



Rijkswaterstaat
Ministerie van Infrastructuur en Milieu



Room for the River

Asian-Netherlands Water
Learning Week



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Content

- The Netherlands – land under water
- Room for the River Program
- Depolderisation of the Noordwaard



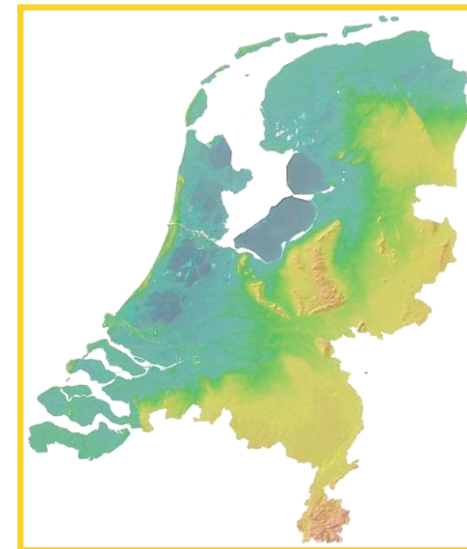
The Dutch created the Netherlands



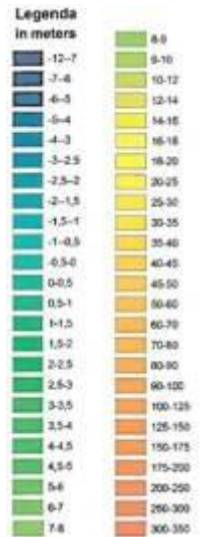
The Netherlands during the Roman time



The Netherlands during the Middle Ages

