Veiligheidsopgave dijkversterking JAV

STERKE LEKDIJK

HOOGHEEMRAADSCHAP
DE STICHTSE RIJNLANDEN

STERKE LEKDIJK

Inhoud van de avond

1. Bescherming tegen overstromingen door de eeuwen heen
2. De functie van de Lekdijk
3. Welke eisen stellen we aan de dijk?
4. Waardoor kan een dijk falen?
5. Wat hebben we gedaan om de dijk te beoordelen?
6. De veiligheidsopgave voor project JAV

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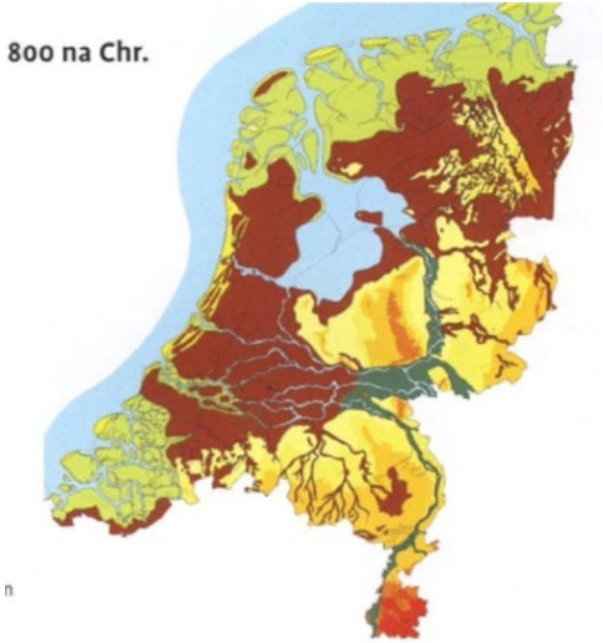
Nederland waterland

- Moeras & slikken (groen)
- Drassig land (bruin)
- Droge gronden (geel/rood)
- Grote rivieren (blauw)
  - → Ontoegankelijk
  - → Vruchtbare grond



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Overstromingen

1287 St. Lucia's vloed: 50.000 - 80.000 slachtoffers; ontstaan Zuiderzee

1421 2e Sint Elisabethsvloed; ontstaan Biesbosch

1570 Allerheiligenvloed

1751 Laatste doorbraak noorder Lekdijk

1916 Zuiderzeevloed

1926 Overstroming rivierengebied

1953 Watersnoodramp zuidwest Nederland

Herstelwerkzaamheden aan de doorgebroken Lekdijk, Esaias van de Velde, 1624 - 1652

Werken aan waterveiligheid

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800

> Woest, natuurlijk rivierenlandschap.
> Beperkte bewoning.

1122

> Afdamming van de Kromme Rijn.
> eerste dijken langs de Lek.

1285

> Afdamming van de Hollandse Ijssel.

1323 / 1327

> Stichting Hoogheemraad-schappen langs de Lekdijk.

t/m 1751

> Regelmatige doorbraken en verlegging van de dijk.

1956

Eerste Deltacommissie

Jaren ’80-’90

> Dijkverbetering hele Lekdijk.

2008

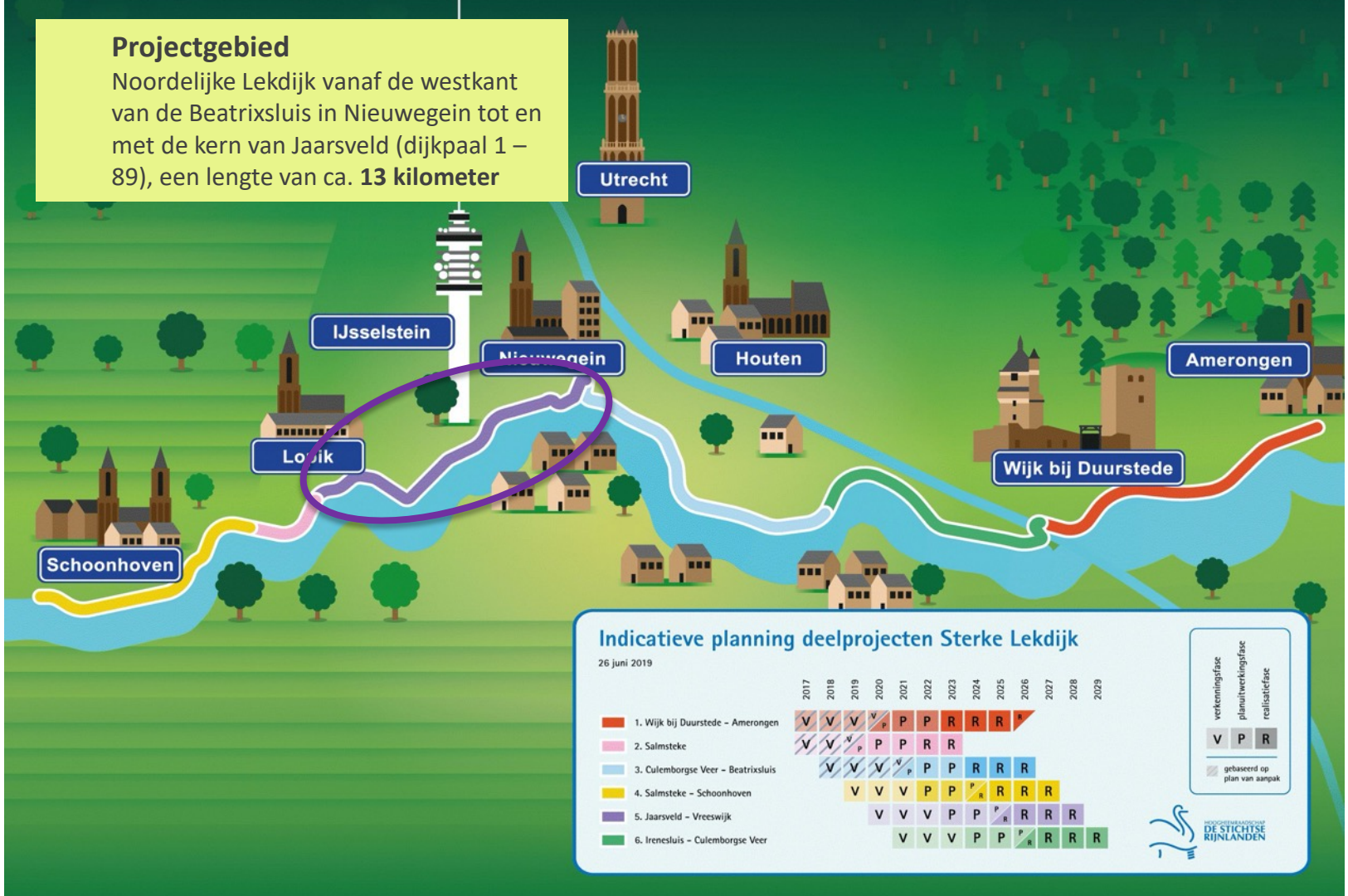
Tweede Deltacommissie

2017

> Start project Sterke Lekdijk.

Projectgebied

Noordelijke Lekdijk vanaf de westkant van de Beatrixsluis in Nieuwegein tot en met de kern van Jaarsveld (dijkpaal 1 – 89), een lengte van ca. **13 kilometer**



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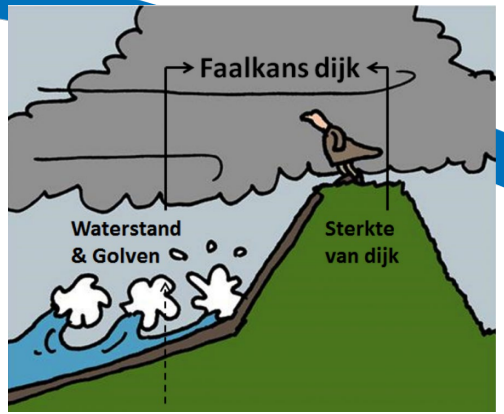
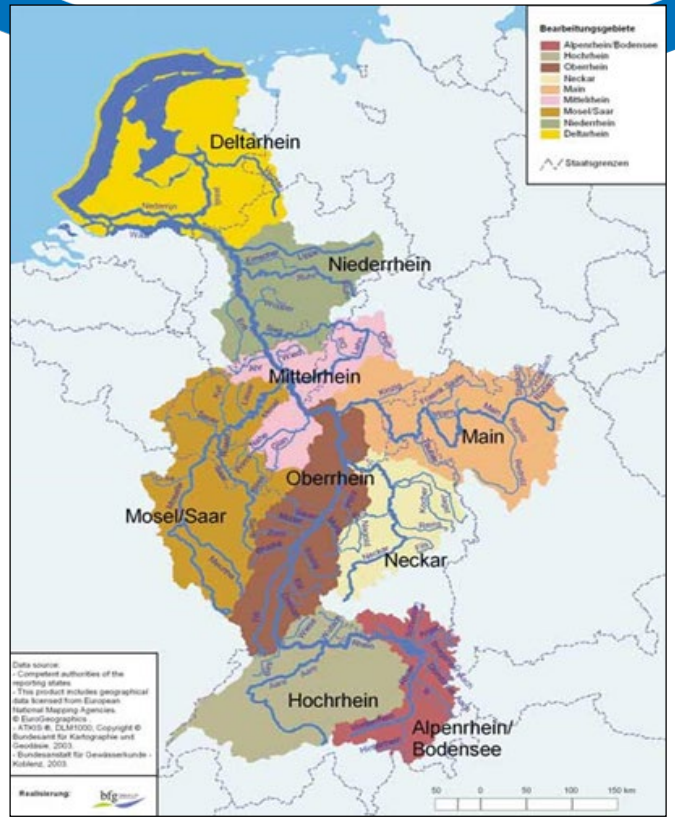


