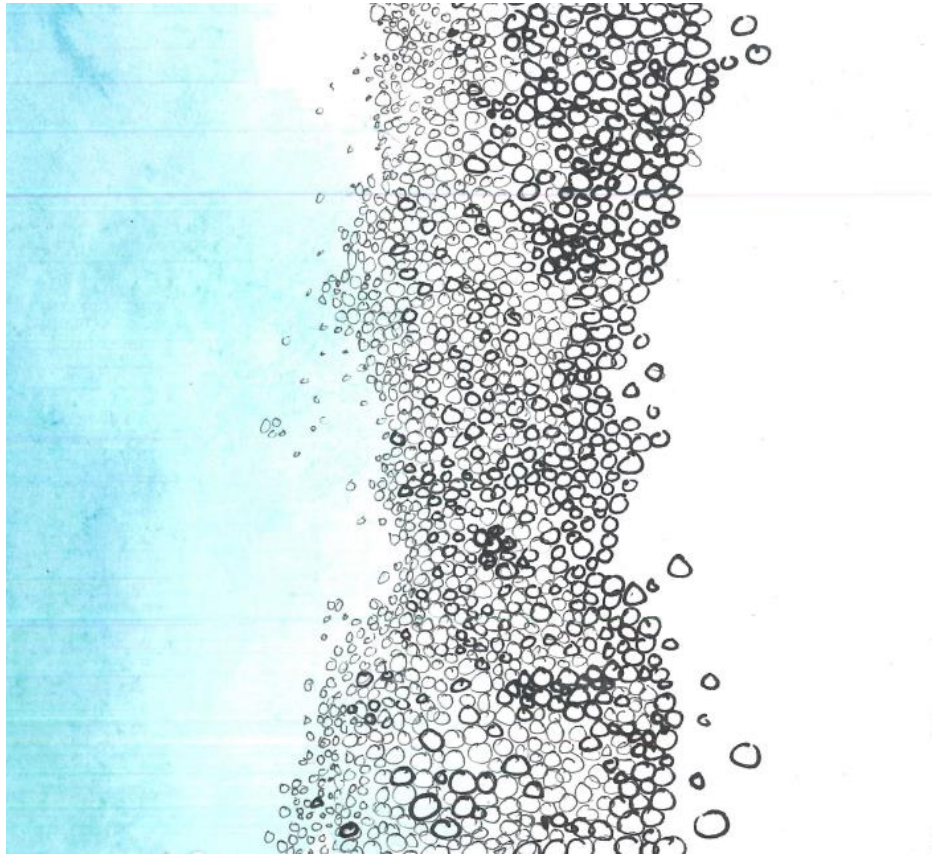
BORDERSCAPE

- Increasing the level of permeability between land and sea (in Northern Netherlands)

