

DP2.8 The December 2013 storm lessons learned in Belgium



Tidal Scheldt → Sigmaplan
Flemish Coast → Coastal Safety Master Plan
Lessons learnt

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Sigmaplan
Ontmoet de Schelde



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flanders
HYDRAULICS RESEARCH

Sigmaplan - WHY? A little history (1976 | 2005)

- **Sigma, the Original °1977**
 - **Why?** 1976: 800 ha of Flanders flooded
 - **Goal?** Protection of the Sea Scheldt on 1/10.000 storm
- **Sigma 2.0. °2005**
 - **Why?** ClimateChange&Adaptation | Scheldt estuary LT 2030 | VL/NL NOPSE | IntegralWaterManagement | Finish S/Σ°1976
 - **Goal?**
 1. Stimulate multifunctional & sustainable use of waterways
 2. Ensure safety & reduce flooding risk
 3. Manage living, enjoying & experiencing the river

Flood risk management policy



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WHAT ?

protect the Flemish coastline and the hinterland against the impact of a 1000 year storm flood and prevent large scale floodings, taking into account climate changes till 2050

estimated sea level rise in 2050: 30cm

→ **Coastal Safety Master Plan**

A 'man made' coastline



A low-lying hinterland coastal groyne



Coastal Safety MP: beach nourishment as main protection measure

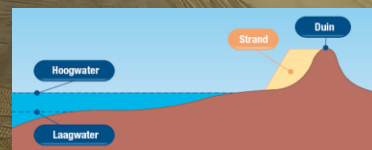
foreshore nourishment



beach or dunefoot nourishment

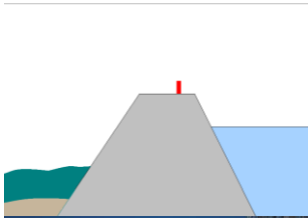


dune nourishment



Coastal Safety MP at coastal resorts with sea walls: sometimes additional 'hard' protection measures

Storm wall



Opportunity to renovate sea wall promenades (Ostend)



Storm walls (simulation)
(De Haan-Wenduine)

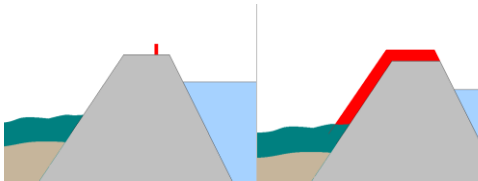
Stilling wave basin
(Ostend)