Overstromingsrisico

De kans op overstroming wordt bepaald door:
- de afvoer van de Rijn
- de hoogte en sterkte van de dijken

Grote afvoer ontstaat door:
- extreme neerslag in het stroomgebied;
- samenvallen afvoer van de verschillende zijrivieren (Main, Neckar en Moezel).

Extreme situatie: 17.500 m3/s bij Lobith



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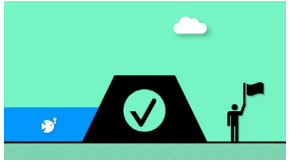
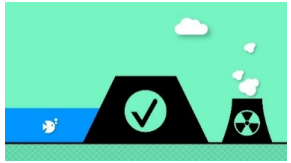
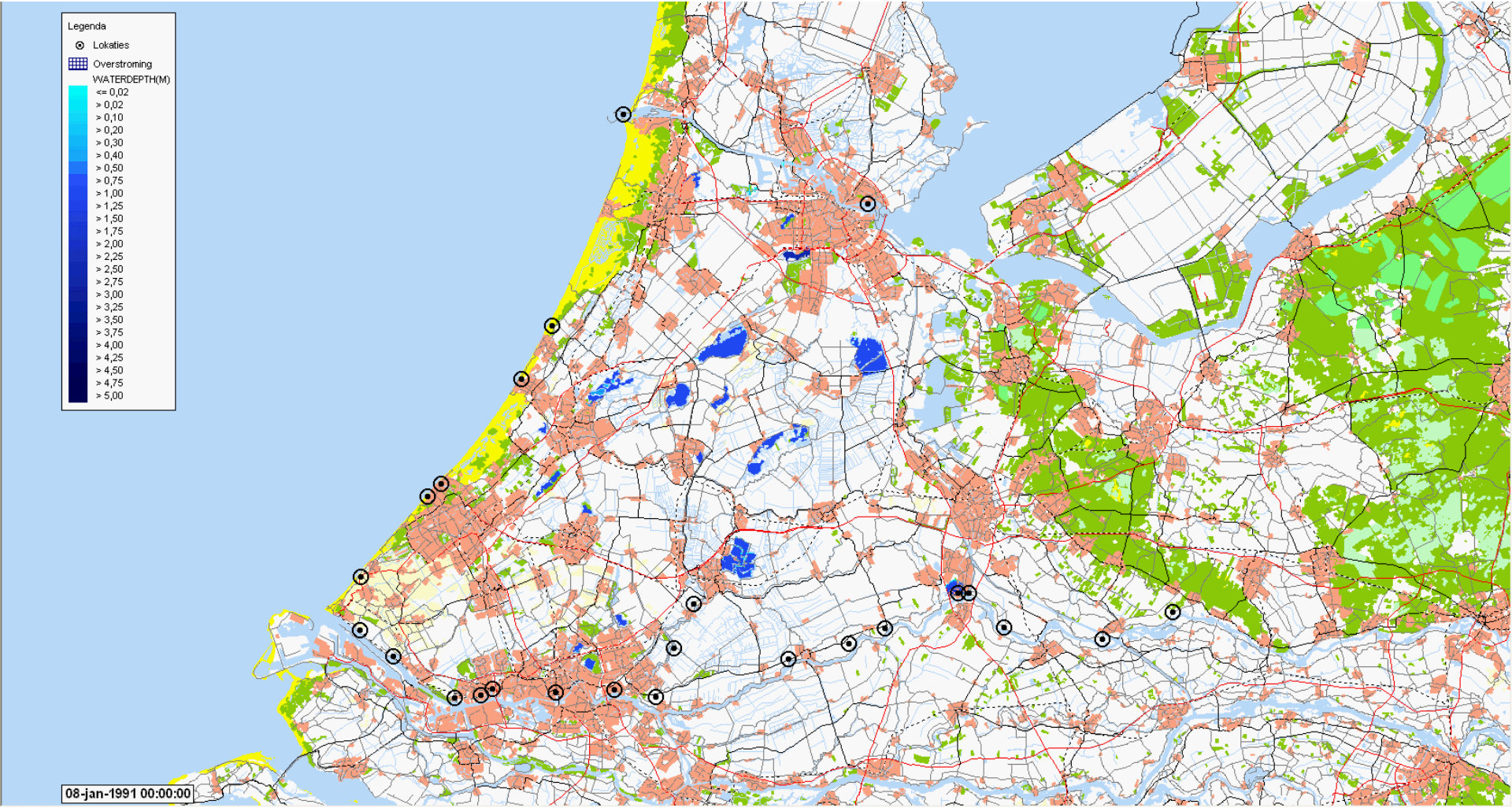
Welk risico is acceptabel?

- Basisveiligheid:
  Voor iedereen in Nederland kans op overlijden door overstroming niet groter dan 1 op 100.000 per jaar.

- Meer bescherming:
  - Op plaatsen waar sprake is van grote groepen slachtoffers en/of grote economische schade, en/of
  - Ernstige schade door uitval van vitale en kwetsbare infrastructuur.






Legenda
Lokaties
Overstroming
WATERDEPTH(M)
<= 0,02
> 0,02
> 0,10
> 0,20
> 0,30
> 0,40
> 0,50
> 0,75
> 1,00
> 1,25
> 1,50
> 1,75
> 2,00
> 2,25
> 2,50
> 2,75
> 3,00
> 3,25
> 3,50
> 3,75
> 4,00
> 4,25
> 4,50
> 4,75
> 5,00
08-jan-1991 00:00:00

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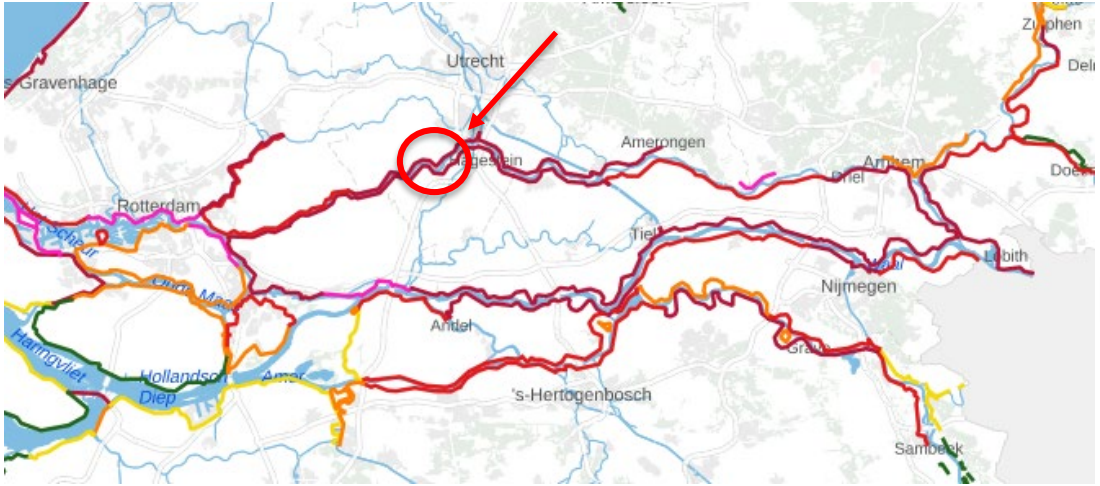
Veiligheidsnormen



