

FORESHORE PILOT PROJECT FOR HOUTRIB DIKE - GUIDELINES FOR CONSTRUCTION

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.

Guidelines

To complement the lessons learned from the construction of the trial section (EcoShape, 2015b), guidelines have now also been drawn up for the construction of a soft reinforcement approach.

They discuss factors that need to be taken into account during the construction and design of a soft reinforcement, in other words reinforcement with an earth body. The difference between the theoretical design and what can actually be done in practice is important here. The operational approach can also affect the design. Another important issue is how design and soil flows interact and the implications in terms of effects, permit conditions and integration in the locality.

The best approach to describing the construction method in a contract is also an area requiring attention, particularly when there are uncertainties in terms of settlement and the morphological development of the profile: management and maintenance are often an area of concern for the dike management authority and they should also be covered in this overview.

In parallel with the drafting of these guidelines for construction, a guideline document was also drafted for the permit procedure (EcoShape, 2016a). Where relevant, reference will be made to that document.

The guidelines begin with a brief review of the Houtrib Dike pilot project and the discussion points it raised. That includes a description of the differences between a small-scale structure of this kind and a much larger sandy reinforcement project (see section 1.2).

The discussion then turns to the interaction between the main factors: the design, construction and maintenance of a sandy reinforcement. The interaction between these factors is directly linked to the fact that a natural defence is being built with soil and that the costs depend primarily on the operational approach and the availability of the soil (see chapter 2). Table 1 on page 13 shows the mutual relationships and establishes links between design, construction and maintenance (in the different columns) and how they relate to flood risk management, soil flows, co-use, EIA, permits and the contract (in the different rows).

During the construction of a sandy reinforcement, it is advisable to make an explicit distinction between four types of measures:

- flood risk management;
- the maintenance layer and maintenance-limitation structures;
- the structures and projects for mitigation and compensation;
- the additional measures for the purposes of planned co-use (see chapter 3).

With regard to the design of the cross-section, a distinction can be made between different profiles. These are the calculated profile, the design profile, the construction profile and the dynamic equilibrium profile. The profiles are discussed in broad terms in these guidelines and they will be handled in greater detail in the 'design guidelines' that will be drawn up in the future (see chapter 4).

The required, possible and/or available soil flows for construction play an important role in the design of a sandy reinforcement and they are decisive factors in the determination of the associated costs. Areas requiring attention here are the structure, possible construction methods and the use of different sand fractions. The subsurface structure in the IJsselmeer area and the possible dredging schedules will also be discussed (see chapter 5).

Reinforcement operations in the IJsselmeer area involving local sand borrowing result in the release of a large volume of covering soil. The approach to managing this covering soil is an important consideration in the design process. It can be used for construction purposes, transferred to another borrow area or used for nature development (chapter 6).

The approach to the construction and design of a sandy reinforcement depends on the soil flows and the equipment used. In addition, the losses that occur and the effects of settlement in the subsurface also play an important role and it is essential to take the effects on nature into account (Chapter 7).

Areas requiring attention when applying for permits and drafting an EIA for the construction of a sandy reinforcement are the location and amount of sand extraction, archaeological and natural values, and turbidity during construction. In addition, possibilities for the storage of the covering soil (chapter 8), for example, must be taken into account beforehand.

Finally, contractual considerations are important. Efforts must be made to establish adequate latitude for the contractor's operational approach and for design options within a framework of minimum technical design requirements and permit conditions. The right incentives must also be in place to encourage a win-win situation for nature, landscape and co-use (chapter 9).

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