

A process to choose between different options to strengthen the Hondsbossche and Pettemer sea defences - NL

1. Policy Objective & Theme

- ADAPTATION TO RISK: Managing impacts of climate change and safeguarding resilience of coasts/coastal systems
- ADAPTATION TO RISK: Preventing and managing natural hazards and technological (human-made) hazards
- ADAPTATION TO RISK: Integrating coherent strategies covering the risk-dimension (prevention to response) into planning and investment

2. Key Approaches

- Participation
- Ecosystems based approach
- Technical

3. Experiences that can be exchanged

A process has been set in place in order to determine how to strengthen a section of dyke that is below the legal safety requirement.

4. Overview of the case

A section of dyke in North Holland no longer meets the legal safety requirements. Four alternative designs have been drawn up and an environmental impact statement (m.e.r.) is being conducted to determine which is the most environmentally favourable. A decision-making process, including strong participation is taking place. The strengthening should be completed by 2015.

5. Context and Objectives

a) Context

The Hondsbossche and Pettemer sea defences are two dyke sections and attached to each other in a longshore direction. They are located in the Province of North Holland along the North Sea and close the gap in the chain of dunes which was a former tidal inlet. They lie in the middle of four Natura 2000 areas and behind them are three polders, with an average surface level of MSL -1 m. and a total area of almost 5 km², a nature reserve and a residential area with houses located 40 m from the inland toe of the dyke, over a length of 300 m. Both dykes have been assigned the status of a Weak Link (Zwakke Schakel) of which there are ten in the Netherlands. In 2004 they were given a priority status which means that by 2020 a structural solution has to be found so that the defences satisfy Dutch legal safety standards.

The Hondsbossche sea defence has a length of 4.6 km. It has been improved several times (e.g. in 1953, 1976 and 1987). Most recently, in 2005, the dyke has been strengthened by replacing the grass cover on the seaward side with basalt. The different elevations of the stones produce extra roughness and, hence, decreasing wave-run and overtopping. This was meant as temporary measure so that safety standards are met for the time being. Additional measures are being developed to assure long term safety. The Pettemer sea defence has a length of 1,5 km and has, similarly, been temporarily strengthened, this time with a vertical, sheet metal wall and a raising of the crest height by 0.7m. A series of short groynes are located along both dykes. They are spaced at some 100 m distance and are elevated till around MHW (Mean High Water). There are hardly any

beaches in between the groyne cells.

The volume of wave overtopping is expected to increase in the future as a consequence of relative sea level rise and, therefore, a process has been developed for deciding on a more sustainable long term safety.

b) Objectives

The water board (Hoogheemraadschap Hollands Noorderkwartier) and regional provincial government are working on a plan that will see the sea defences strengthened to withstand a storm event of 1:10.000 for the next 50 years. The aim of the project is to find a balance between dyke fortification measures, spatial quality, and social acceptance.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

The coastal defences are managed by the principal Water board (Hollands Noorderkwartier). The Province has a controlling function and oversees the work of the water board. The central Government is responsible for the final decision of the defence measures. To maintain the basic coast line, the Central Government is responsible for sand strengthened measurements for the whole Dutch coast.

b) ICZM tools

Once these sea defences, together with a second (the “Duinen Kop van Noord-Holland”), had been recognised as being a weak link, the Province of North Holland initiated, in 1999, a multi-disciplinary project referred to as Kustvisie 2050 ('Perception of the Coast in 2050'). A report in 2005 presented different safety scenarios which would also improve the spatial quality of the coastal zone. In 2006, the Province made an initial choice for an overtopping dyke i.e. a dyke which waves can overtop to a maximum of 10 l/m/s in a heavy storm. This would involve strengthening the crest and inner slope of the dyke. That same year, it was recognised that the effects of climate change had been under-estimated and that this choice would not bring the desired safety and would need to be revised. As a result, in 2007 a new decision was taken to look at four different options. An Environmental Impact Statement procedure was also set up to look at the effects of the alternatives and the costs.

There are four options under consideration, three primarily strengthen on the landward side and one primarily on the seaward side. They are:-

- traditional crest heightening of 5-7m. This would entail the slope behind the dyke to be lengthened by 42m. with a stability berm of 30m. This would cause some cultural-historic and significant nature losses but the overall landscape would be unchanged. Access for the public and cyclists would be improved with nature areas developed in the polders.
- limited crest heightening (2m.) with a widening of the seaward slope and a 12m. widening landwards with a 30m wide berm. Recreation facilities would be realised similar to those in the traditional crest heightening study. This alternative still has to be designed and tested.
- coarsening the outer slope. Large rock blocks laid on the seaward slope would give a rough appearance and would be done in combination with a crown wall on the top of the dyke and the inner slope made erosion proof. A stability berm would be laid on the inner slope which would allow over-topped water during a storm to be caught in a gully which would be laid out as an attractive recreation area. In one place (Petten), a steel dam wall will be needed. The crown of the dyke would also be used for a bicycle path. This would be the cheapest option but maintenance costs may be higher
- construction of an extended and higher foreland. This will mean the addition of sand on the seaward side of the dyke 300m out to sea which would be used for beach recreation at Camperduin and Petten aan Zee. In between the recreational areas natural areas will be developed. The inner slope of the dyke would be made erosion-proof, again with a protecting berm. In this area, a visitor's centre would be built. Some nature areas may be lost although other areas and foraging areas for birds may be designated although no decision on this has yet been made. Sand would need to be suppleted every five years although it would displace along the coastline. This will also have a positive effect on the coast north of the dyke. In the future it can work as a 'sand motor'. Projects to strengthen the dyke in the future (after 50 yrs.) will be easier and can be implemented faster than the more conservative ways of strengthening dykes

The planning is such that in 2010, the EIA (m.e.r.) would be ready and must give the most environmentally favourable

alternative. Following completion, the Province and Water board as well as two municipal councils have accepted the alternative to extend seawards with an extended and higher foreland. This option will now be further worked out into a coastal defence plan in case the option is approved as the preferred alternative ("voorkeursalternatief" VKA). The State Secretary for the Ministry of Traffic and Waterways will also need to approve the choice for which a budget will have to be in place. This final decision is expected in 2010 with work starting in 2012 to be completed by 2015. The whole process is on target and this has been largely helped by an intensive interaction between stakeholders to ensure broad support for the final results.

7. Cost and resources

Costs are still confidential and are still being calculated to see how much the costs can be reduced.

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

All legal requirements for safety will be fulfilled.

9. Success and Fail factors

Communication with the local community and relevant stakeholders from the outset was deemed to be significant to the success of the work so far. The two partners organized various information evenings and gatherings for the residents about the solutions under discussion and the scheduling of the various activities involved. A website has been set up and a special periodical newsletter and articles in local media produced.

10. Unforeseen outcomes

None to date.

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13. Sources

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Aanvullend versterkingsonderzoek Hondsbossche (3.94 MB) 



ComCoast flood risk management schemes (9.04 MB) 



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Startnotitie dijkversterking zwakke schakel Hondsbossche (4.42 MB) 