



Rijkswaterstaat
*Ministry of Infrastructure and the
Environment*

Asset management of the Dutch coast: Policy and Practice

Quirijn Lodder





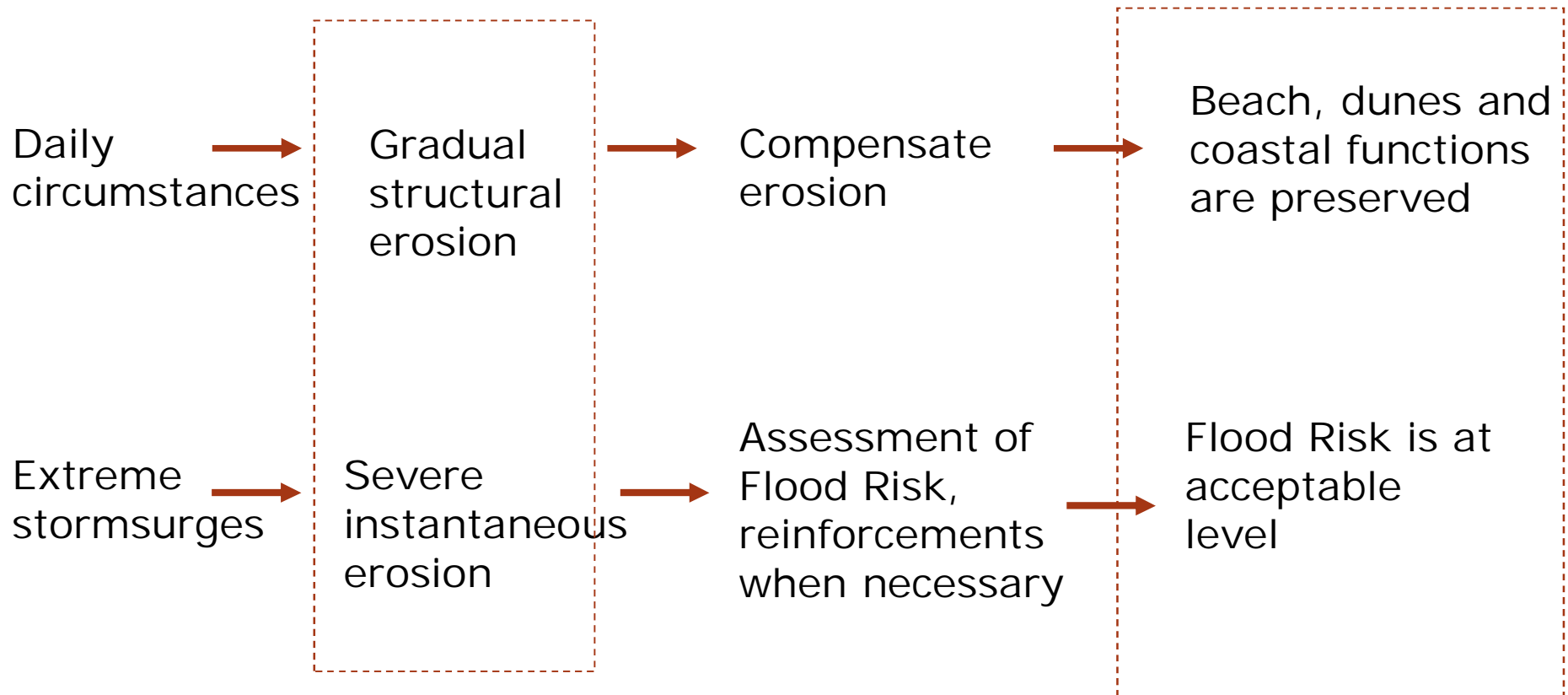
About myself:

- **Work:**
 - Rijkswaterstaat (National Government) equivalent of Environment Agency
- **Tasks:**
 - Technical Management of the Dutch Coastal Nourishment Program
 - Advise Flood Risk Management projects



