



Kingdom of the Netherlands

Room for the River

From flood *Resistance* to
flood *Accomodation*

Renee Jones-Bos
Ambassador

Dale Morris
Sr Economist



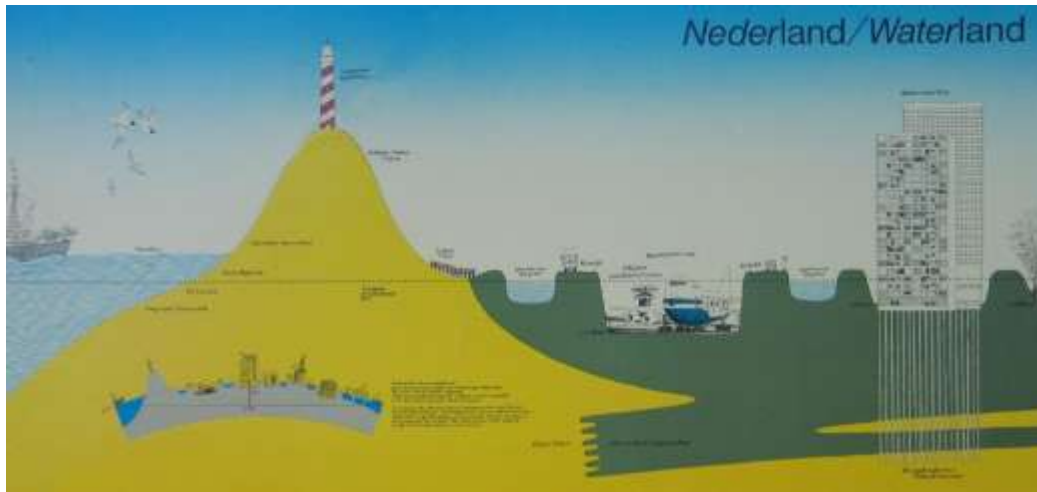
“Make it a Story”





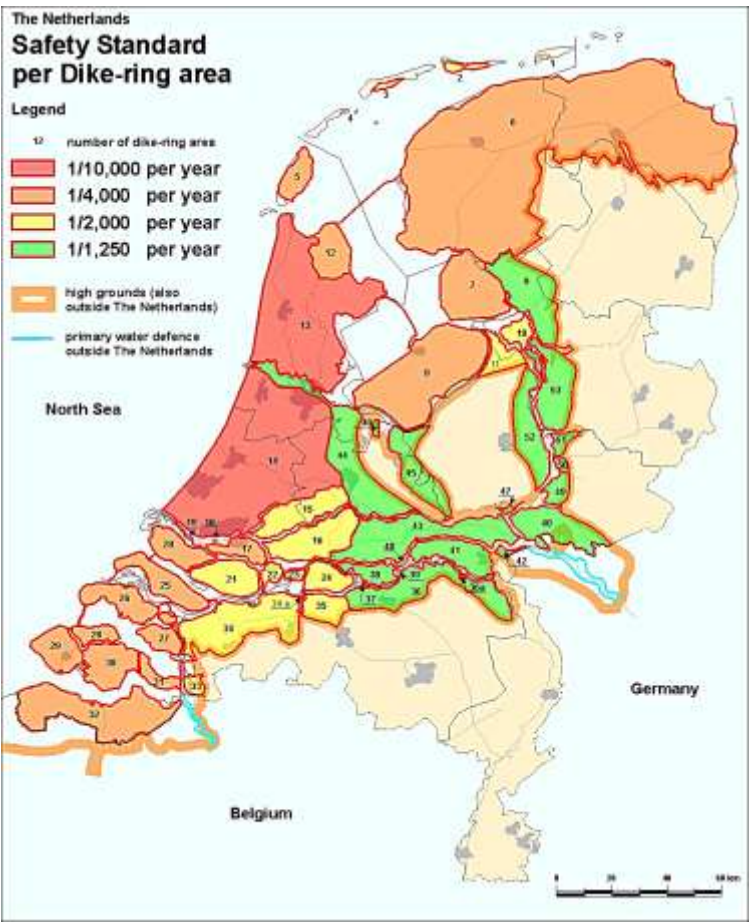


The Netherlands: a delta landscape, penetrated by rivers, subject to sea and river flooding





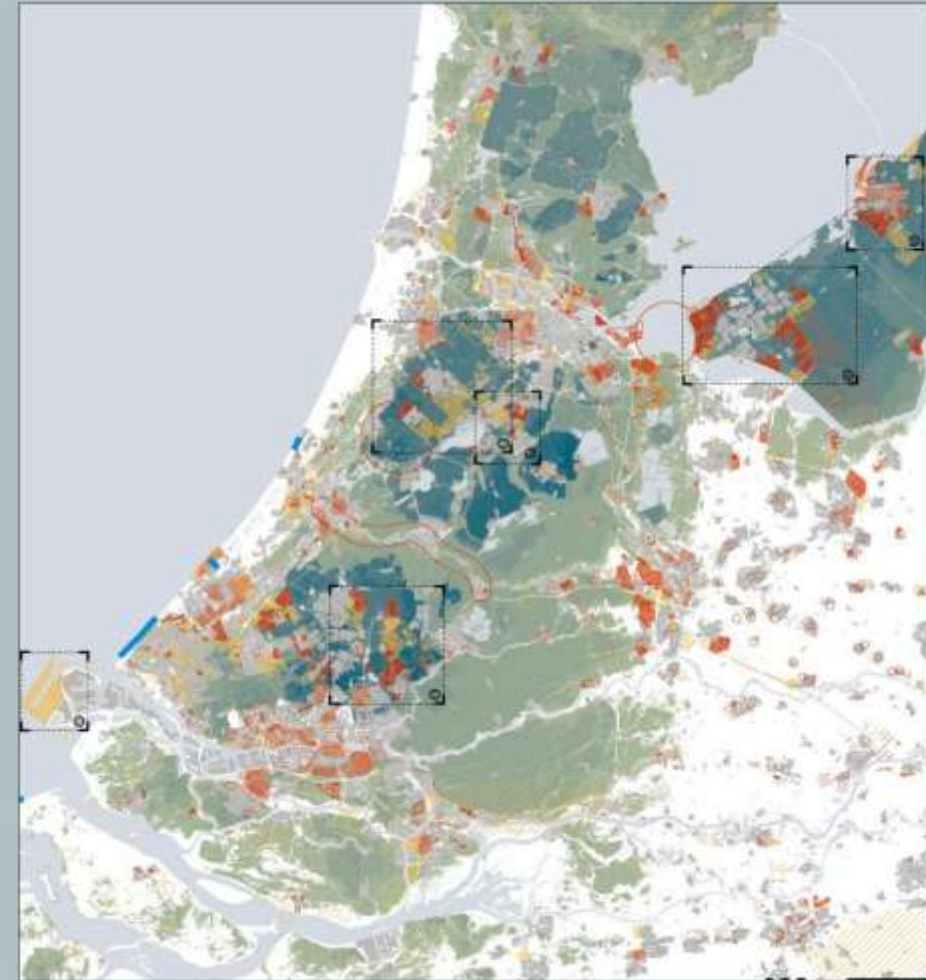
1958 flood risk/safety standards established (post '53 flood)





A dangerous, dynamic landscape (or, a hydraulic engineering laboratory)

- security, and economy
- ~ 17 million people, 16th largest economy, 3rd most densely populated country
- 60% of people live in, 70% of GDP produced in, areas between 1 and 6.5 meters below mean sea level
- subsiding
- water is our challenge, and our opportunity



Hoogteligging quickscan water- en verstedelijkingsopgaven
diepe polders en buitendijks bouwen



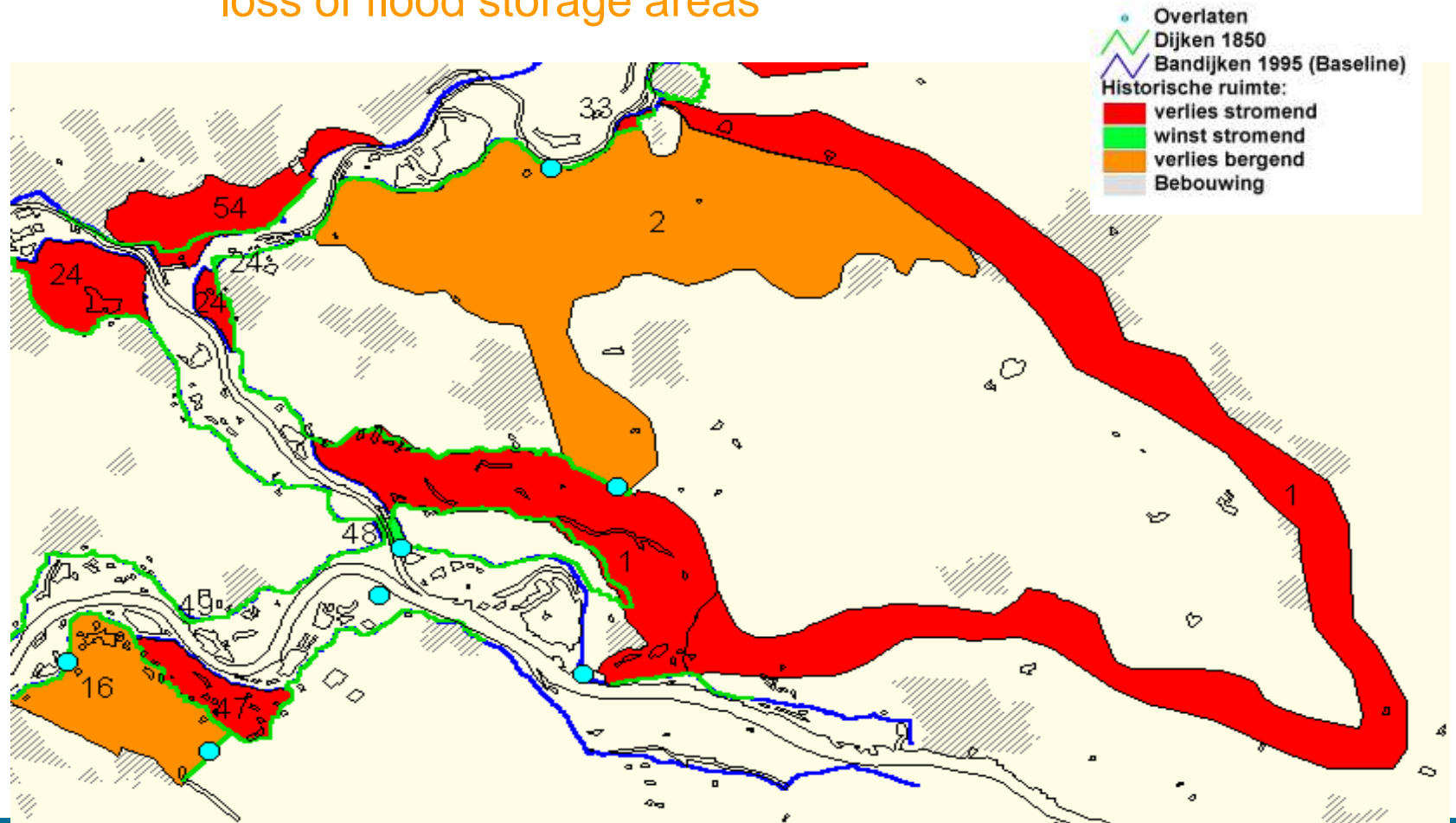








Encroachments (1850 – 2000):
restriction of discharge capacity
loss of flood storage areas