Kans per jaar

- 1:300
- 1:1000
- 1:3000
- 1:10000
- 1:30000
- 1:100000
- 1:1000000

1/30.000 per jaar

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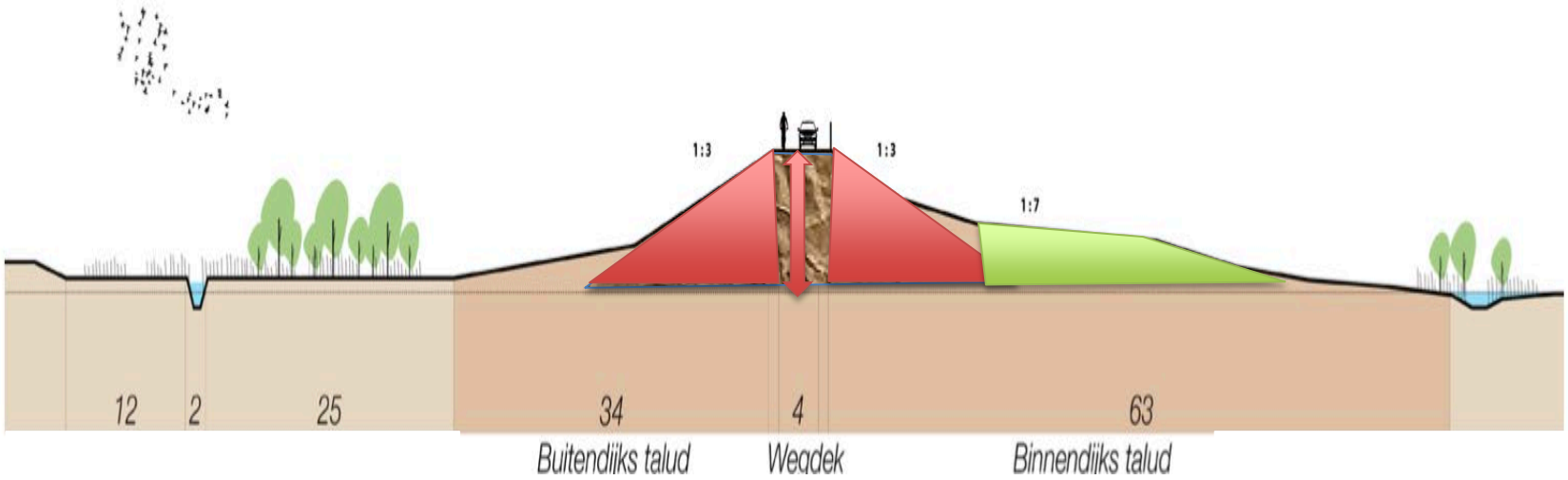
Veiligheidsnormen



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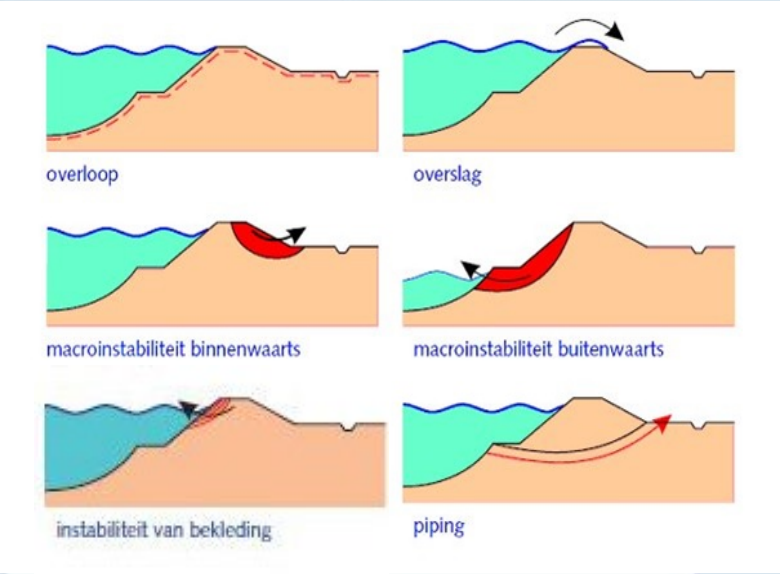
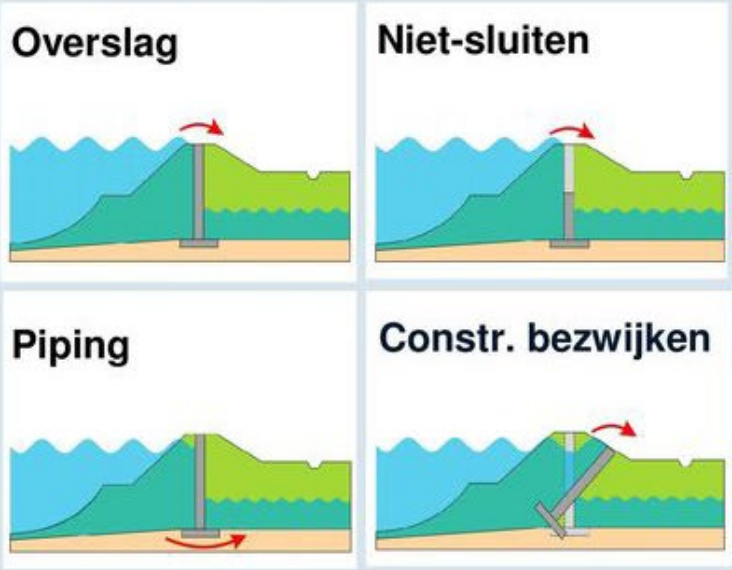
Waardoor kan een dijk falen?

Dijken



Kunstwerken



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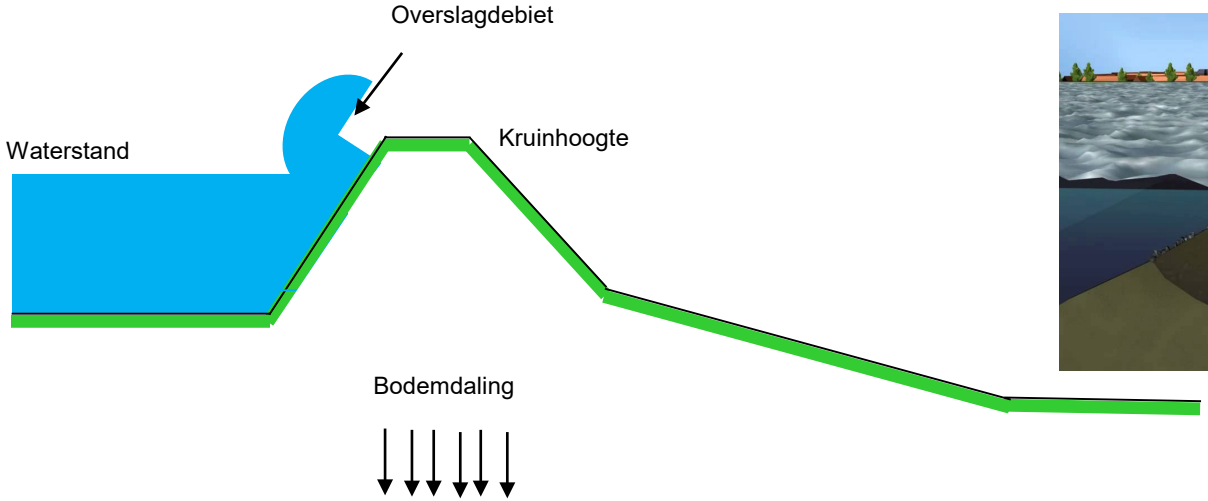
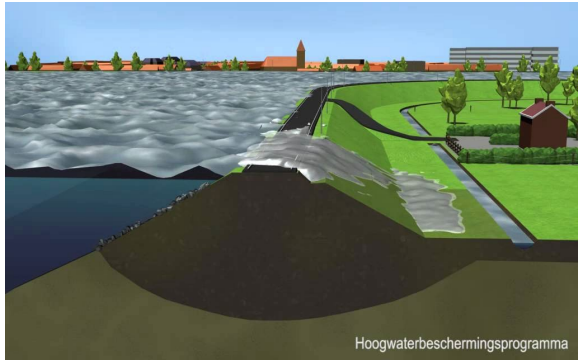
Faalmechanismen overloop en overslag