Coastal Recession

Coastal Management Policy



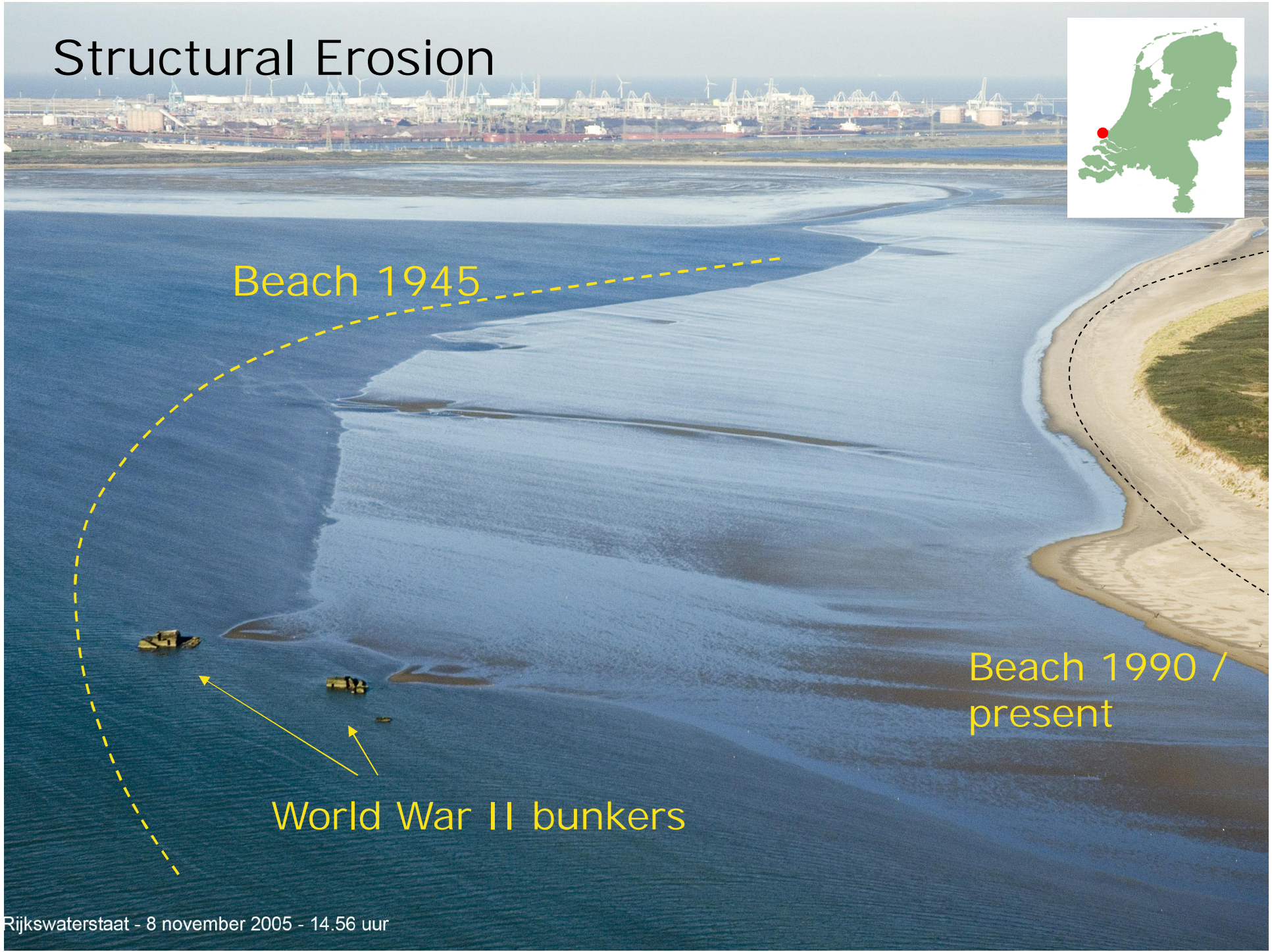
Structural Erosion



Beach 1945

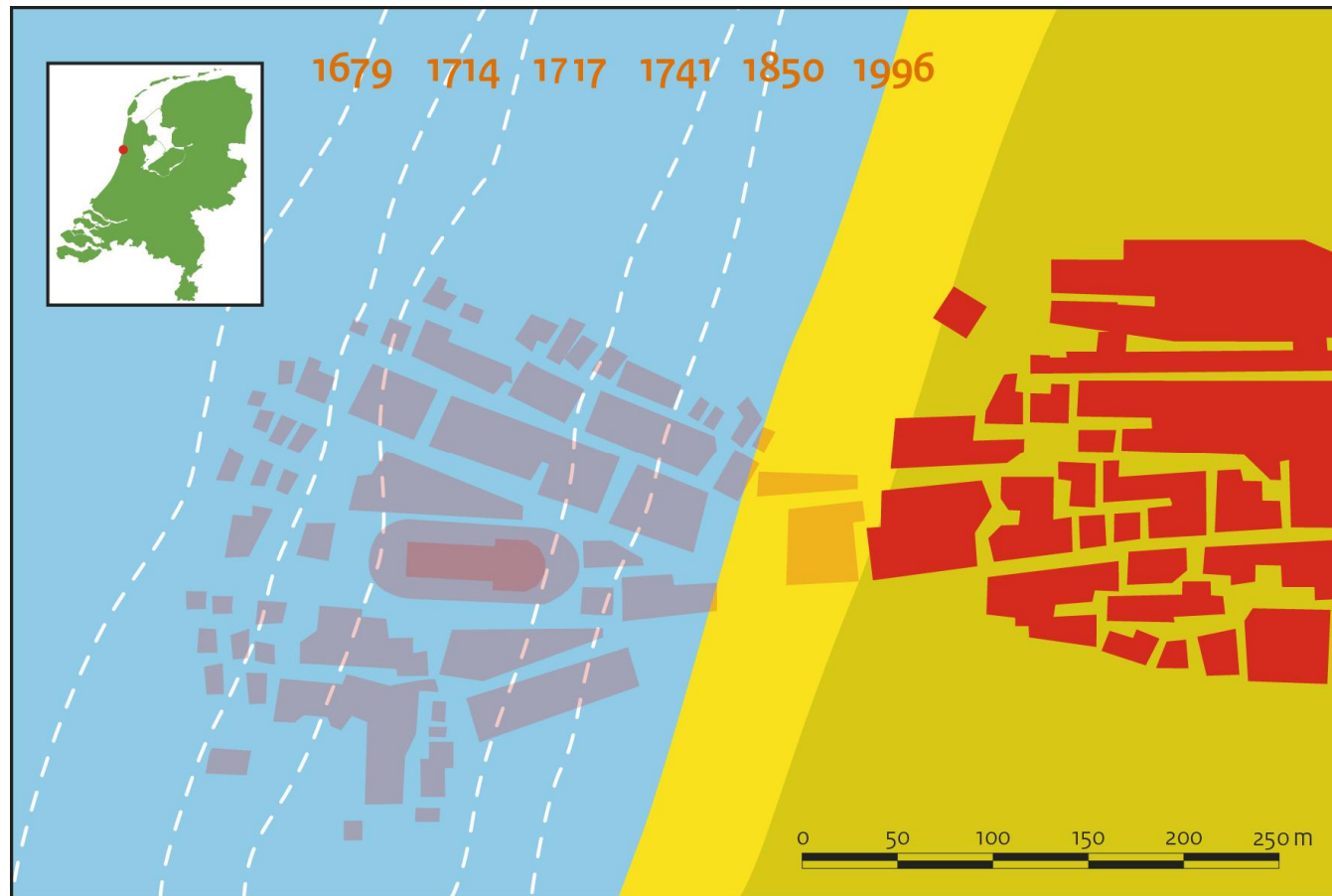
Beach 1990 / present

World War II bunkers



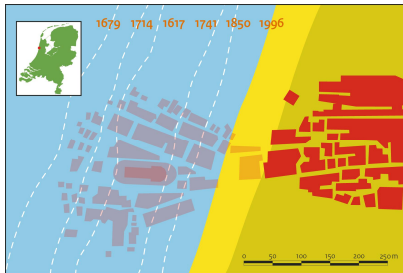


Coastal Erosion: Egmond aan Zee



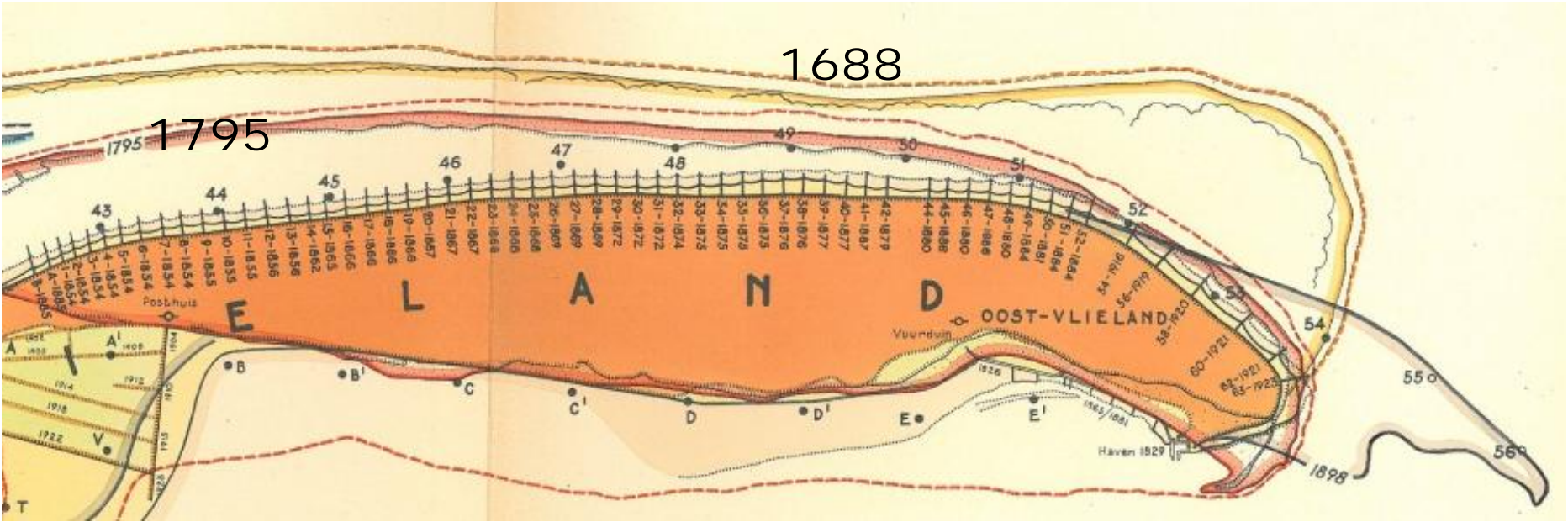


Coastal Erosion: Egmond aan Zee



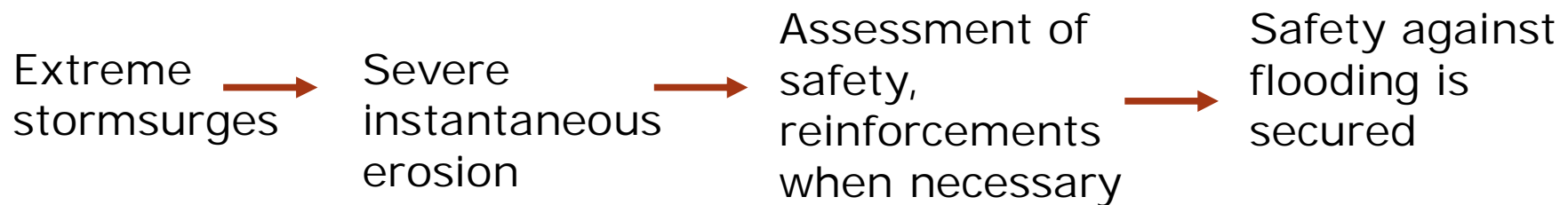
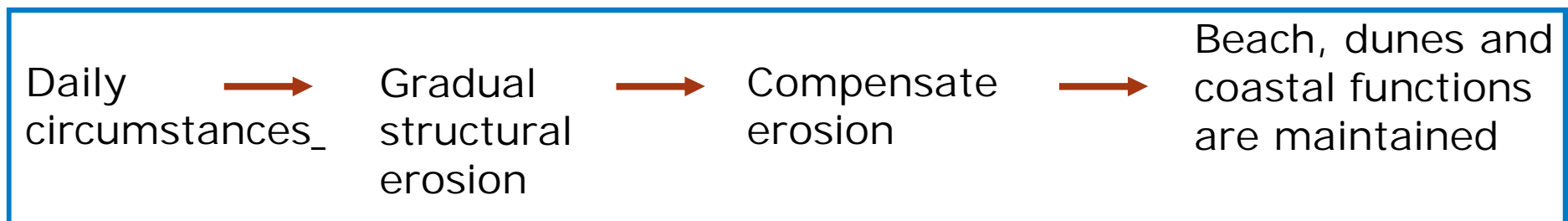