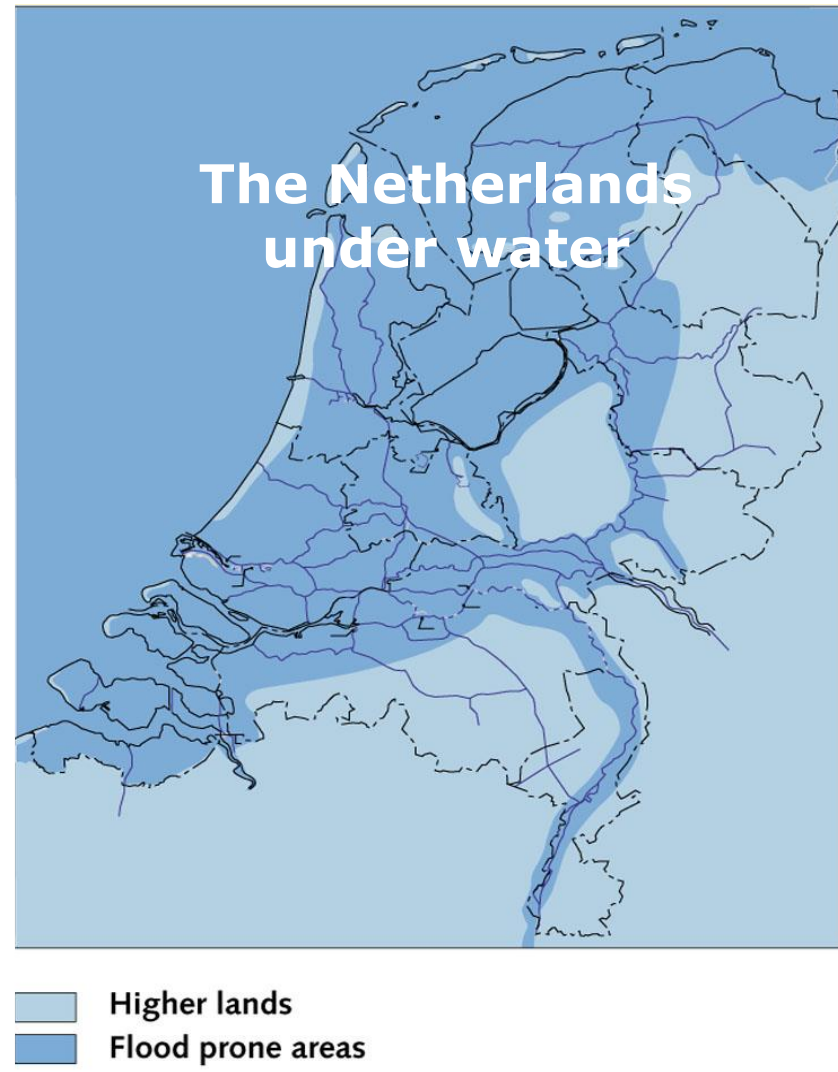


The Netherlands in the 21st century





**More than 50%
of Dutch people
live below
Sea Level !**





Flooding causes in the Netherlands

1. The rivers are sandwiched between higher dykes, behind which live a growing number of people;
2. Subsidence has lowered the land behind the dykes;
3. Climate change – rivers have to cope with an increasing volume of water.

Arnhem 1830



Arnhem 2000

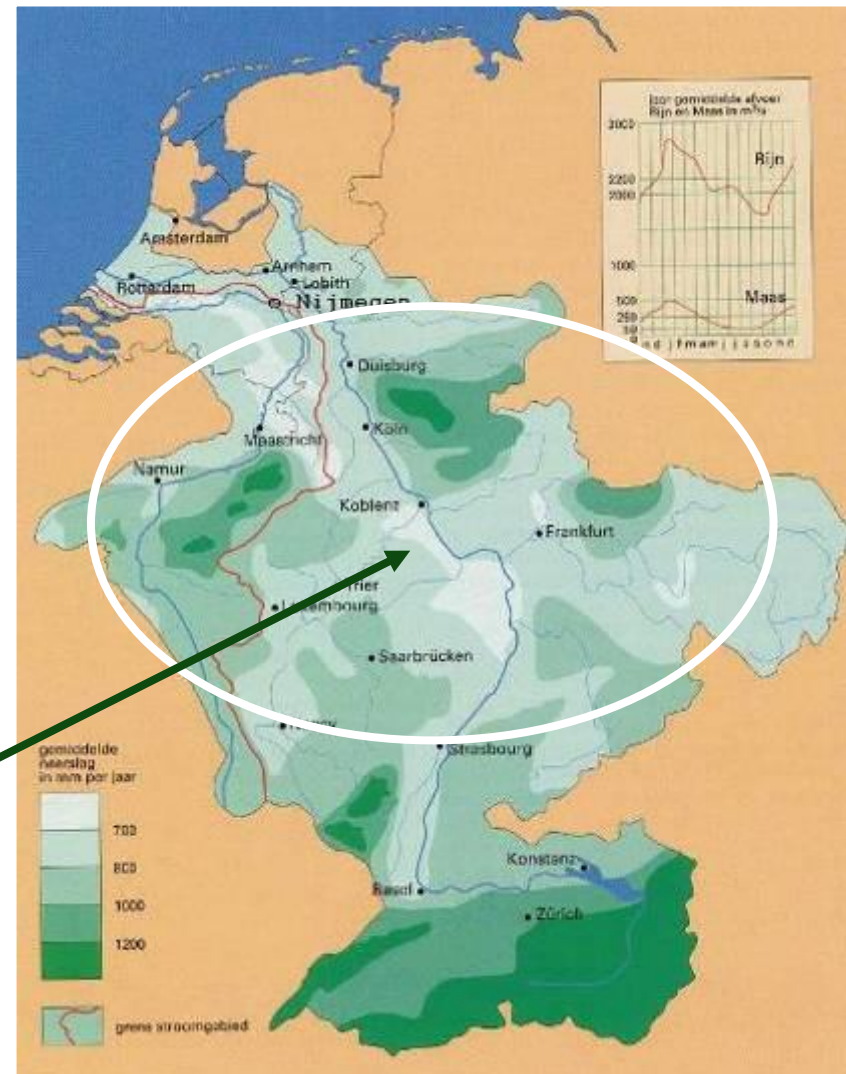
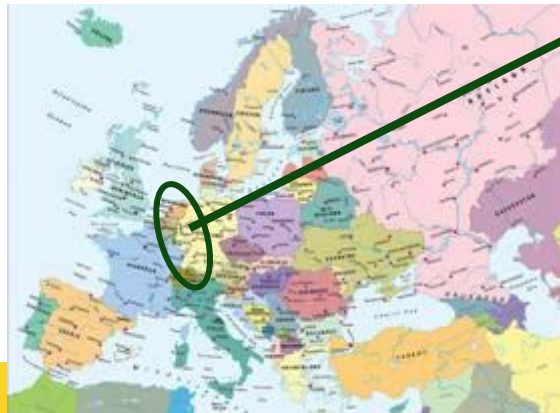




