

2. *History of Coastal Defences at Eastoke*

Since the early 1920s, the Eastoke peninsula has been increasingly developed as a residential area. The building of beach huts and bungalows commenced in the 1930s close behind the wide shingle barrier beach. However, natural retreat and loss of sediments from this beach made it necessary to build defences to protect these properties. In 1939, a concrete seawall was constructed in front of the old Beach Club, with a timber revetment (sloping surface) and groynes adjacent to it. By 1974, the seawall had been extended to the east and west, for a total of 2.6 kilometres. This seawall, however, did nothing to solve the fundamental causes of beach erosion, and wave reflections from its front face lowered the levels of the shingle beach, and by 1978 repairs to the seawall were required.

By the early 1980s, the Eastoke frontage was regularly overtopped by wave action, causing flooding and damage of many properties. The ageing concrete seawall was also approaching the end of its serviceable life and a failure could have led to shoreline retreat of up to 3 metres per annum and subsequent loss of properties. The frequency and severity of overtopping (water carried over the top of a coastal defence) events was increasing annually. In an effort to reduce the damage, a rear splash wall was constructed along the entire length of the seawall. These measures did not adequately prevent regular overtopping or storm damage to properties.

A major Beach Replenishment Scheme, carried out in 1985 has successfully alleviated further incidents of this nature by removing the energy of waves before it is reflected by the concrete seawall. The scheme involved importing half a million cubic metres of shingle from the Owers Bank and placing it on the beach over a length of 2.2 kilometres. Subsequently, there has been a requirement for ongoing shingle recycling to provide the necessary level of protection.

Such a large amount of material being injected into the sediment transport system resulted in the rapid transport of material along the frontage. In 1987, new timber groynes were built in order to try and control the transport rate along the replenished area and in 1990 a rock groyne was constructed to further reduce loss of material around Eastoke Point.

In 1992, it became necessary for emergency repairs to be carried out at Eastoke Point. These works involved the construction of 150 metres of rock revetment and rock stub groynes. These works proved to be successful and a stable beach was maintained. A Beach Management Plan was adopted in 1992. Although now expired, the objectives of this plan included:

- Continuous monitoring of the beach;
- Immediate reaction to any rapid drawdown, as waves remove material in a groyne bay (beach compartment between two groynes);
- Carry out annual beach recycling; and
- Use of material accreting (accumulating) at Central Beachlands as a source of material.

The success of the 1992 Beach Management Plan influenced the further management of the coastal defences at Eastoke. In 1999, the Council developed and approved a Beach Management Strategy Plan that identified the most effective approach to managing the southern frontage of the Eastoke peninsula. This decision was made after considering all relevant economic, environmental and technical criteria, and this Plan has been the basis of maintaining the beaches that are the first line of defence against the threat of coastal erosion and flooding along the Eastoke peninsula.

This Plan recommended defending the frontage against a storm event with a return period (average period of time between occurrences of a given event) of 1 in 200 years, which is achieved by:

- Annual shingle recycling operations, moving shingle from areas where the beaches have accreted to depleted areas where beach widths and levels were too low; and
- An annual Coastal Management Study.

Groynes and revetments are regularly monitored along the beach, with the profile of the groynes being adjusted by adding or reducing the number of planks to suit the changes in beach profile. Unfortunately, despite these measures, there is a net loss of some 5,000 cubic metres per year of shingle from the Eastoke frontage. This was anticipated, and led to the inclusion within the Plan of a further element, namely:

- When appropriate, beach material that has been lost offshore and deposited in the approach channel to Chichester Harbour is during navigational dredging and replaced on the beach. This is intended to partly recover the beach sediments lost offshore.

This deposition of material represents a serious hazard to mariners and the Chichester Harbour Conservancy is required to remove the material in the interest of safety. The Council, working in partnership with the Chichester Harbour Conservancy, can ensure that by dredging and returning this material back to the Eastoke frontage, it is not removed from the local sediment transport system. Extensive post-project monitoring of both Hayling Island and the Witterings (on the other side of the harbour entrance) has been carried out to ensure that any adverse effects of the operations are identified and that suitable mitigation measures are implemented.

In this report, this periodic dredging and replacement of beach sediments is regarded as part of the recycling operations rather than as a beach recharge, in which extra sediment is imported to the Eastoke frontage from some distant source. The operations undertaken in 1997, 2002 and 2007 to dredge shingle from the entrance channel into Chichester Harbour, and place this on the beaches to the west of Eastoke Point involved the pumping ashore of 25,000, 50,000 and 75,000 cubic metres respectively.

This 1999 Plan has been the basis of maintaining beach levels along the Eastoke frontage, but it became necessary to carry out a recharge operation in early 2008, using shingle dredged from a marine aggregate dredging area situated off the east coast of the Isle of Wight. This involved dredging some 25,000 cubic metres of shingle and placing on the beaches along the main southern frontage at Eastoke, i.e. to the west of the present study area. A further and similar recharge scheme is presently being planned. Figure 2.2 summarises the history of coastal defences at Eastoke until 2008.