Vlieland



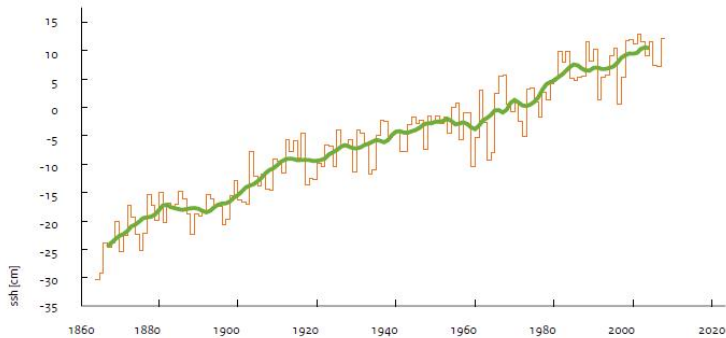


Compensation of structural erosion





Coastal evolution

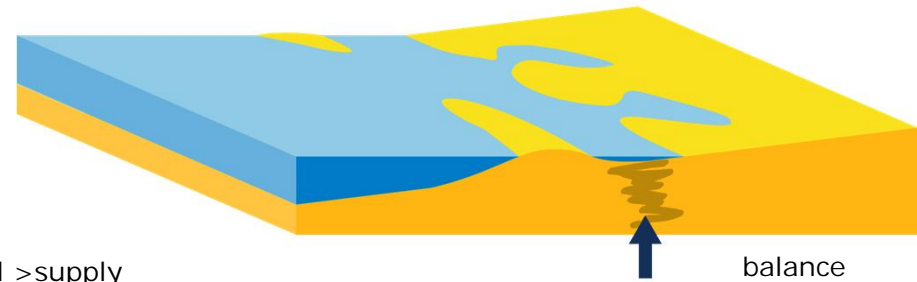


Measured Sea Level Rise
Around 20 cm/century

demand < supply



demand = supply



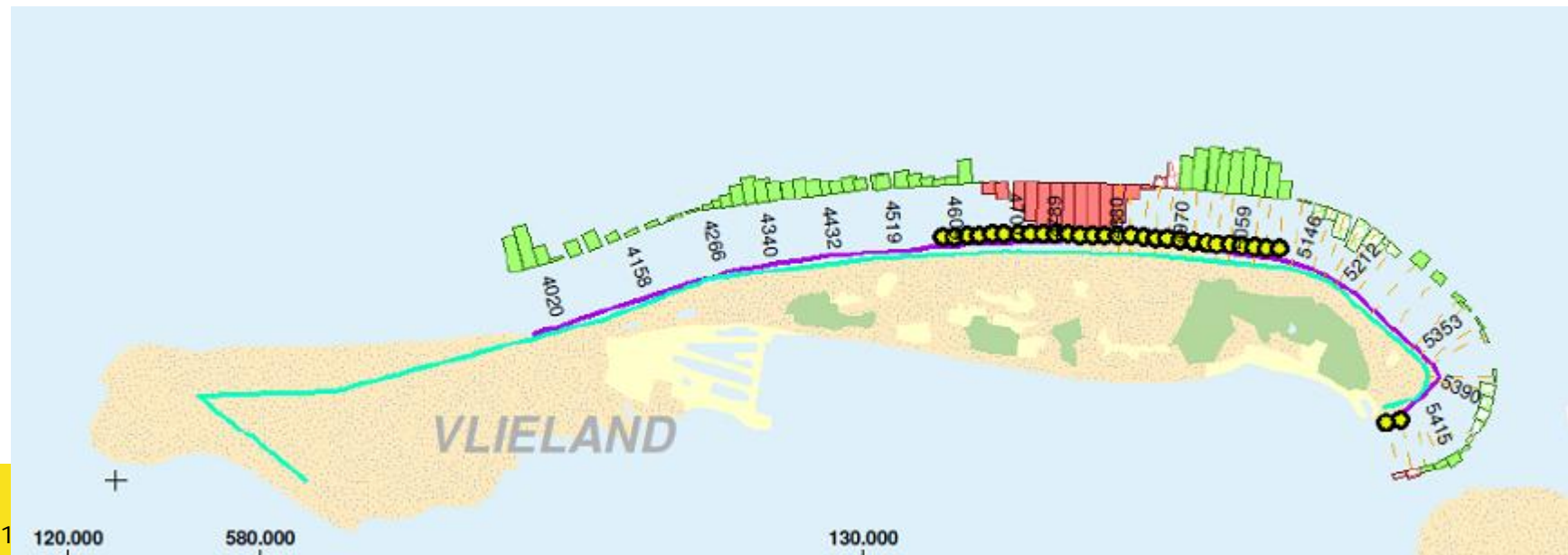
demand > supply

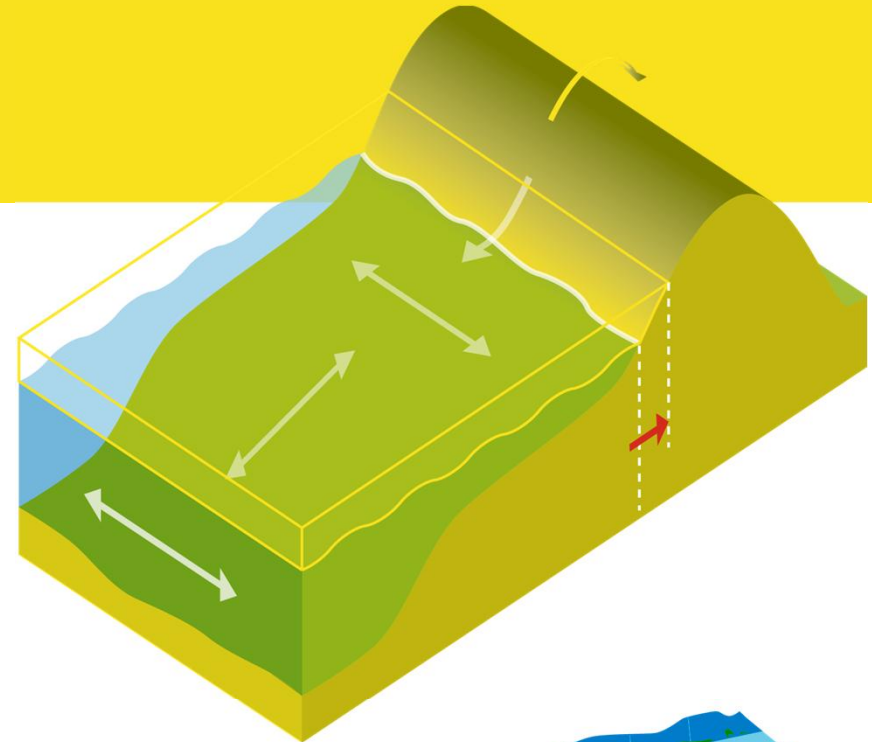




Planning of Nourishments based on Reference Coastline (BKL in dutch)

- Compensate erosion, preserve “sandy” system
- Yearly: Measure, Asses, Plan Nourishments
- Reference Coastline:
 - Preserve existing coastal functions (protection against flooding, structures on the dunes, dune habitat, recreation, fresh water extraction....)

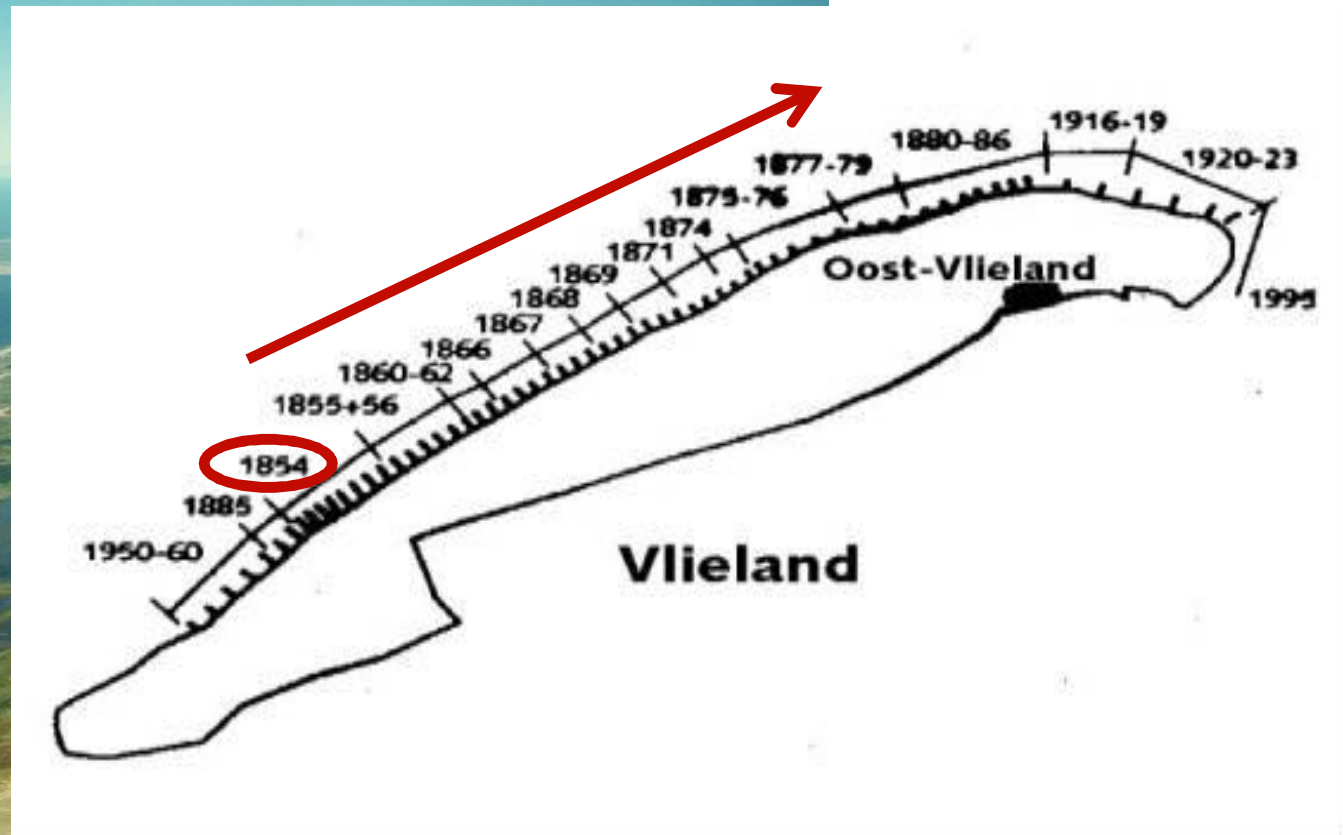
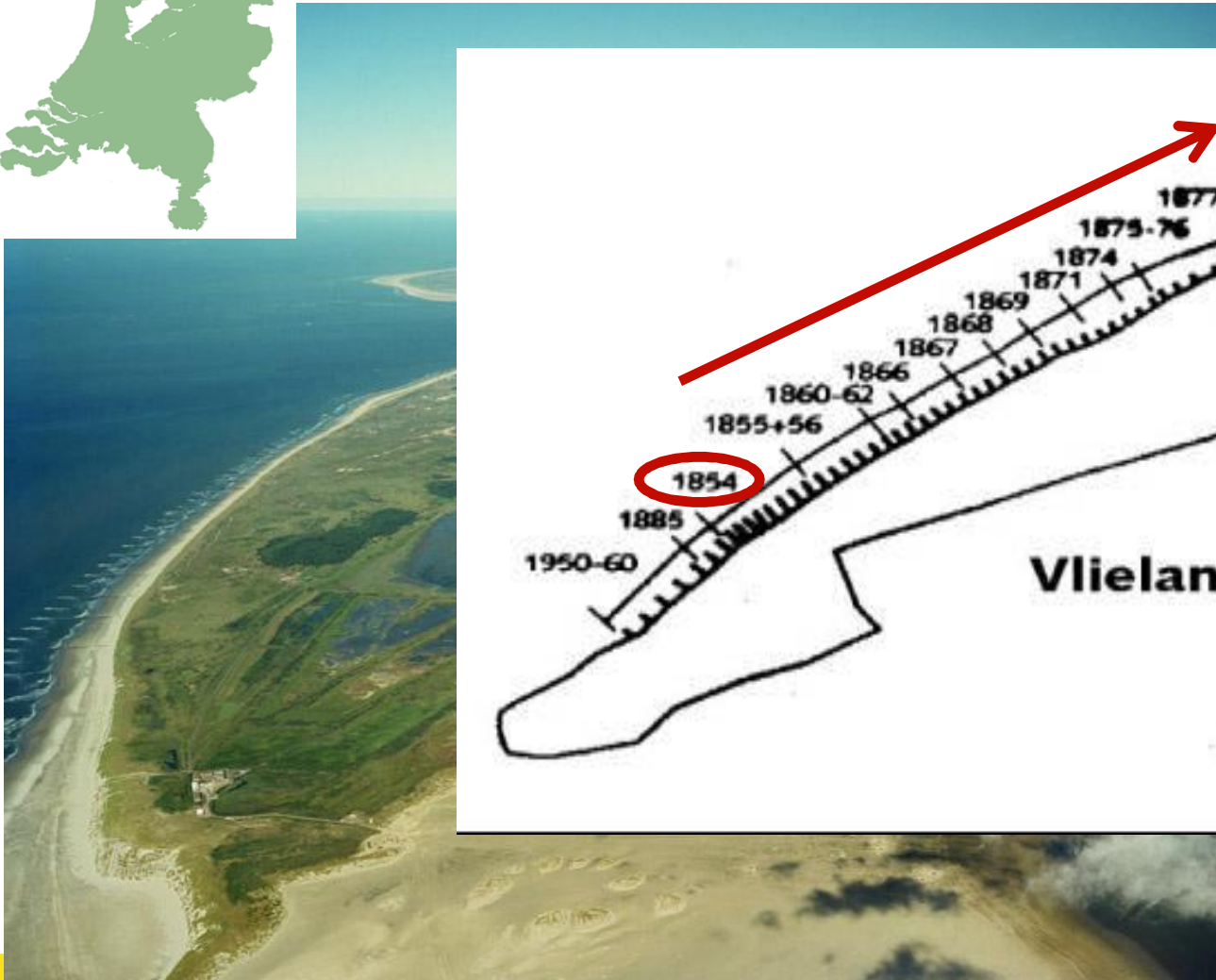




Preserve sufficient sediment
in the active coastal zone



Why do we use sand?