INTRODUCTION

- A coastal borderscape; the aim for permeable borders

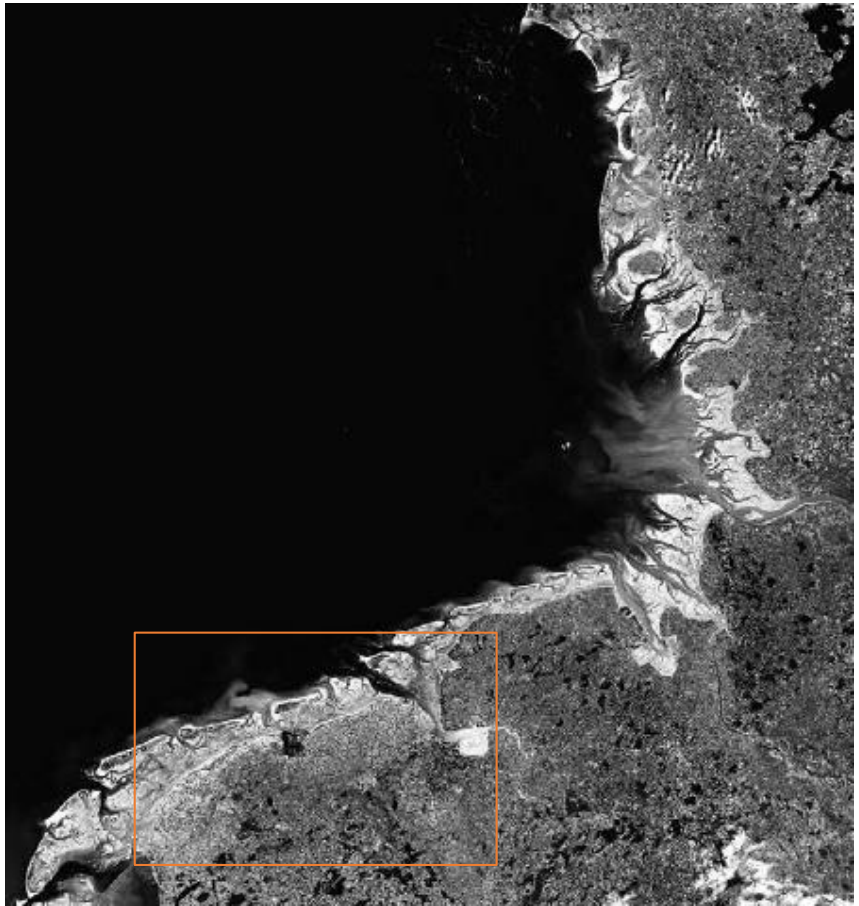
Sea



Land

INTRODUCTION

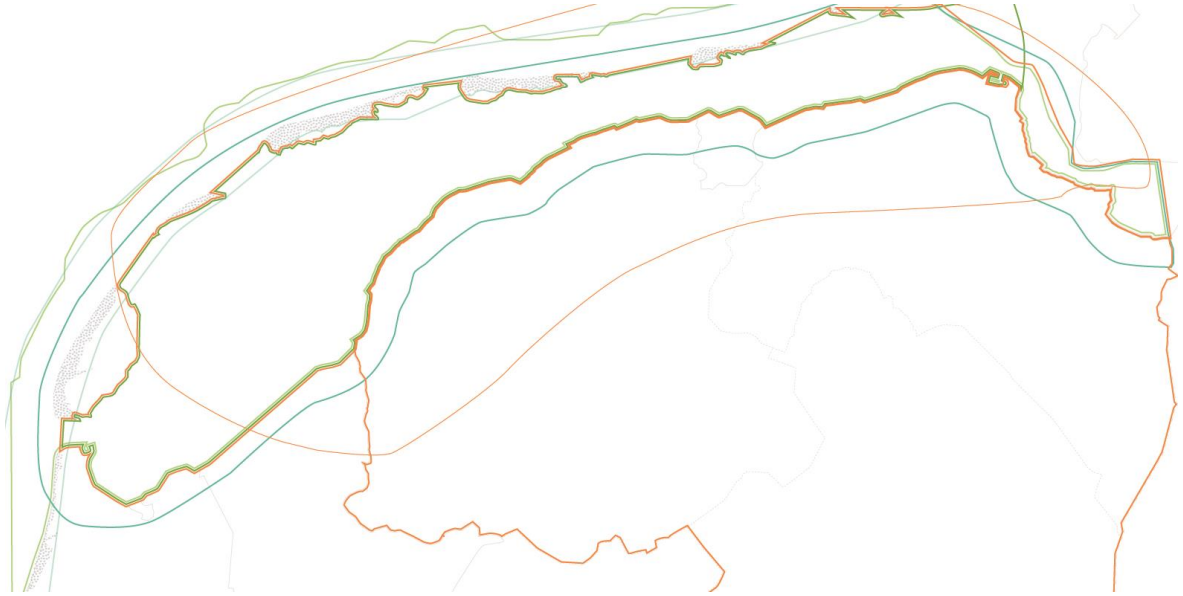
- Case study: Northern Netherlands



PROBLEM STATEMENT

- Primary dike as coastal border: spatial & administrative **narrow line**

Dike at Lauwersmeer



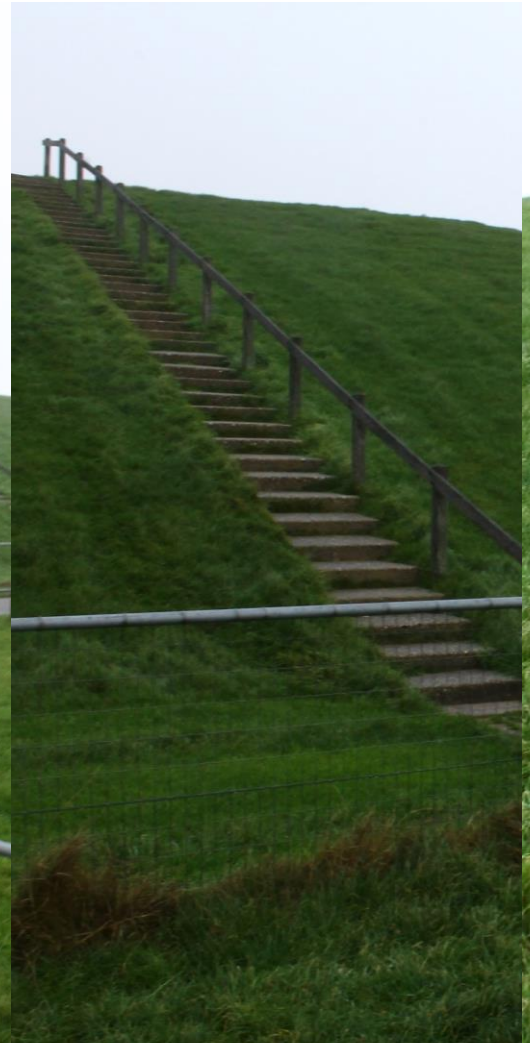
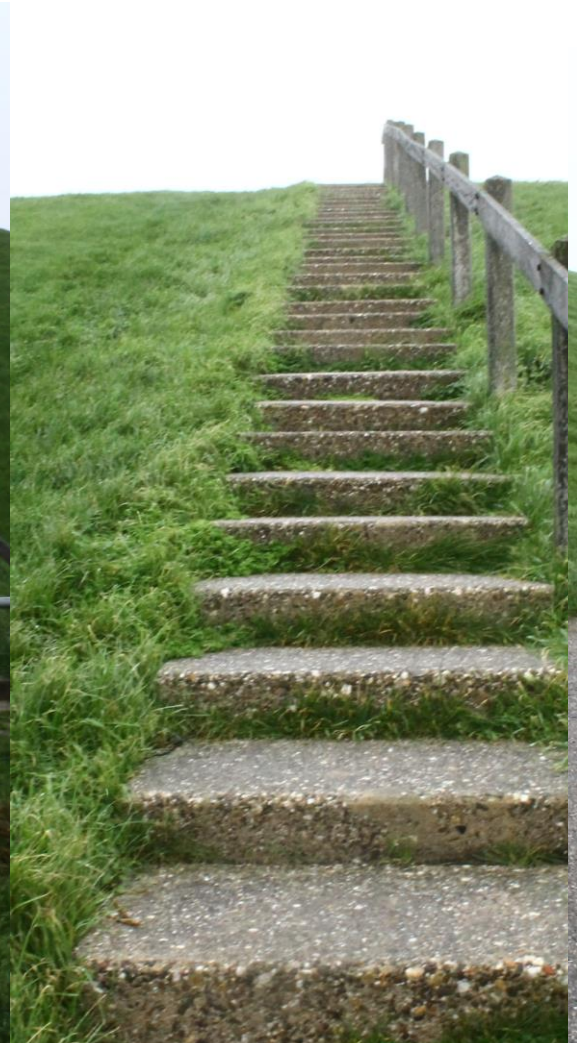
Overlap of planning policies

