

Scheldt Sediment based groyne project Fort Sint-Filips

modelling, construction & monitoring

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Intro – Sigmaplan
Groyne modelling
Groyne construction
Groyne monitoring
Conclusions

Intro - Sigmaplan

645 kilometer

Flood defences (dijken, kaaimuren ...)

18

major 'ruimte voor water'-projects

7375

hectare nature development
(= 14750 football fields)

69

areas



Intro - Sigmapijan projects

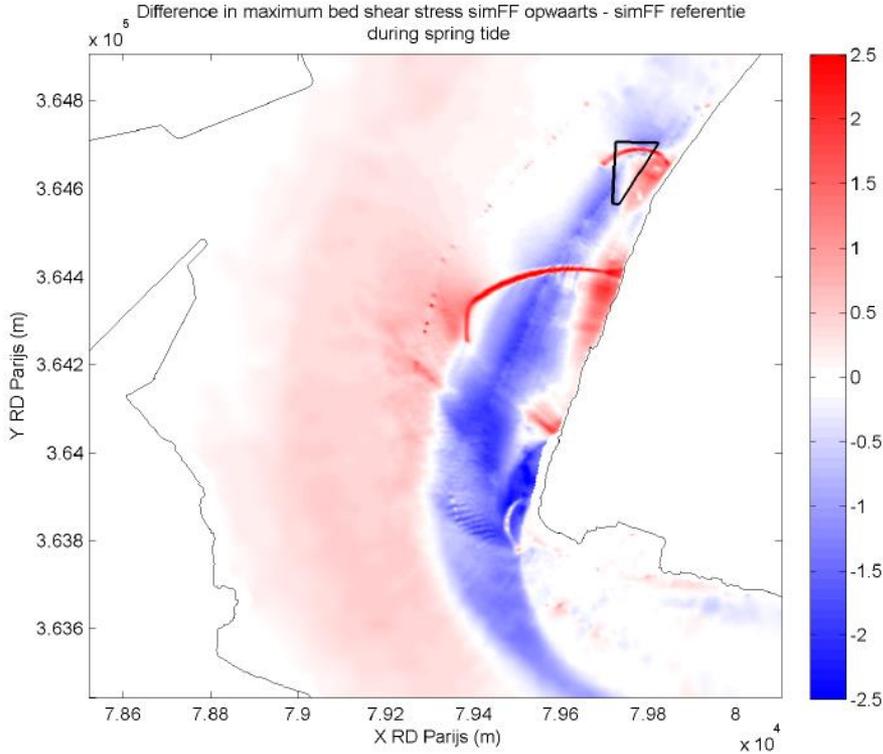


Scaldis3D Simulations (Flanders Hydraulics)

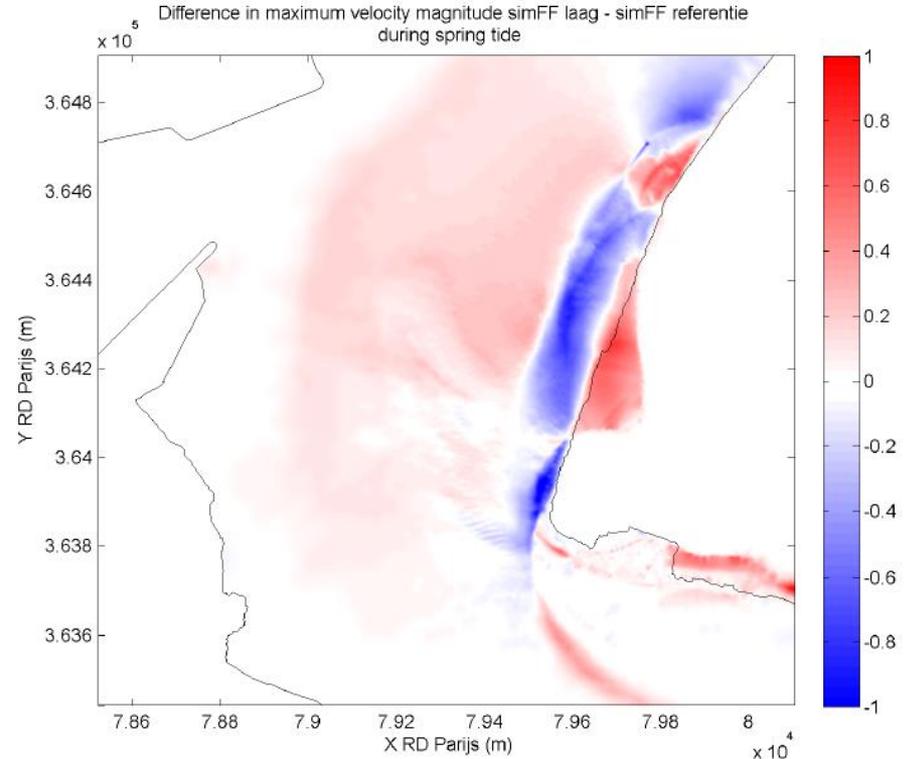
Groyne Modelling



Choose from different configuration of groynes
– shear stress as proxy for sedimentation/erosion