3 level strategy

1. Do nothing



2. Buffer



3. Consolidate



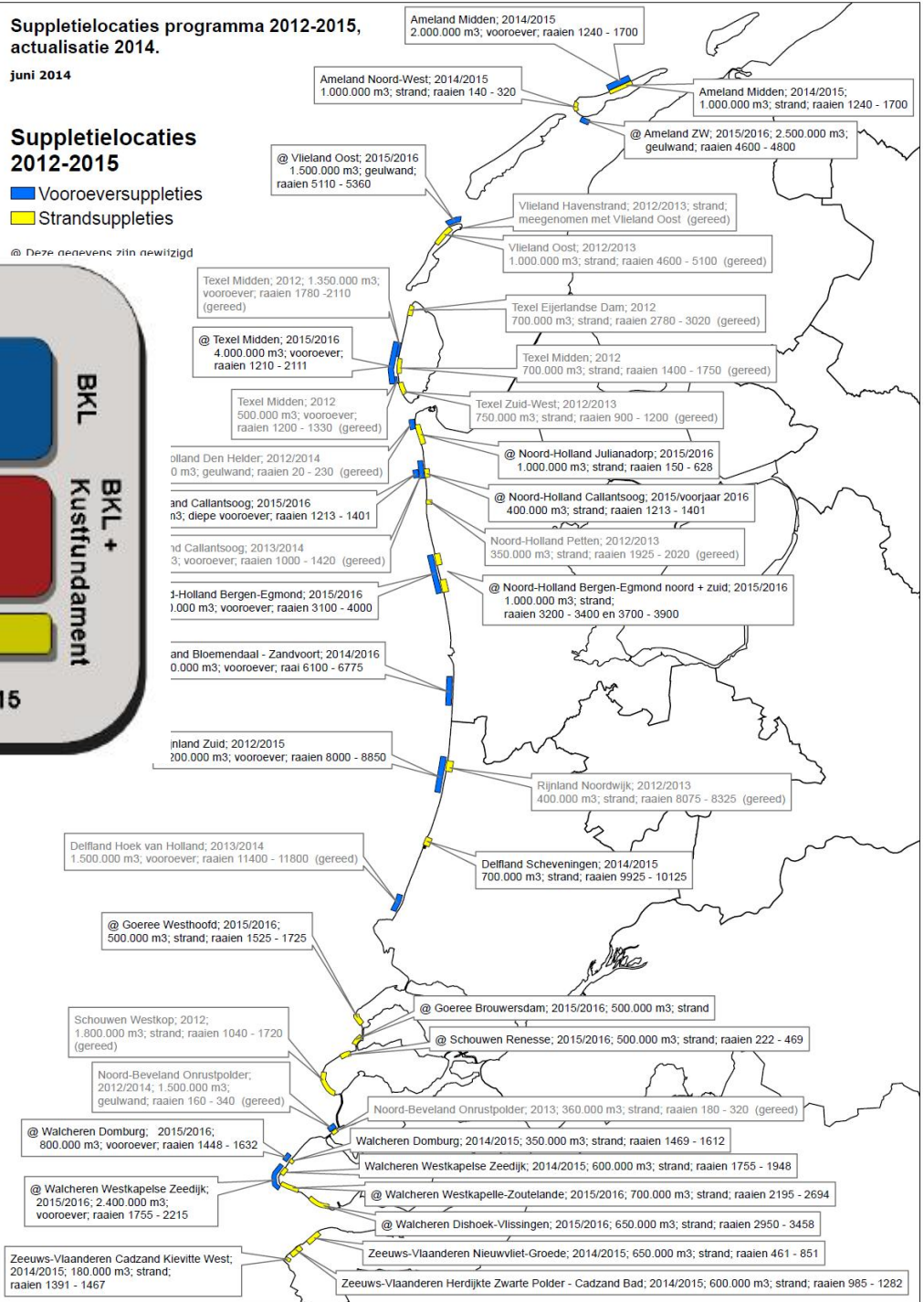
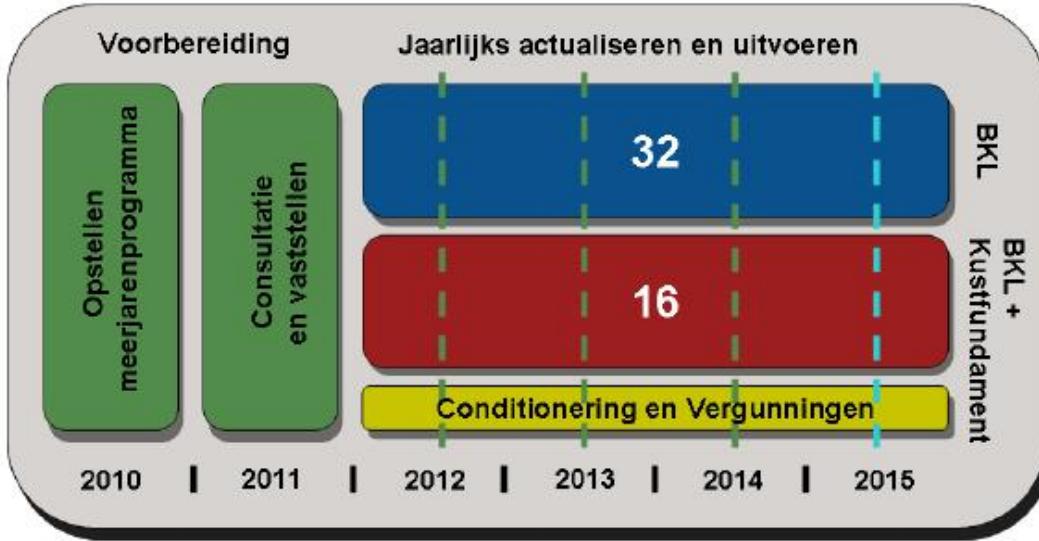
Suppletielocaties programma 2012-2015, actualisatie 2014.