PROBLEM STATEMENT

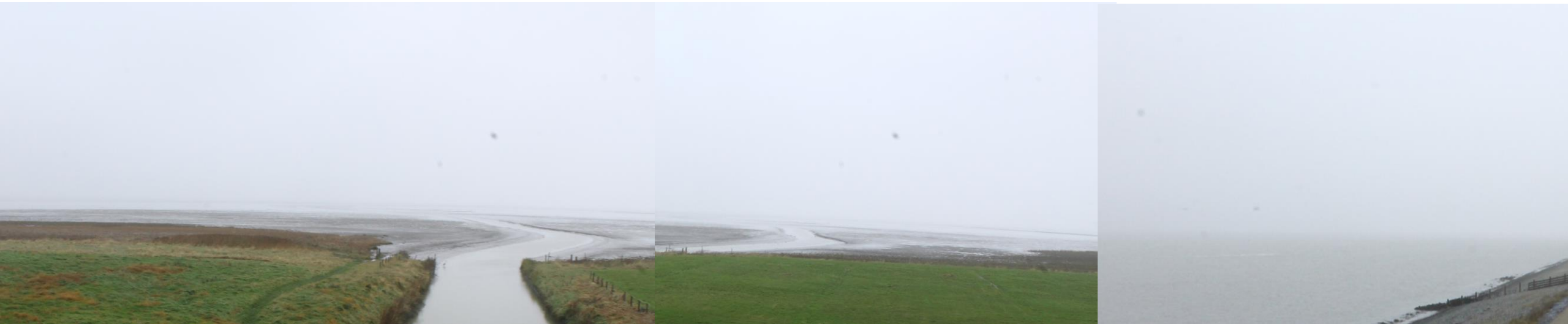
- A **thin seperation** between ecological systems, uses and experiences of two sides

“Wide area of production land, enclosed by the primary dike as continuous wall”

//Close to the primary dike

“Outside the dike, the stretched view the dynamic Wadden area”

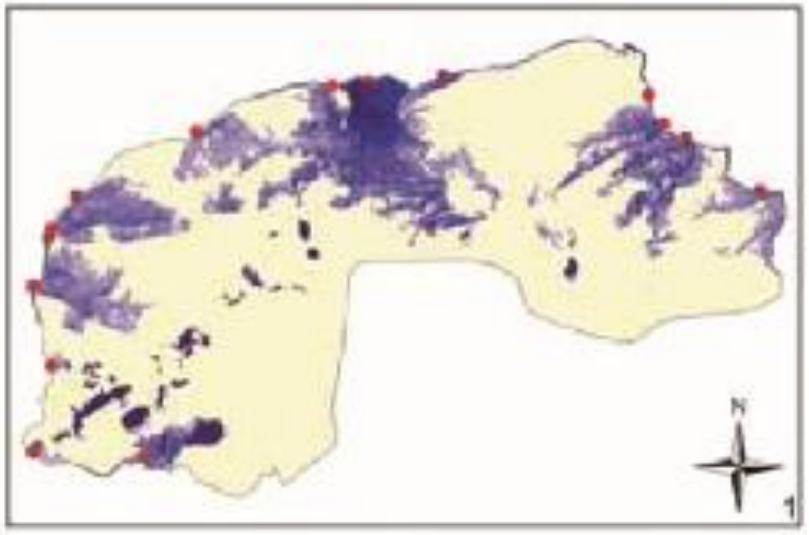


“Zooming out, the primary dike as narrow element inbetween”

