ENGINEER REVIEWS COAST DEFENCE PROBLEMS

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Mr. E. B. Wise Tells Traders of Plans for Highcliffe

Cliff Stabilization Might Cost £400,000

IT was hoped that work would start on the £90,000 coast protection scheme for Highcliffe in the autumn of this year, and with construction taking about a year, the effects would be seen in the summer of 1968, Christchurch Council's Borough Engineer, Mr. E. B. Wise, stated at the meeting of the Highcliffe and District Chamber of Trade on Monday evening. But he warned that there could be no guarantee of success with the scheme.

Mr. Wise, who had been invited to speak about the cliffs and beach at Highcliffe, the subject of much concern and a number of complaints by the traders in the past, also pointed out that the scheme would only deal with the problem of erosion by the sea. To tackle that of cliff stabilization would cost the borough an estimated £400,000, and at present the Council had no plans to carry out such work.

Mr Wise commenced by moving back in time 8,000 to 10,000 years ago, when what is now Old Harry Rocks and the Needles, Isle of Wight, were joined by a line of chalk hills, with an extension of the River Frome running through the valley. These hills, now of course under water, are known as the Dolphin Bank, and are at a depth of only 30 feet in places.

The soil in the bay was composed of gravel, clay and sand with very little resistance, and over the thousands of years the many miles of the bay had been scoured out by the sea and by weather erosion.

Another factor, said Mr. Wise, was that in this part of the country the land was sinking at the rate of an eighth to a tenth of an inch a year—about a foot in a person's lifetime—and over the centuries this had been continuing just as much as the sea had been eating into the bay.

On the south coast, he continued, there was a coastal drift from west to east, and these currents created a strong tendency for beach-forming material—sand and shingle—to work from west to east. But the Christchurch Ledge, a deposit of ironstone boulders**,** running out to sea from Hengistbury Head, had for a period acted as a groyne, retaining sand and shingle in large quantities and preventing it from moving eastwards.

About a century ago, said Mr. Wise, things began to change. The ironstone boulders in the clay of Warren Hill, at Hengistbury Head, attracted commercial interest and a company obtained the concession of working it. At first the stones most easily obtained were those on the shore and just off it, and these were taken away, in huge quantities, by barge to Wales. It was only later that the company moved into the hill and started quarrying.

As a result of the materials being moved from the shore and just beyond it, the sea was able to break through and a deep channel was scoured close inshore against the Head. Large quantities of sand escaped into the channel and streamed into the inshore part of Christchurch Bay, where a curious phenomenon took place.

The current took the sand in to the shore where it met the river flowing out. The two currents squeezed it between them and a long sandspit began to grow. By the time the Ordnance Sheets for 1859 were prepared, it had reached as far as Highcliffe Castle, but its length varied from time to time.

In 1935, Mr. Wise went on, the last breach of the sandspit took place, during a great gale, and about a mile of sand was pushed bodily on to the shore. Very shortly after that, Bournemouth Corporation decided to construct a groyne at Hengistbury Head to build up their own beaches, with the result that it "locked" the big supplies of sand in the bay to the west.

From that time—1937/38—onwards, the supply of sand to Christchurch Bay was cut off and the long sandspit did not grow again It remained in its present position, terminating near Mudeford Quay The beaches at Avon Beach and Friars Cliff were very full of sand, and although the sea started to encroach upon them, it was a slow process and it was not until after the war that erosion became serious Christchurch Council then acquired the land, and sea defence works were put in up to Friars Cliff and Steamer Point. This erosion had gradually worked eastwards and now Highcliffe was feeling the effects.

Until about the middle of the last century, Mr. Wise explained, normal erosion of the Highcliffe Bay had been going on, but it had been a purely natural process.

Anyone who had a beach hut on the cliff at Highcliffe and had seen it carried away in a landslide, considered it to be a catastrophe, but whilst it might be so to them, it was all part of a perfectly natural process whereby the coast tended to move back all the time. The only thing that helped was if there was a good beach to keep the sea away from the foot of the cliffs. But once the beach had gone, so, too, had the natural defence, and there was nothing in the substance of Highcliffe cliffs to resist the action of the sea to any great degree.