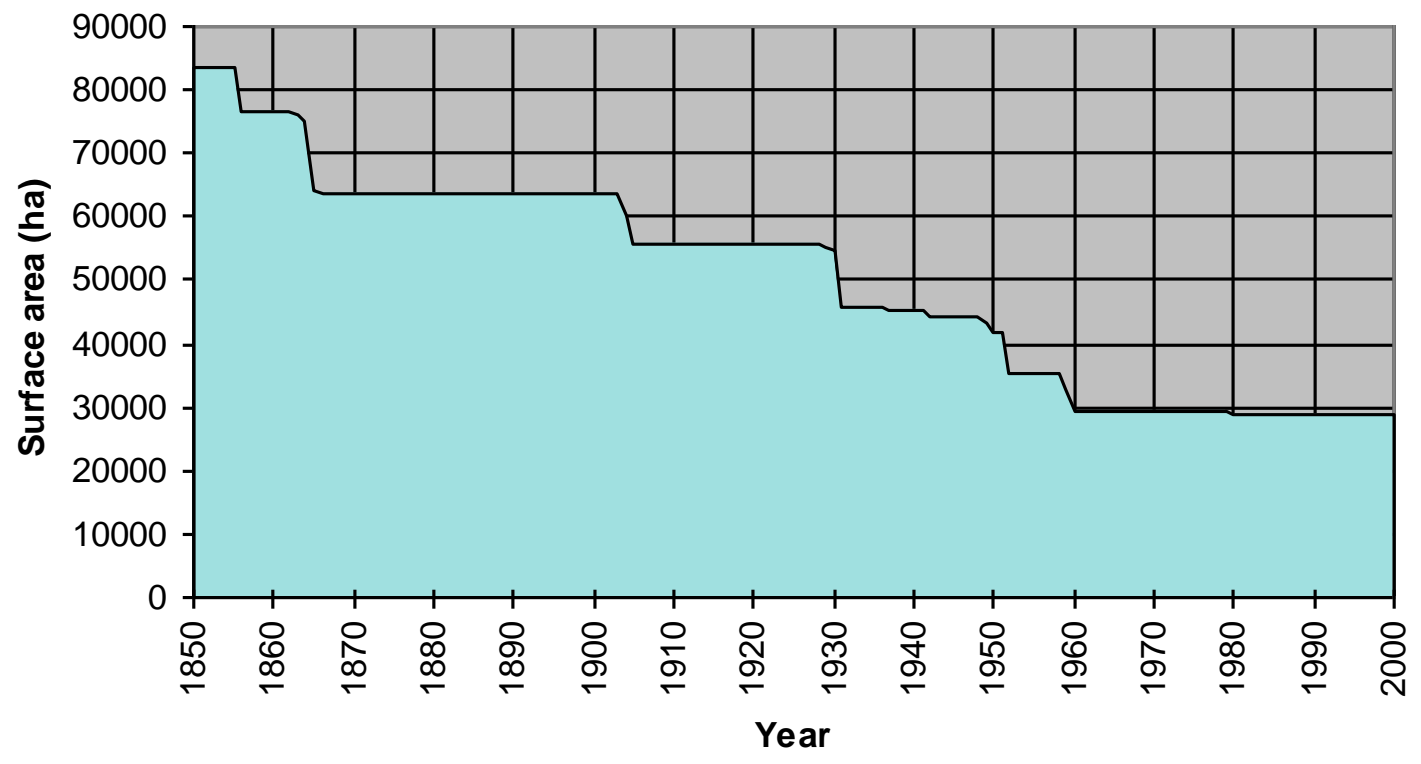


Urban Bottleneck at Arnhem (1830 and 2000)





Available surface area



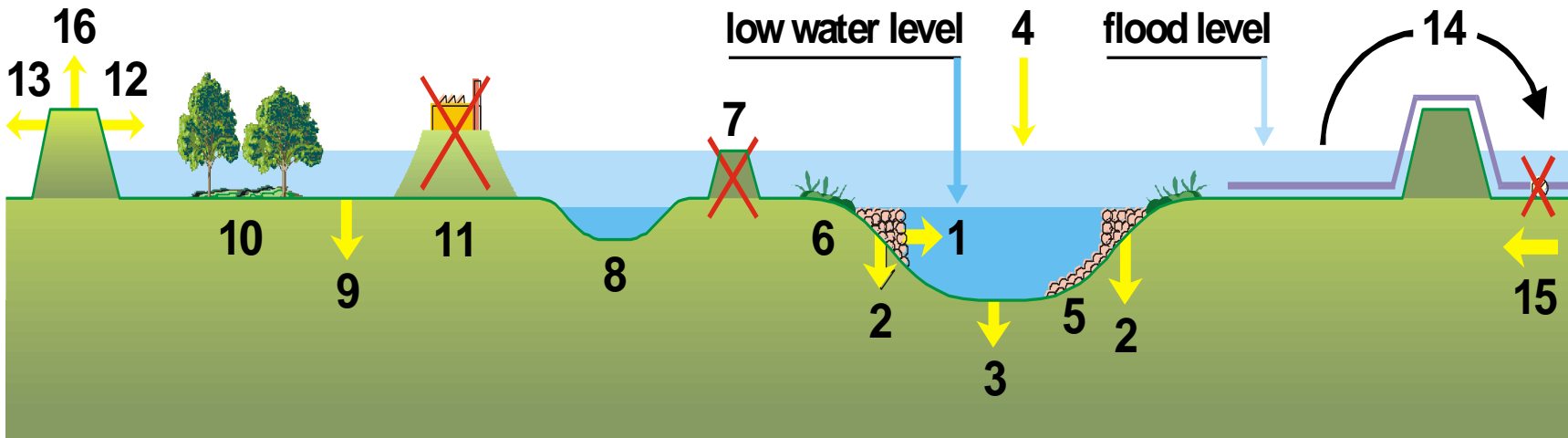


Room for the River

- Design discharge increase (for 2050), from 15.000 m³/s to 16.000 m³/s, is *insufficient*, given climate change
- Projected need: 18,000 – 20,000 m³/s by 2100;
 - › 1995 flood: 12,500 m³/s
- Heightening / reinforcing embankments is costly (\$1.7 billion / 2050), and will likely increase overall risk

- From *flood resistance* to *flood accomodation*
- Reduce projected increase in design discharge levels
- Dike heightening only as a last resort
- Flood management and spatial quality (enhancing natural and cultural landscape values); design teams led by local govt.

- RvR began as idea in 1986, gained momentum in 1990s, US projects as inspiration