At present, beach levels along much of the southern coastline of the Eastoke peninsula are being managed to provide an adequate standard of defence against coastal flooding and erosion. In addition, defences have recently been improved along the northern shoreline of the peninsula, reducing the risks from tidal inundation along that coastline. Around Eastoke Point, however, the shingle barrier beach and the seawalls and revetments behind it are not providing an appropriate standard of protection of defence. The 2006 coastal defence strategy for the Eastoke Peninsula identified the preferred option for the defences for the Eastoke Point frontage as “Hold the Line to a 1 in 200 Return Period standard of defence”, i.e. a 0.5% Standard of Protection. This decision was in line with guidance issued by Defra in their Flood and Coastal Defence Project Appraisal Guidance (Volume PAG3, Economic Appraisal). This recommends that defences for intensively developed urban areas at risk of flooding or erosion (Land Use Band A) at the coast have an indicative standard of protection to cope with a return

period event of 100 to 300 years (or an annual probability of failure of 0.003 to 0.01). This leads to a basic underlying assumption of the present study, namely that any coastal defence scheme for Eastoke Point should be designed, built and maintained to deliver this standard of protection without any substantial landward or seaward shift in the position of the existing coastal defences.

At present, the standard of protection provided by the coastal defences is low; our modelling during this study indicates 5 to 10 properties have the potential to be flooded by events which have a return period of two to five years.

Based on present-day conditions, a more severe event, with a return period of 50 years, would be expected to flood large parts of the Eastoke peninsula, and flood up to 30 houses, while a more extreme event still (200 year return period) would be expected to flood some 400 properties. These flood risks will increase as a consequence of rising sea levels as one result of global warming.

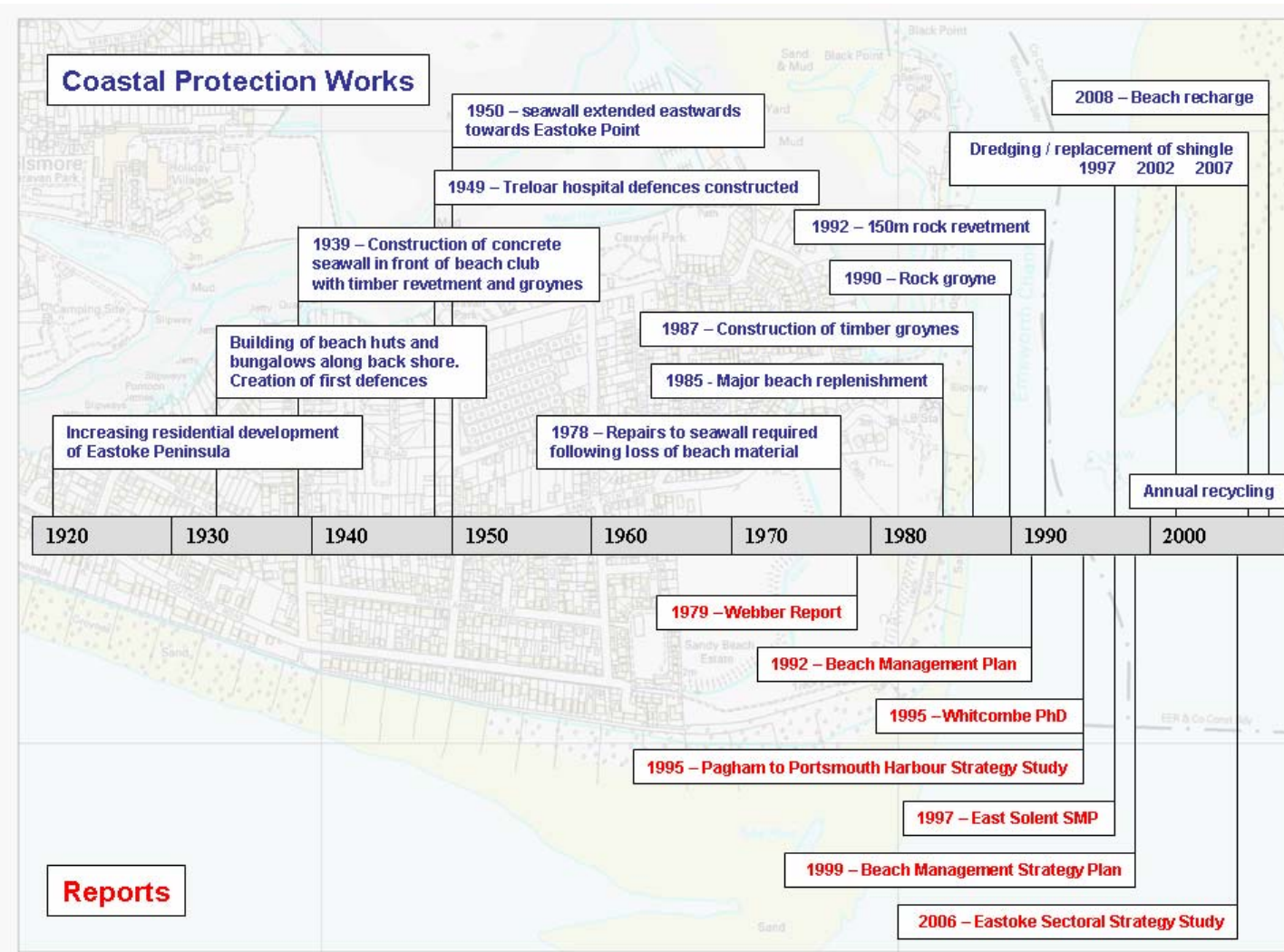


Figure 2.2 Development of coastal defences at Eastoke Point