Returning to history again, Mr. Wise continued that about 1750 the Earl of Bute, Minister to King George III, built a castle at Highcliffe, which was about vertically where the beach is now, with quite a garden in front of it, but the cliffs were rapidly eroding. The Earl was ageing and his staff tried to patch up

the cliffs and kept the news from him. But after his death the castle was untenable and was abandoned.

The present Highcliffe Castle was built some 200 to 300 yards behind the site of the first castle. Lady Stuart de Rothesay decided to do something about the erosion, and put in a drainage system together with some concrete defence works at the bottom of the cliffs, which had lasted to this day.

In the meantime the long sandspit had grown and gave some protection. It was this, together with the very efficient drainage works, which had kept the Castle in such good condition.

Returning to the present day, Mr. Wise pointed out that to a person standing at the top, the cliffs at Highcliffe appear to be very much steeper than they actually are. In fact the angle of the cliffs is about 20 degrees only, an average gradient of 1 in 3. The clays of which they are composed vary in resistance, and this is the reason for the terracing of the cliffs.

If nothing was done at Highcliffe, there would always be landslides during wet weather or after hard frosts followed by thaws, and there were three causes of this.

Firstly, there was the flowing of water from the land through the cliff; secondly, in a dry summer the clay could become as hard as concrete, but in wet weather it was semi-fluid; and lastly there was the factor of erosion of the foot of the cliff by the sea.

Until about four years ago there had been relatively little erosion of the foot of the cliff because there was quite a good beach to keep the sea away, and over the last 50 years it had receded at less than one inch a year. But four years ago the process of erosion working up from the west reached Highcliffe, and in a very short time the beach was gone. Even in calm weather, at high tide the sea came to the foot of the cliffs, which it eroded. Thus a certain amount of support was removed and so the greater was the tendency for the cliffs to slide.

There had been various considerations as to how to stabilize the cliffs but the loss of the beach was an even more pressing problem, and the Council had had to decide whether the beach could be reinstated.

About two years ago, said Mr. Wise, the Beach Committee sent him to Norfolk where there was a very similar problem dating back to 1953, many miles of beach having been completely denuded and the sea going right up to the foot of the cliffs, which were also composed of clay, though of a different type. There he saw what very effective and quite spectacular work had been done to combat the problem, mainly due to an invention of one firm, Messrs. Mobbs & English, which was designed to build up beaches.

This consisted of a timber wall, or revetment, on the shore, about 50 feet from the cliffs and parallel to them. The revetment was built of very strong timbers with steel sheet piling under it to prevent undermining. It presented a sloping face to the sea and the timbers had a gap of about 2" between them.

When there were high seas running, the waves ran up the structure and any shingle being carried shot over the top and remained behind. Any sand would run through the gaps and so both these materials would be deposited and retained in the strip between the revetment and the cliffs. If it was successful it would keep the waves away from the foot of the cliffs.

Outside of the revetment were groynes as long as possible, also with gaps between the timbers. The ordinary type of groyne had the timber panels touching each other, with the result that the shore built up on one side, while on the lee side it was stepped down. This had a great disadvantage, because the sea ran round the end of the groyne and was deflected into the lee side, causing scour. With open, or permeable, timbers, the build up of sand took place on both sides and was distributed evenly.

At Norfolk, said Mr. Wise, where the work had been completed for some time, he found the beach had built up both behind the revetment and between the groynes, and it seemed so effective that he reported favourably and the Council decided to engage consultants to prepare a scheme. Before the consultants were engaged, the Council approached the Ministry, who maintained a hydrographical department, and it was their opinion, after visiting the site, that a scheme similar to that at Norfolk was the most likely to succeed. The Ministry had "sat on it" for a long time, but after one of their inspectors had seen the site, they not only approved the scheme, but agreed to underwrite it by means of a large grant. In fact, they and the County Council would be providing more than half the cost.