1 - narrowing of main channel

2 - lowering of groyne

3 - dredging

4 - dumping of sediment

5 - permanent layer

6 - natural bank

7 - removing of summer embankment

8 - secondary channel

9 - lowering of flood plain

10 - nature development

11 - removing of high-water free areas

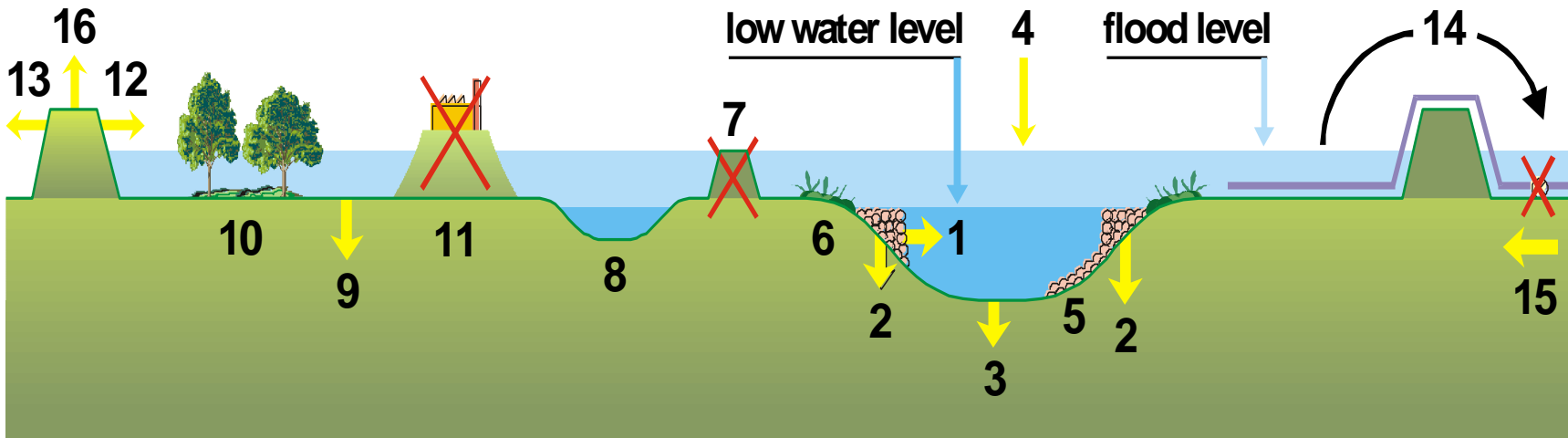
12 - dike reinforcement

13 - dike repositioning

14 - retention

15 - obstruction of lateral flow

16 - dike raising



1 - narrowing of main channel

2 - lowering of groyne

3 - dredging

4 - dumping of sediment

5 - permanent layer

6 - natural bank

7 - removing of summer embankment

8 - secondary channel

9 - lowering of flood plain

10 - nature development

11 - removing of high-water free areas

12 - dike reinforcement

13 - dike repositioning

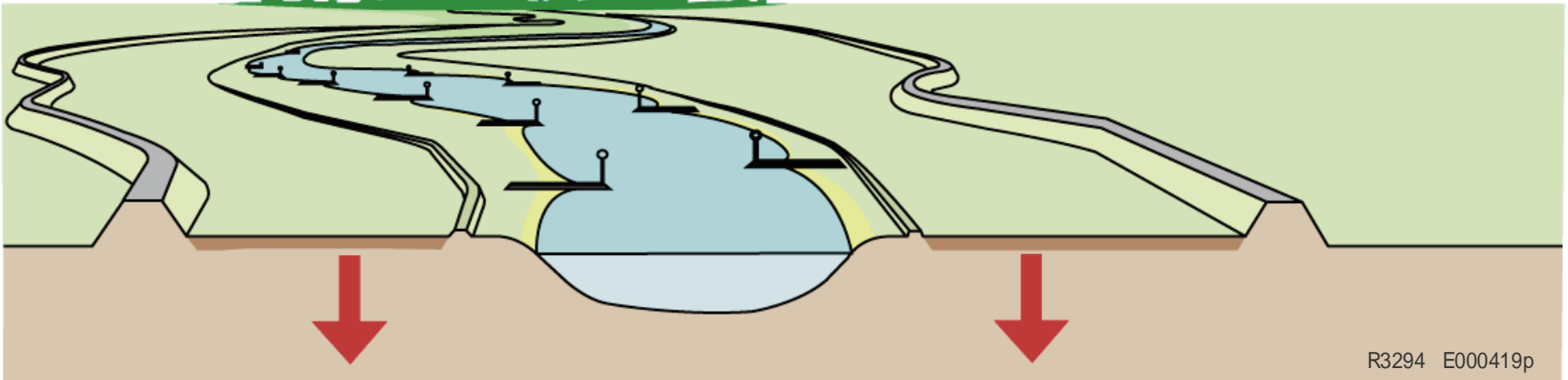
14 - retention

15 - obstruction of lateral flow

16 - dike raising



Dredging

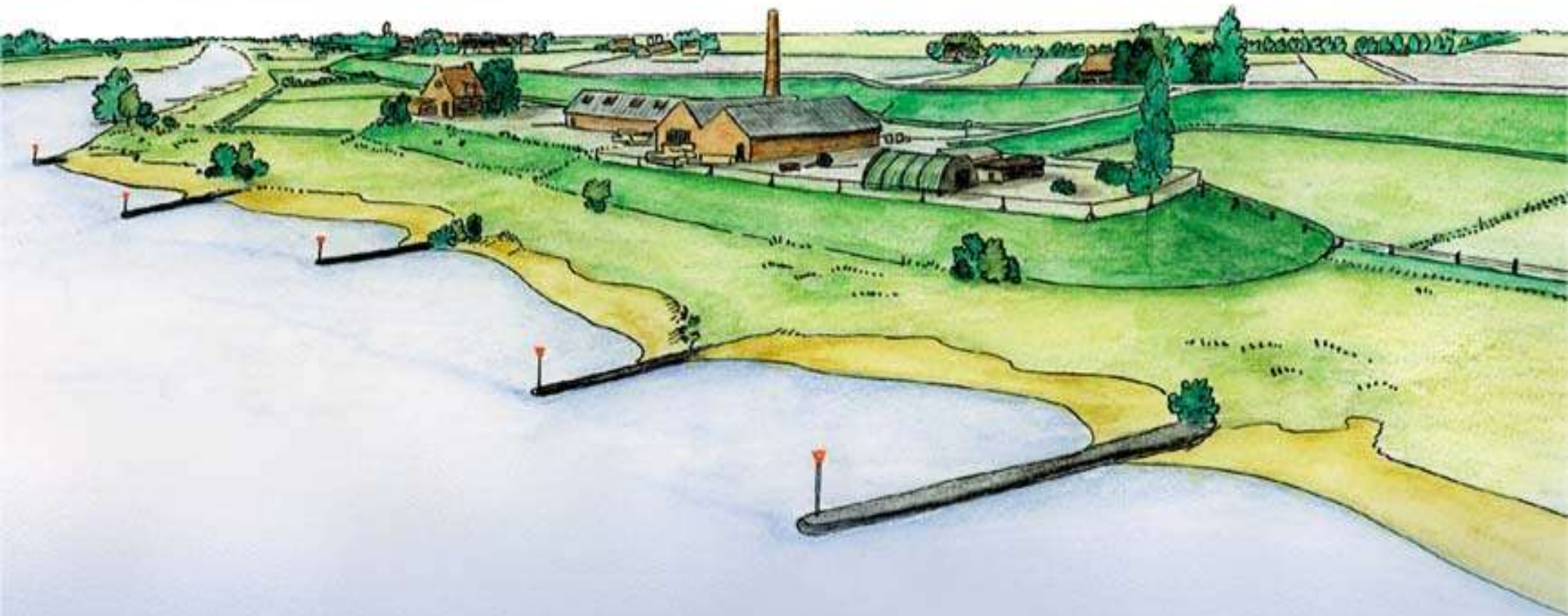


R3294 E000419p

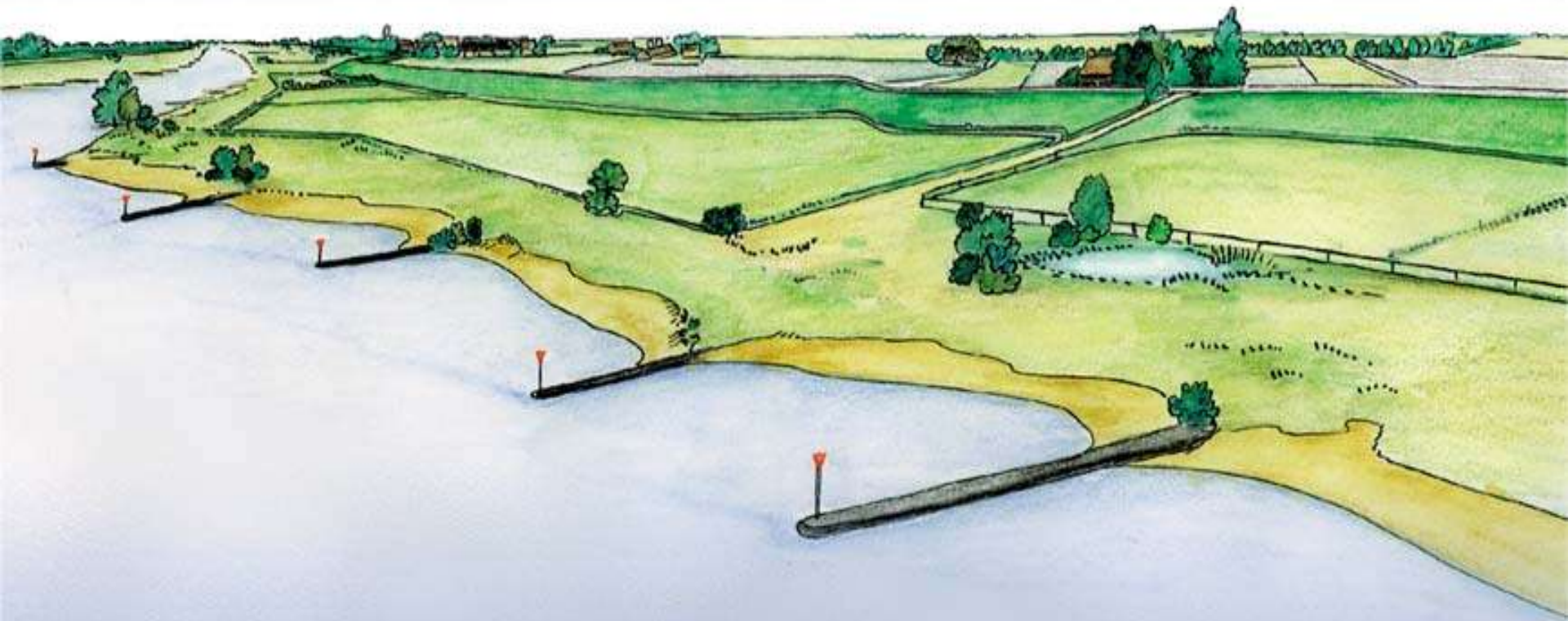
lowering flood plains



Elevated area; before removal



Elevated area; after removal



Abutment of a bridge; before removal



Abutment of a bridge; after removal

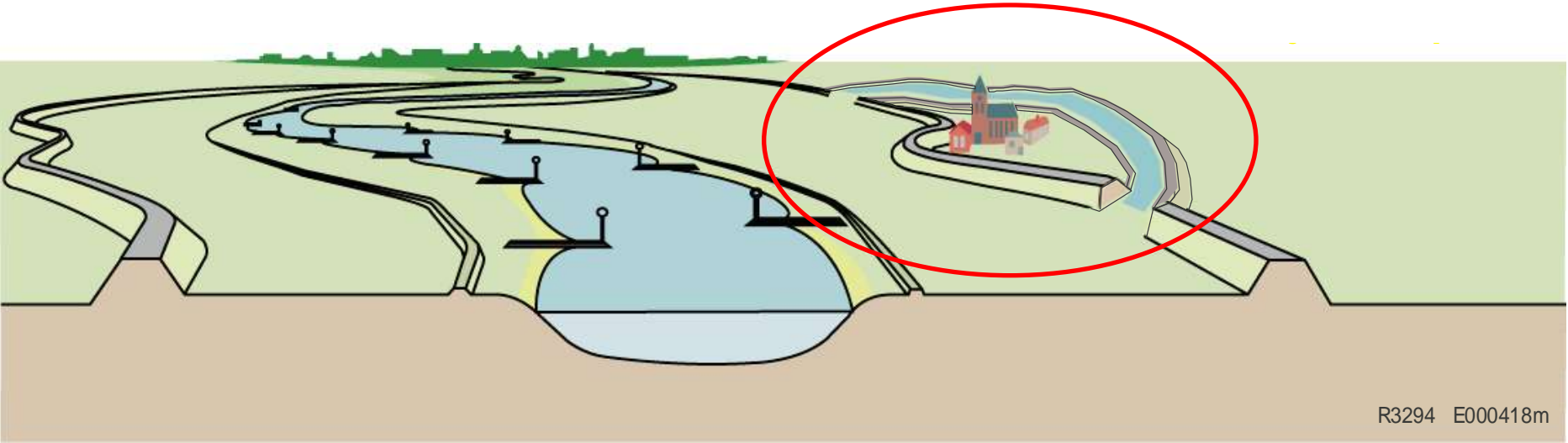




Dike relocation (set back)