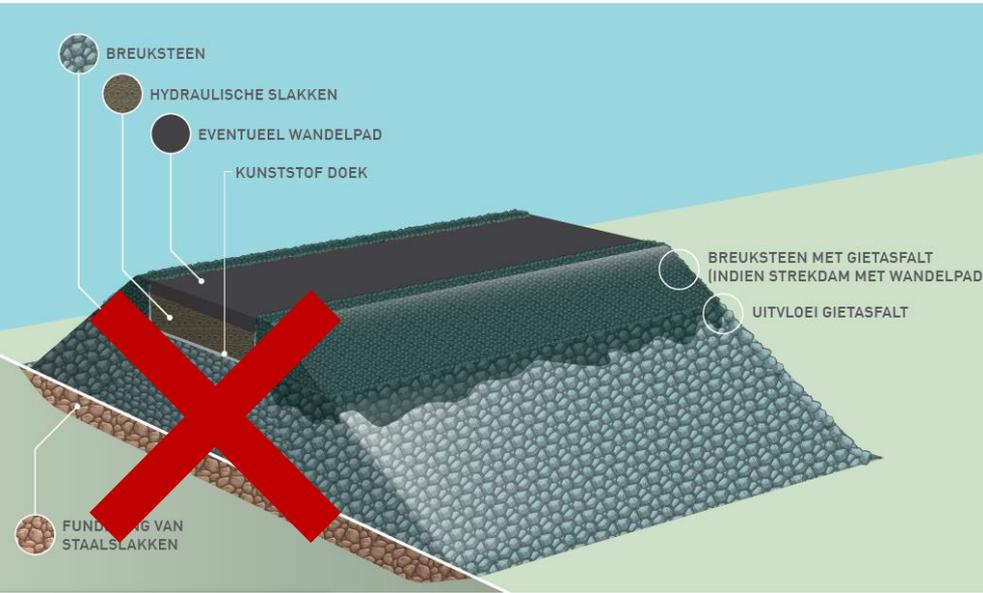
Figuur 20 - Verschil in maximale bodemschuifspanning (simFF_opwaarts – simFF_referentie) (Pa). Het driehoekige polygoon geeft de locatie van de erosieput weer.



Figuur 15 - Verschil in maximale snelheid (simFF_laag – simFF_referentie) (m/s)

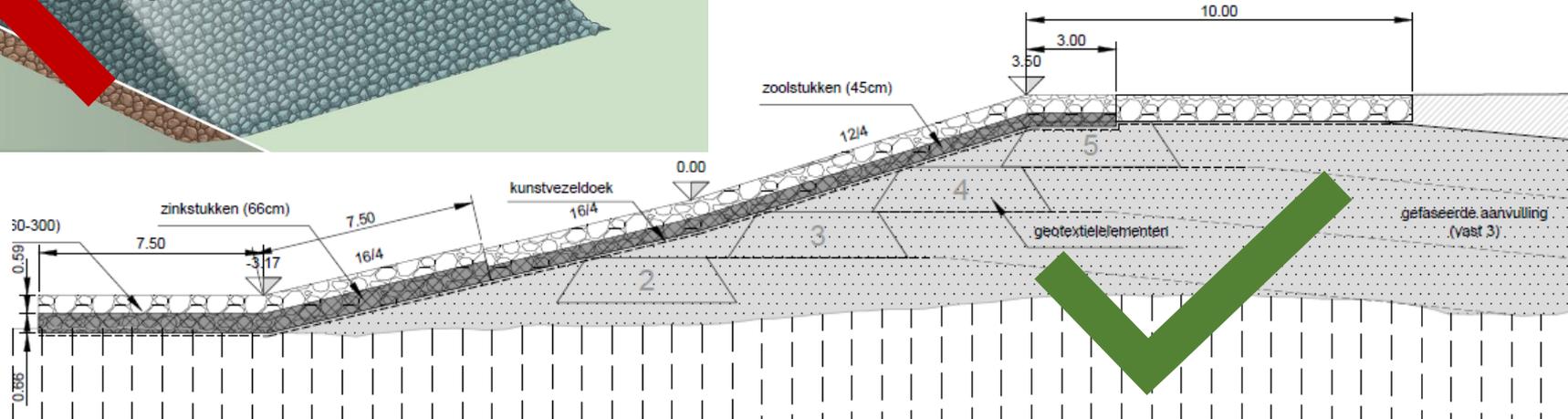
Groyne Construction

Core constructoin material = sediment not quarry stones:



Environmental + Cost Saving

- Less transportation
- Reusing dredged sediment
- No use of new natural resources





Step 1 : Constructing a temporary dyke with the Scheldt sediment stocks close to the groyne



Scheldt - Groyne Construction



Step 2 : applying 2 layers of protection against erosion –
Geotextile bags & Willowmattresses filled with quarreystones

Scheldt - Groyne Construction



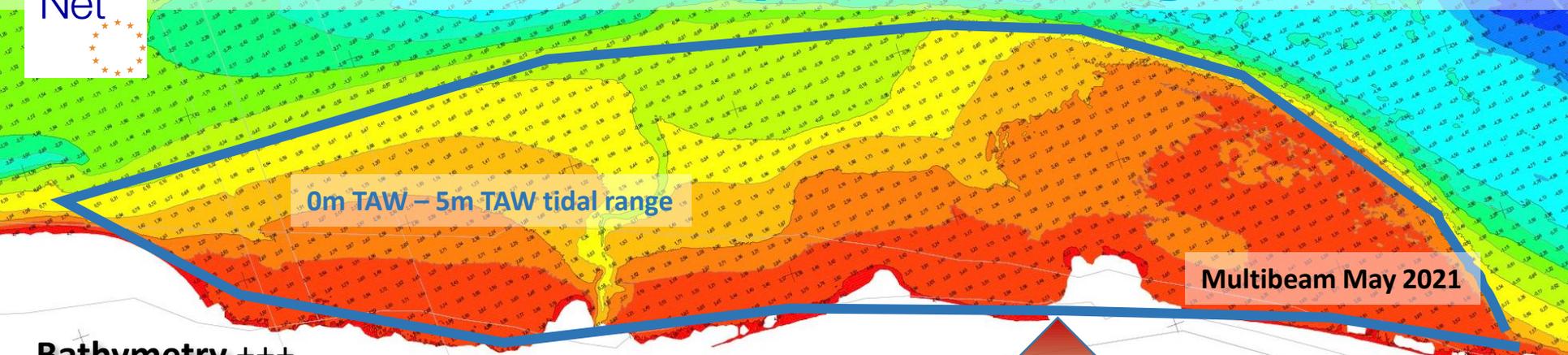
Step 3 - Lowering the temporary dyke on the groyne, reusing the sediment to create an area for estuarine development

Financial results

- + 10,000 m³ quarry stones
- + **117,000 m³ sediment**
- + 15,500 m³ geotextile elements
- + 10,800 m² willow mattresses

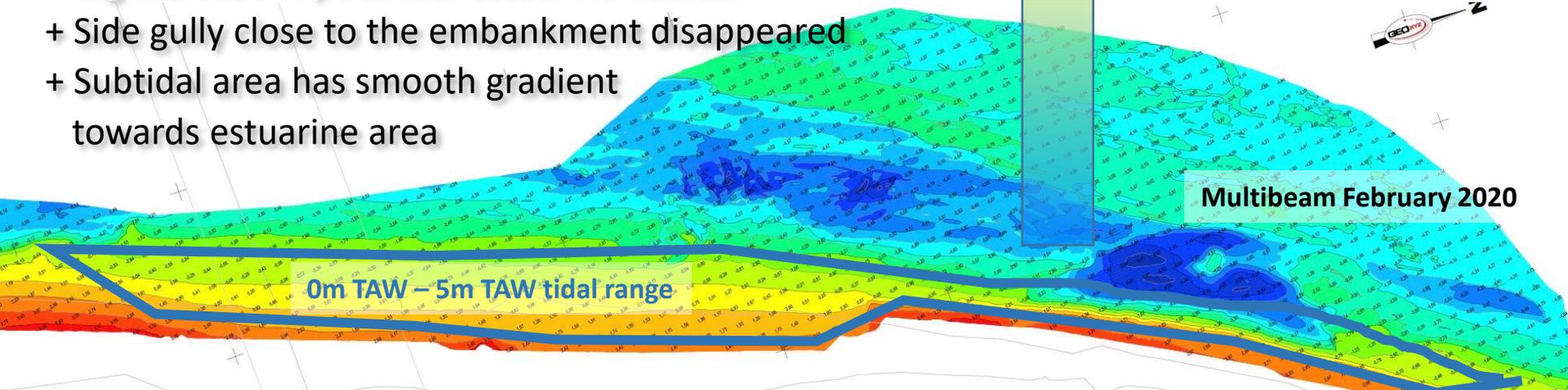
→ Total cost 2,466,000.00 € (*Standard design: 4,693,000.00 €*)