Overloop

Overslag

Faalmechanismen overloop en overslag





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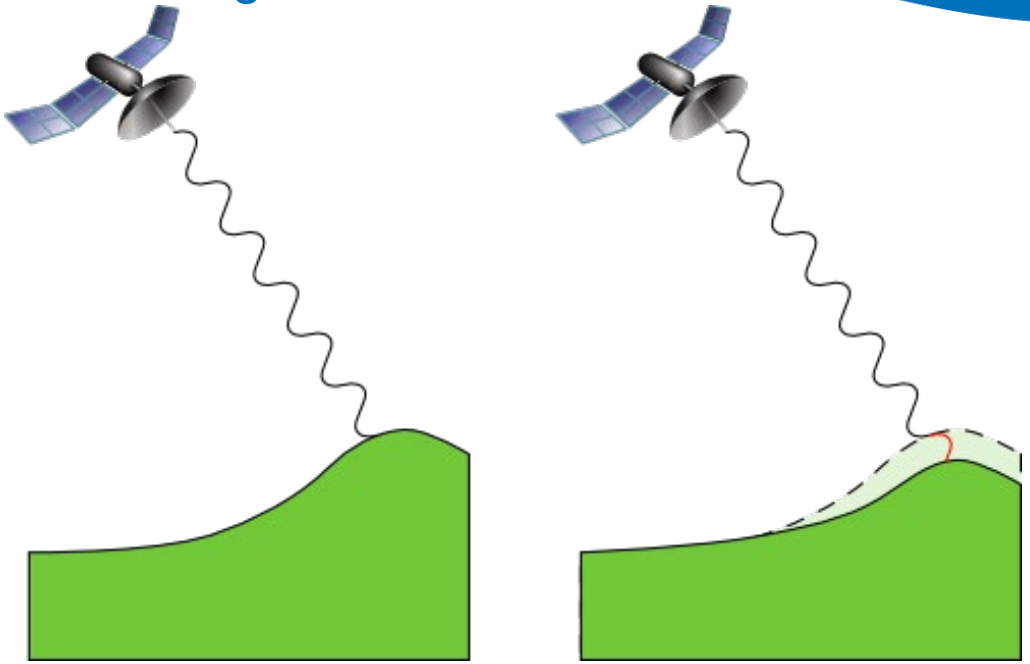
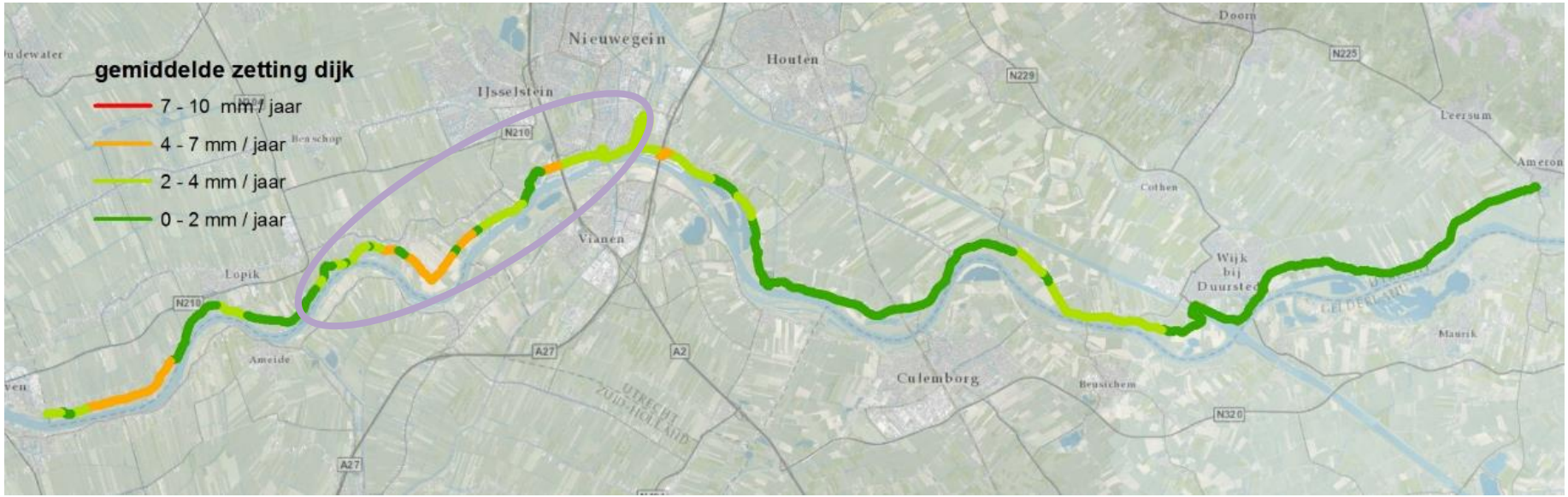
Onderzoek bodemdaling



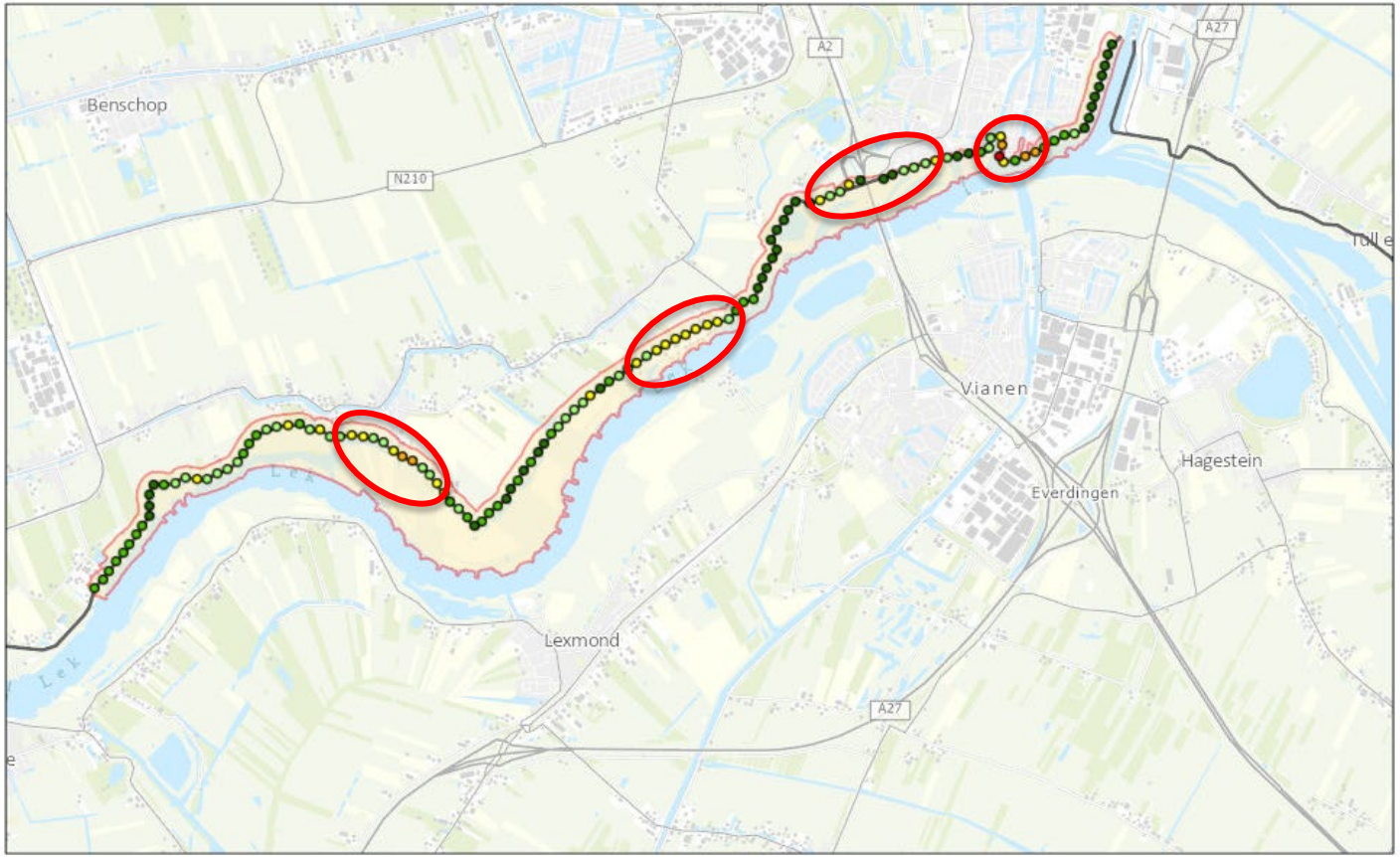
STERKE LEKDIJK

Onderzoek bodemdaling



4 mm x 50 jaar = 20 cm

Opgave hoogte



3-12-2020

GEKB_ Graserosie kruin en binnentalud _q _ 5 l_s_m_

- <-0.50
- <-0.25
- < 0.00
- < 0.25
- < 0.50
- > 0.50
- Overig - dijk
- Systeemgrens (20201117)