© *André Brouwer*
BRUWER
C2902-1
27.08.2001





R3294 E000418m



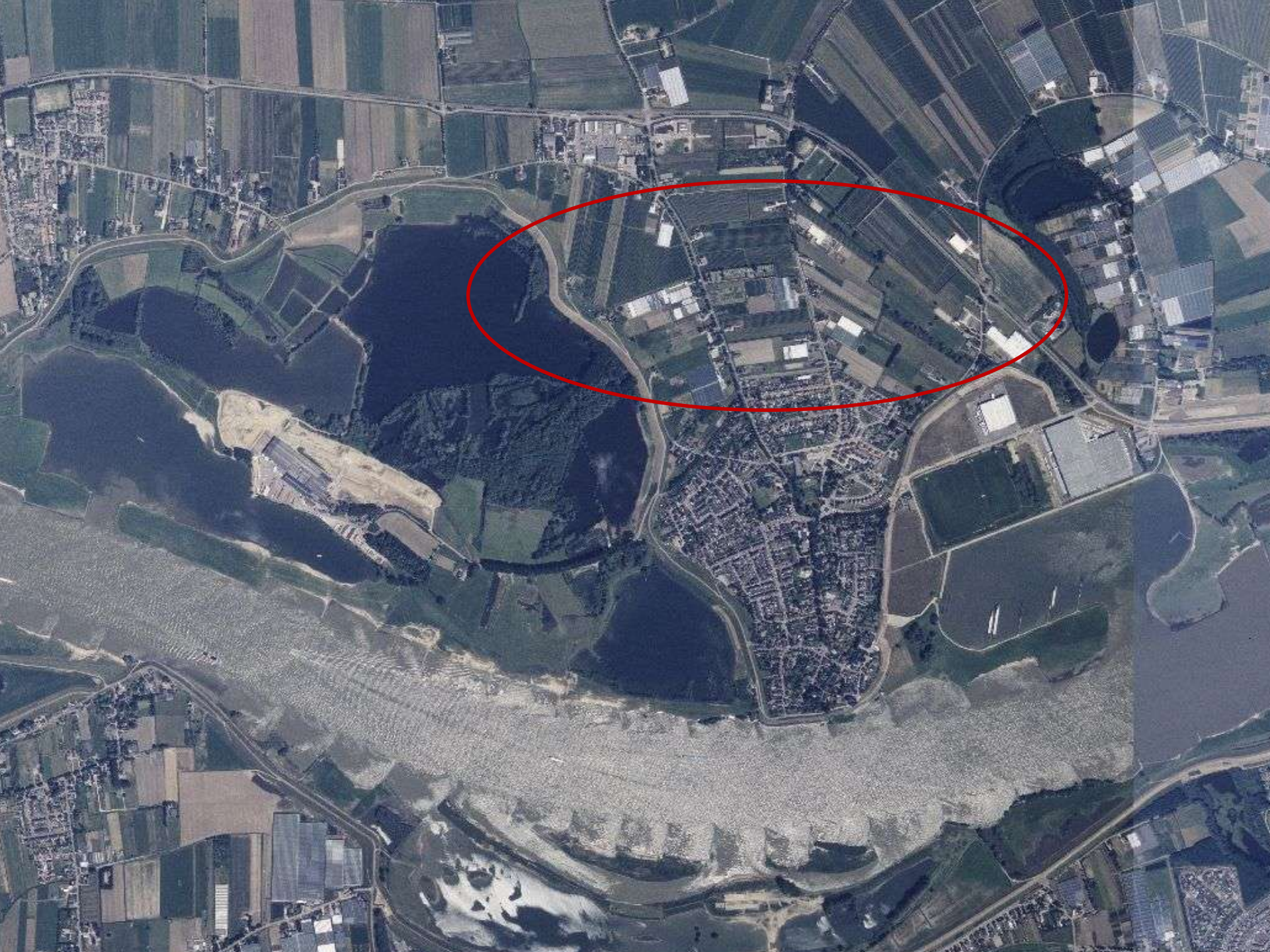
Waal River / Nijmegen Project

- River bottleneck, channel restriction from 1500m width to 450 m width

Options:

- Ag / undeveloped land available to north
- Northern river bank land targeted for development
- Key road / rail / harbor infrastructure







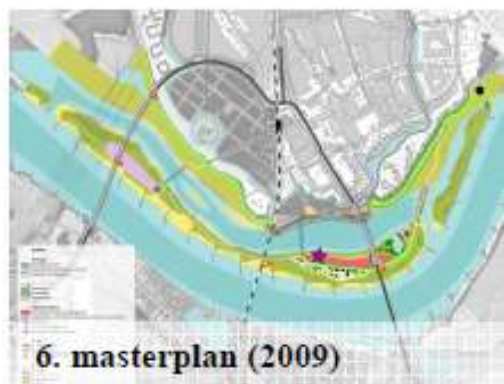


Bypass rejected

- Creation of moat fortress unwise
- Safety: 1/250 – 1/500 yr event?
- Possible future requirement to heighten fortress embankments?
- Infra needs substantial (bridges, roads)
- Negative impact on farmers / landowners
- Taking land out of commerce
- Overall Cost



Dike set-back strategy: safety, increased storage / flow capacity, and new land opportunities



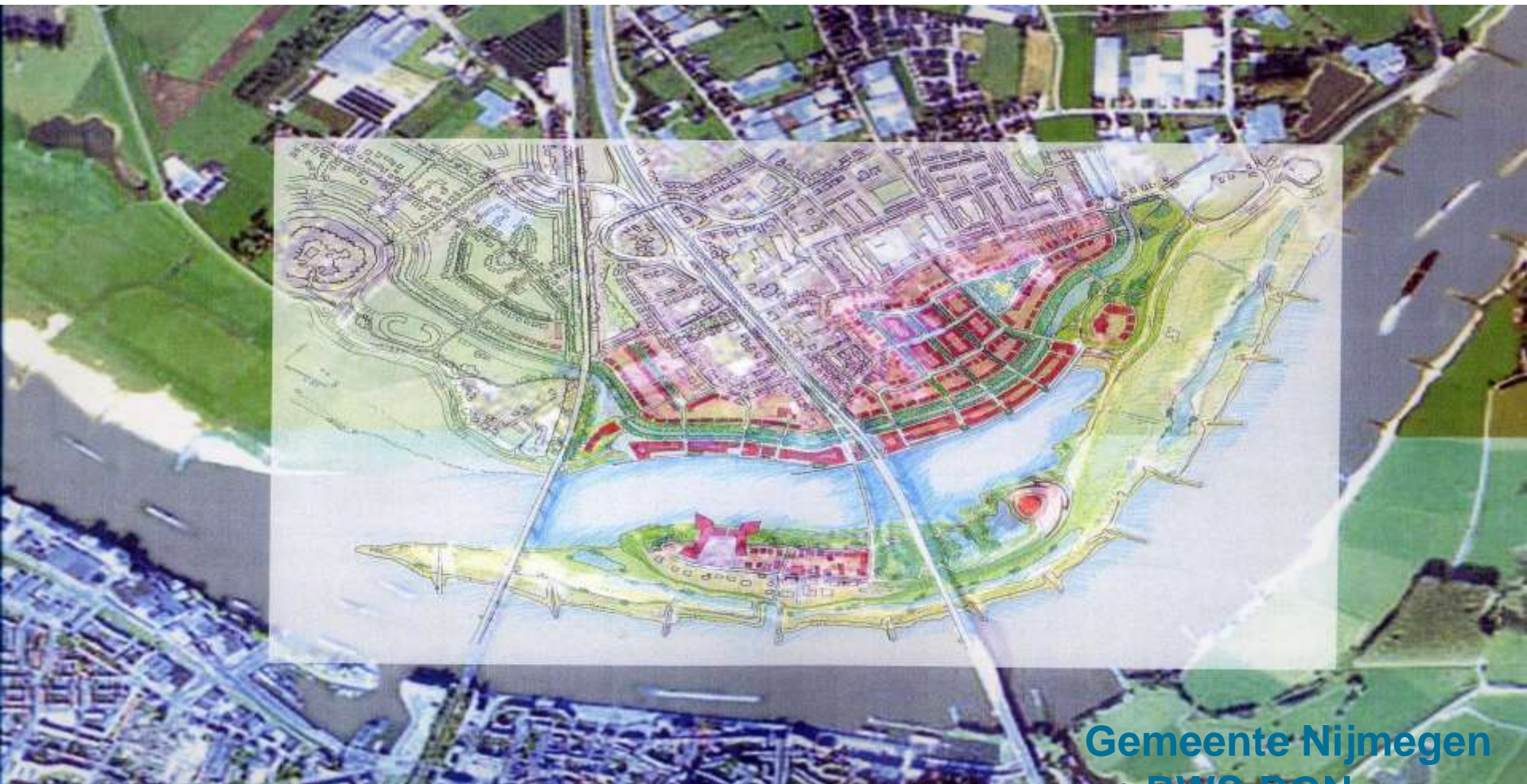


Before / After (impression)



