



SANDBANKS COAST PROTECTION

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Introduction

Sandbanks Peninsula is a low lying sand spit situated on the east side of the entrance to Poole Harbour in Dorset. Poole Harbour is one of the world's largest natural harbours and its extensive waters provide a haven for a busy commercial port and much recreational sailing and water sport activities. The mud flats and salt marshes are of great ecological value and Poole Harbour is a SPA, Ramsar and SSSI site.

At the beginning of the century, the Sandbanks Peninsula area consisted entirely of sand dunes apart from two coastguard cottages built in 1850 and a few wooden holiday homes. Sandbanks was part of the Wimborne Estate and during the 1910's, the first plots were sold off and some permanent homes were built. In post war times, the building of luxury residences with their own waterfront and slipway has escalated with the final infilling of smaller houses, bungalows and blocks of flats. Less than half the dwellings are used throughout the year as permanent homes, the rest being used as holiday flats and second homes. In 1929, the whole of the beach and present recreation ground consisting of 13 acres were purchased from the Estate for the sum of £13.

Marconi undertook many of his early experiments at Sandbanks, and is commemorated by a plaque at the Haven Hotel.

There is a ferry across the Harbour mouth to the Purbeck Hills - built in 1926 and replaced in 1957 and again in recent years.

On the south side of the peninsula facing out to sea is one of Poole's most important amenity beaches which has Blue Flag and Seaside Awards (Figure 1).

Sediment Transport

The movement of sand both onto and along this spit is very complex with, at times, parts of the spit showing accretion at the same time as erosion elsewhere. Sand transport takes place not only because of wave action, but also by the action of tidal currents within the East Looe Channel, which runs close to and almost parallel to the shoreline. The nearshore bathymetry is also ever changing, not only affected by waves breaking over the sea bed but also by rapid tidal flows along the Swash Channel and the East Looe Channel. There is onshore movement of sand from Hook Sand, lying seawards of the East Looe Channel, without which the Sandbanks frontage would not be stable.

The long term trend of sand transport is from west to east therefore it is likely that most of the beach sediment travelling along the Sandbanks frontage will reach the beaches at Bournemouth in due course and eventually travel the whole length of Poole Bay to Hengistbury Head and beyond. More puzzling is the original source of the sand brought ashore along the Sandbanks peninsula. There is some evidence of

south-westerly travelling sediment transport, driven by tidal flows, offshore from these beaches, reaching the eastern flank of Hook Sand. This may be the route by which sand reaches that sandbank, before subsequently moving onshore. However, it is less clear where this sand comes from. Originally, the erosion of the sandy cliffs along Poole Bay would have provided a great deal of sand, some moving east along the beaches under the action of waves, some perhaps moving west on the deeper seabed under the action of tidal currents. There is however, little supply of “new” sand to Poole Bay at present and this has necessitated beach recharge schemes to supplement the natural sand that remains.

History

An erosion problem was first identified on Sandbanks in 1896 when the Harbour Authority of the day constructed fourteen groynes along the seaward frontage to prevent the peninsula from being breached. This arrested the erosion and created a stable environment which allowed the accretion of sand for the period 1901 to 1924.

From 1955 onwards the groynes fell into disrepair but because of the width of the beach in this period properties were not perceived to be at risk from erosion. As the condition of the groynes deteriorated the majority were removed for reasons of public safety. By 1990 only three groynes remained located at the western end of the site adjacent to Midway Path. In 1991 a series of south easterly storms reduced the beach level considerably resulting in emergency works being undertaken in the form of the construction of a new rock groyne at Midway Path and local rock protection to sea walls. Subsequent emergency works were carried out in 1994 and 1995 consisting of an extension to the rock groyne at Midway Path and a new rock revetment to the east of the groyne.

Recent Coastal Protection Works

There have been two recent schemes.

Phase 1

As a result of the apparent increase in the erosion rate and the perceived threat to properties, in late 1994, specialist consultant HR Wallingford was commissioned to produce an outline design for a coast protection scheme to deal with the rapidly worsening situation. The scheme chosen built on the partial success of the Midway Path groyne and consisted of four additional rock groynes, one to the west of the Midway Path groyne and three to the east. Midway Path groyne itself was also extended.

The majority of rock used for the groynes was in the range of 3-6 tonne Portland Limestone which was delivered to site by road transport.

One of the major concerns of the design was the problem of placing a rock armour groyne, a potentially dangerous structure for individuals to walk on, by a beach which could have as many as 15,000 people visiting it on a typical summer's day.

Borough of Poole (BoP) was advised that legally, the groynes should be signed to warn the public of the potential dangers and that access onto the groynes was prohibited. Practically it was known that people would walk on the groynes in spite of all warnings. So it was decided to place a flat concrete walkway along the top of all the surface piercing groynes to make them as safe as possible.

These walkways are in constant use by the public and are considered to be of considerable amenity value.

Historically, the majority of Sandbanks consisted of sand dunes but due to residential development and the recent beach erosion they had been depleted considerably. As part of the works we undertook to regenerate approximately 1200m² of new dunes by planting marram and sea lyme grass. These are now well established to such a level that they are now inhabited by sand lizards

The Phase I scheme has worked well, attracting sand in very large quantities, thus, not only does the wider beach now protect the sea walls, but also their life has been greatly extended and public safety and amenity have been improved.