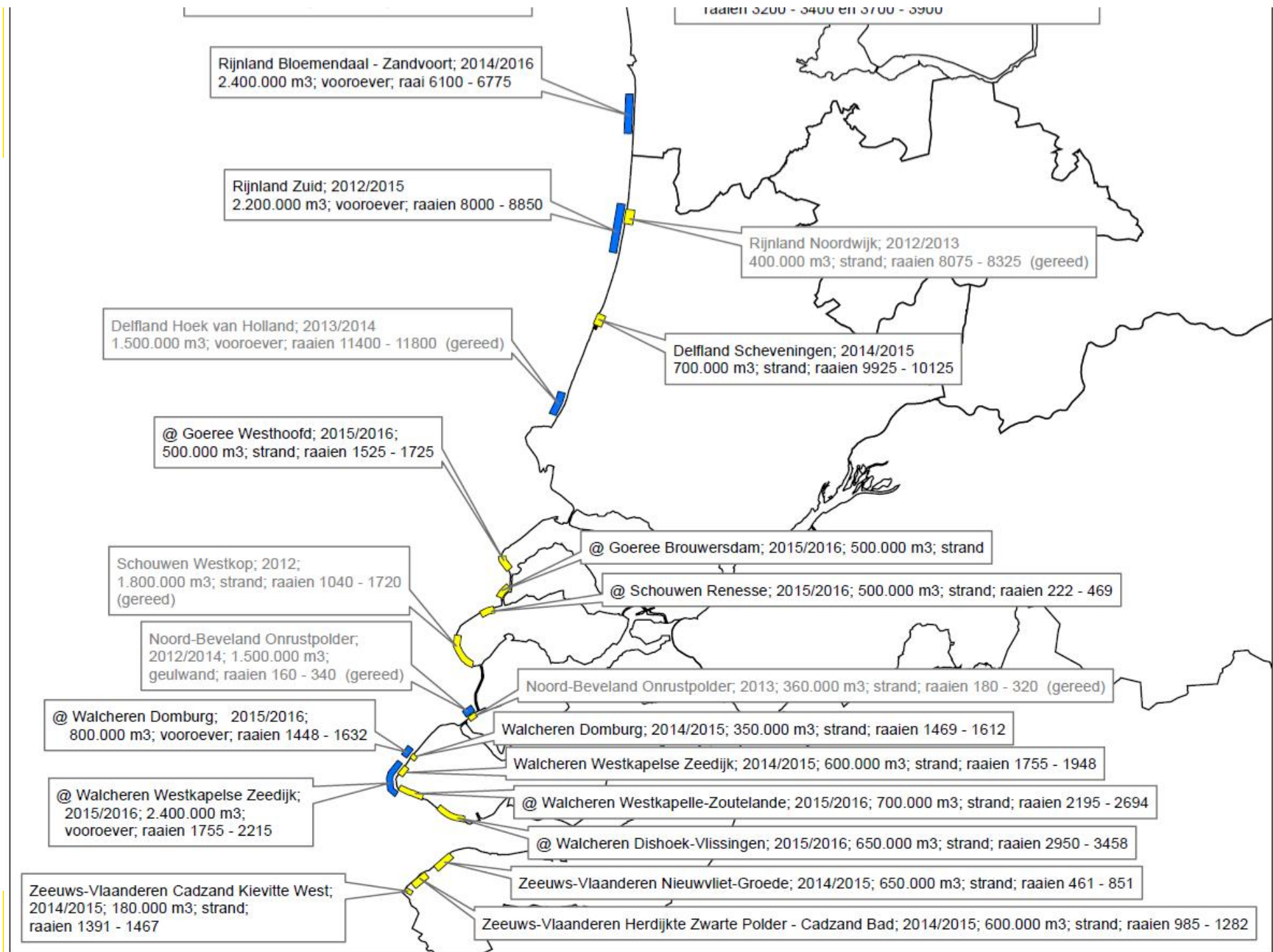
juni 2014

Suppletielocaties 2012-2015

■ Vooroever-suppleties
■ Strandsuppleties

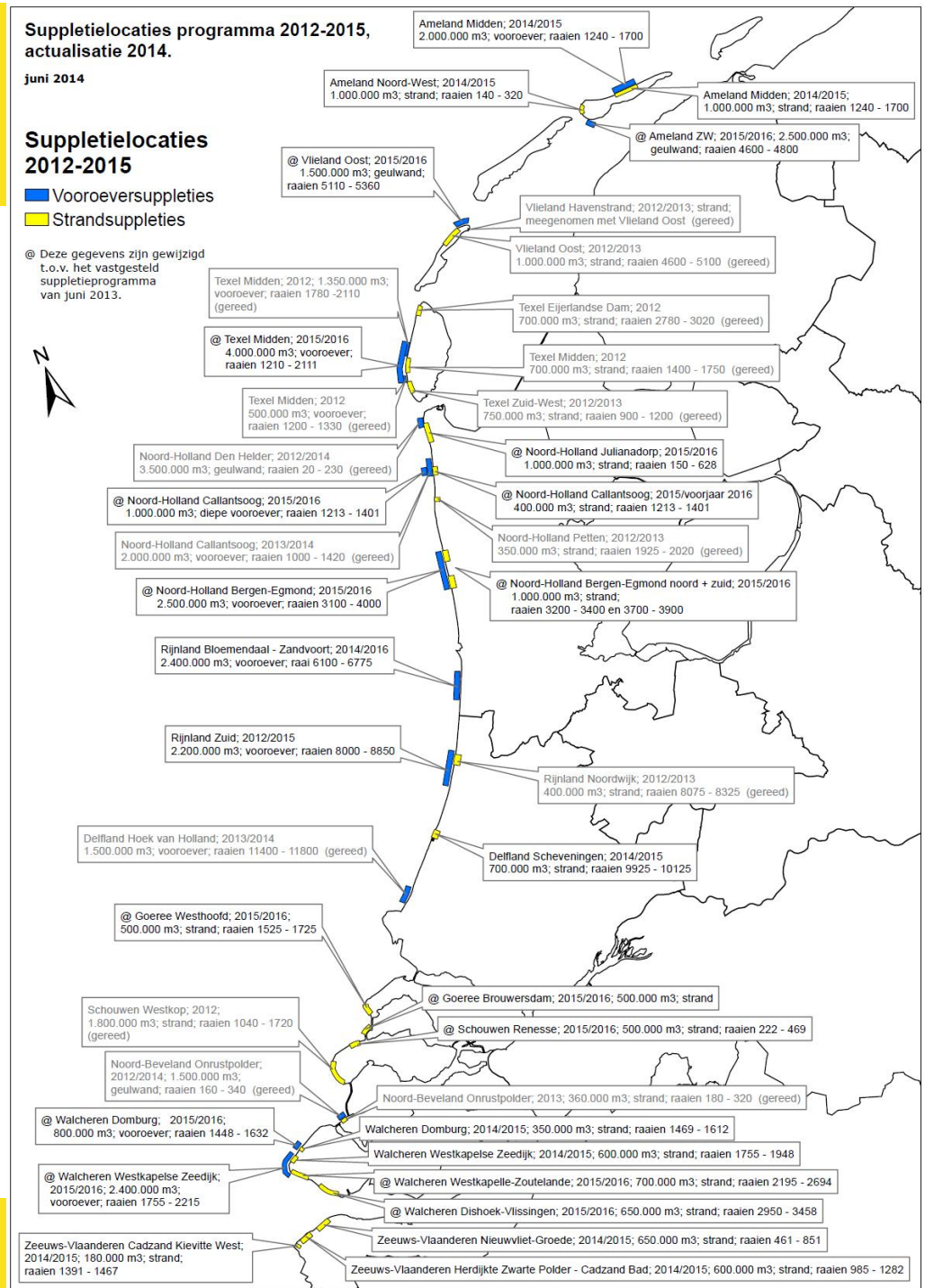
@ Deze gegevens zijn nieuwzijdig

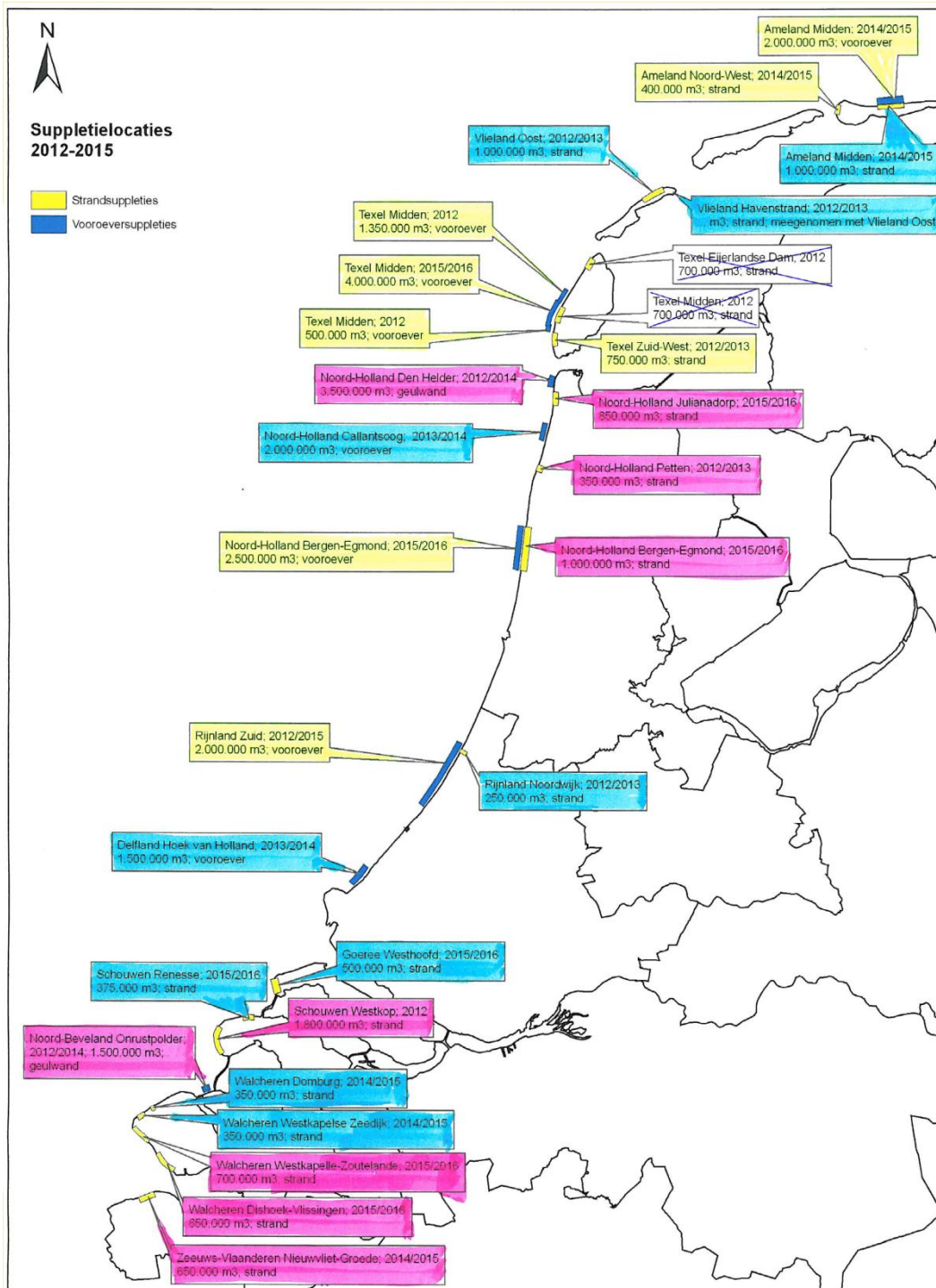




Costs

- Yearly budget, approx. 55Meuro/40 M GBP
- Down from 70 Meuro in 2009
- Efficiency: 4 year plan vs annual plan





Tendering

Type schip

Contract 1: > 12 m draught

Contract 2: < 6 m draught

Contract 3: ca. 7 m draught

Goal maximize competition.

Per contract a maximum price.

Tenders above are not valid.

Option charter a ship

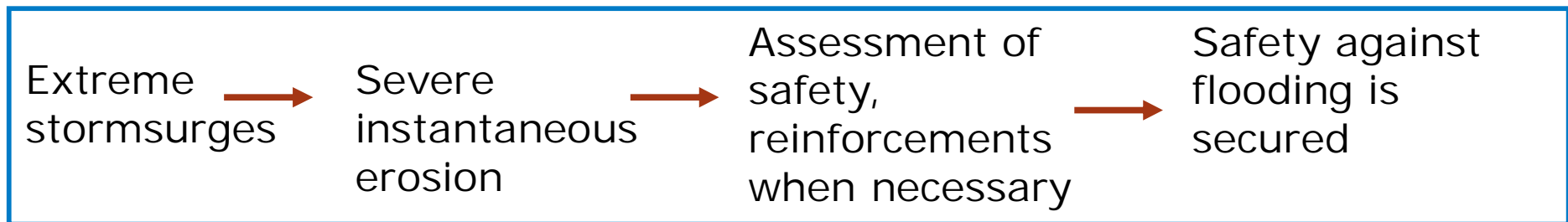


Sequential tendering

- Friday contract 1
 - Tuesday notify all contractors who put in a bid
- ↓
- Friday contract 2
 - Tuesday notify all contractors who put in a bid
- ↓
- Friday contract 3
 - Tuesday notify all contractors who put in a bid
- ↓
- Finalize the contacts.



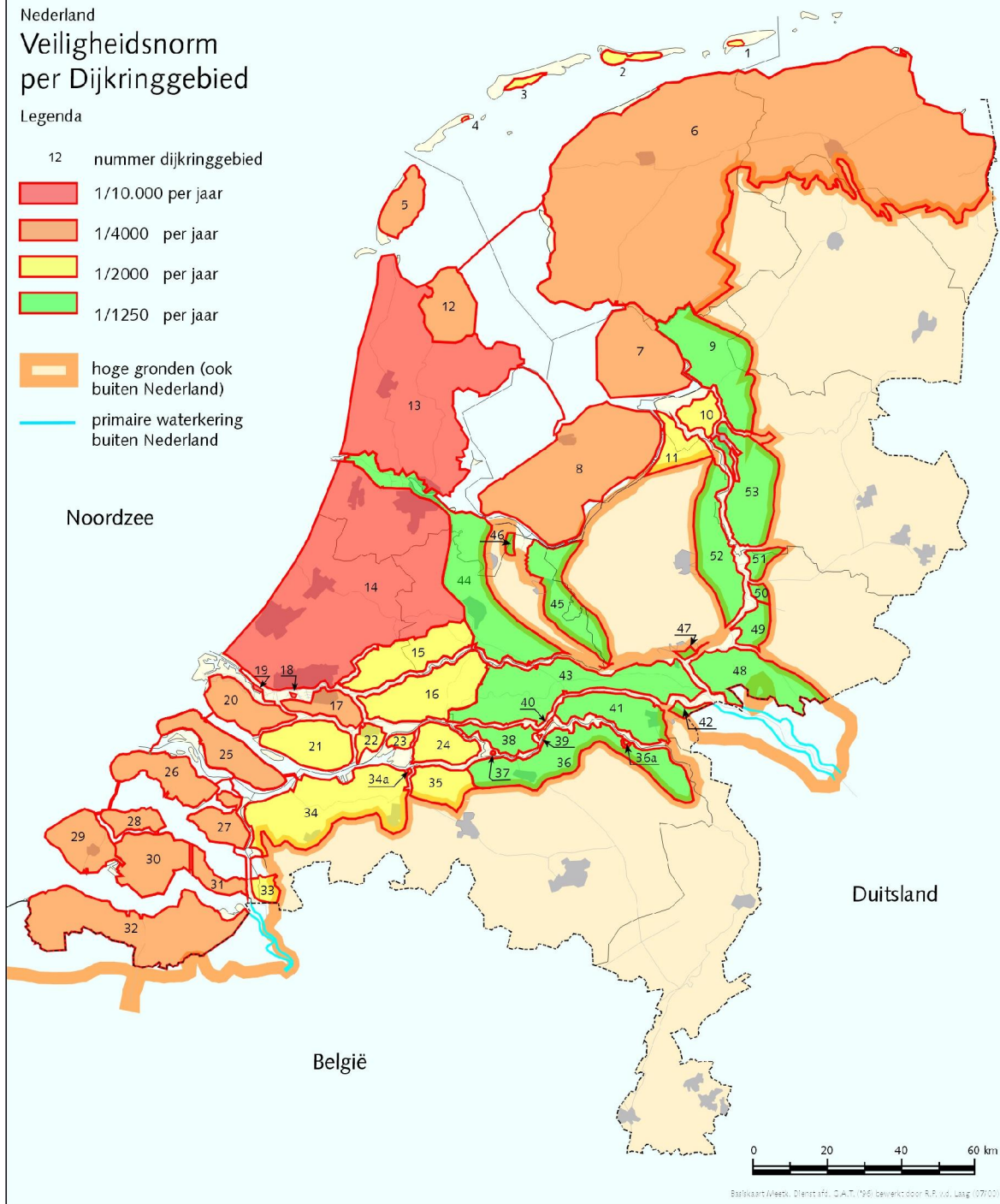
Ensuring tolerable flood risk



Nederland Veiligheidsnorm per Dijkkringgebied

Legenda

- 12 nummer dijkkringgebied
- 1/10.000 per jaar
- 1/4000 per jaar
- 1/2000 per jaar
- 1/1250 per jaar
- hoge gronden (ook buiten Nederland)
- primaire waterkering buiten Nederland