Catchment area of Rhine and Meuse

Discharge at Lobith (border NL)

- Average:
2,200 m³/s
- Highest level (1993/1995):
12,000 m³/s
- Discharge 1/1250 yr:
16,000 m³/s





Room for the River

Near-flood of 1993 and 1995

Evacuation of 250,000 people in 1995





Room for the River Programme

The measures adopted by over 30 locations collectively form the Room for the River Programme.

In addition to safety, the programme also invests in spatial quality.





Programme features

Budget

€ 2.3 billion

Planning

start 2007 – completion 2015

Current maximum drainage capacity

15,000 m³/sec

Drainage capacity after completion

16,000 m³/sec

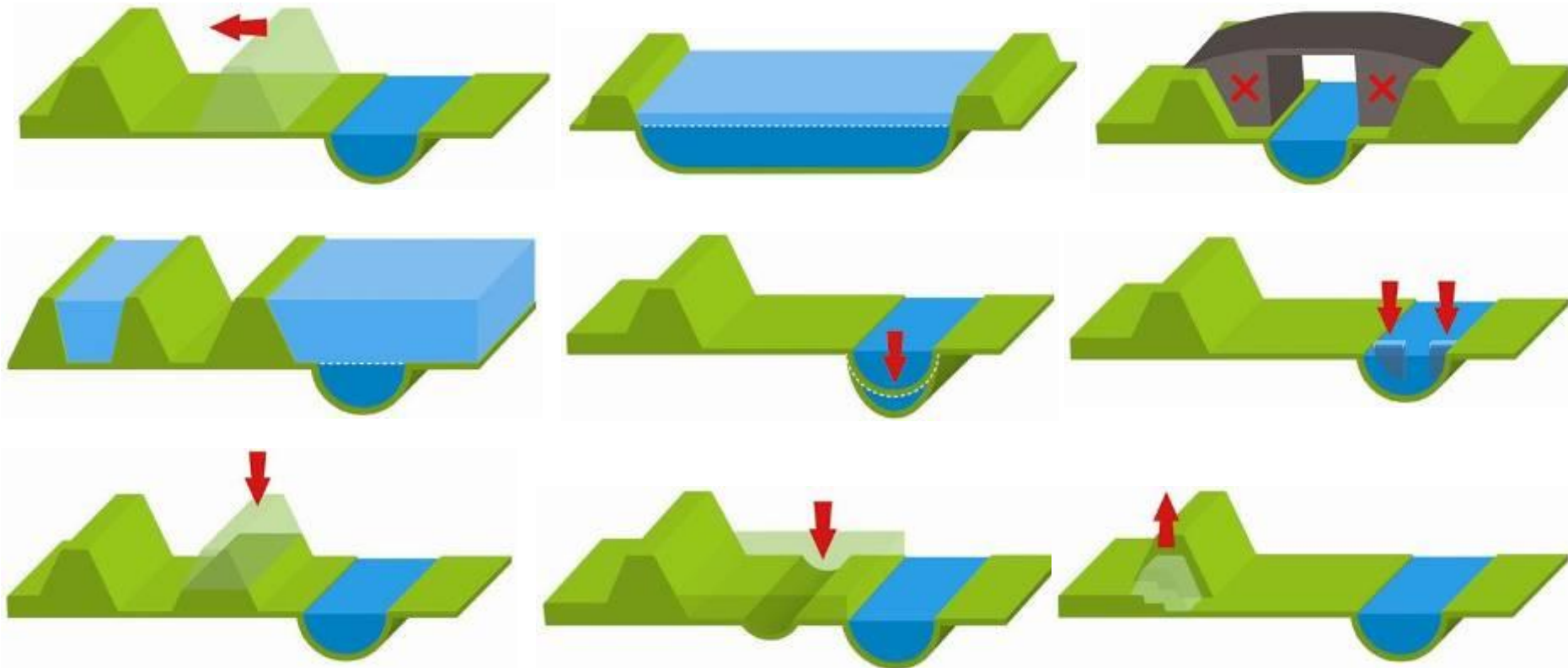
Government collaboration:

- State programme
- Implemented by provinces, councils and water surveyors





River expansion techniques for Room for the River





Aim of Depolderisation Noordwaard

- Safety: 30 centimetre dip in water level at Gorinchem
- Improving spatial quality
- Objective
 - Current residents must continue to be able to live there
 - Prospects for farmers (within or outside of Noordwaard)



Ring dyke 23 before and after depolderisation

before



after





Administrative Collaboration

- Administrative collaboration with:
 - Ministry of EA&I
 - Werkendam City Council
 - Rivierenland Water Board
 - Province of North Brabant
 - Department of Public Works South Holland (manager)
- Collaboration set down in a PA (Partnership Agreement)



Decision Making

- Key Planning Decision for Room for the River (2006)
- Design vision (2007)
 - Design studios
 - Administrative acts
- National integration plan (2010)
 - Pre-design (October 2009)
 - Design (April 2010)
 - Definitive plan (August 2010)
 - State Council (August 2011)
 - Coordinated with Nb, FF, Clearing & Wbb Licences
- Expropriation
 - Proposal (March 2011)
 - Royal decree (October 2011)



4 Inflow Openings

Based on GIS
information from
Rijkswaterstaat

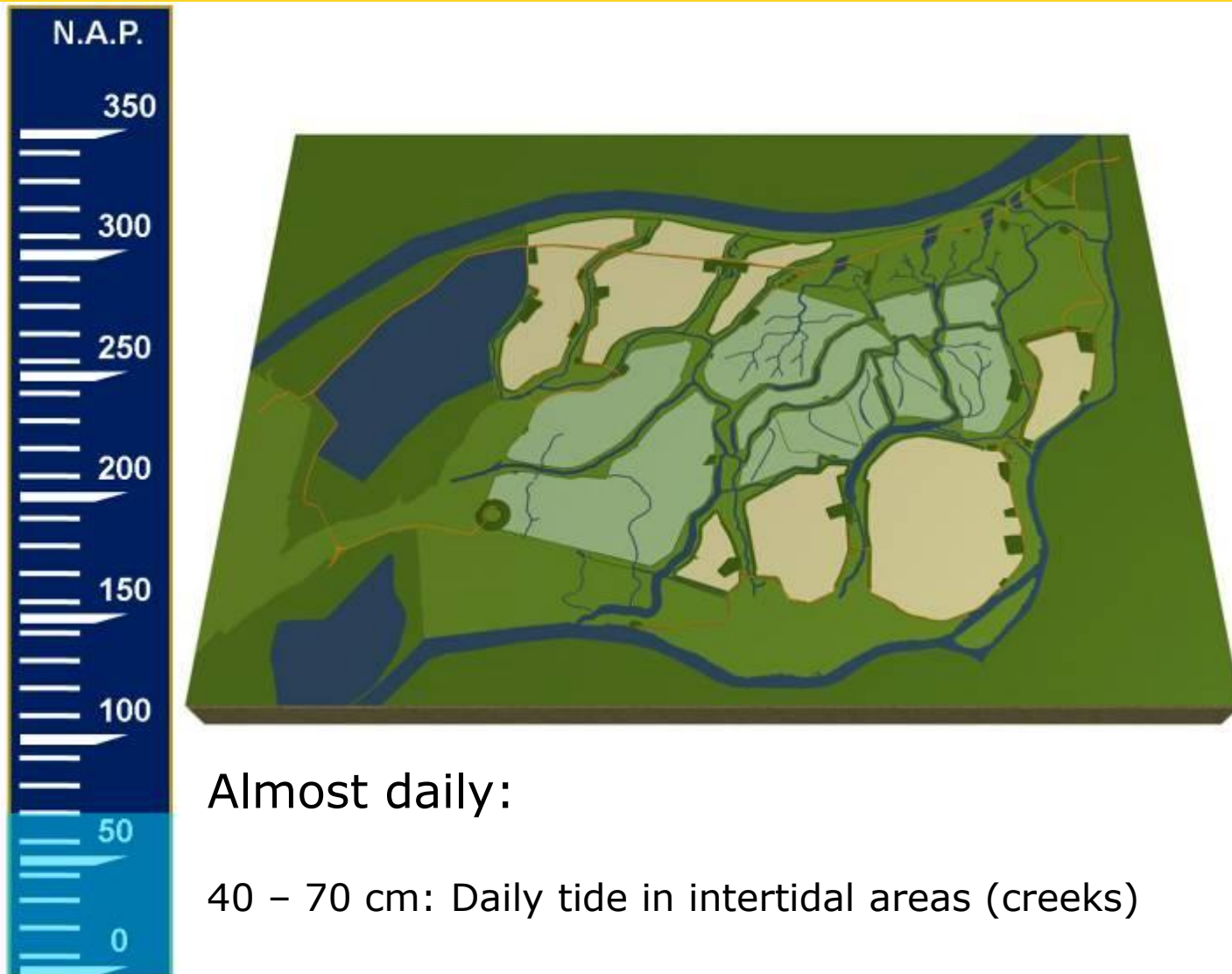
Used in WAQUA
– hydraulic
computer model