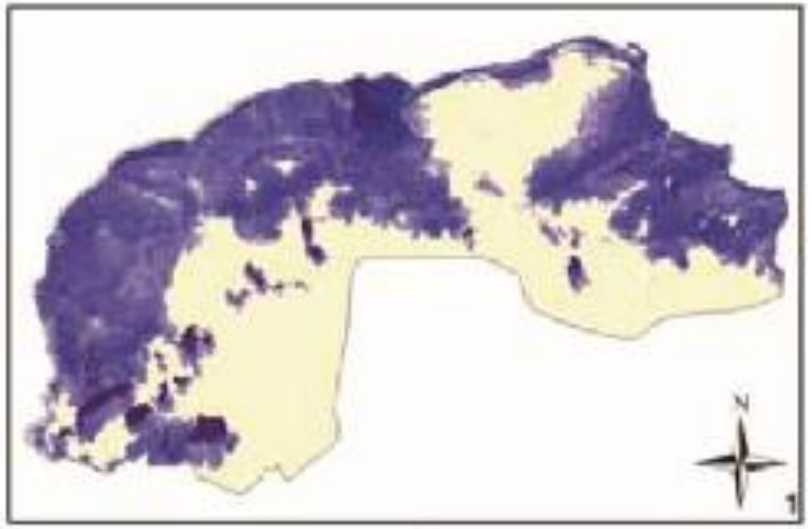
- > 50% of the primary dike **is rejected** on water safety based on predictions of change

Rejected

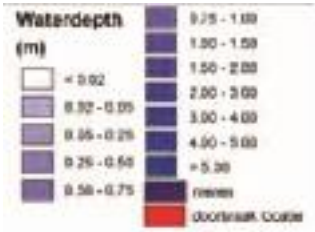
- Increase of **Flooding risk:** now in Northern Netherlands



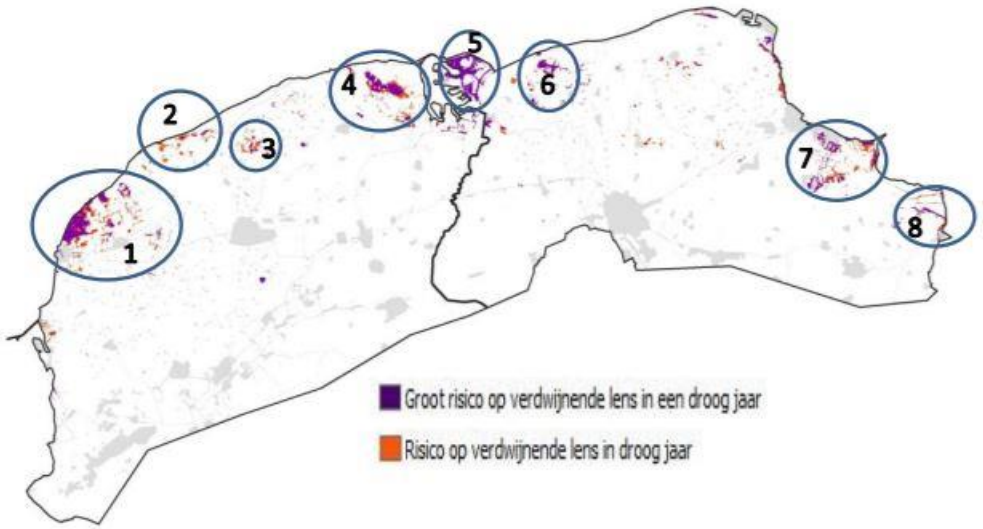
Scenario I: Water regulators break (sluices, pumping stations)



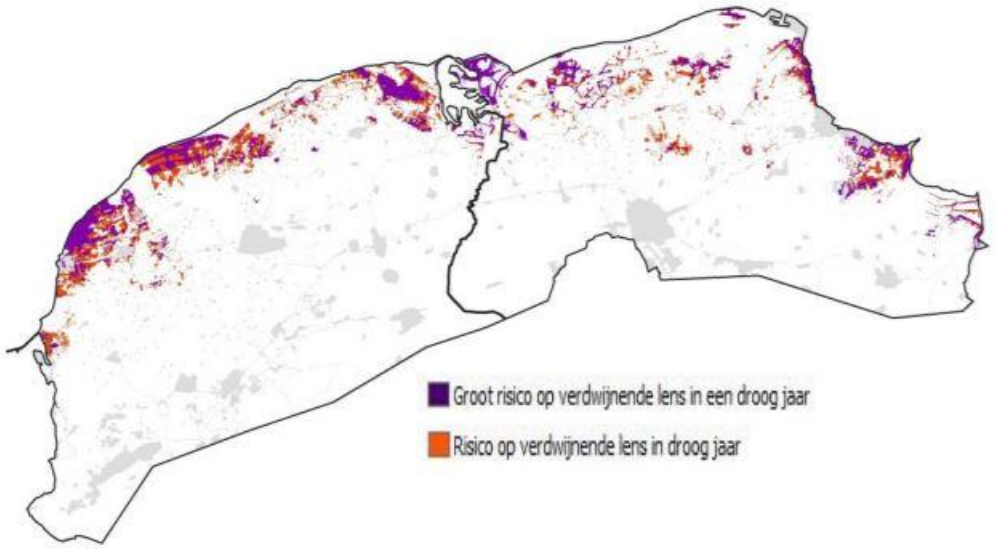
Scenario II: primary dike breaks each km