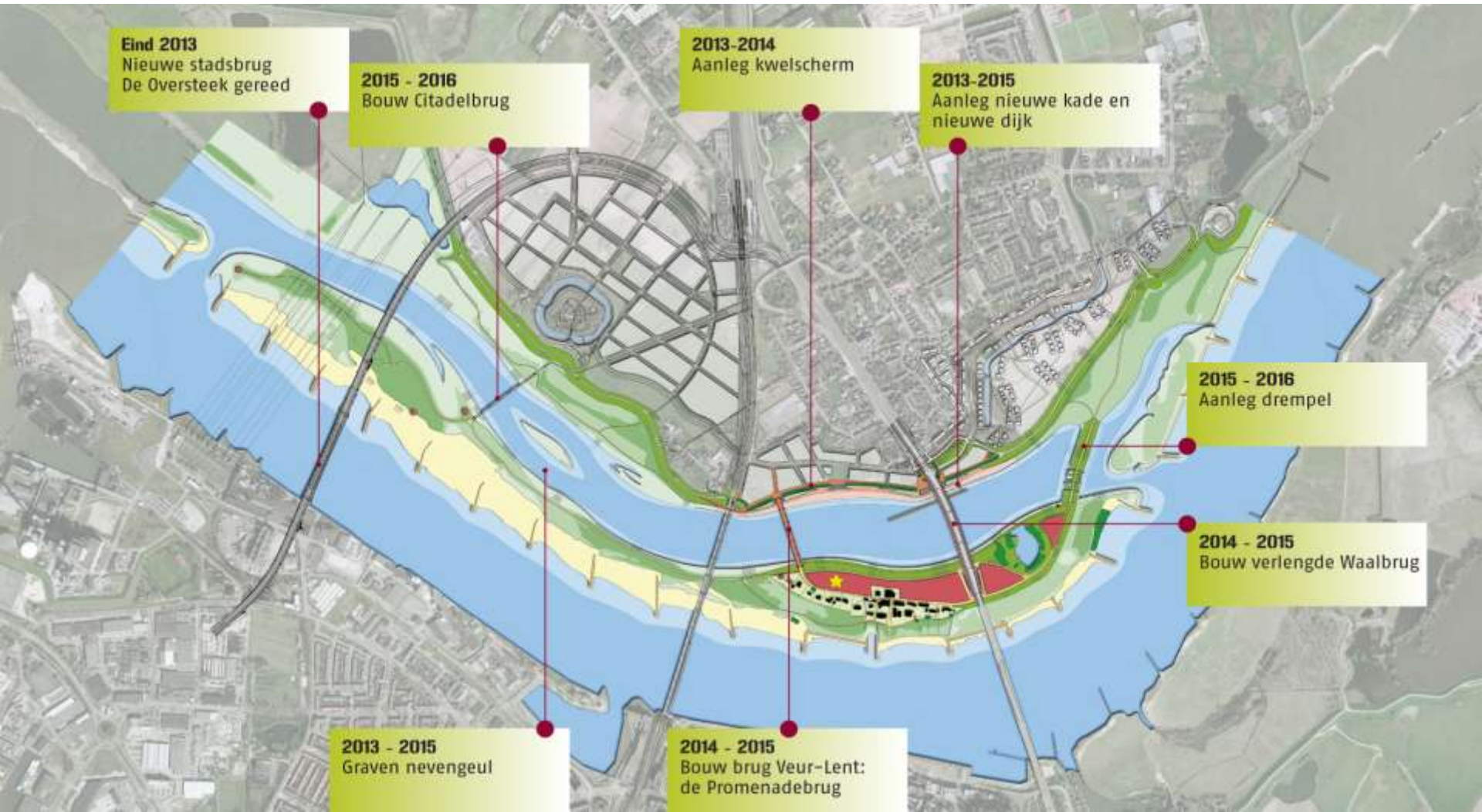


New spatial quality, commercial/residential development





Planning 2006 – 2011, implementation 2013 – 2016 Cost: \$400 million



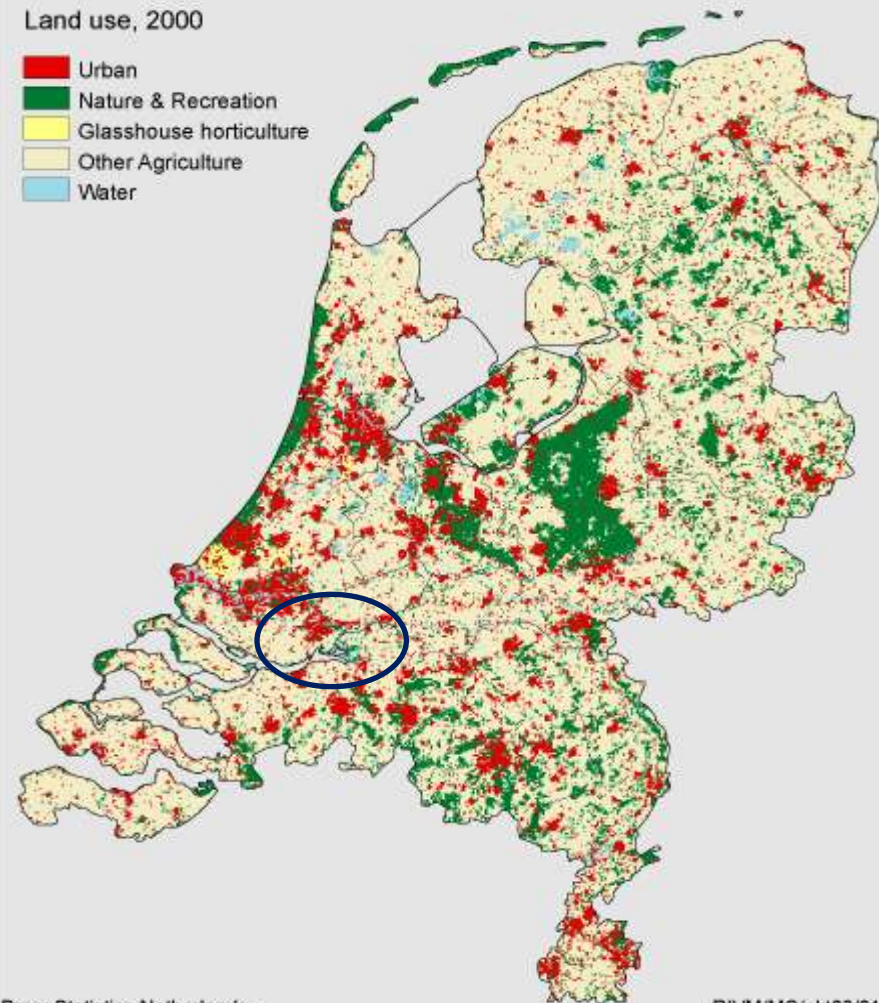


Noordwaard Polder



Land use, 2000

- Urban
- Nature & Recreation
- Glasshouse horticulture
- Other Agriculture
- Water







Depoldering Noordwaard (11,000 square acres)

Goals:

- Lower water level +/- 30 cm @ Gorinchem
- Improve spatial quality of area
- Restore coherence of environment
- Enable current residents to maintain residence, if desired
- Maintenance of farming occupation (either within polder or elsewhere)

Impacts:

- Overflow area will flood 1-5 x year
- Nearby areas 1 x in 25 years
- Fort Steurgart remains protected
- Most residences will now be “outside the dikes”, on raised mounds
- Flood levels no higher than 1 meter in residences
- New park / recreation / tourism opportunities
- Remains accessible to all users
- Surprise! Reduce flood risk at Dordrecht (90 cm)