1:48,000

0 0.4 0.8 1.6 mi

0 0.5 1 2 km

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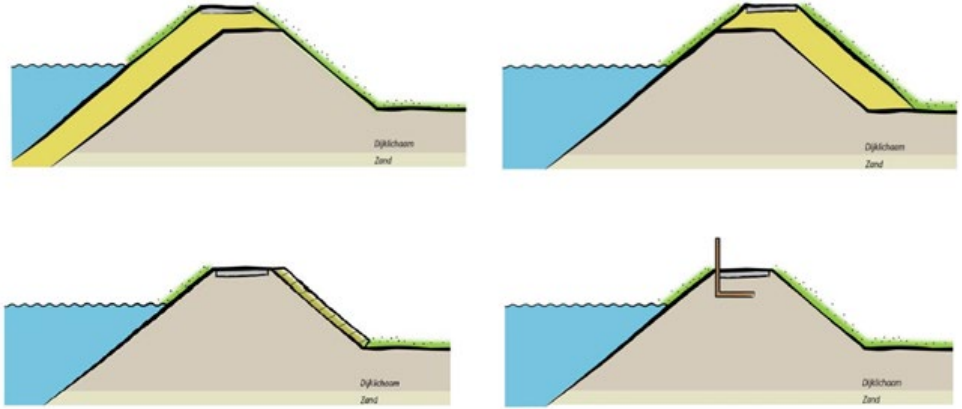
Oplossingen hoogte



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Faalmechanisme macroinstabiliteit

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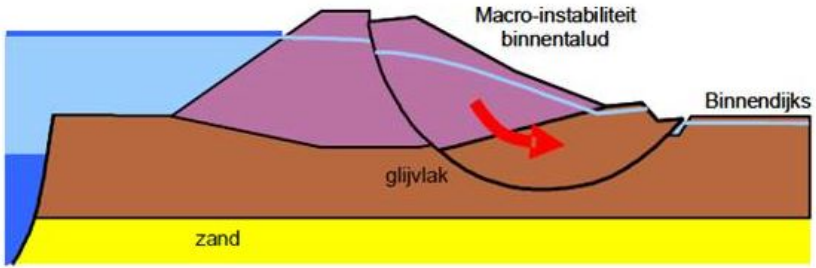
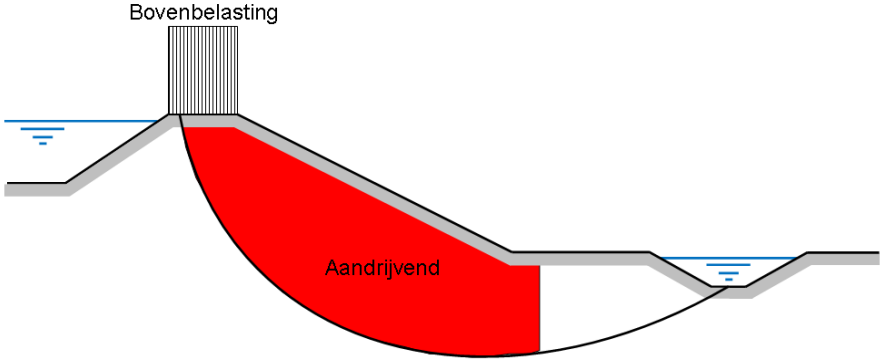
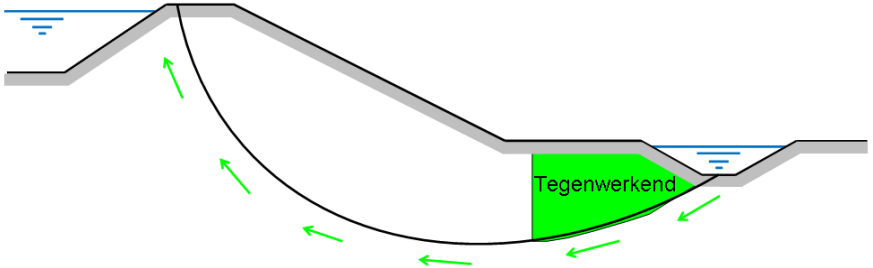
Faalmechanisme macroinstabiliteit







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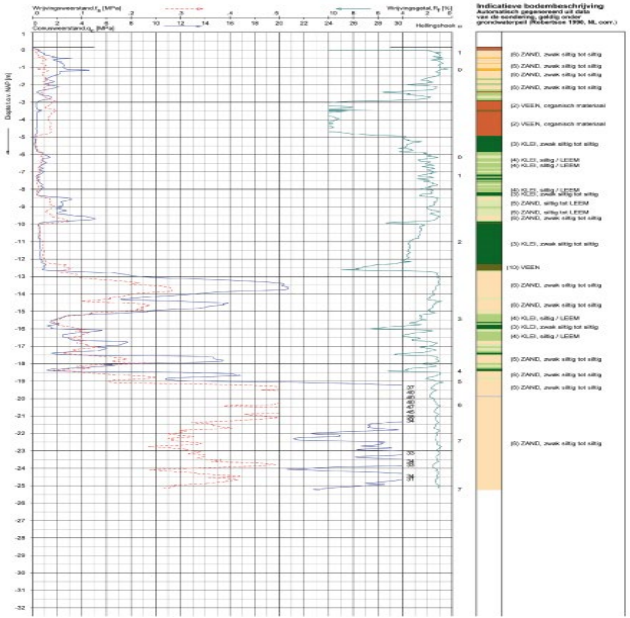
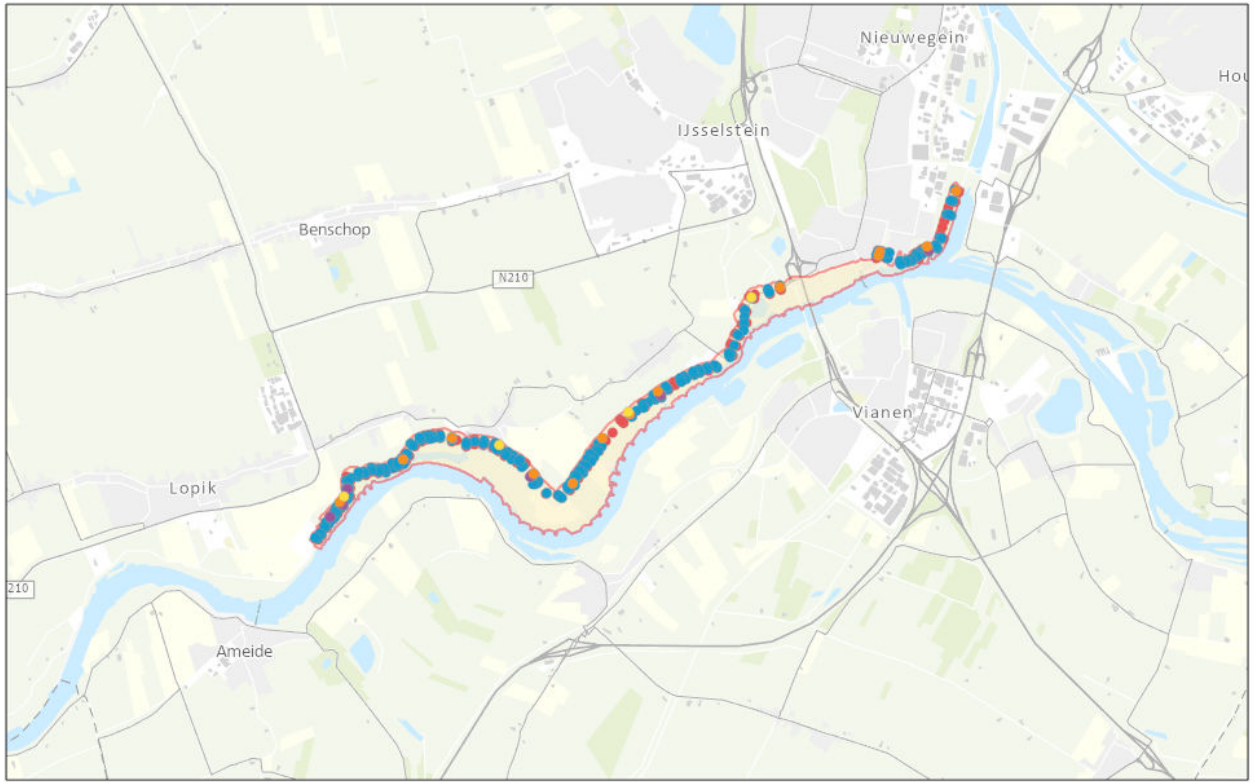
Grondonderzoek