- Increase of **Salinization**: now and in 2050 in Northern Netherlands

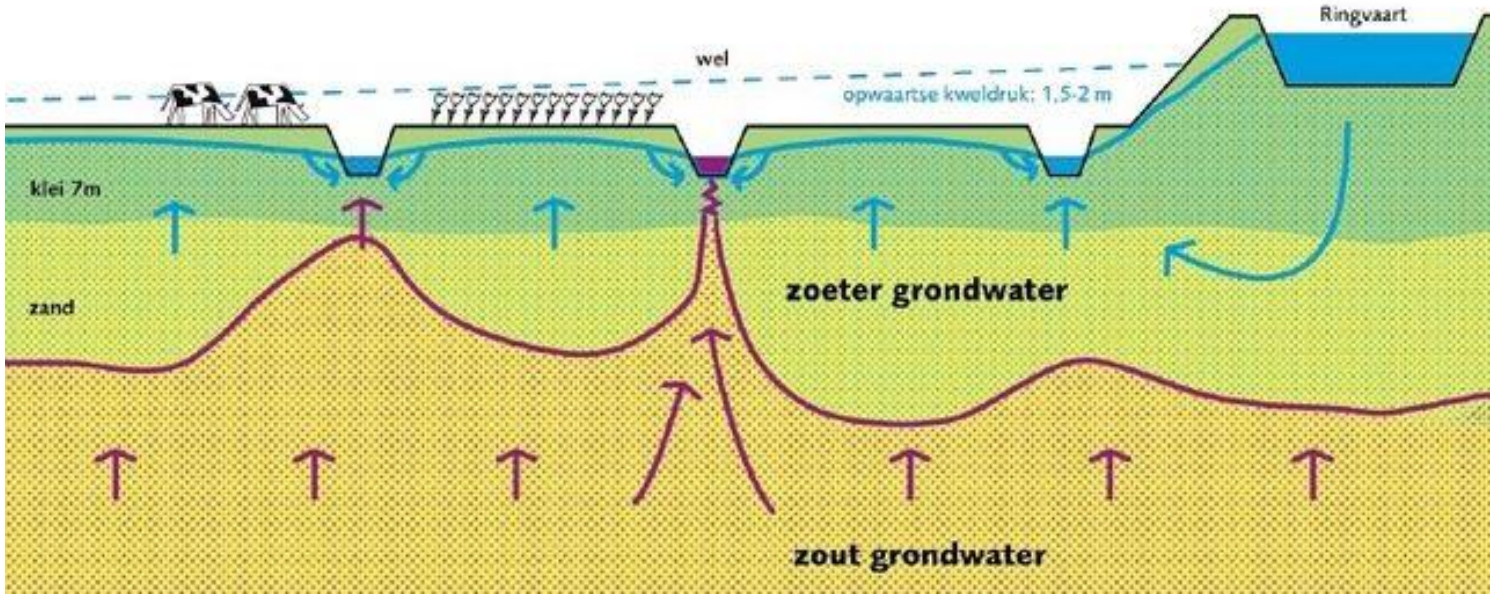


Now

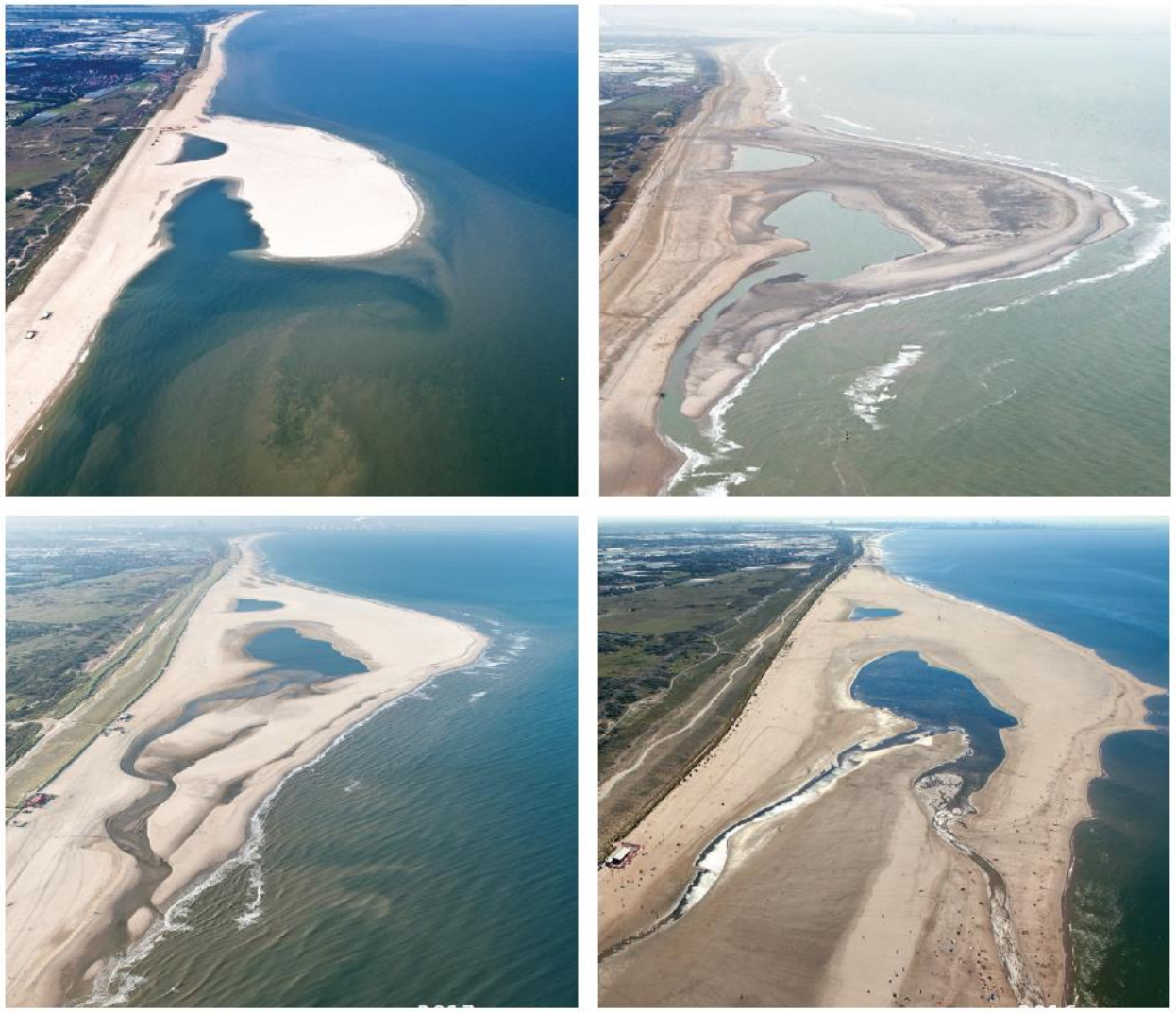


2050

- **Salinization**: leads to crops damage and decrease fresh water reserves



- Relevance borderscapes I: **Adaptive capacity** to deal with change



Sand nourishment, NL

- Relevance borderscapes II: **Merging of functions and processes** land and sea

Salty agriculture, Texel, Northern NL