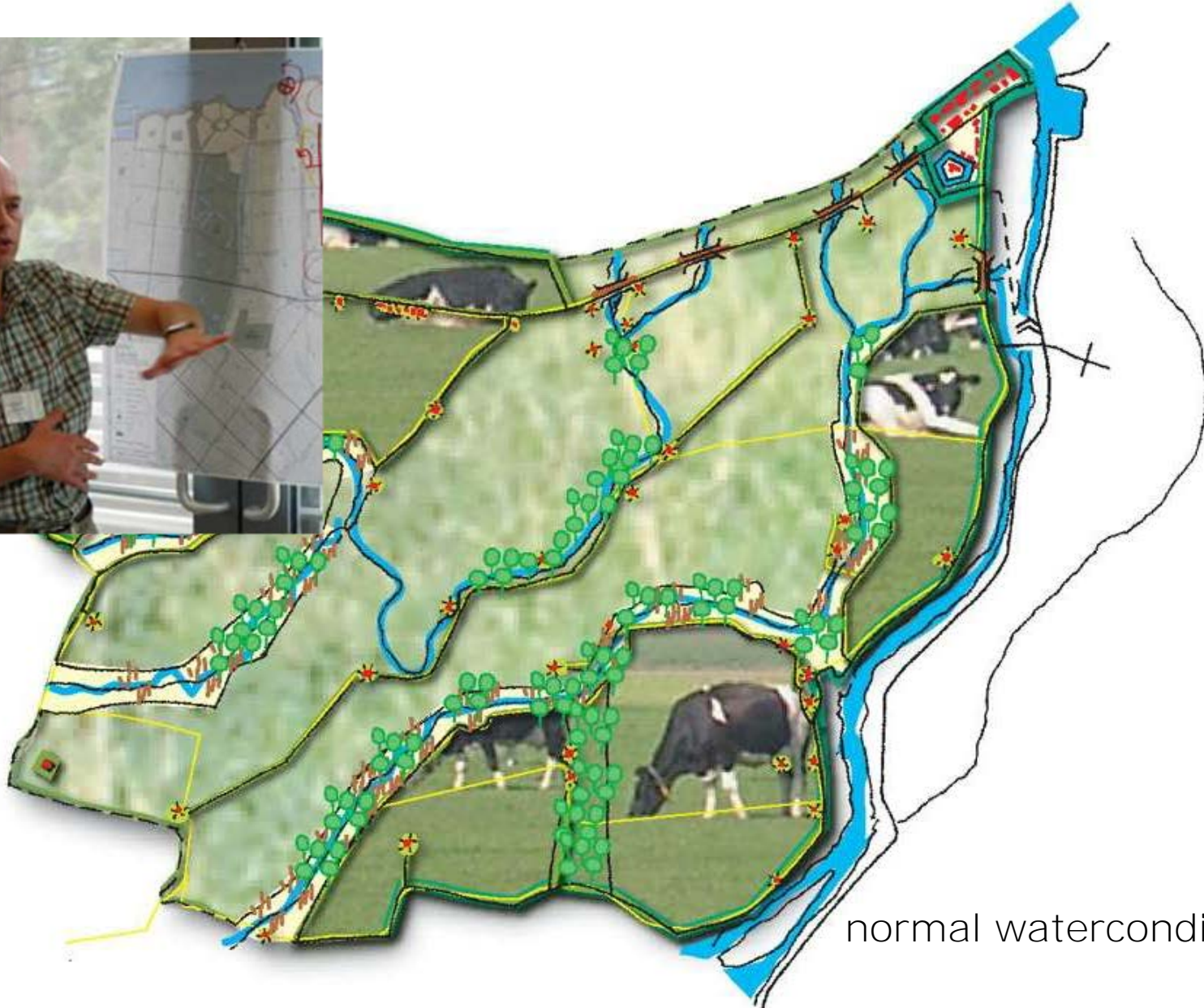
3

Depoldering, the plan



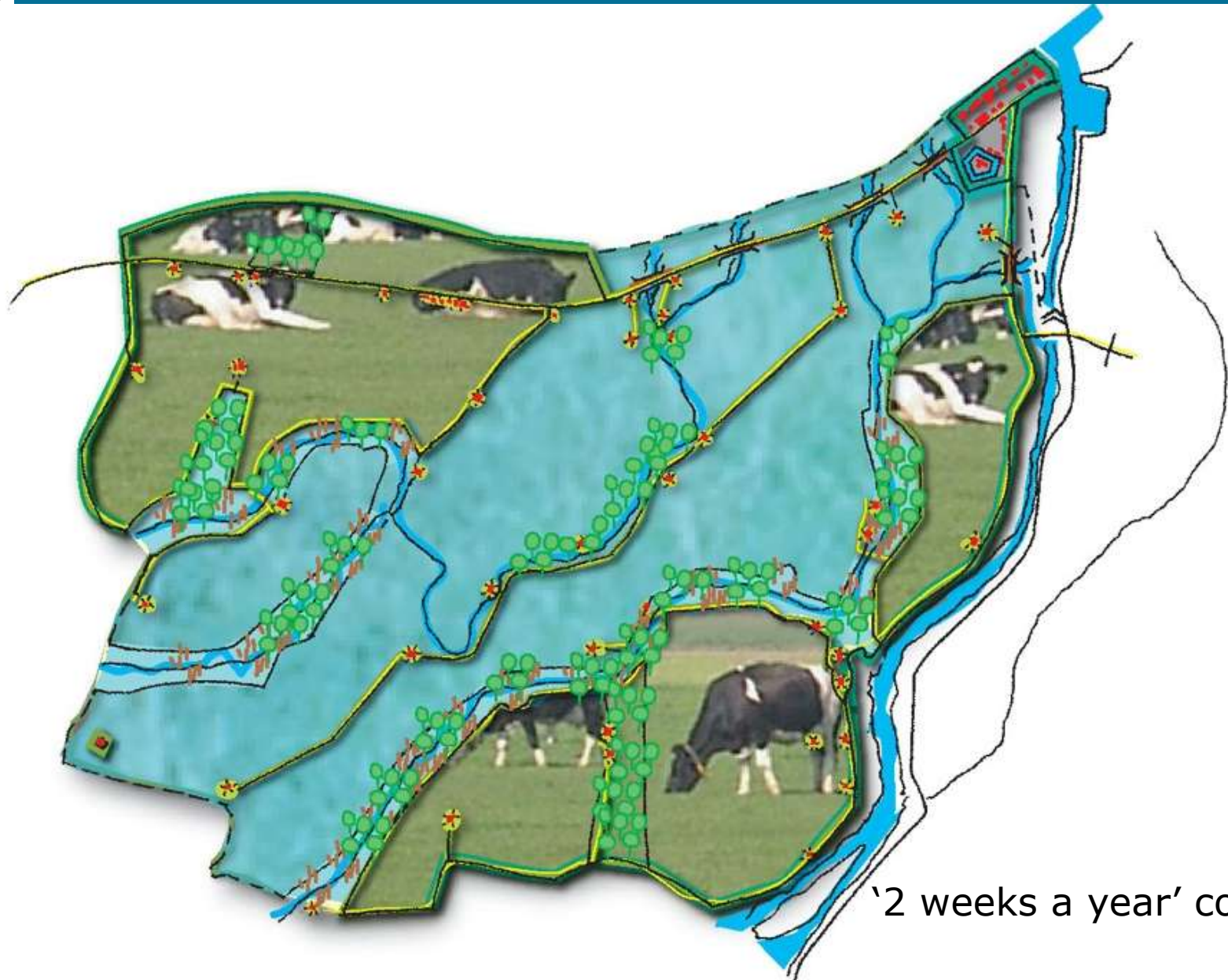
3

First sketches



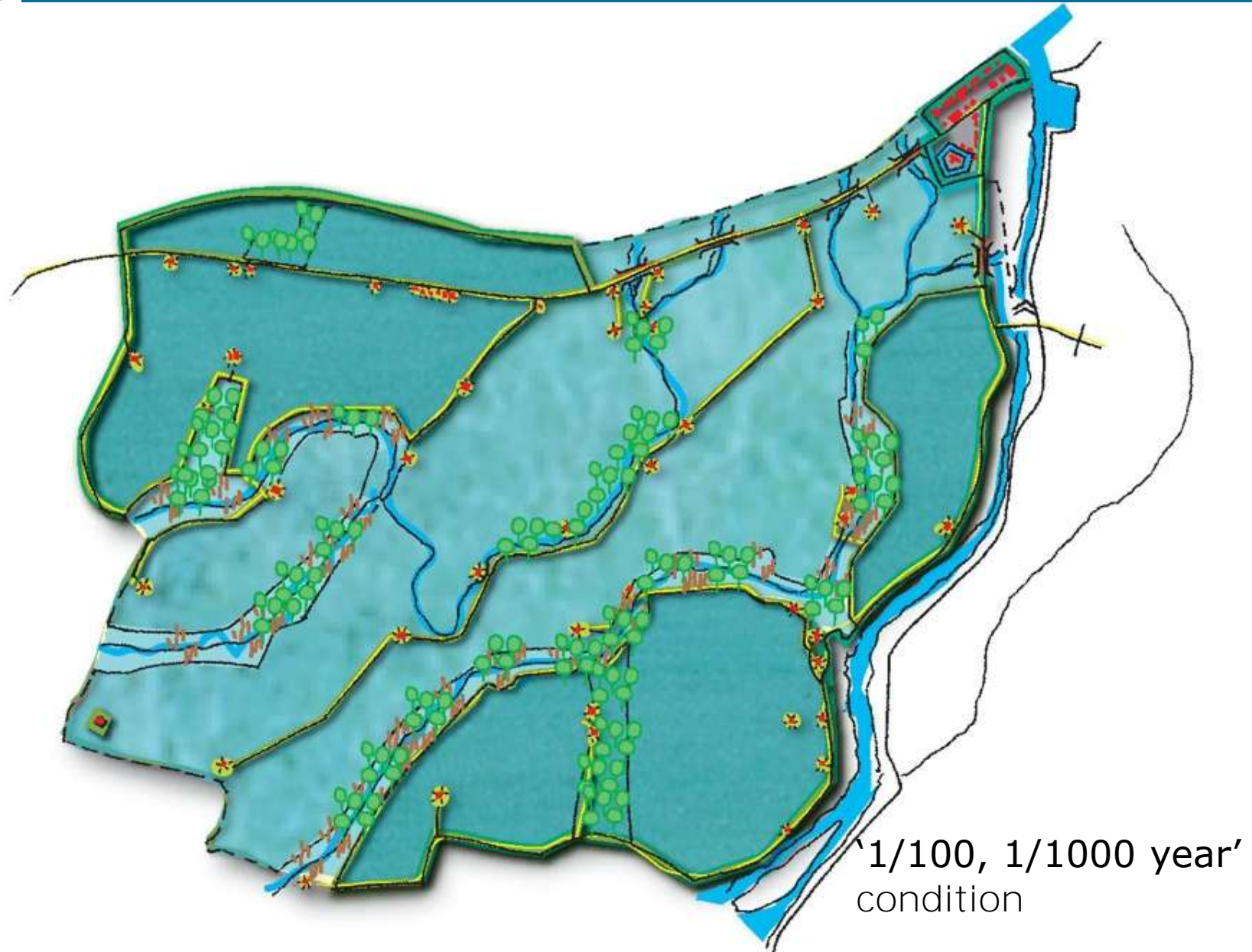
normal watercondition

3 First sketches



'2 weeks a year' condition

3 First sketches



3

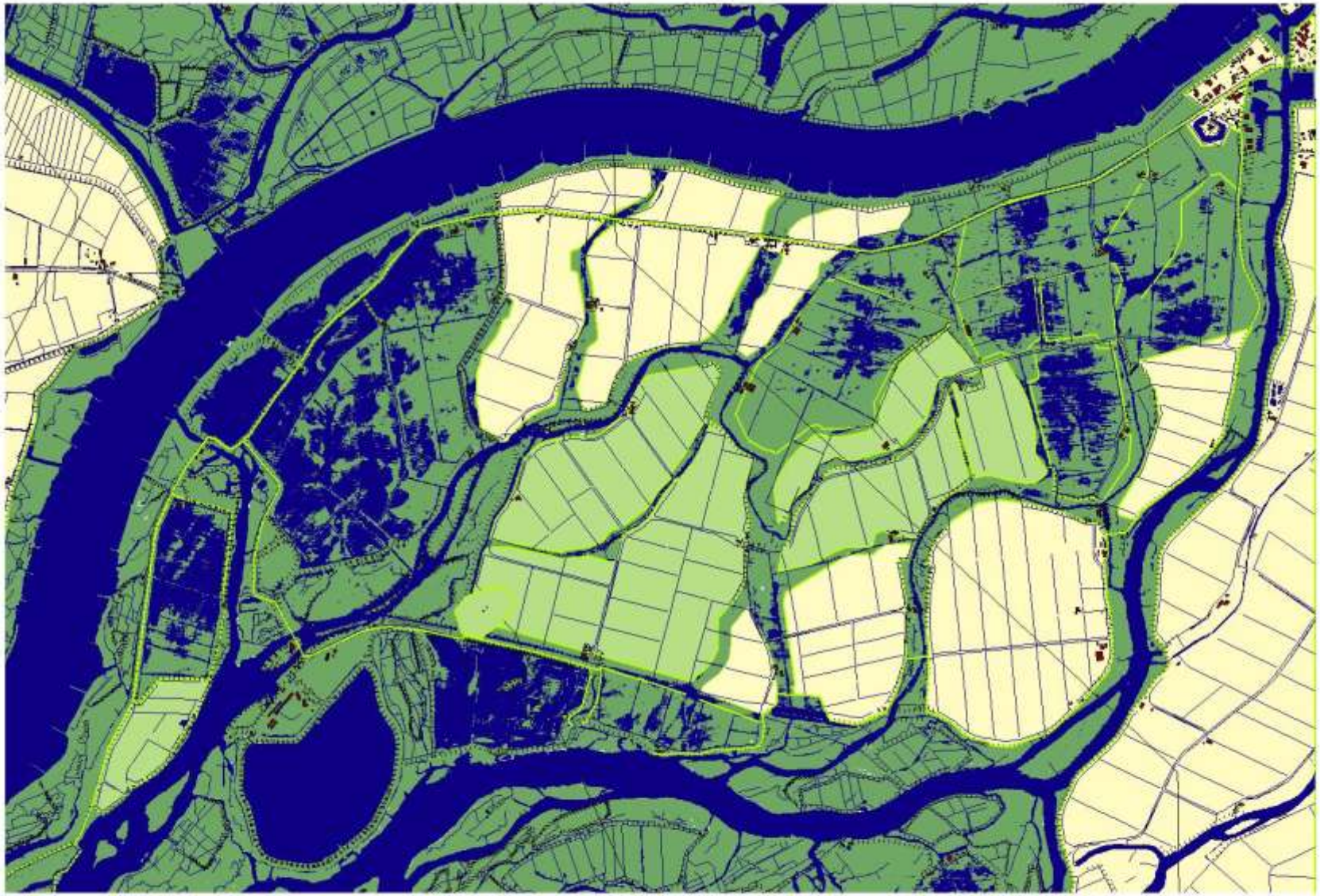
waterdynamic



Noordwaard bij extreem laag water (0,20 m + NAP)