Grondonderzoek

Grondonderzoek



10-3-2021

1:68,000

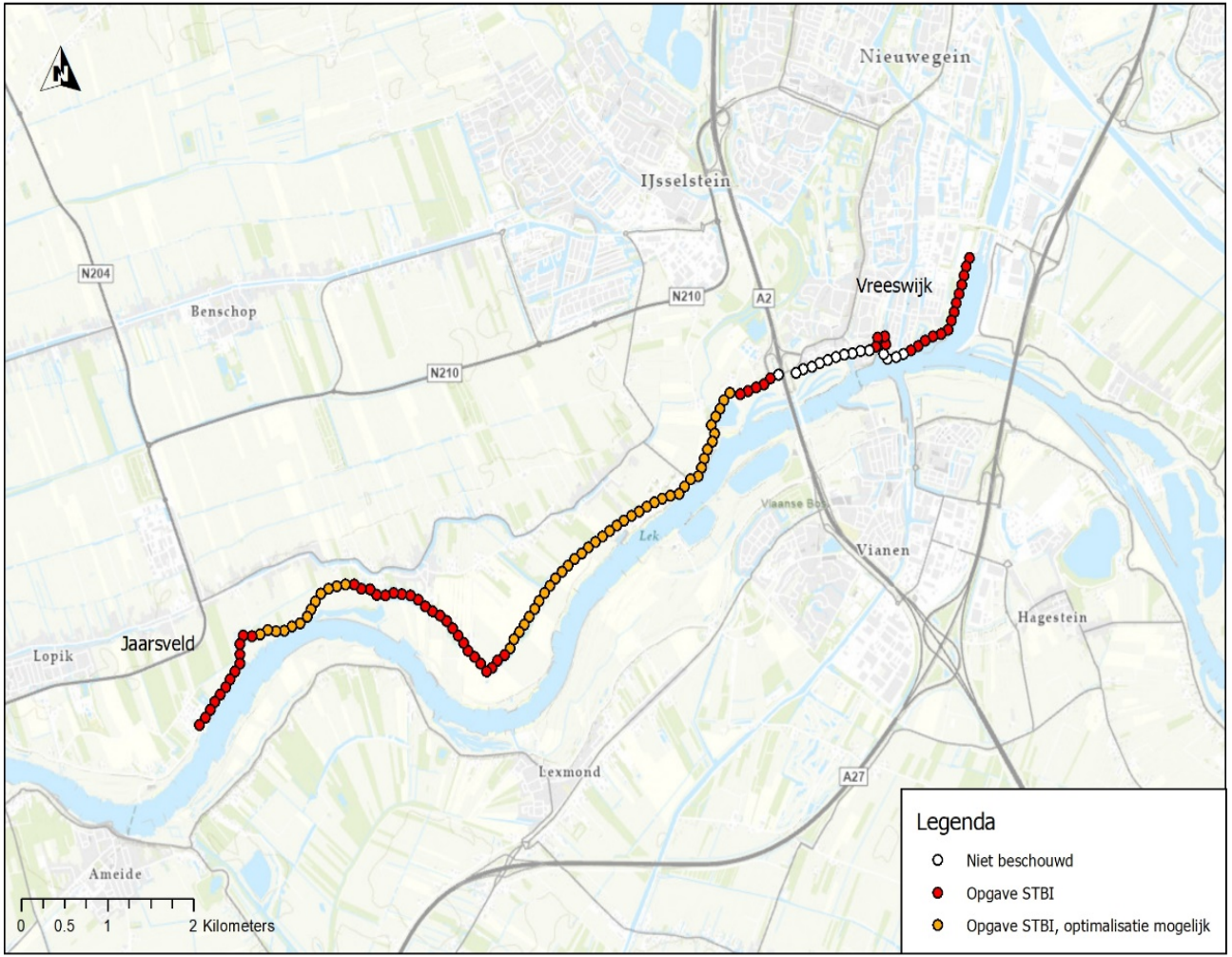
0 0.5 1 2 mi

0 0.75 1.5 3 km

Grondonderzoek - werklijst

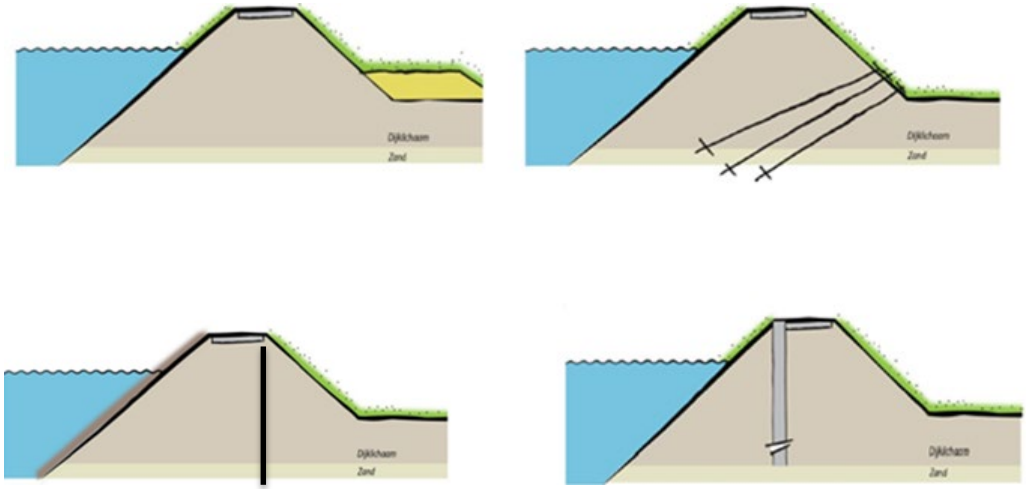
- Handboring
- Sondering
- Tijdelijke Peilbuis
- Mechanische boring + Peilbuis
- Mechanische boring
- Pompproef
- Systeemgrens (20201117)

Opgave macroinstabiliteit



STERKE LEKDIJK

Oplossingen macroinstabiliteit



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Faalmechanisme piping

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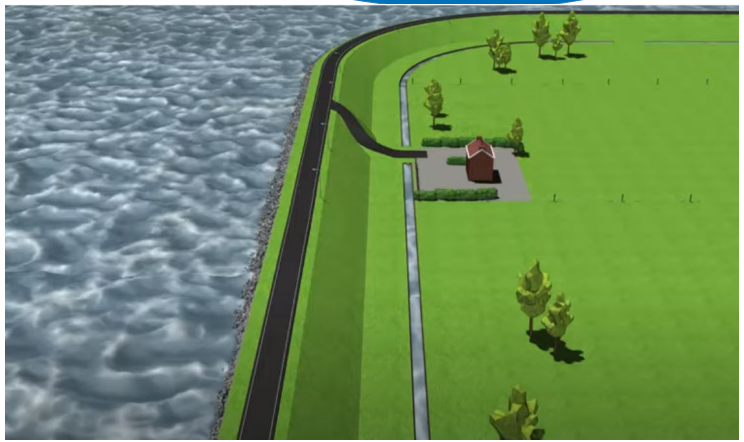
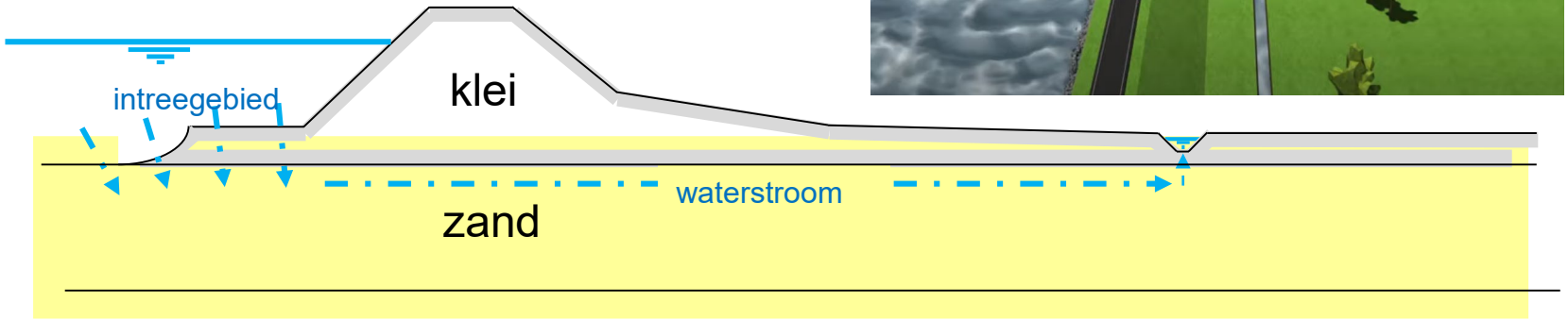
Faalmechanisme piping