2 Outflow Openings









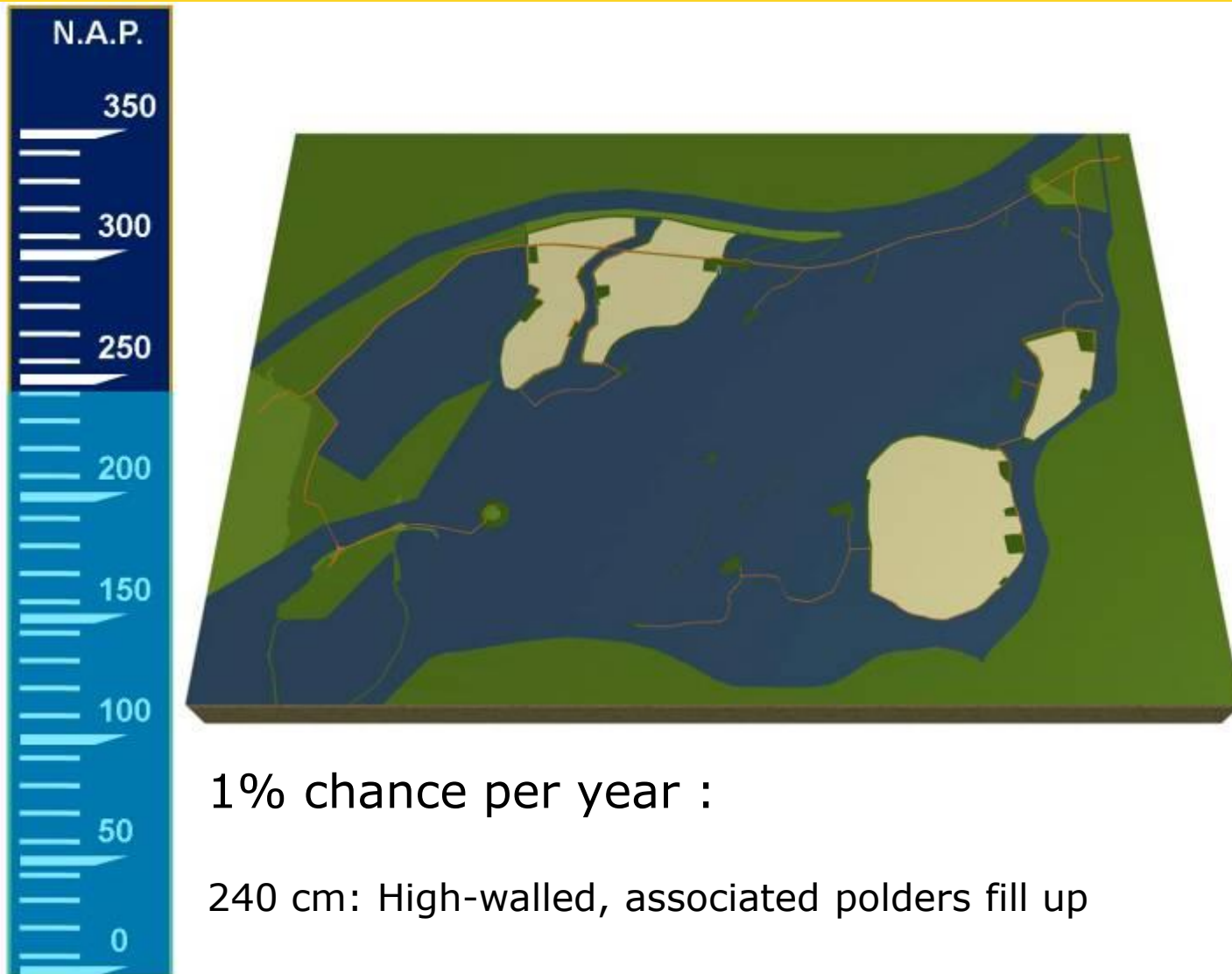
30 days per year:

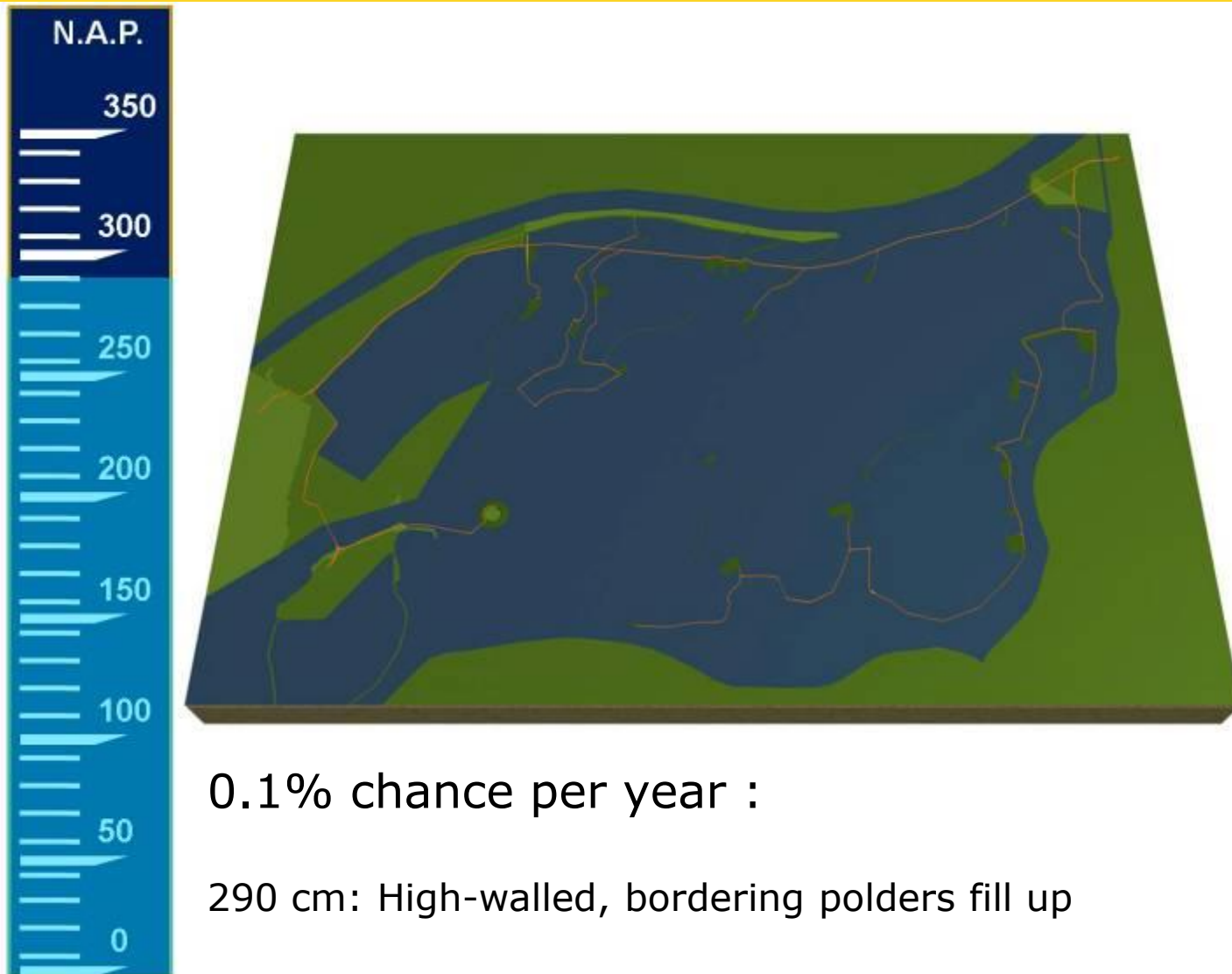
135 cm: Dry layer of walled polders is lost