Mr. Wise said he thought the scheme was bound to be partially successful, but all sea defence works, he pointed out, had an element of experiment in them. When the revetment was constructed it would look like a considerable barrier, being about eight feet high, but the more successful it was, the more it would be buried, and there would be flights of steps over it to get to the beach on the seaward side.

From the point of view of Highcliffe as a resort, it was hoped that not only would there be a higher beach behind the revetment, but that the groynes would build up a beach outside it, which visitors and holidaymakers wanted and which would contribute towards Highcliffe's prosperity.

Mr. Wise reminded the traders that the scheme would deal with only one of the three causes of erosion, and the question of getting the cliff into permanent shape was quite another matter. It could be done, but would be most expensive, and would mean levelling the slope of the cliffs and introducing a system of drainage. The cost had been roughly estimated at something like £400,000.

He also gave a further word of warning. Since the beach had been lost some four years ago, he said, the bottom of the cliff had been cut back by about 30 or 40 feet. Even if the £90,000 scheme was successful, the erosion that had

gone before would still have its effect, and landslides could be expected to continue for the next five to 15 years as the cliff gradually adjusted itself.

Replying to a question from Coun. H. R. Bourke as to whether the Minister had given any encouragement to the extension of the present proposed scheme, Mr. Wise said that the Minister had drawn attention to the fact that works were to finish between the "public" cliffs and Culmore, that nature did not recognise such boundaries, and that the problem of erosion to the west had to be faced up to. But he was quite content that the part proposed should be constructed.

Mr. Wise added it was hoped, if the scheme was successful, that the beaches would start to build up back towards Mudeford.

Alderman J. Richardson wondered if the result would be the "shunting" of the problem over to Barton, if the Highcliffe scheme succeeded. Mr. Wise answered that this was so, and said the inherent trouble was that if you trapped sand you robbed those to the lee. But there was a limit to the amount of sand that could be retained, and if it did build up at Highcliffe it would then go on. He added that Lymington Council had not objected to their proposals, because they recognised that Christchurch had this problem.

Answering another question, he stated that Christchurch had not objected to Bournemouth's groyne at Hengistbury Head, probably because Christchurch at that time had never had to do any sea defence works and had no experience of them. But it was as well that they did not object to that groyne.

Explaining this, Mr. Wise said that before the groyne was constructed, as he had stated previously, there was the long sandspit off the shore, but there were no beaches at Mudeford or Avon Beach, which were just river banks. The beaches that were there now would disappear if the groyne was removed, and they would again have an estuary with fast flowing water.

Returning to the £90,000 scheme, Mr. Wise said that instructions had been given for bills of quantities to be prepared so that orders could be made for the necessary materials as soon as possible Sheet steel piling and heavy timber were in short supply at present, and it could take up to seven months before delivery.

Of a scheme for the stabilization of the cliffs, the Borough Engineer said that the cliffs would have to be graded to an "easy" angle, involving much movement of soil, and then there would have to be a system of under-drainage on the "herring-bone" pattern, followed by the planting of a very coarse grass mixture on the cliff face. The drainage system discharged vast quantities of water and kept the cliffs relatively dry.

At Herne Bay such a scheme had been successful for decades but it had been very expensive. There a main road and a number of houses had been threatened, and grant assistance had been in the region of 85%. Mr. Wise said he thought the Ministry would take the view that a similar scheme for

Highcliffe would be more of amenity value, and that the grant would be much lower—possibly 25%.

Mr. M. Graham asked what the condition would be of the beach behind the revetment at Highcliffe, and suggested that it would be rather difficult to keep clean. Mr. Wise replied that they expected it to be a mixture of sand, shingle and clay. It might not be very attractive to the eye, but it would be doing its main job of keeping the sea away from the foot of the cliffs and at least it would be somewhere to put deckchairs!

To a further question about how the scheme was to be paid for, Coun. Bourke answered that if the Borough borrowed £50,000 over 60 years at interest of 7%, towards their share of the cost, it would be less than a halfpenny rate, which he described as "chicken-feed."