- Safety standards
- A flood defence should be able to with stand the fixed standard

Current standards

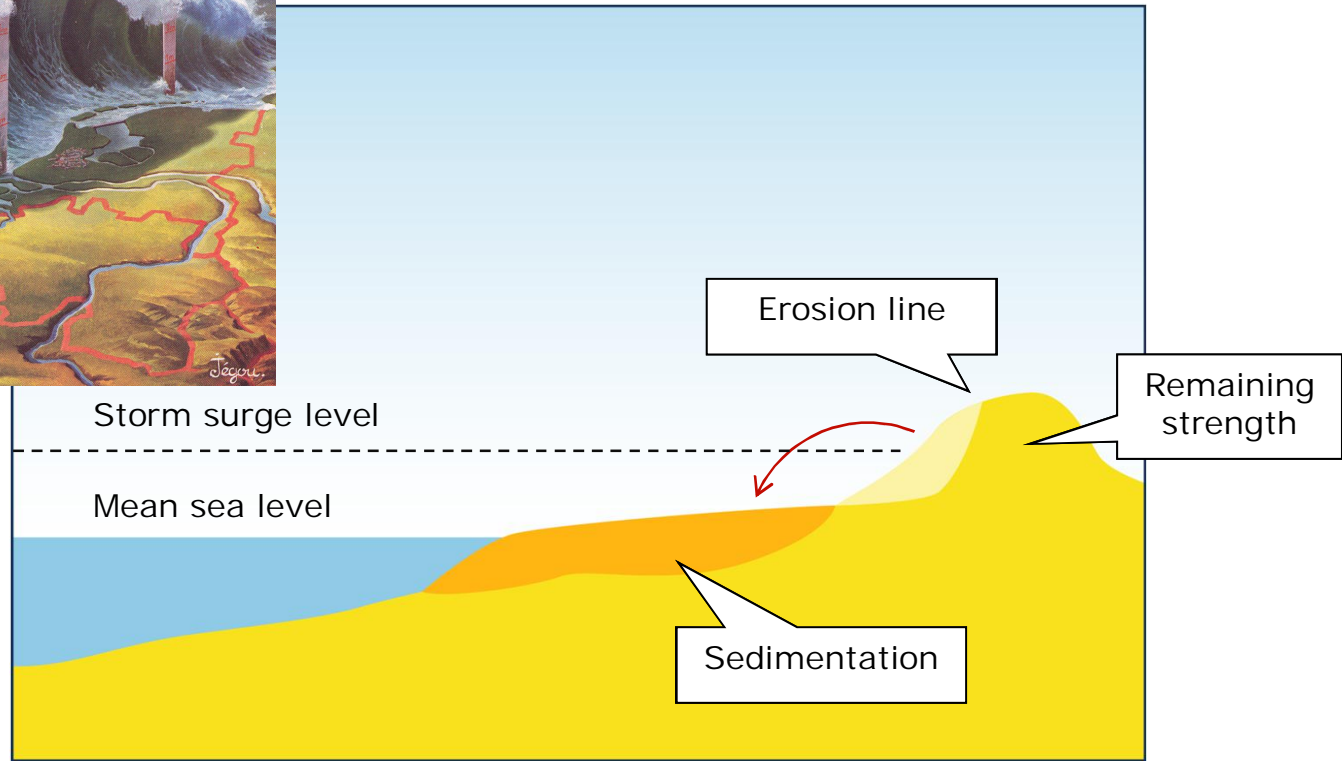
- 1/10.000 central Holland
- 1/4.000 rest of the coast
- 1/2000 and 1/1250 inland rivers

erstaat

Basiskaart/WaerN, Dienst IFA, © A.T.T./198) bewerkt door R.F. v.d. Laag (07/00)



Safety against flooding





Safety standards

- All dutch levees have to meet a fixed “safety standard”
- In other words: the accepted probability of breaching of a levee is set by the Water Act (the standards are given in next slide)
- When insufficient Levee’s are reinforced

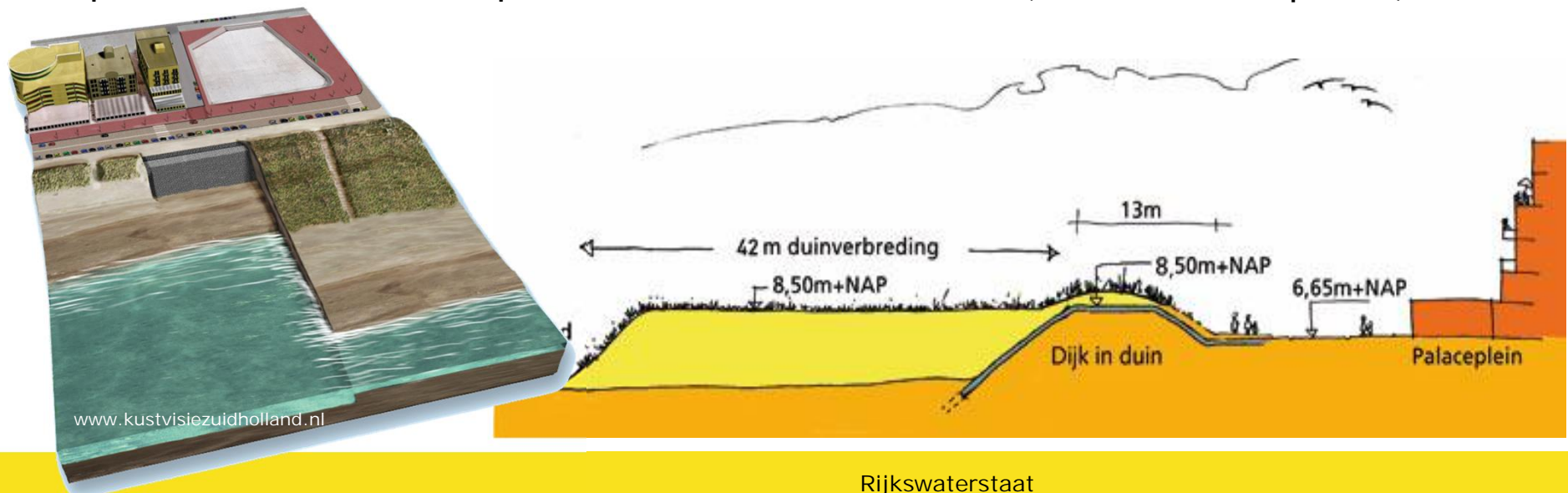


Example Noordwijk: Dike in Dune (2007-2008)

Seaward dune extension of about 42 meter

Water defense (dike and sand) is positioned seaward of boulevard (boulevard area becomes protected)

Space for new developments on the boulevard (economic impulse)



Deltaprogramma in kaart

Stad van zaken per project

- verkenning
- planmativering
- realisatie
- geneed
- getemporeerd





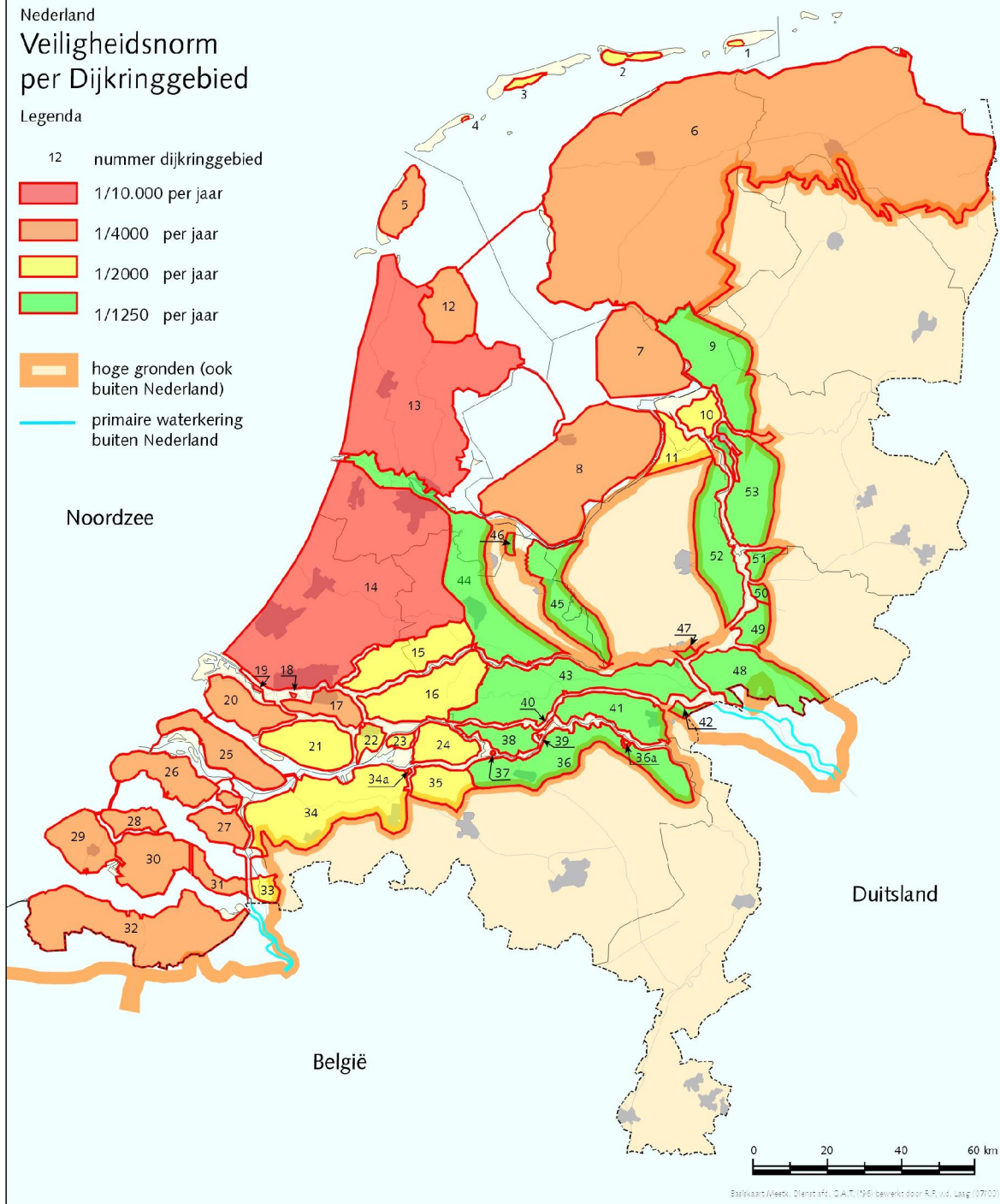
Towards new safety standards

- Current safety standards (embedded in Water Act) are derived from 'expired' risk- and cba analysis (late 1950's)
- Hence: current safety standards lead to suboptimal investments in flood risk reduction (now and in the future)
- Since 1990, ongoing work to gain insight to update the standards
- 2014 first "draft" of new standards have been set
- 2017 finalize within the legal framework