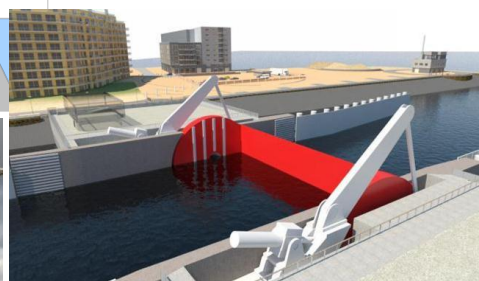
Stilling wave basin - principle

Coastal Safety MP - harbours: close or protect all around

Storm wall or heighten quay wall



Storm surge barrier (simulation)
at Nieuwpoort harbour

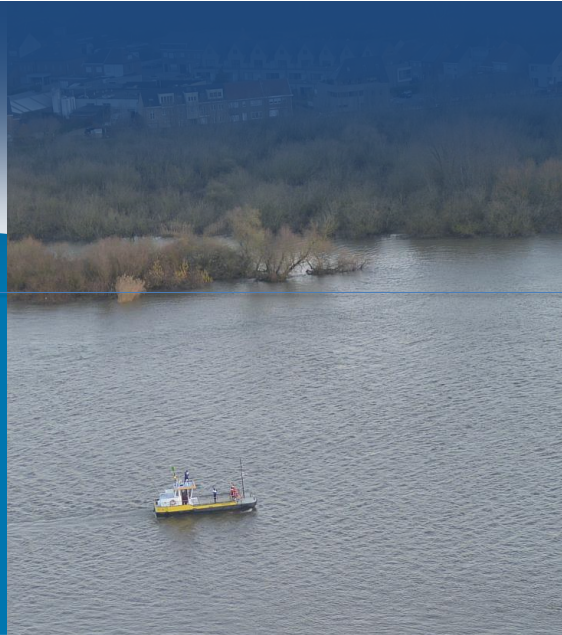


Storm wall (simulation)
at Zeebrugge harbour



Reinforce dams, locks and sluices

Lessons Learned December 2013 Storm Belgium



SigmaPlan
Ontmoet de Schelde



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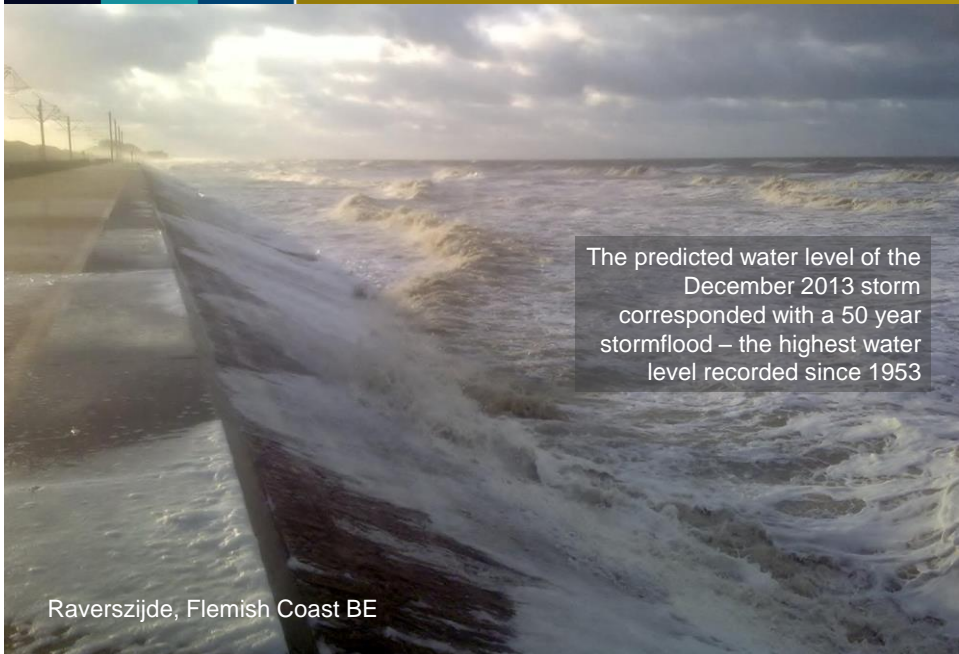


Vlaamse Regiering en Zeeakkoord N.V.
weg van water



Agentschap voor
Natuur en Bos

06/12/2013 Storm – understanding the risk



The predicted water level of the December 2013 storm corresponded with a 50 year stormflood – the highest water level recorded since 1953

Raverszijde, Flemish Coast BE



Adaptive Sigma|Plan measures shown to be futureproofed

- Sigma in action in 10 areas!
- Understanding the risk : FREEBOARDMAPS (WL)
- No mayor problems, due to:
 - No upstream drain from precipitation
 - Storm mainly offshore, onshore relatively less strong
 - The offshore storm was toned, with more moderated impact

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December 2013 storm: preparedness - mobile storm wall on the sea wall in Ostend



PREVENTION :

- mobile storm walls were built up and closed
- port piers and promenades closed
- tunnels for beach access closed
- locks and sluices were reinforced
- all coastal maintenance contractors on stand by

Additional Measures

- Sandbags in critical areas
- Shut down underground constructions and parking spots
- Closing the coastal road in Ostend

December 2013 storm: Coastal Area



- Main damages were:
- essentially losses of sand;
- sand cliffs on the beaches

Response

waterbouwkunde
LABORATORIE



• Waterways & Sea Canal:

- Surveillance on levees during highwater event.
- Closing gates in Antwerp and other structures to avoid water damage/flooding.

• Coastal Division:

- Regional coast protection plan activated
- Evacuation in Bredene



Response

- Extensive high water reporting:
- Helicopter flights



LESSONS LEARNED December Storm

- Most critical : harbour area > finalisation on protection measures is urgent
- Sense of urgency for additional beach nourishments is needed. This measurements have shown to be very effective
- Although the sand losses were modest, the beach and foreshore need to be nourished. It has shown its efficiency



LESSONS LEARNED December Storm

- **Predictions were reliable (Flanders Hydraulics Research | WL)**
- **Large visibility highlights need for Sigmaplan!**
 - Antwerp 7,23 TAW (+1,49 m), leaks show urgency of Quay Wall stabilisation
 - 10 out of 12 controlled flooding areas show off
 - There is room 4 more; only a few active FCA's 100% filled
- **Crisis team list with people who 'need-to-be-present':**
 - Has to take into account 2 periods; (extreme + following normal storm tide)
 - Augmentation of capacity and more people on 'stand by'
- **Crisis communication needs some fine tuning**
 - At the RIS warning system, technical failures should be avoided
 - Waterinfo.be needs to be ready for use
 - Do not underestimate the power of Social Media for avoiding panic reactions

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