Algae generation& sediment farms, proposed project Eemshaven, Northern NL

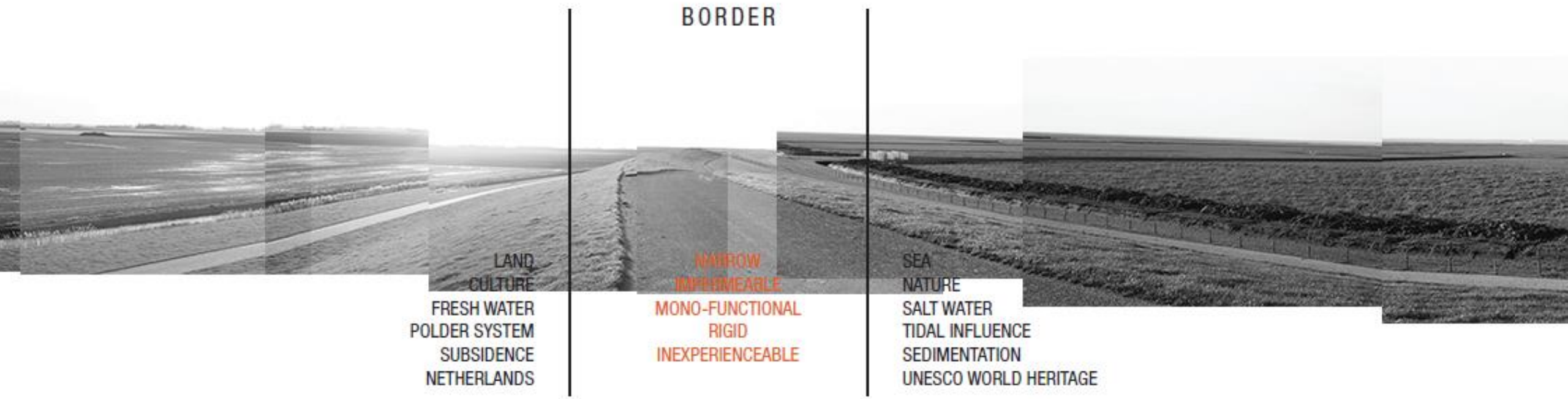
- Relevance borderscapes III: **Attractive human experience** in fixed & dynamic

2km Southend Pier, UK

Waterpark Zalige bridge, Nijmegen, NL

RESEARCH QUESTION

*"Which instrumental **design principles** for a **spatial structure** can be developed that increase the permeability between land and sea establishing a coastal borderscape in Northern Netherlands?"*



