

TOWARDS SOLUTIONS I

Storing the water: flood protection & creating ecological benefits

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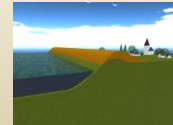
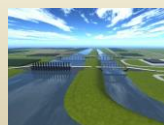


Sigmaplan: Protects Nature and People Blue & Green improvement

Sigmaplan



1. Who? The Sigma Plan, roles & research
2. Why? Sigma, the original & Sigma update 2005
3. What? Operating principles
4. How? Sigma so far? *study, decide and implement*



WHO? Roles & Research

FLEMISH GOVERNMENT

Department Mobility & Public Works

WATERWAYS & SEA CANAL (W&Z)

Agency for Nature and Forest (ANB)

Multifunctional approach partners

Research

Universities /UA, Ugent, KUL
Flanders Hydraulics Research/WL
Institute4TechnologyResearch/VITO
Institute4Nature&Forest /INBO)

Consultancy (IMDC, Technum-Tractebel
Engineering, Antea, Arcadis, Grontmij,
Haskoning, SBE, ...)

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WHO? Waterways & Sea Canal

W&Z Independent Agency

Runs water ways and surrounding Area in Flanders

Waterwegen en Zeekanaal NV

- afdeling Zeeschelde
- afdeling Boven-Schelde
- afdeling Zeekanaal
- nv De Schepvaert
- nv De Schepvaert
- Agentschap Maritieme Dienstverlening en Kust
- afdeling Kust
- Afdeling Maritieme Toegang
- afdeling Maritieme Toegang

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WHY? A little history (1976 | 2005)

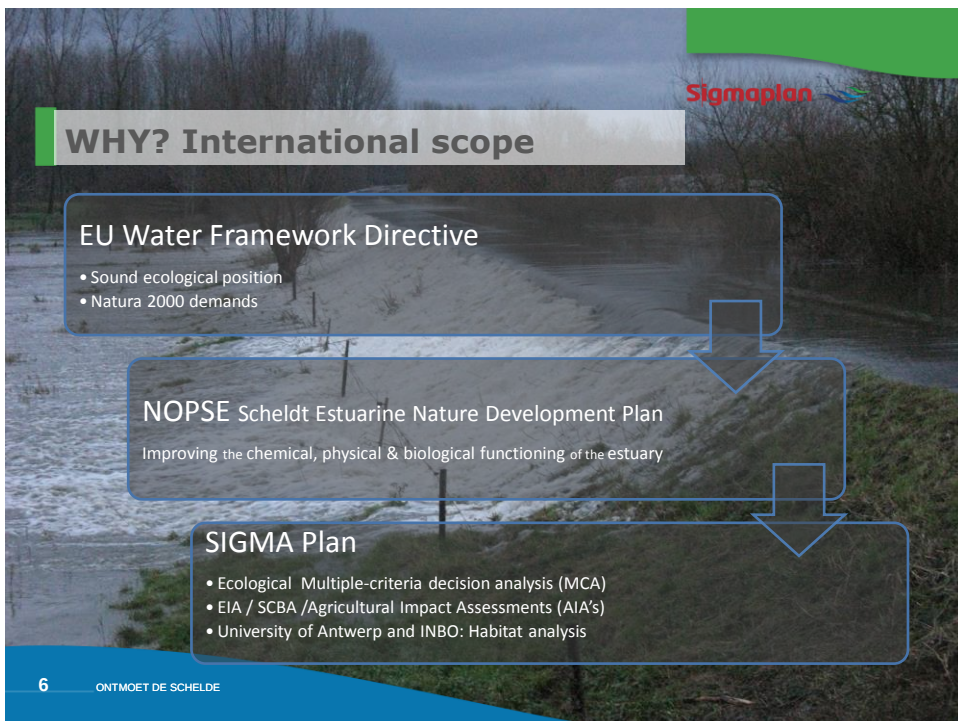
■ Sigma, the Original °1977

- **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 rivier

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WHY? International scope

EU Water Framework Directive

- Sound ecological position
- Natura 2000 demands

NOPSE Scheldt Estuarine Nature Development Plan

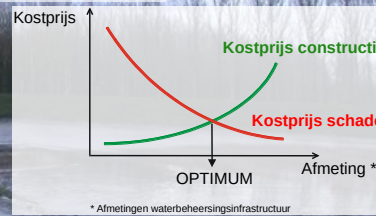
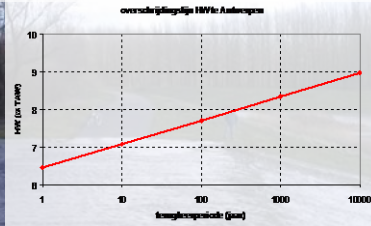
Improving the chemical, physical & biological functioning of the estuary

SIGMA Plan

- Ecological Multiple-criteria decision analysis (MCA)
- EIA / SCBA /Agricultural Impact Assessments (AIA's)
- University of Antwerp and INBO: Habitat analysis

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WHAT? New Safety Concept



NEW Sigma Safety Concept : 'ROOM 4 the RIVER' approach



1. New river areas (de-poldering | shift the embankment)
2. Flood controlled areas (FCA with outlet sluice)
3. Upgrade: FCA + 'controlled reduced tide' (GGG/CRT)

WHAT? Room4theRiver: Operating principles

1. New River Areas | De-poldering

New Dike

Dike removal





WHAT? Integrated project...**Objective Nature:** Enhancing Natural Quality & Life Cycle

- Allow the sustainable development of the Scheldt ecosystem (WFD)



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ONTMOET DE SCHELDE

NOW? Sigma So Far: F&F

- dykes = 645 km → 512 km finished
- $\Sigma 1.0 = 1133$ ha → 533 ha finished
- $\Sigma 2.0 = 3344$ ha → 146 ha finished

(Lillo, Lippenbroek, Bergemeersen, Paardenweide)

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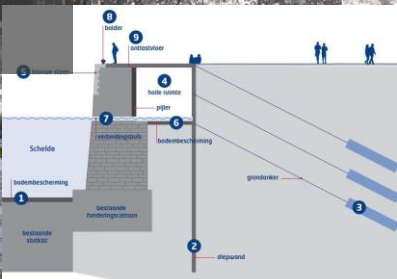
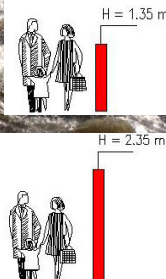
ONTMOET DE SCHELDE

Sigma2day: Different type of projects Protecting Antwerp against Flooding

Sigmaplan

- **Scheldt Quays Antwerp= City Sigma Project**
- **Unique in many ways:**
 - Symbiosis of updated safety Infrastructure, quay wall renovation and a new public domain;
 - Participation with city of Antwerp and locals;
 - Specific Renovation in line with Heritage

1. Restore ancient connection between Antwerp citizens & the river Scheldt
2. New city development area
3. Improve accessibility
4. Respect maritime history

Sigma 2day

Sigmaplan

- Shown to be future proof (6/12/13)
- Different Area's, Many choices
- New Area's every 5 years – 50.10⁶ euro yearly
- Building blocks depending on future need