Phase 2

Despite the overall improvement along this groyned frontage, the beach further eastward continued to erode sufficiently to cause concern, with sea-front properties at risk of damage. The area affected covered a frontage of about 700 metres. As there was some uncertainty with respect to future beach evolution, BoP included in this scheme a contingency for future beach nourishment, should monitoring indicate that this is required. However, experience gained during the building of the Phase 1 scheme led BoP to believe that the new groyne bays would fill naturally from onshore transport of sand from Hook Sand.

The works consisted of constructing four new rock groynes and alterations to two existing groynes and was completed in spring 2001. The design of the works was very similar to Phase I. Each of the groynes has an independent concrete walkway section and the rock armour is Portland limestone in the range of 1-6 tonnes.

As with Phase I, it was also decided to re-generate sand dunes for this phase of the works. In order to achieve this a nursery area to grow suitable planting material was set aside at the rear of Sandbanks Pavilion. Seeds were taken from the grasses in the sand dunes created in 1995/6 and germinated in a greenhouse. When ready, the small plants were planted out in the nursery and then later transferred to the areas designated for sand dunes.

As with Phase I, Phase II has on the whole been very successful and has attracted sand in large quantities. Only the eastern end of the works has continued to have erosion problems. It has always been BoP intention to undertake re-nourishment works as a contingency should this prove necessary.

Beach Replenishment

Why - Although the erosion at the western end of Sandbanks is now managed by the recently constructed groyne it has continued in the central and eastern end. This has resulted in the lowering and narrowing of the beach. It was considered that during prolonged stormy conditions the concrete sea wall could be under threat of damage or collapse.

Where From - Poole Harbour Commissioners (PHC) were undertaking some dredging within the harbour. This was part of their maintenance programme on the navigation channels, which they have to carry out so the harbour can remain open as a commercial port. Some of the dredged material was similar to that on the beach and appeared to be suitable for beach replenishment. If we did not use the sand it would have been taken to sea and dumped and probably lost in the English Channel, so it could be said that by putting it on the beach the sand was being recycled.

Where and How Much 125,909 m³ (226,336 tonnes) of suitable sand were dredged. Of this some 83.9%, 88,031 m³ (158,456 tonnes allowing for a bulking factor of 1.2 in the Dredger's hold) was placed on the beach.

The normal movement of the sand on Sandbanks is from west to east, so more sand was placed at the western end to allow the wind and waves to move it over the main area to be protected over a period of time.

Beach replenishment is not on its own a long term solution and consideration will be given to 'beach control structures' such as groyne and breakwaters in the future.

The Works

A 750m long, 800mm diameter pipe was towed in three sections to the site by sea to connect from the dredger to the shore. The depth of the water restricted how close to the shore the dredger could operate.

The "Saga" a trailer suction hopper dredger commenced work on the 3 March 2003 material placed on the beach was dredged from the Main Swash Channel and the Middle Ship Channel. The dredger would collect material from one of the locations and then sail to the end of the pipeline located off the beach. Connecting to the pipeline the material would then be pumped ashore from the dredger's hold and it would return to the channel to dredge more material. The whole round trip took an average of 3-3½ hours. This process was repeated a total 71 times with the dredger operating 24 hours a day, each load was on average 1,830m³. The dredging was completed on 17 March 2003.

At the landward end of the pipeline coming to shore a "Y" section was fitted with a valve on each arm of the Y. Connecting 12m lengths of pipeline to either side of the Y material was then pumped in each direction along the length of the beach.

These sections of pipeline were placed parallel to the sea wall. Sand bunds were formed towards the sea side to create a lagoon in order to retain the sand on the beach

and avoid losses of sand to the foreshore. The sand/water mixture from the pipeline flowed in behind the bund where the sand settled out on the beach and the water returned to the sea at the end of the lagoon.

A bulldozer was then employed to profile the sand on the beach to the required level.

The total length of beach re-nourished was 1020m, increasing the width of the beach by an average of 50m.

Who paid - The Poole Harbour Commissioners paid for the dredging of the sand from the harbour. The Borough of Poole with 100% financial support from DEFRA (the Department for Environment Food and Rural Affairs) paid for the pumping and spreading of the sand on the beach.

As the sand is owned by the Crown Estate, which is property in the United Kingdom owned by the sovereign, Borough of Poole had to buy the sand. This normally costs just over £1.00/m³. However as we are using the sand for beach replenishment we buy the sand at a discounted rate of 48.5p/m³.

Possible Future Works

The Council is working with other Authorities and Organisations with an interest in the coastline to develop options for the management of the coastline within Poole Bay. The partners we are working with are: Bournemouth Borough Council, Purbeck District Council, the Environment Agency, Poole Harbour Commissioners and English Nature.

A strategic study is currently underway by consulting engineers Halcrow. This is considering options on how to manage the erosion problems within the whole of Poole Bay. Such options as groynes (either rock or timber), off shore breakwaters, beach replenishment, rock revetments and cills are being considered.

To date in Poole one public consultation meeting has been held to which over 60 local organisations and residents groups were invited. It is proposed to hold another public meeting in June or July of this year for the consultants to present the findings of the study.

When the report is published consideration will then be given to further coastal protection schemes to protect the private cliff top properties and the Poole beaches.

DCR
28 May 2003



Dredger Saga with pipeline pumping material to shore



Suction “arm” on dredger about to be lowered to start dredging



Creating lagoon to discharge material on shore



Material being pumped ashore



Bulldozer levelling beach



Beach before works



Beach after works