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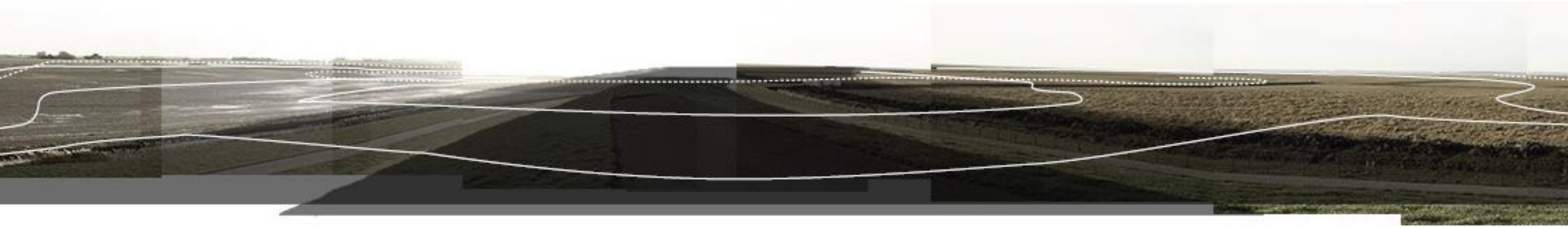
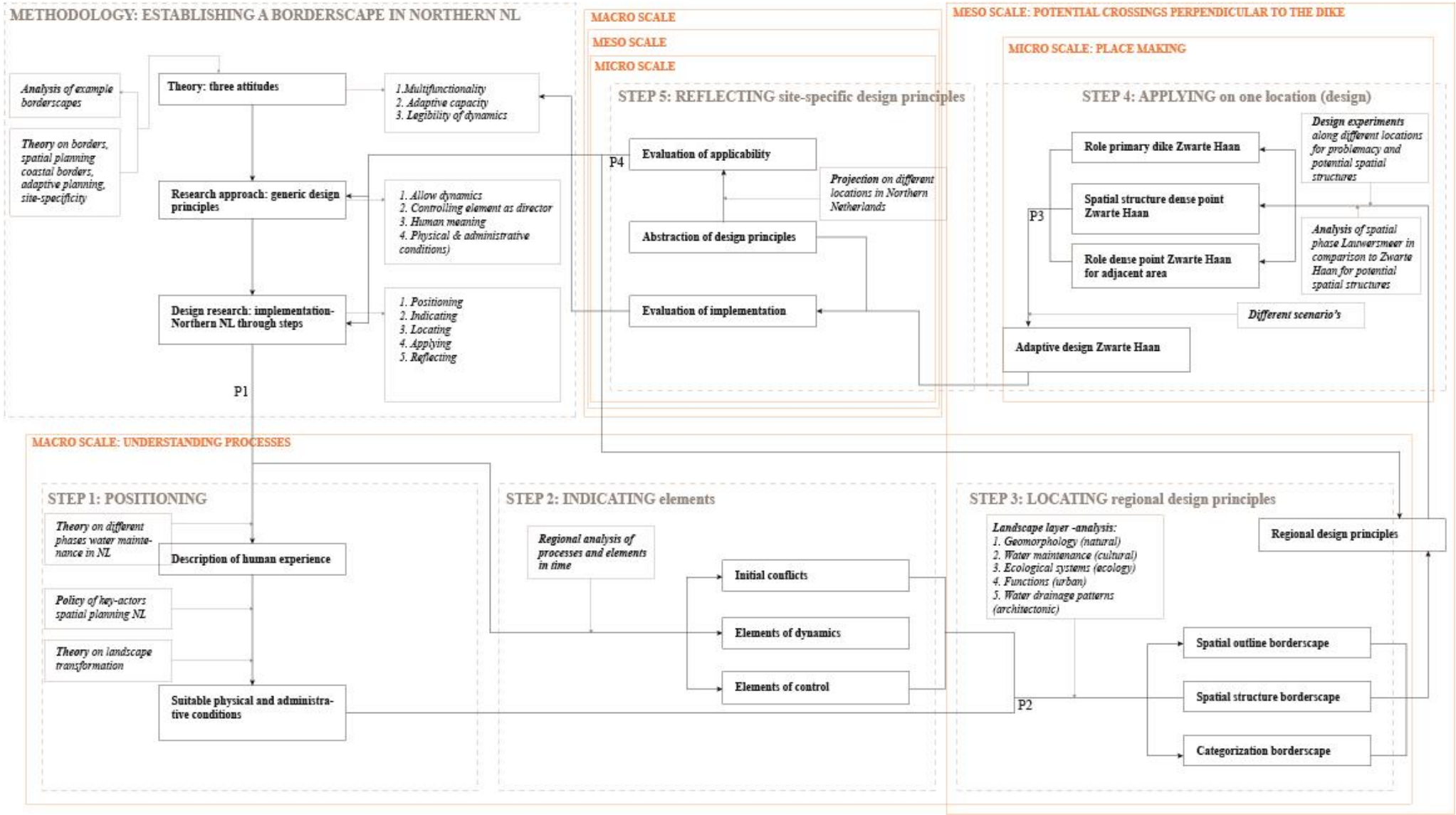
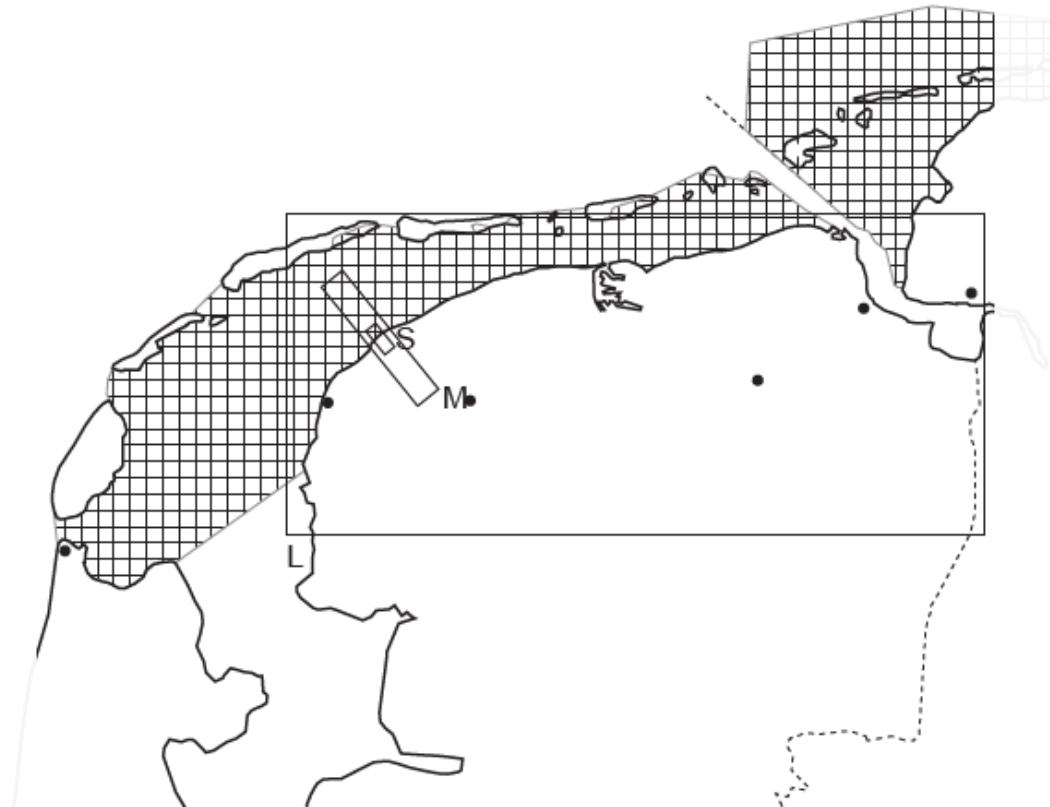


