HOUTRIB DIKE SANDY FORESHORE PILOT PROJECT
Business Case for Sandy Foreshores

Abstract

Context
The stated aim of the foreshore pilot project for the Houtrib Dike was to establish a firmer basis for faster sandy dike-strengthening operations, in particular in the load conditions in the larger lakes. The results from the project have now been applied in both present and future projects covered by the Flood Protection Programme. One of those projects is the strengthening of the Markermeer dikes between Hoorn and Edam in the Netherlands, which includes a sandy reinforcement approach (the 'shore dike'). The knowledge generated by this pilot project was also used to determine the dimensions for the sandy reinforcement of the western section of the Houtrib Dike and the sandy outer edges of the Marker Wadden.

Reports
In addition to the more technical basic reports, a number of guidelines were also drafted as part of the pilot project. This report looks at a study of 'upscaling' for the Sandy Foreshores Business Case.

Present report
This report is based on the knowledge developed in the Houtrib Dike Foreshore pilot project and it also looks at how the Houtrib Dike is currently being strengthened using sand. The emphasis is therefore on the IJsselmeer area. In addition, a broader look is taken at possible applications in the Lower Rhine and Wadden areas.

Details
The conclusion is that a sandy foreshore can be an alternative to conventional dike-upgrade approaches in certain conditions.

A sandy foreshore can be an alternative to dikes when the dike crest is not high enough or when a dike revetment is weak. However, a sandy foreshore is not a solution for piping. When macro-instability is an issue, a dune-for-dike solution may be an option.

In typical conditions, sandy foreshores are cost-effective for water depths of up to about 2.5 metres. This limit value may vary depending on location-specific conditions. For example, if the foreshore joins the dike at a lower point, the water depth may be proportionately larger. However, where there is a lot of settlement in the subsurface, the opposite is the case.

Sandy foreshores are a useful option only when there is a borrow location nearby (<5 km). In the case of smaller upgrade projects, it will be possible to use existing borrow locations. If a new borrow location is needed, the additional costs for research and permit procedures mean that the approach is useful only if a longer section is being strengthened with sand.

A sandy foreshore should preferably be perpendicular to the dominant wave direction. In these situations, wave reduction plays a major role but erosion as a result of net longitudinal transport remains limited. The sections in question here include those facing in a southwesterly direction. A sandy foreshore is also possible on more sheltered sections because longitudinal transport is limited here and the same therefore applies to maintenance. The potential wave reduction due to the sandy foreshore will therefore be less.

A sandy foreshore can make a major local contribution to leisure and nature development. However, the benefits in the form of costs prevented result seldom, if ever, in joint financing for a sandy foreshore. A sandy foreshore in locations designated as habitat directive areas

can have significant negative effects that preclude its implementation. There may also be major additional costs due to mandatory nature compensation. This factor is less significant, and it may even play no role at all, in bird directive areas.

The proper coordination of these variables requires an integrated design process that makes intelligent use of land and nature management objectives based on an approach designed to benefit nature. The creation of foreshores generates opportunities but also takes up space that is often already in use or for which there is a designated use.
Another factor of importance is how the manager of the flood defence can exert control over the sandy foreshore since guarantees will be required to ensure that the foreshore stays in place and that it can continue to work effectively as a defence in design conditions.

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