0 500 1000 Meters

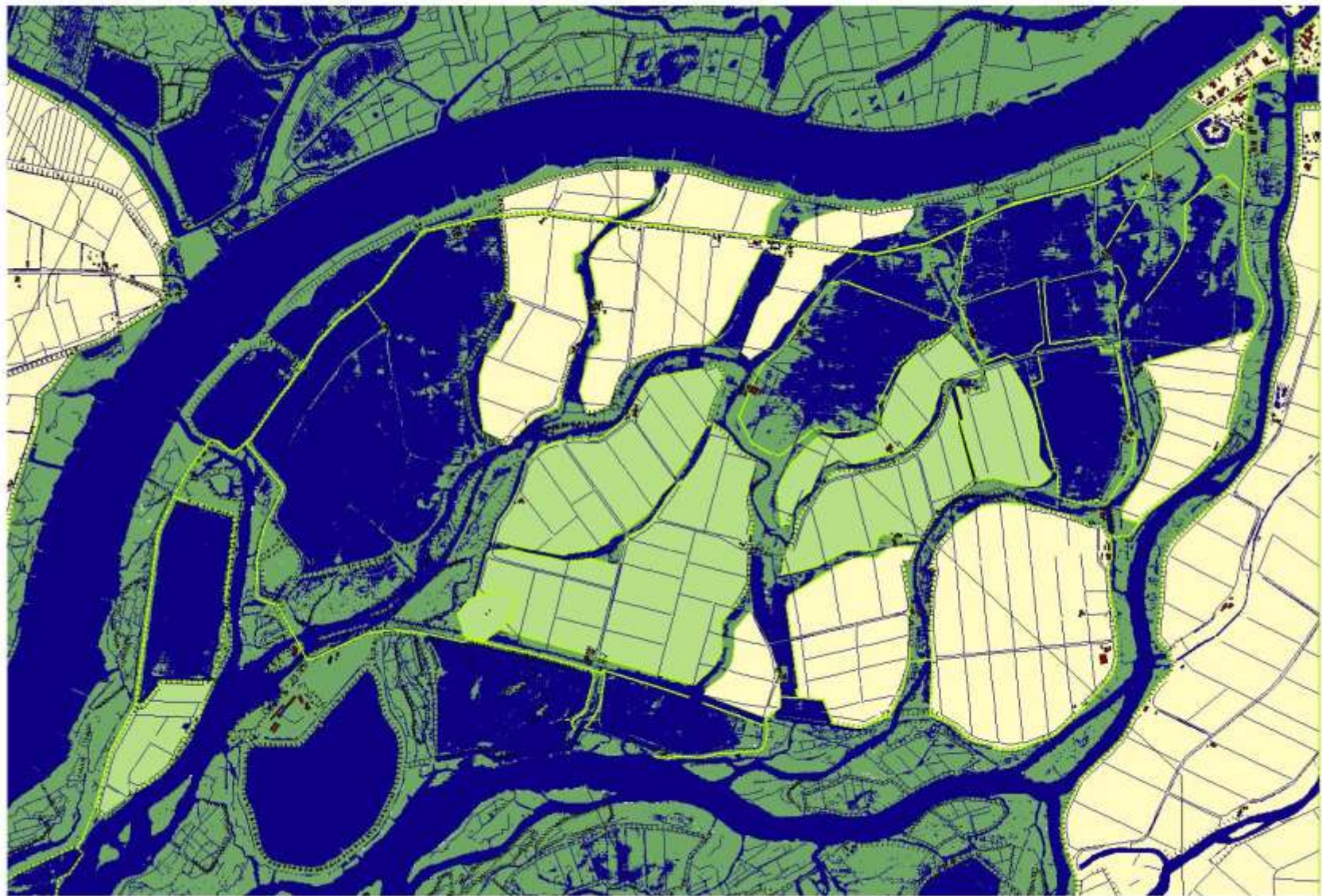
3 waterdynamisch



Noordwaard bij gemiddeld laag water (0,40 m + NAP)

0 500 1000 Meters

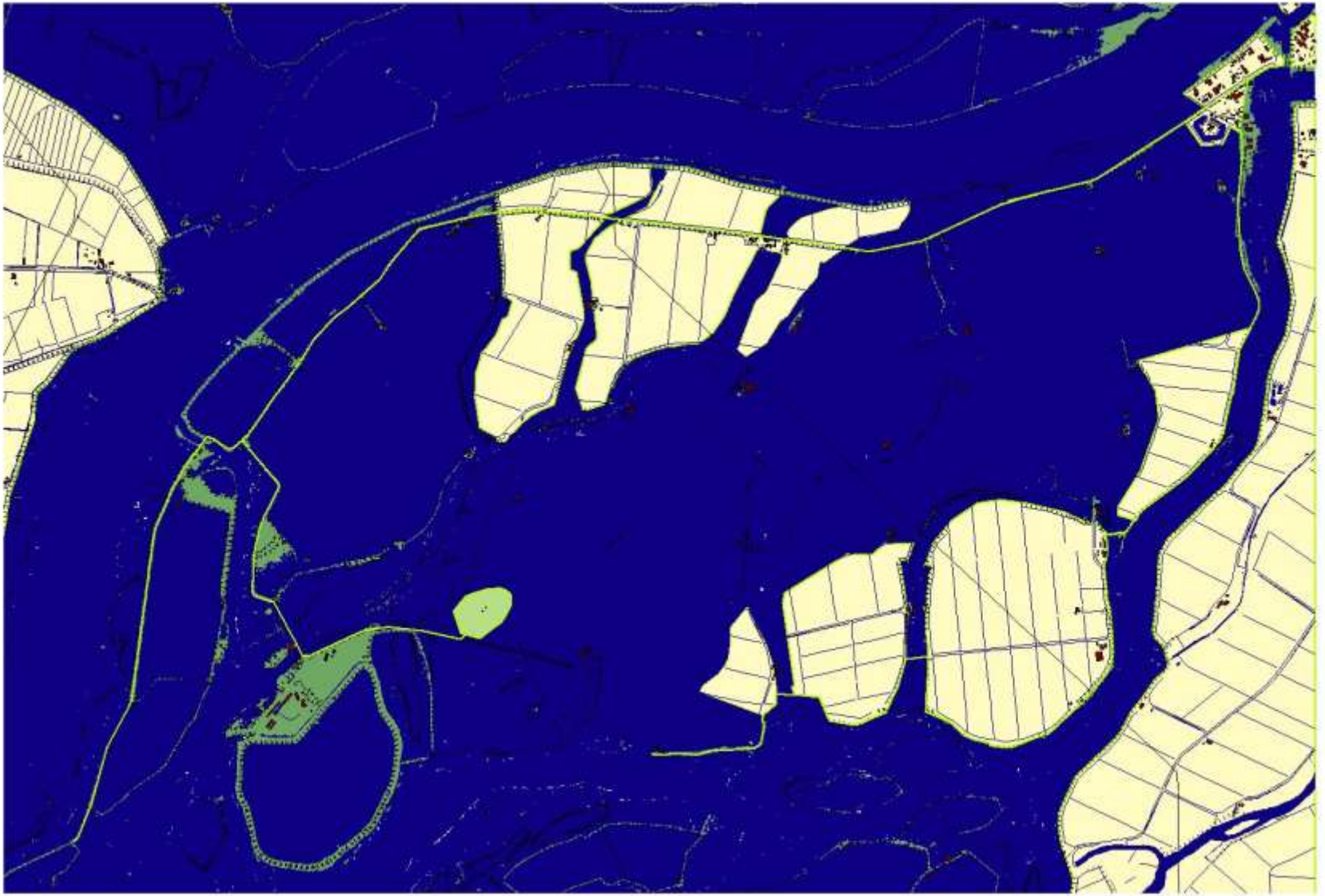
3 waterdynamic



Noordwaard bij gemiddeld hoog water (0,70 m + NAP)

0 500 1000 Meters

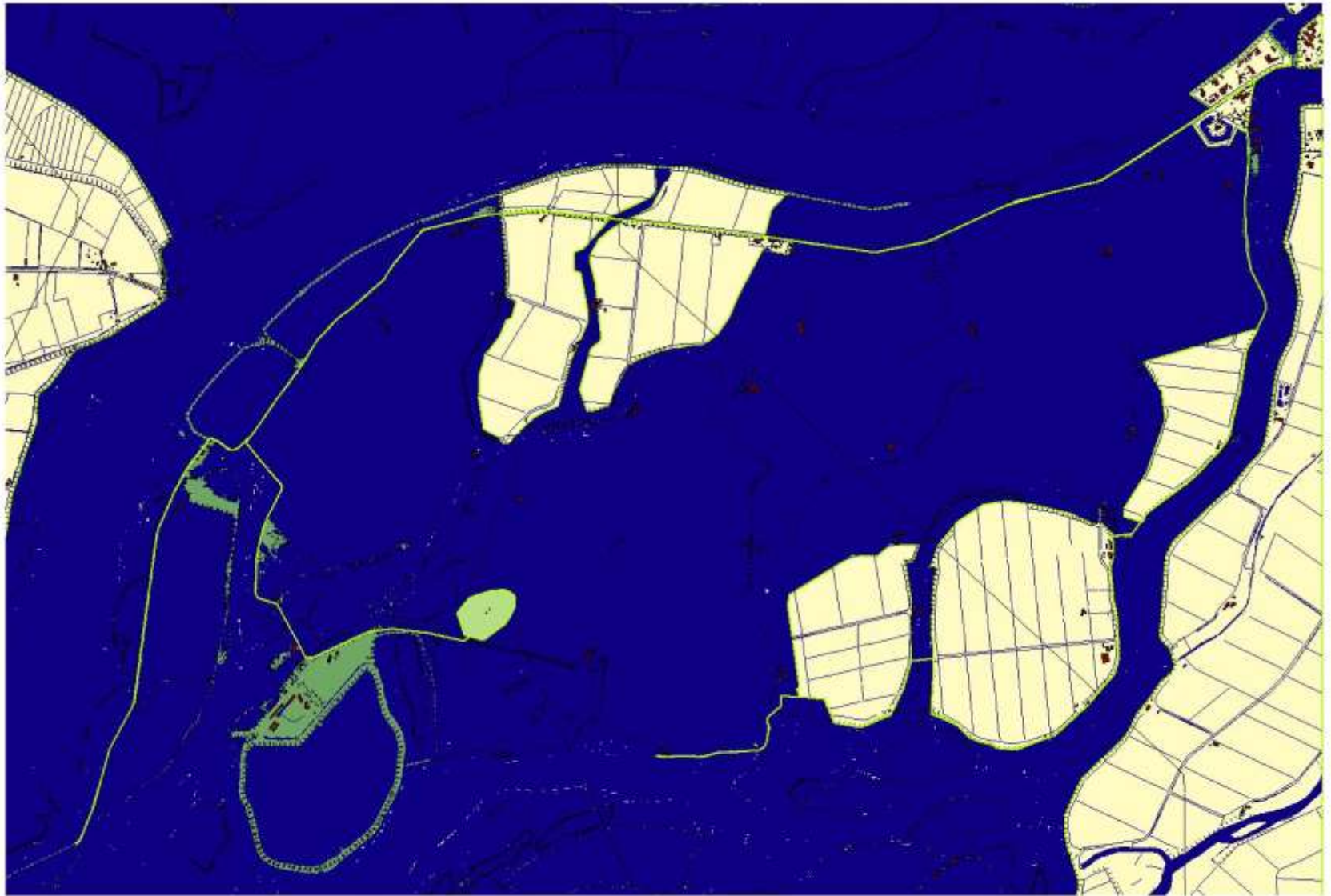
3 waterdynamic



Noordwaard waterstand 1x per jaar (2,00 m + NAP)