→ **50% cheaper !!!**

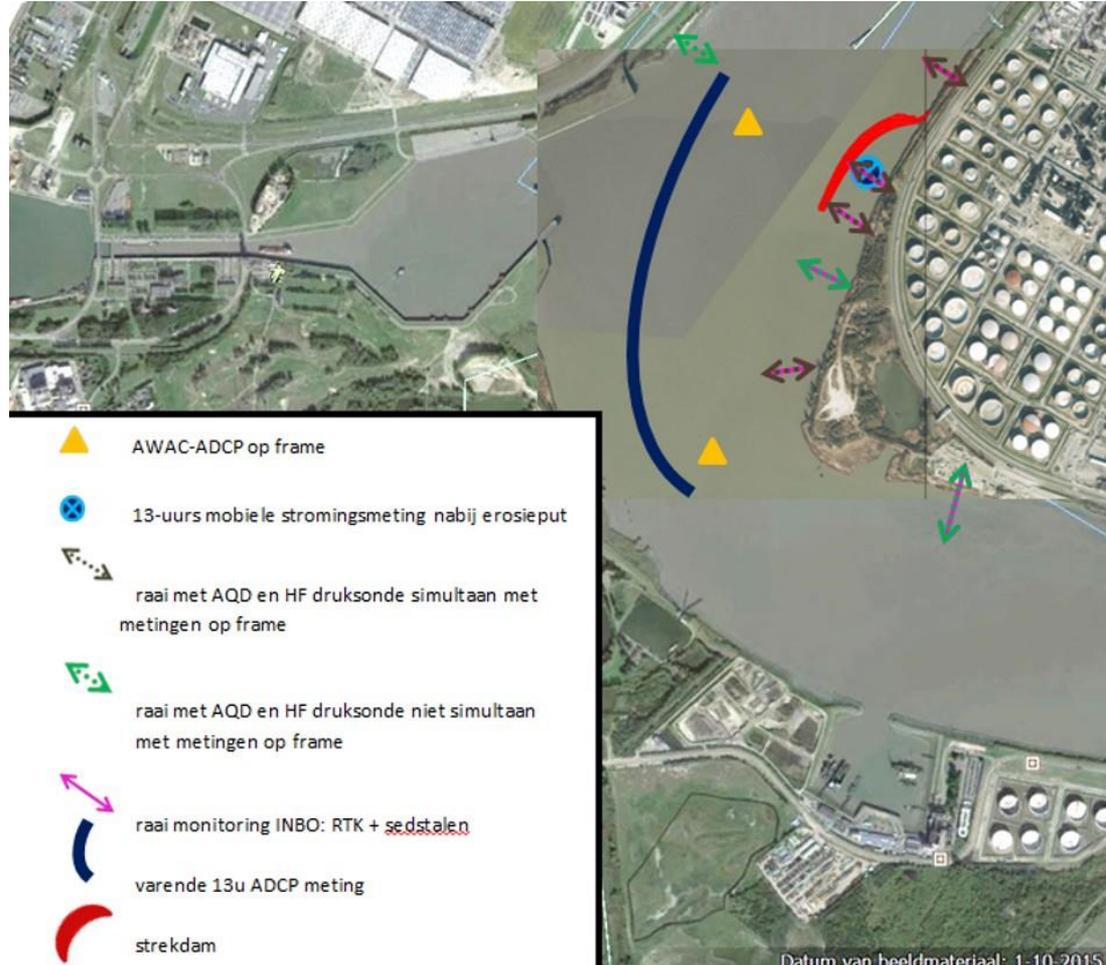


Bathymetry +++

- + Big increase in potential estuarine habitat
- + Side gully close to the embankment disappeared
- + Subtidal area has smooth gradient towards estuarine area



- T0 monitoring 08/2018
- *Construction 2019-2021*
- T1 – 08/2021
- T2 – 2022
- T3 – 2023
- T4 – 2024



Scheldt - Groyne Monitoring – 4 years period

- Water velocity in proximity of groyne T1 → T4
- Nature development behind groyne T2 → T4:
 - Morphological : surface - velocity, flood duration, wave amplitude , granulometry of sediment
 - Ecological : development of (hyper) benthos, development of tidal vegetation (reeds ed.), evolution of species and numbers of foraging water birds
- Effects up – and downstream the groyne
 - Water velocity in intertidal areas
 - Benthos and evolution of tidal vegetation
- Changes in bathymetry



Conclusion - Scheldt Sediment based groyne



Financial benefits 50%



Nature goals & sustainable compared to quarry stone



Extra benefits as part of a big soil sanitation project



Funding & Exchange of results (Interreg Smartsediment)

info : <https://www.grensregio.eu/projecten/smartsediment>
<https://sigmaplan.be/nl/projecten/dijkwerken/>