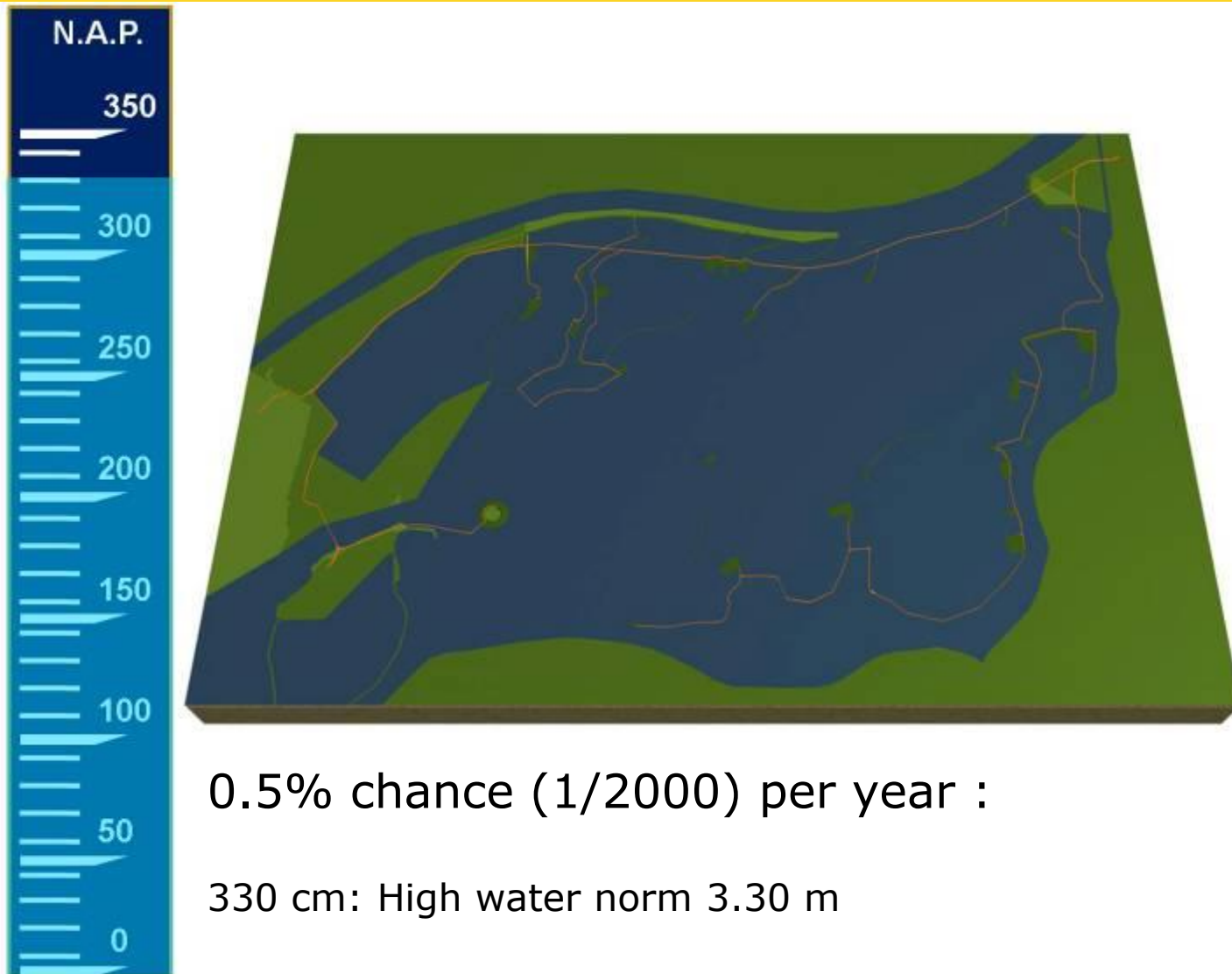


Once per year on average:

