989 the Council carried out a scheme, to the south of Swanage, at Durlston Bay. The scheme provided protection to an area of land on which the closest building to the edge of the cliff was a block of flats, known as Durlston Cliff. The problem was caused by a combination of ground water and wave action. The cliffs below the flats are formed mainly in layers of Purbeck Stone and marl. Slips occurred in the material when it became excessively wet and the marl lost its strength. This provided a lubricated surface on which the blocks of Purbeck

Stone could slip. The slipped material then moved down to the shoreline where it was washed away, at the foot of the cliff, by wave action. To protect against the wave action of the sea, large armour stones, weighing between eight to ten tonnes each, were placed at the bottom. The cliff was then, in effect, rebuilt with rock fill using the armour as a gravity retaining structure. In addition, ground water was drained from the cliff and was discharged at the bottom to improve stability. I enclose details of the scheme.

In December 2000 a significant slip occurred in an area just to the south of the area where the 1989 scheme was carried out. The slip took away the coastal footpath and the gardens of adjacent properties. Changes in policy and the legislative framework mean it will be more difficult to undertake a major scheme to protect the built assets now at a greater risk. Unless some remedial measures, such as deep drainage, can be implemented to control and slow the rate of erosion within a managed retreat policy, then an accelerated rate of erosion may be expected to occur in response to predicted changes in climate. Some emergency works have been carried out which involved re-routing a stream which, following the slip, was flowing into the slip area. This should reduce the rate of erosion but is by no means a total solution.

In recent years there has been a significant change in the way that issues concerning the coast have been managed. This has arisen from the increasing awareness of the need for a closer working relationship with those dealing with the coast and neighbouring Authorities. Shoreline management plans have been implemented which have developed specific policies for dealing with issues on the coast. This Council has been involved with neighbouring authorities in undertaking these plans. The district's coastline falls within two separate plans. The plan for the western length, defined as sediment sub-cell 5g, is for the length of coast from Durlston Head to Portland Bill. The eastern section, from Durlston Head to Hurst Spit, is defined as sediment sub-cell 5f. Both plans are complete and are available in this office for inspection.

The purpose of these plans is to provide a strategic framework for the long-term management of the coast. The plans have assessed the processes acting on the coast, how these processes affect the sediment movement within the cell and the influences on the natural and built environment. The data collected has been used to establish the lengths of coastline where coast defence work would be appropriate and, alternatively, where works would be detrimental to the protection of the coast as a whole.

These plans were undertaken in two stages. The first stage involved gathering all existing data on the coastline and establishing what further data was required, as well as formulating a brief for the second stage.

The second stage developed a generic management option for each specific length of coast. This could be:

- to do nothing and allow erosion to continue;
- to control the amount of erosion by engineering techniques but retreat from the existing line of the coast;
- to prevent further erosion by maintaining existing or providing new defences on the existing line of the coast.
- to prevent further erosion by providing new defences in front of the existing line of the coast.

The preferred options have been set out in the plans which have now been adopted by the relevant authorities and will provide the framework for the management of the coast in the future.

How a particular management option for a length of coast is achieved may require a more detailed study and these have been termed "strategy studies". These would normally follow from the recommendations of the shoreline management plan. However, because there was a predetermined need to study the erosion problems within Swanage Bay a strategy study was carried out concurrently.

The purpose of the study at Swanage Bay was to appraise the effectiveness of the existing groynes, sea walls, and other coastal defences, as well as to look at where coastal defences may be required in other locations around the bay. The report recommended a scheme to increase the width of the beach by recharging with sand to make it more effective in dissipating wave energy. The main concern about the scheme was whether sand could be retained on the beach without control structures, the possibility of sand blocking the outfalls which discharge into the bay and the effect the movement of sand may have on other facilities and the natural environment of the bay. For this reason a further detailed study has been carried out which has involved the collection of more extensive data to develop and increase the reliability of the mathematical model of the coastal processes in the bay. When this work was completed, the recommendation was for replacement of the existing timber groyne field with rock groynes followed by beach recharge. This was assessed by the consultants as being the most economic scheme over a 50-year period. It was not, however, the cheapest scheme in terms of initial capital cost.

Consultations were carried out on this scheme and issues raised had cost implications for the proposals. A reassessment of the scheme economics was therefore carried out and this has resulted in a very small margin between the scheme costs between rock and timber groynes. As the local community has a preference for timber groynes, the consultant is now recommending a timber groyne and sand recharge scheme. The Council gave its approval to proceed with the design stage of this scheme in October 2004. The design has now been completed and work started on installing the timber groynes at the end of October. The sand for the beach recharge was originally programmed to take place in January 2006 but this has been brought forward to the end of November. The scheme is expected to cost about £2.2 million.

At the same time as considering a scheme for Swanage a study was being carried out to look at the possibility and impact of deepening the entrance to Poole Harbour and whether the dredged material could be used for re-charging the beaches at Bournemouth, Poole and Swanage. The study has shown there would be little impact to the harbour and therefore this material has been used for the recharge of Swanage beach with the benefit of considerable cost savings.

A strategy study in Poole Bay and Harbour has also been completed and the final report was dated February 2004. This includes the coastline from Hengisbury Head to Durlston Head as well as Poole Harbour. The report can be found on Bournemouth Borough Council's web site at www.bournemouth.gov.uk It is under residents/ environment/ assessment of flood and coast defence options.

Consideration is now being given to undertaking a second round of shoreline management plans and the boundaries for these plans have been reviewed. This Council will still be involved in two shoreline management plans. One plan will run from Hurst Spit to Durlston Head and the other from Durlston Head to Rame Head

You are welcome to view any of this information at these offices but it would be advisable to make an appointment so that the documents can be made available to you. You may have copies of this information at the Council's standard rate for photocopying.

Purbeck District Council is a member of the Standing Conference on Problems Associated with the Coastline (SCOPAC) and you may be able to obtain more information from the web site www.scopac.org.uk.

Part of the district's coastal boundary, running from the chalk stacks at Old Harry to the district's western boundary, forms part of the world heritage site. More information about the geology and geomorphology of this coast can be found on the web site www.swgfl.org.uk/jurassic.

I trust this information is helpful to you in your studies.

Yours sincerely,

Mike Goater
District Engineer

Supplemental

Brett
Following our discussion as a first effort please see attached.

With regard to subsidence there have been a number of incidents over the years of mining subsidence both to the underground Purbeck stone quarries around the Swanage area and to the clay mines at Norden. In addition there have been cases of subsidence due to inadequate foundations on soils which are either wholly or partially composed of shrinkable clays eg Bovington and Swanage. Elsewhere there have been problems with buildings constructed on alluvium eg Wareham and on peat eg Stoborough. Building control should be able to provide more information about this.

Hope this is of help
Mike