Nederland Veiligheidsnorm per Dijkkringgebied

Legenda

- 12 nummer dijkkringgebied
- 1/10.000 per jaar
- 1/4000 per jaar
- 1/2000 per jaar
- 1/1250 per jaar
- hoge gronden (ook buiten Nederland)
- primaire waterkering buiten Nederland



- Safety standards
- A flood defence should be able to with stand the fixed standard

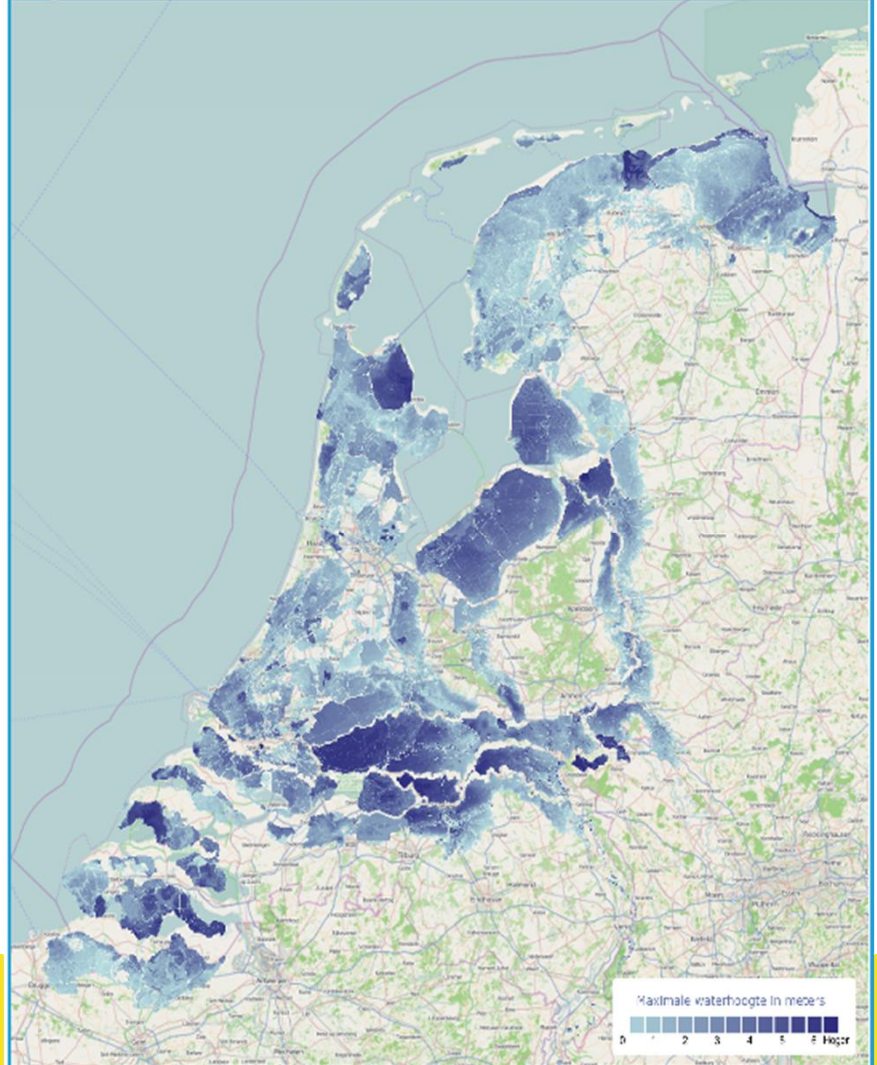
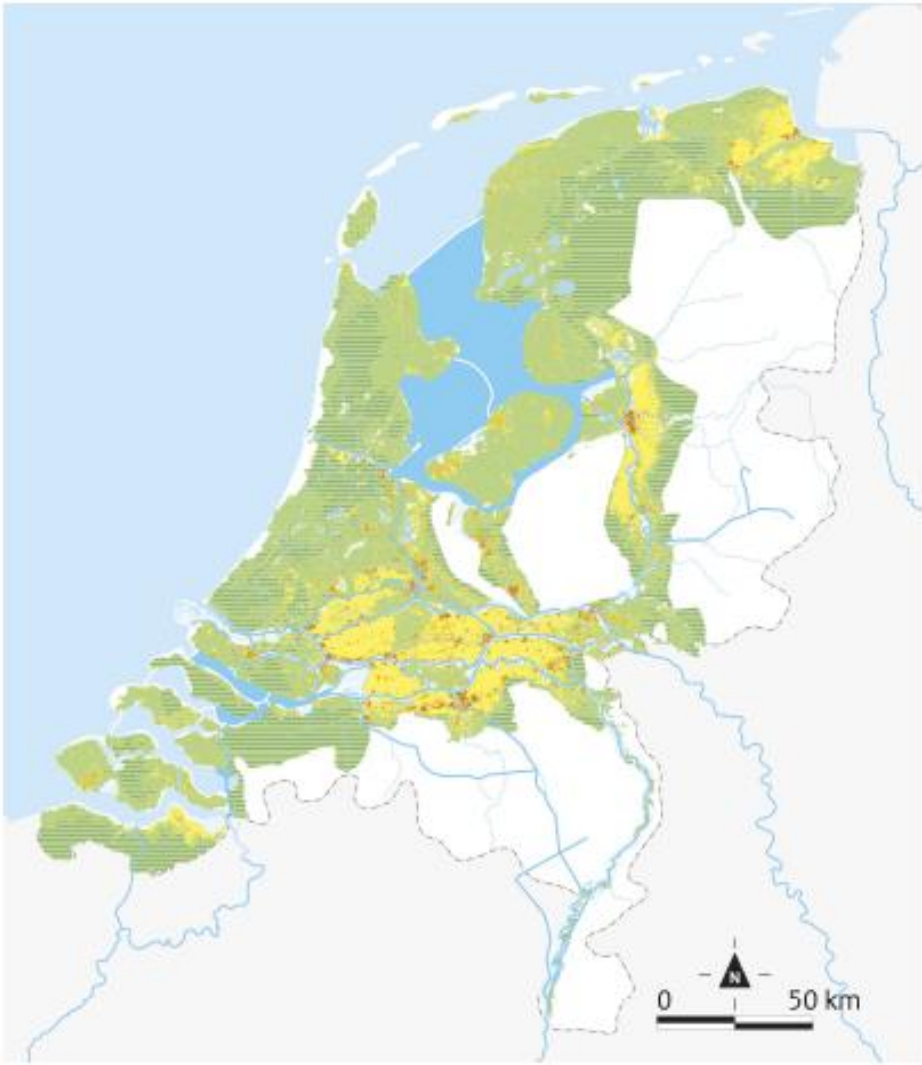
Current standards

- 1/10.000 central Holland
- 1/4.000 rest of the coast
- 1/2000 and 1/1250 inland rivers

erstaat



potential flood risk vs "actual" flood risk

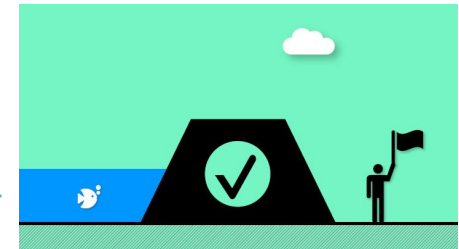




Policy objectives (2050)

Letter to parliament (April 2013):

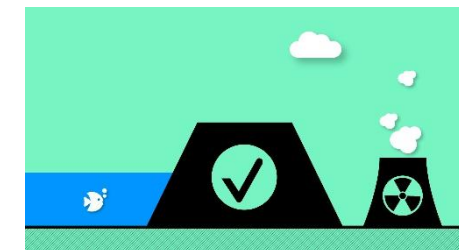
1. Provide a solidary baseline for personal safety
Associated Risk metric: Local Individual Risk 10⁻⁵ per year



2. Prevent large numbers of fatalities and large economic damage as much as possible
Associated Risk metric: Societal risk / Economic risk (CBA)



3. Prevent the loss or failure of vital / vulnerable national assets as much as possible
Associated Risk metric: Economic risk (CBA)





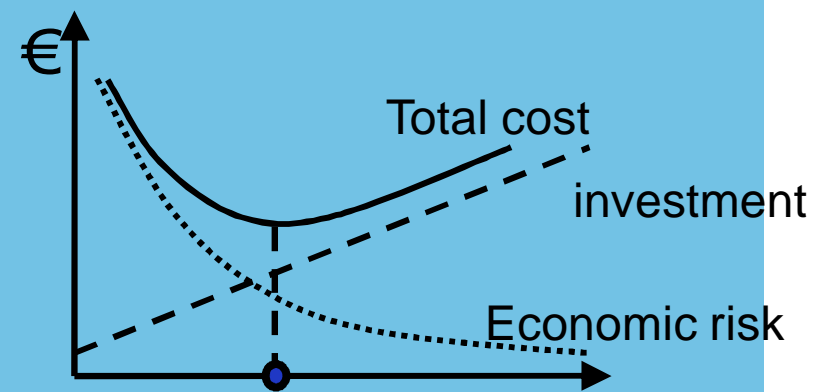
Level of standard: towards tolerability

Local individual risk

10⁻⁴? -> CBA will overrule
10⁻⁵? -> **tolerable?**
10⁻⁶? -> too strict with respect to floods as non man-made disaster

