

## Twin Dyke – Building with Nature for multiple benefits

The obvious solution to a sea defence problem is usually the easiest one to accept, because it's indeed so *obvious*. If a sea dyke is not strong enough for the consequences of future climate change, then it should be reinforced to meet the new requirements. However, beside an estuary on the southern shoreline of the Wadden Sea, the regional water authority and the provincial government proposed a daring, innovative solution that costs less, is nature-friendly, and potentially brings many additional benefits to the area. Completed in early 2020, the Twin Dyke is a test bed for a Nature Based approach to coastal flood protection.

### Higher, wider, stronger

Much of the Dutch coastline is protected by dykes that were constructed long before anyone had ever heard of Climate Change, and a massive programme of works is now underway to upgrade the country's flood defences. During the past five years, Regional Water Authority (RWA) Noorderzijlvest has reinforced 12 km of sea dyke between Delfzijl and Eemshaven beside the Wadden Sea, on the north-eastern coast of the Province of Groningen. In this project the existing sea dyke had to be raised, widened, and strengthened to withstand wave action resulting from higher sea levels and storm surges.

But over one section of the dyke, in cooperation with the province of Groningen, the RWA took a totally different approach.

### More than just sea protection

Kees de Jong, Strategic Advisor at RWA Noorderzijlvest: "In the middle of this 12 km dyke, along a stretch of 2.5 km, working with the other parties in the project, we found opportunities to create *multiple* benefits for the community at large, rather than simply keeping the sea out. For example, economic and ecological. What if we left the existing dyke as it is, and backed it up with another dyke land-inwards to catch any storm wave spill-over? We could then connect the enclosed area to the coastal waters during non-storm conditions. This would create a semi-natural ecological wet zone in which flora and fauna can flourish, as well as enabling economic activity." And so, the Twin Dyke project was born: two dykes enclosing a tidal zone normally open to the sea, divided into a south basin for natural tidal flows, and a north basin with controlled water inflow for saline agriculture.

### From concept to reality

An idea is one thing; convincing people is quite another. Kees de Jong: "The national flood protection programme provides funding for reinforcement of the existing dyke, so that was covered. In terms of the basic construction costs, the Twin Dyke solution was no more expensive than the standard reinforcement applied over the rest of the dyke. However, to realise the projected *extra* benefits, we had to make a business case together with the Province of Groningen for additional financing. For example, to enable commercial aquaculture or saline agriculture, you need a flow channel between the basins and the estuary plus water control infrastructure, and these need to be embedded in the sea dyke. Fortunately, additional funds were found by the province to realize the business case."

The north basin is reserved for future aqua/agricultural activity, aimed at generating jobs and downstream crop processing activity. This potential is based on pilot projects already taking place elsewhere in the Wadden Sea and in Zeeuws Vlaanderen.

Besides supplying water to the north basin, the tidal south basin will also serve to capture suspended clay particles from the estuary. During high tide, the murky water flows into the south basin, where the clay can settle out, leaving cleared water. Over time this is expected to generate a deposit of construction-quality clay, for example for future dyke reinforcement (economic benefit), while also improving the water quality in the estuary, and creating a foraging area for birds at low tide (ecological value).

Many potential benefits, it would seem. But is it realistic? Kees de Jong sums up: “Obviously we can’t *guarantee* the financial benefits that will result from the extra investments of Building with Nature in this way. Nobody has ever done it before, but it is a promising, ongoing experiment. Here in Groningen we’re fortunate to be working in a partnership that has shown courage and vision by being willing to invest, accept the risk and give this Nature Based Solution a chance. Without that, this initiative would still be just a pipe dream.”

[Article body: 615 words]

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Suggestions for below the article:

- The Twin Dyke is a subproject of the dyke reinforcement project Delfzijl-Eemshaven
  - <https://www.noorderzijlvest.nl/dijkeemshavendelfzijl/> (Dutch only)
  - [https://www.youtube.com/watch?time\\_continue=1&v=tTR\\_TONszKE&feature=emb\\_logo](https://www.youtube.com/watch?time_continue=1&v=tTR_TONszKE&feature=emb_logo) (360° video tour of the dyke, 5:20)
  - Elaborated Business Case – lessons learned from the Twin Dyke project (download link)
- Participants in the Twin Dyke:
  - Regional Water Authority Noorderzijlvest (execution)
  - Province of Groningen (execution, funding)
  - Ministry of Economic Affairs (funding)
  - Waddenfonds (funding) - investment fund for ecology & economy of Wadden Sea area
  - National Flood Protection Programme (funding)

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Spelling note: dike (US) or dyke (UK)? I prefer UK spelling – this is for Europe readership, not the US. Note that the ‘elaborated case’ document uses US spelling.