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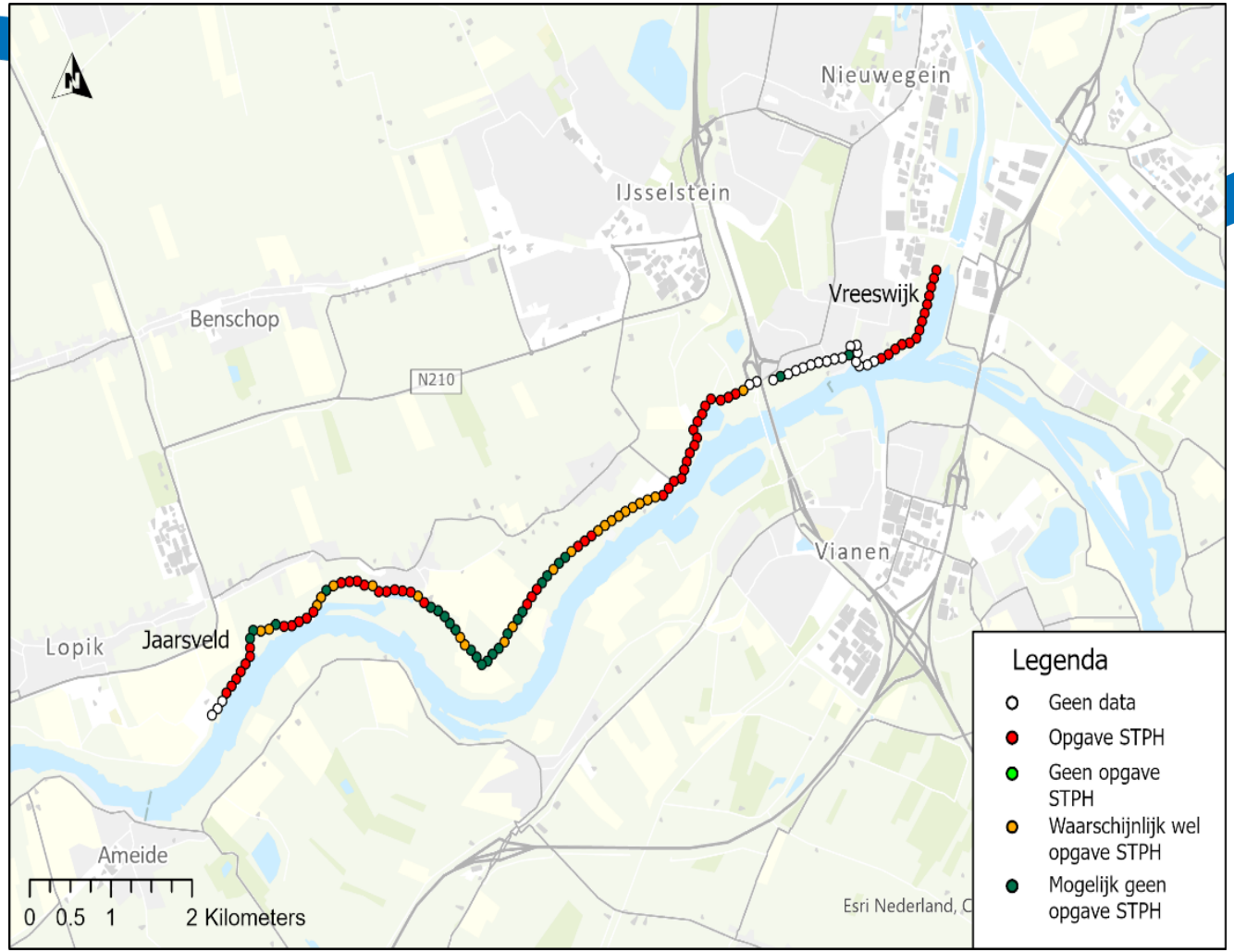
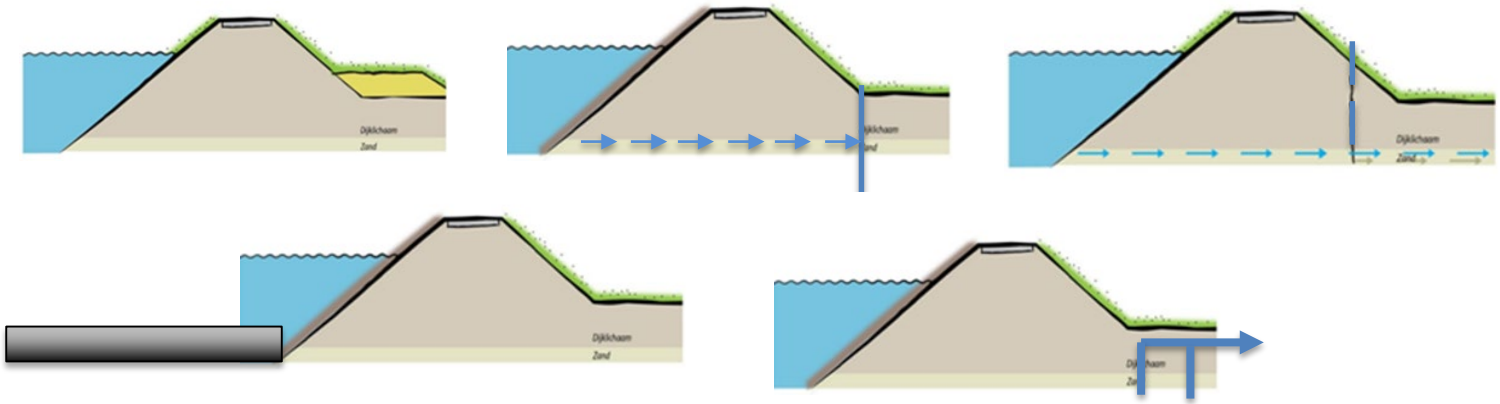
Grondonderzoek

gelaagdheid zandpakket

Opgave piping



Oplossingen piping



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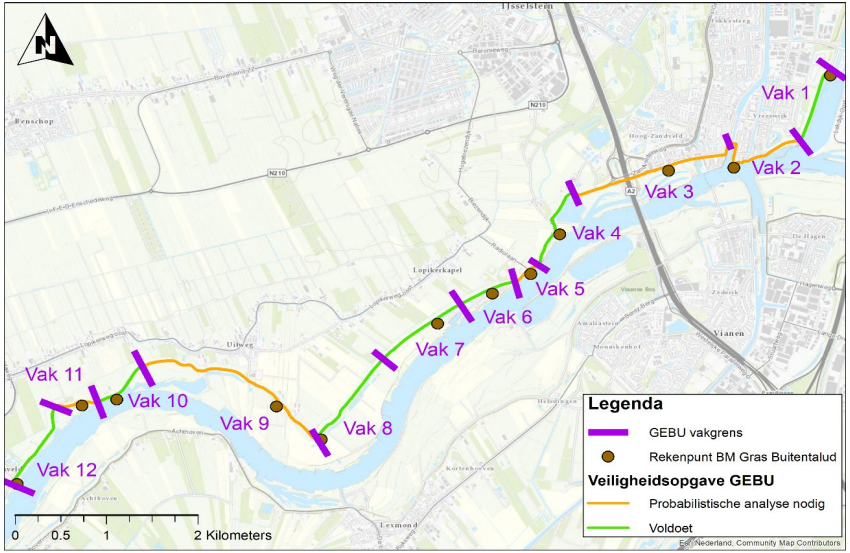
Faalmechanisme instabiliteit bekleding

STERKE LEKDIJK

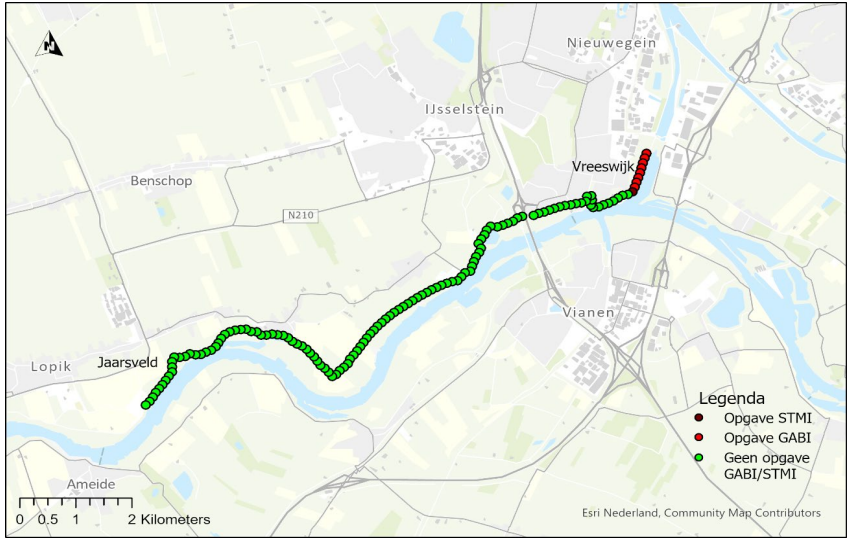
Faalmechanisme instabiliteit bekleding

STERKE LEKDIJK

Opgave instabiliteit bekleding



Erosie buitentalud



Instabiliteit bekleding binnentalud

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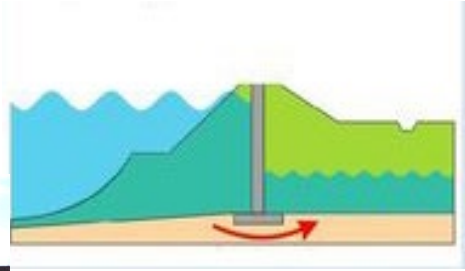
Faalmechanismen kunstwerken