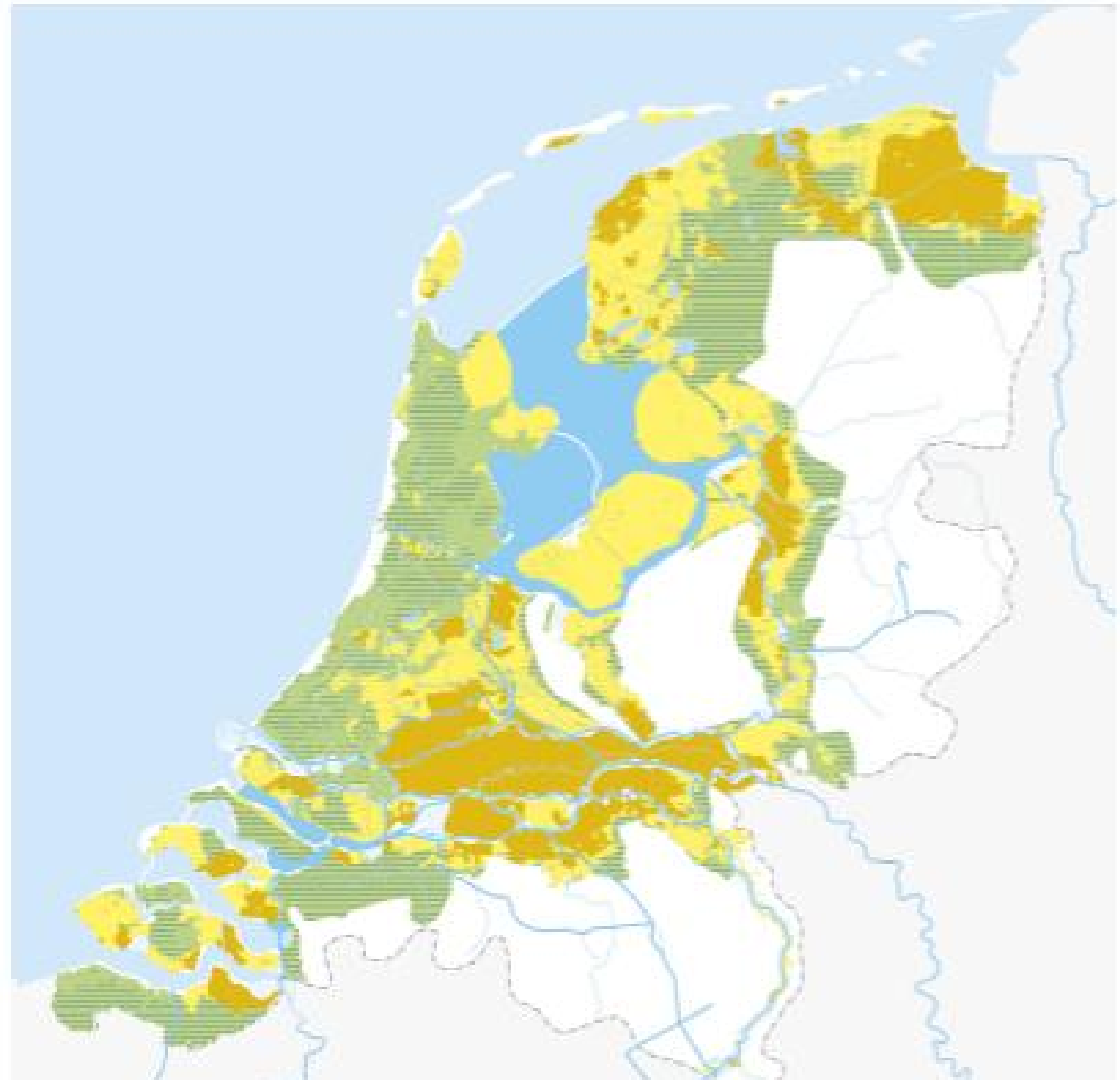
CBA

Optimizing economic risk reduction vs costs



'take the strictest'

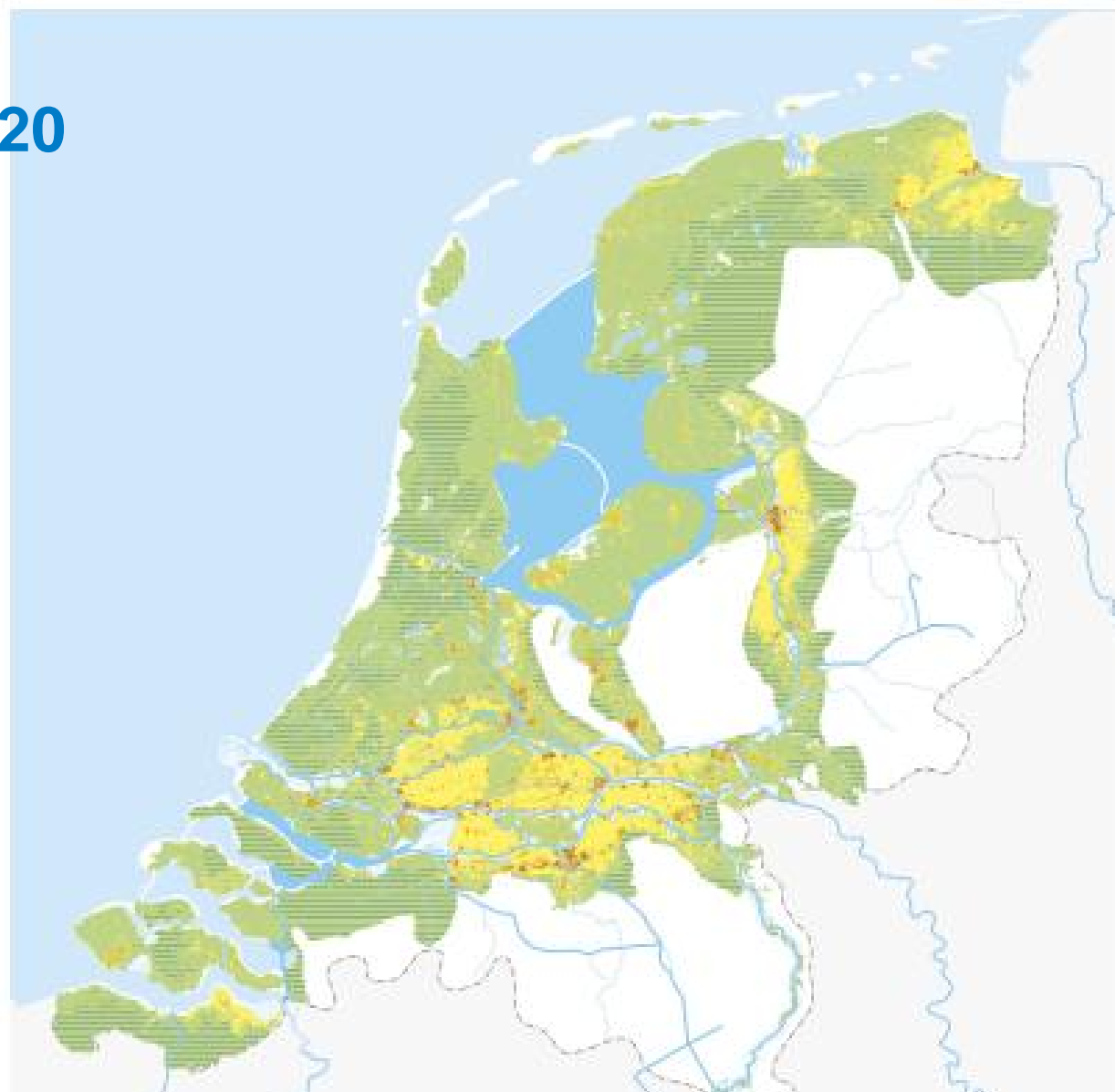
LIR 2020



Jaarlijkse kans op overlijden van een individu door een overstroming



Economic risk 2020



Schaderisico per hectare per jaar (euro)

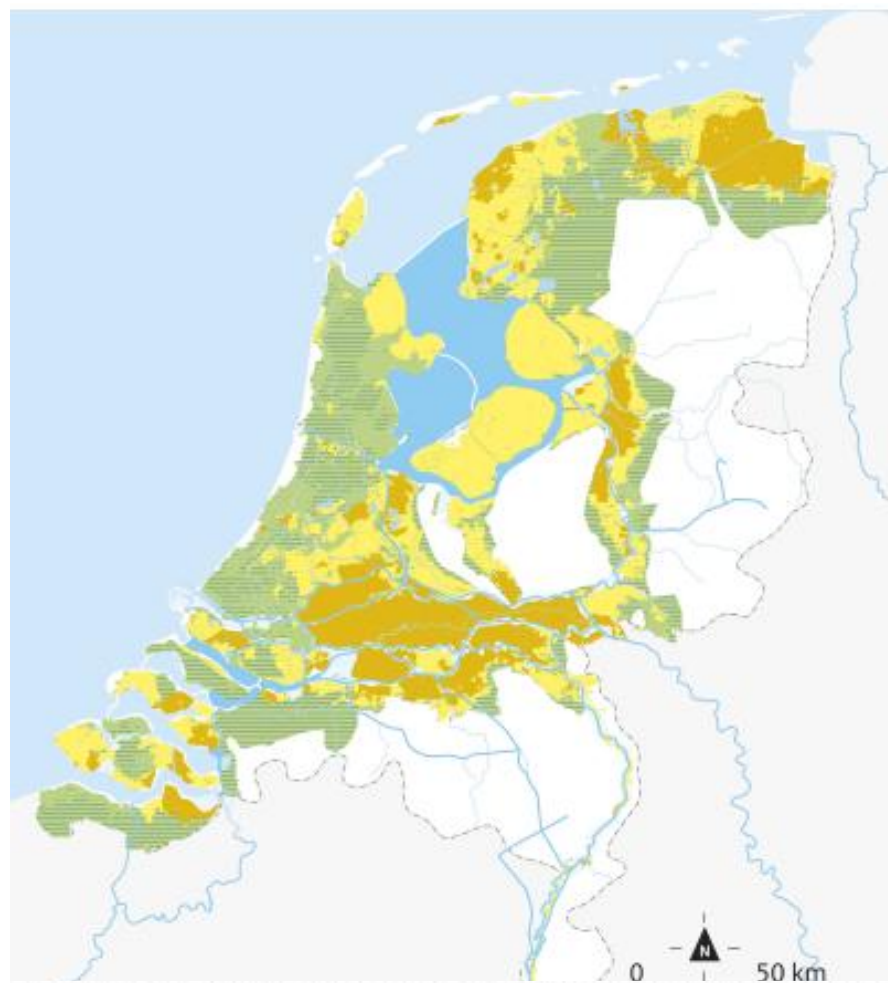


Bron: Gebaseerd op de 'Technisch-inhoudelijke uitwerking van eisen aan de primaire keringen' (DPV 2.2., werkrapport DPV) en voorgestelde normspecificaties per dijktraject (zie bijlage 1).

LIR 2020



LIR 2050



Jaarlijkse kans op overlijden van een individu door een overstroming

- | | | |
|-------------------------------|----------------------------------|-------------------------|
| kleiner dan 10^{-6} | groter dan 10^{-5} | zoetwater |
| tussen 10^{-6} en 10^{-5} | potentieel overstroombaar gebied | zout water / brak water |

Economic risk 2020



Economic risk 2050



Schaderisico per hectare per jaar (euro)

- minder dan € 100
- tussen € 100 en € 1.000
- tussen € 1.000 en € 10.000
- meer dan € 10.000
- potentieel overstroombaar gebied

- zoetwater
- zout water / brak water

Bron: Gebaseerd op de 'Technisch-inhoudelijke uitwerking van eisen aan de primaire keringen' (DPV 2.2., werkrapport DPV) en voorgestelde normspecificaties per dijktraject (zie bijlage 1).





Governance, key aspects

- Water Act
 - Compensate structural erosion (Tool: reference coastline, helps with transparency and measure performance)
 - Safety levels for flood defences
- Federal funding
 - Nourishments
 - Reinforcements flood defences (50%)
- Local funding
 - Maintenance of flood defences
 - Reinforcements flood defences (50%)
 - Improvements to local infrastructure (f.i. beachfront)

Thank you for your attention

Quirijn Lodder, Rijkswaterstaat