0 500 1000 Meters

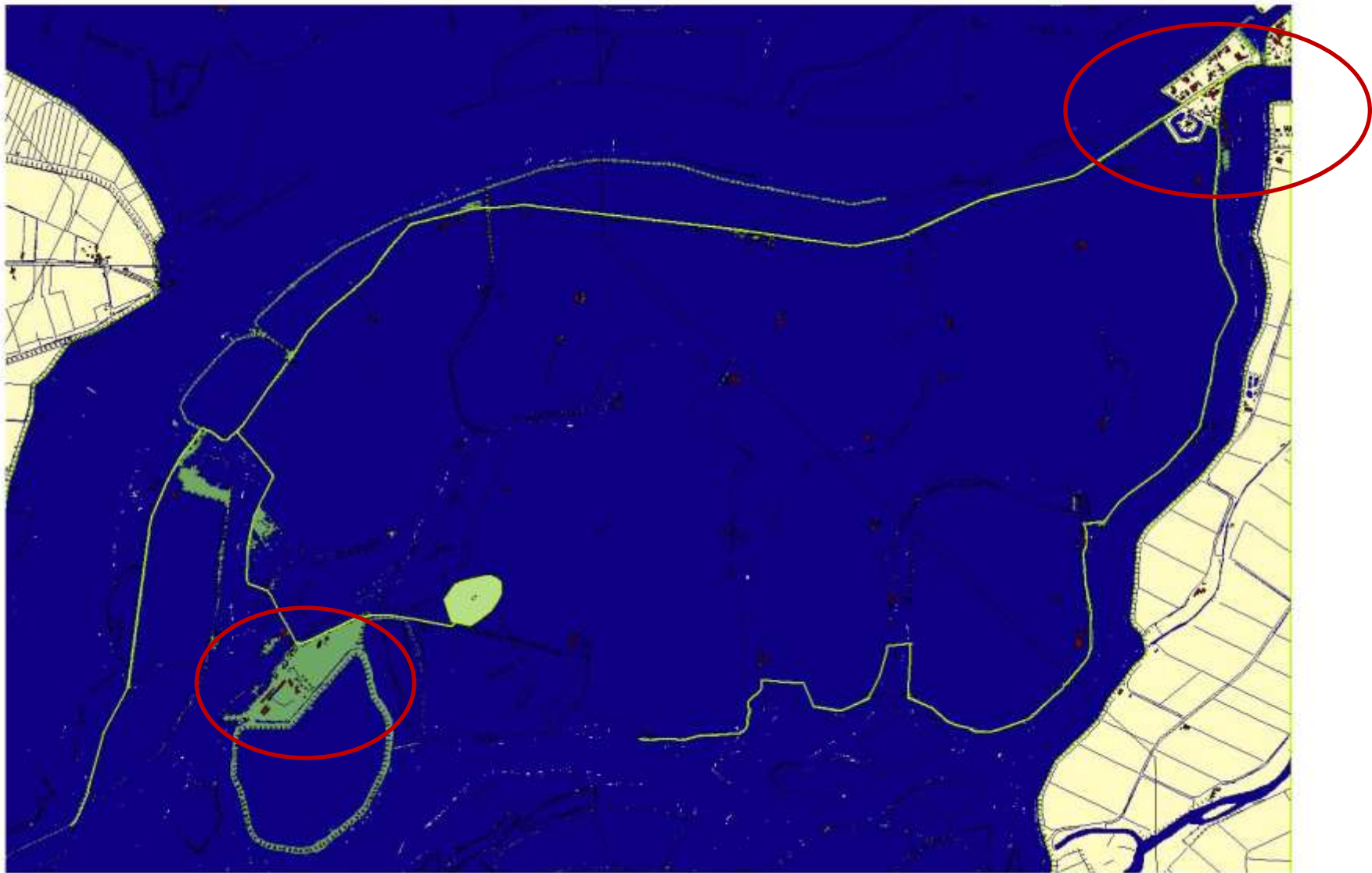
3 waterdynamic



Noordwaard bij hoge waterstand (3,00 m + NAP)

0 500 1000 Meters

3 waterdynamic



Noordwaard bij extreem hoge waterstand (3,50 m + NAP)

0 500 1000 Meters



Depoldering Noordwaard (11,000 square acres)

- Goals:

- Lower water level +/- 30 cm @ Gorinchem
- Improve spatial quality of area
- Restore coherence of environment
- Enable current residents to maintain residence, if desired
- Maintenance of farming occupation (either within polder or elsewhere)

- Impacts:

- Overflow area will flood 1-5 x year
- Nearby areas 1 x in 25 years
- Fort Steurgart remains protected
- Most residences will now be “outside the dikes”, on raised mounds
- Flood levels no higher than 1 meter in residences
- New park / recreation / tourism opportunities
- Remains accessible to all users
- Surprise! Reduce flood risk at Dordrecht (90 cm)



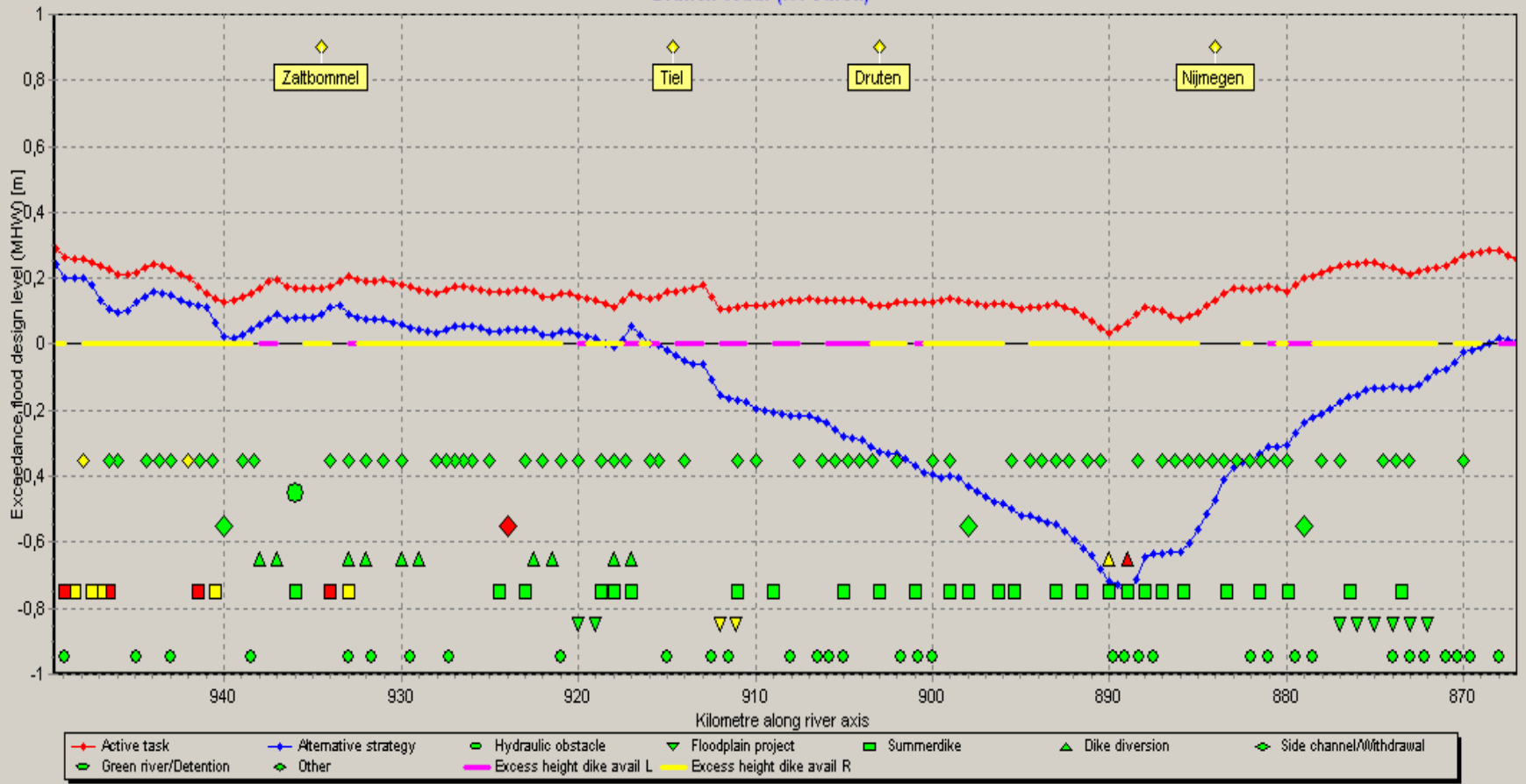
The Room for the River *Planning Toolkit*

- Large amounts of river data collected and put inside the “black box”
- Field of play: hundreds of kilometers of river reaches
- Data was smoothed/made consistent, and toolkit model was to generate local and system-wide impacts
- 700 possible measures/actions (type and scope) identified by experts/stakeholders; each individually modelled
- A-ha! Many alternative strategies are conceivable for improving flood protection for the medium term





Branch Waal (tot Vuren)





What makes/made the Planning Kit a useful tool?

- forms a common knowledge base
- supports and facilitates learning, rivers form a *system*
- enlarges knowledge of local, regional river management
- people can check the relevance of their own ideas about flood management
- sense of empowerment: users understand process and science

- simple to use
- complete overview of measures
- easy to distribute among stakeholders



Room for the River today

700 potential projects identified, 39 selected, 35 being implemented
urban, agricultural/rural, wetland restoration

2,3 billion euro budget (\$3 billion)

Implementation 2009-2015: money is committed, not subject to annual appropriations cycle, this yields certainty *and* cost savings

Oversight team coordinates feedback / experience between projects

Info: www.ruimtevoorderivier.nl/meta-navigatie/english



Lessons

- Retain, Store, Discharge
- Emergencies (national, local) yield opportunities; **“strike while the iron is hot,”** acknowledge implementation takes time
- Combining protection and spatial quality creates broader public support for measures: environmental, economic, safety
 - **“And...and” not “either...or”**
- Transparency and directness about goals, acknowledge trade-offs at beginning of process
- Allow local stakeholders to guide (many partners)
- Offer many possible options
- More time in awareness / planning yields better, quicker implementation
- Toolkit is key to create shared knowledge
- Steady, reliable, dedicated project funding lowers overall costs



Contact @ Royal Netherlands Embassy

Ambassador Renee Jones-Bos

202 274 2501

Was-Cdp@minbuza.nl

Dale Morris

202 274 2618

Dale.morris@minbuza.nl

Thanks to:

Deltares, Rijkswaterstaat, Robbert de Koning, Jos Dijkman, Twynstra-Gudde,
Netherlands Association of Waterboards, Province of North Brabant