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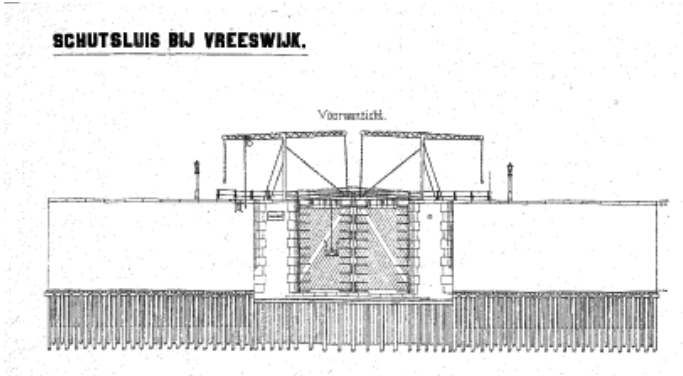
Onderzoek kunstwerken



Tekeningen kunstwerken

Ervaringen dijkbeheerders

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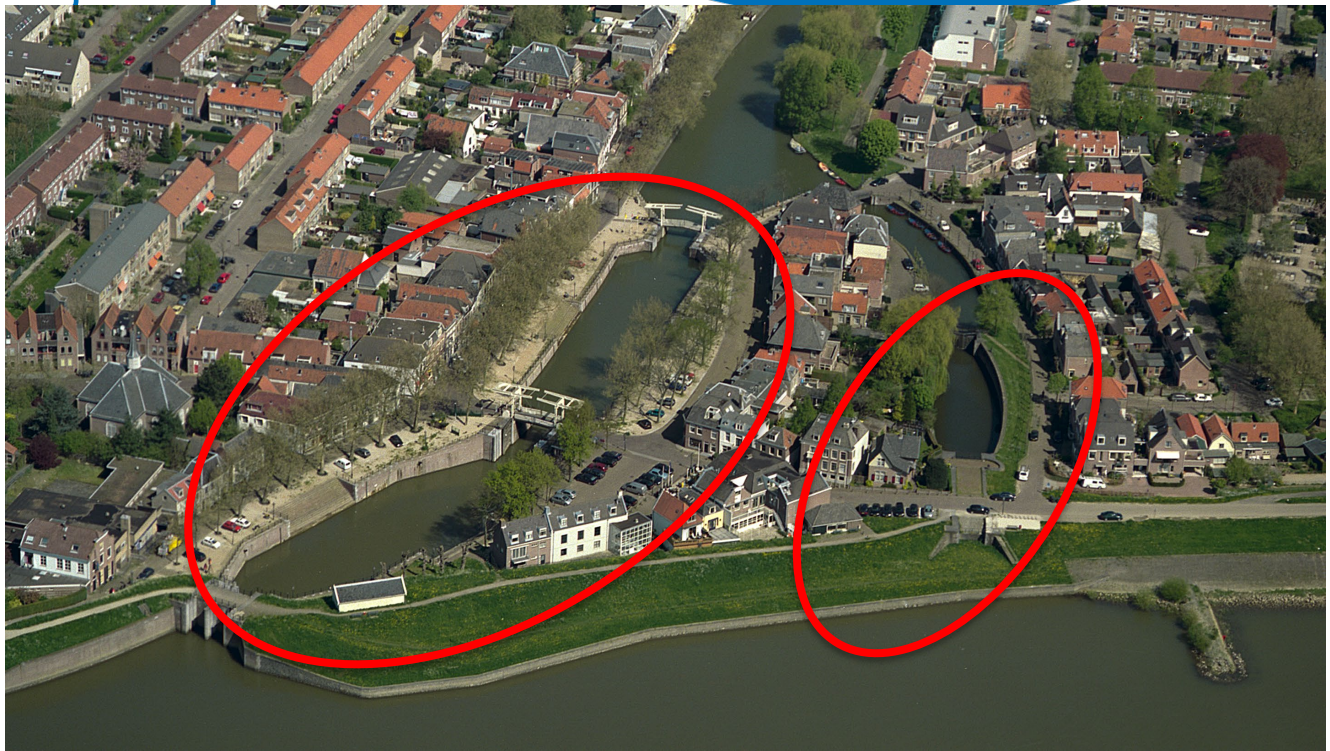
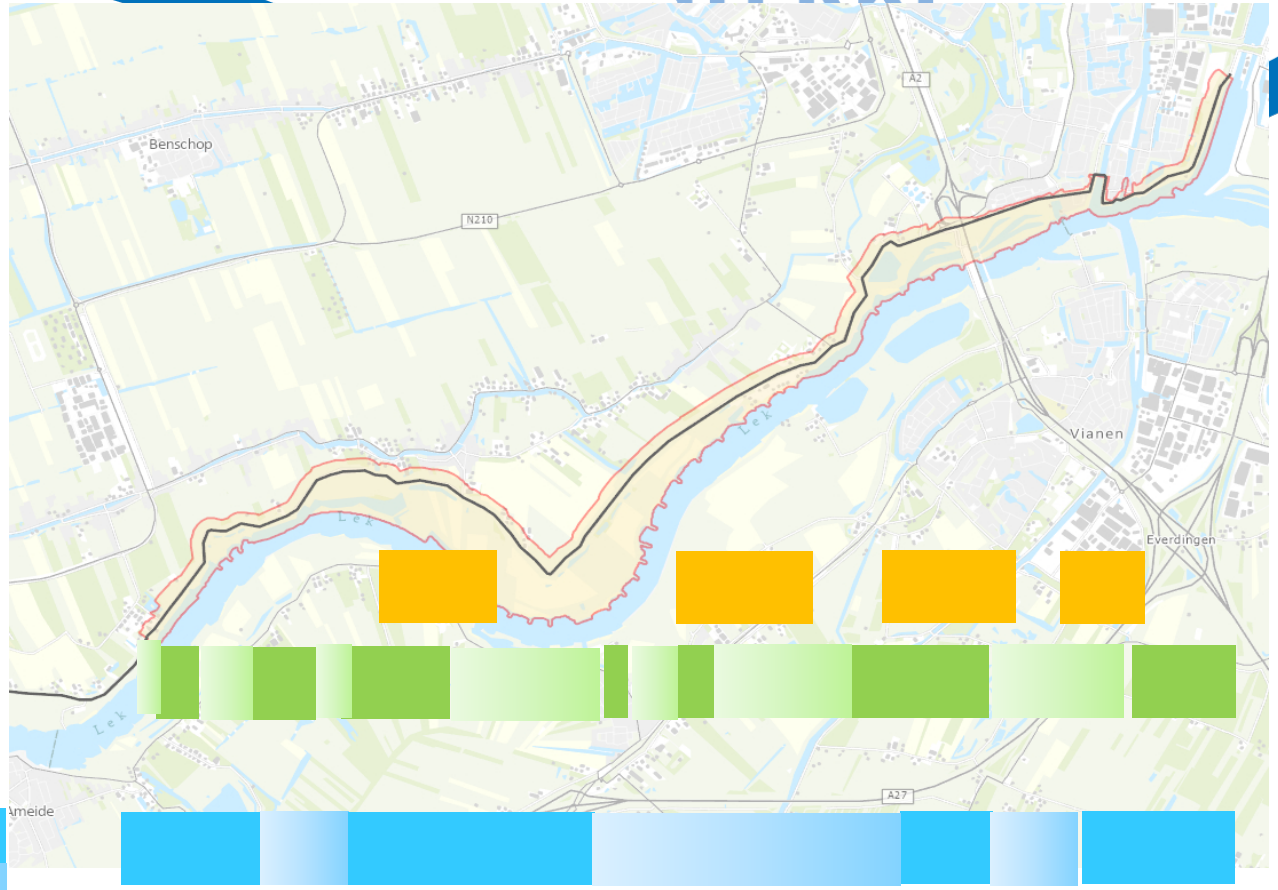
Opgave kunstwerken - Gemeentesluis
- Rijkshulpschutsluis

- Piping
- Sluitingsprocedure (Gemeentesluis)



Veiligheidsopgave JAV (Samenvatting)

Aanscherping in komende periode.