



“Royal HaskoningDHV has shown outstanding commitment and drive throughout the various stages of the process and we look forward to the company’s help for the continuation of the project right through to construction.”

Ceredigion County Council

Coastal protection for the historic Borth

The threat of flooding and erosion is affecting more and more of Britain’s coastline and communities as many coastal defences are in desperate need of repair or replacement. As sea levels rise, the risk to people and property will increase. Particularly vulnerable is the beautiful village of Borth. Built on a shingle ridge in Cardigan Bay, Wales, it is home to around 1,500 people, which increases by 7,000 regular visitors who return during holidays attracted by its beautiful surroundings.

As the village of Borth has developed on a mobile shingle bank, with many properties built on top of the beach, it is vulnerable to flooding and erosion, requiring the construction of coastal defences. Ordinary storms affect properties every winter with overtopping flooding through homes and on to the high street, and few can get insurance. Ceredigion County Council is responsible for these defences, and together with consultant Royal HaskoningDHV has developed the innovative scheme currently under construction which delivers amenity as well as coast protection benefits.

The current 1970’s timber groynes and breastwork defences (also designed by Royal HaskoningDHV) were reaching the end of their life and there was a pressing need for further protection on the 6km frontage. The village and region has a strong relationship with its coast and consequently there is an active and informed local community committed to be involved in the future operation and development of its seafront. In developing a Strategy for the frontage, consultation clearly

signalled that any scheme would need not only to provide protection, but also to include amenity measures to ensure the long term economic sustainability of the town and region. Borth’s award-winning beach is popular for bucket and spade holidays, bathers, surfers and adventure enthusiasts, and a key measure identified by the community was the requirement to sustain or improve local surfing. Royal HaskoningDHV investigated this provision, and concluded in their 2006 Strategy that the way forward was to improve the defences by a £29m phased scheme of beach nourishment and rock beach structures, which included a multi-function artificial reef configured to provide both coast protection and surfing amenity.

Ceredigion Council secured funding from Welsh Assembly Government and Welsh European Funding Office (WEFO) Convergence funding for the £13.5m first phase of the Strategy, which is currently under construction by Contractor Bam Nuttall. However, the funding came with the requirement to spend over £5m in 2010/11 financial year. A January 2011 construction start put considerable pressure on the construction team to achieve this.

The current works include 150,000m³ of shingle nourishment, controlled by a series of onshore rock breakwaters groynes. At the southern end, where consultation had identified the need for open beach and views, the shingle is controlled by an innovative double reef located 400m offshore. This rock reef has been configured with surfing in mind.



Coastal protection for the historic Borth

Alice Johnson, Royal HaskoningDHV's NEC Supervisor for the construction, and project manager for design and development of the scheme, provides further details about the scheme:

“We have had a long association with Ceredigion CC and Borth, which has enabled us to build up a strong relationship with the local community. The design of the scheme has been significantly influenced by the people of Borth, who have strongly held opinions of what they want to see on their doorstep. Their support has been essential in getting the scheme through planning and other consents and approvals in the demanding timescales required by the funding. Their support is ongoing in the understanding of the construction phase and the inevitable disruption, which Bam Nuttall strove to keep to a minimum. The most significant element of the new defences, when they are completed, will be the broad shingle beach. The multi-purpose reef is a relatively new concept for use in coastal defence, and being located 400m offshore, it will be unobtrusive, only being visible when the tide is out. Waves will break over the reef, reducing energy to protect the beach from erosion, and encouraging the development of a wider beach inshore. Although the reef has been designed primarily to protect the shingle beach, it is shaped to help swell waves break, creating an additional surfing facility. Accordingly the design and layout of the scheme, has involved many studies including initial computer modelling of the shore and beach behaviour to develop an outline arrangement, which was further refined through 3D physical modelling by HR Wallingford. This model demonstrated the response of the design to ordinary, storm and extreme conditions at Borth, and was also used to assess the surfability of waves.”

We are proud to have been a key and lead part of the development, modelling, design and supervision of the Borth

Coastal Defence Scheme Phase 1 and for this have been awarded the George Gibby Merit Award and previously the Considerate Constructors gold award. I have also particularly enjoyed working on the project through the numerical and physical modelling and the design of the innovative structures within the scheme, alongside the involvement of the Borth community in the shaping of the scheme.

The tendered construction costs were reduced post-award during a period of design development involving client, designer, contractor and NEC project manager Atkins. A number of ideas were developed to be included within the scheme; most notably the use of a quarried replacement shingle to be buried deep within the beach and covered with natural shingle. This significantly reduced importation costs and resulted in a closer geological match to the natural beach sediments.

The fight against coastal erosion is on-going for Borth and this scheme addresses the first phase of the strategy to manage the risk over the next 50-100 years which will continue to increase as sea levels rise. Beyond this; further environment, planning and management approaches are required to address these issues raised in the emerging shoreline management plan.

We continue to further progress phase 2 of the frontage to the northern end of the village.

Alice Johnson

T: + 44 (0)1392 447 999

E: alice.johnson@rhdhv.com