200 cm: Water from Nieuwe Merwede flows through four openings under the ring dyke into the Noordwaard









Housing(1)

- From 48 houses to 25
- From 24 farmers to 10
- Hamlets Kievietswaard and Steenenmuur
- Individual houses





Housing(2) and protection against Noordwaard flooding

Until now:

- Inner dyke area
- Norm dykes: 1/2.000 per year (= chance of flooding)
- Legal standard

Later:

- Outer dyke area
- Capacity standard of dyke: 1/100 or 1/1.000 per year (= chance of flooding)
- No legal standard





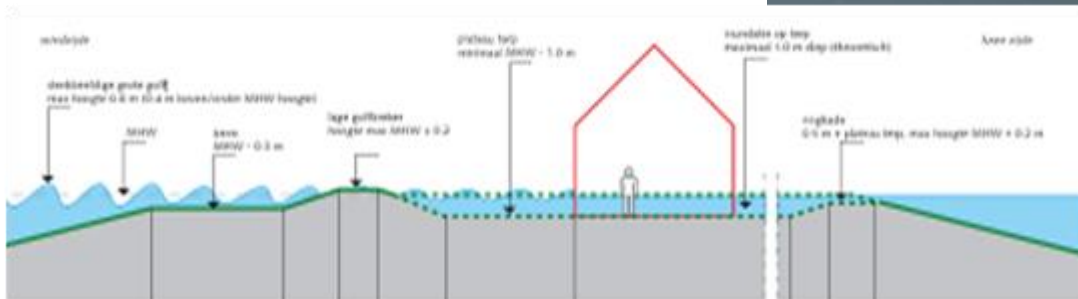
Housing(3)

- Demolition of houses
 - Unfavourable location hydraulic target
 - More than 1 meter of water at normative water level
 - House flooding more than 1/25 years
 - In poor architectural state
- Custom solutions
 - Introduce ring dykes
 - Architectural changes to homes
 - Compensation for flood damage
- New artificial hills
(flood-free – 50 cm above MHW)





Customised living (11 objects)





Agriculture from app. 1640 acres to 860 + 200 acres

- From app. 25 to app. 10 farmers
- Farm management in wet low dyke polders (200 ha)
- High dyke polders: arable farming
- Low dyke polders: livestock farming
- Role of inter-tidal area management





Accessibility – flood water evacuation route





The contract (1) D&C for Noordwaard

- Functional specifications
- Certain project components not open to negotiation
 - Hydraulic PvE
 - Map area
 - Town planning (RIP)
 - 4 licences
- Open to negotiation
 - Design of bridges and pumping stations
 - Construction of dykes and roads
 - Construction logistics and ground flows





The contract (2) EMVI

- Granted at surplus value
 - Process quality (project and licensing management)
 - Impediments (construction and transport)
 - Robustness of design (dykes, roads and no willows)
 - Spatial quality (bridges, pumping stations and assurance)





The contract (3)

- Granted to: Boskalis / Martens&Van Oord / Van Hattum&Blankevoort / Gebr. Van Kessel
- Planning
 - 2011 Preparation
(explosives, design, licences)
 - 2012 Creeks and dykes – hills
 - 2013 Creeks and dykes – bridges
 - 2014 Finalisation
 - 2015 Levelling of dams





Deviations (after contracting)

- No 'large' changes – end result is the same
- Small changes in the plan:
 - Change in height of the entry
 - Combining bike and car paths at the Steurgat
- Many detail changes:
 - Different situation for contractor than expected (polluted grounds, more structures, trees, road foundations etc)
 - Changes in method of realisation
 - Improving acces to agricultural areas (adding culverts, paths)



Figures

- 28 houses and businesses to be demolished
- 29 hills and customised solutions
- 38 traffic bridges
- 12 pumping stations and 17 wind-water mills)
- 50 km of new road
- 0.7 km of new and 0.7 km improved primary dams
- 29 km high and 40 km low dams
- 4 million m³ land terracing



Aerial Photograph of Noordwaard





Aerial Photograph of Noordwaard





Thank you for listening to my story.



Any questions?