RESEARCH FRAMEWORK

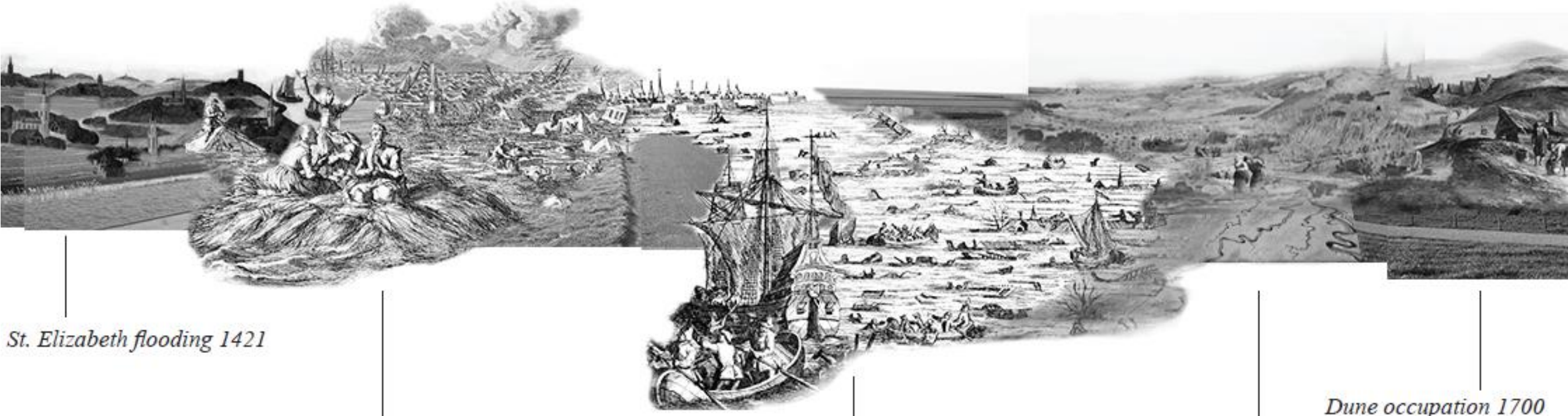


- Moving through the scales:
  - Macro-scale (L): Understanding processes and systems
  - Meso-scale (M): Potential crossings of processes and systems
  - Micro-scale (S): Place-making



1. POSITIONING

- Human meaning borderscape*:* **re-introduction** of experience of **dynamics**



St. Elizabeth flooding 1421

St. Lucia flooding 1287

Christmas flooding 1717

Sand-drift dunes 1500

Dune occupation 1700

1. POSITIONING

- Suitable administrative & spatial conditions*:* **transformation** of existing spatial structure, the primary dike, and **decisive power to the users** in the zone

Old dike as sculpture

Old dike with road

Old gullie as canalized water parcellation in polder system

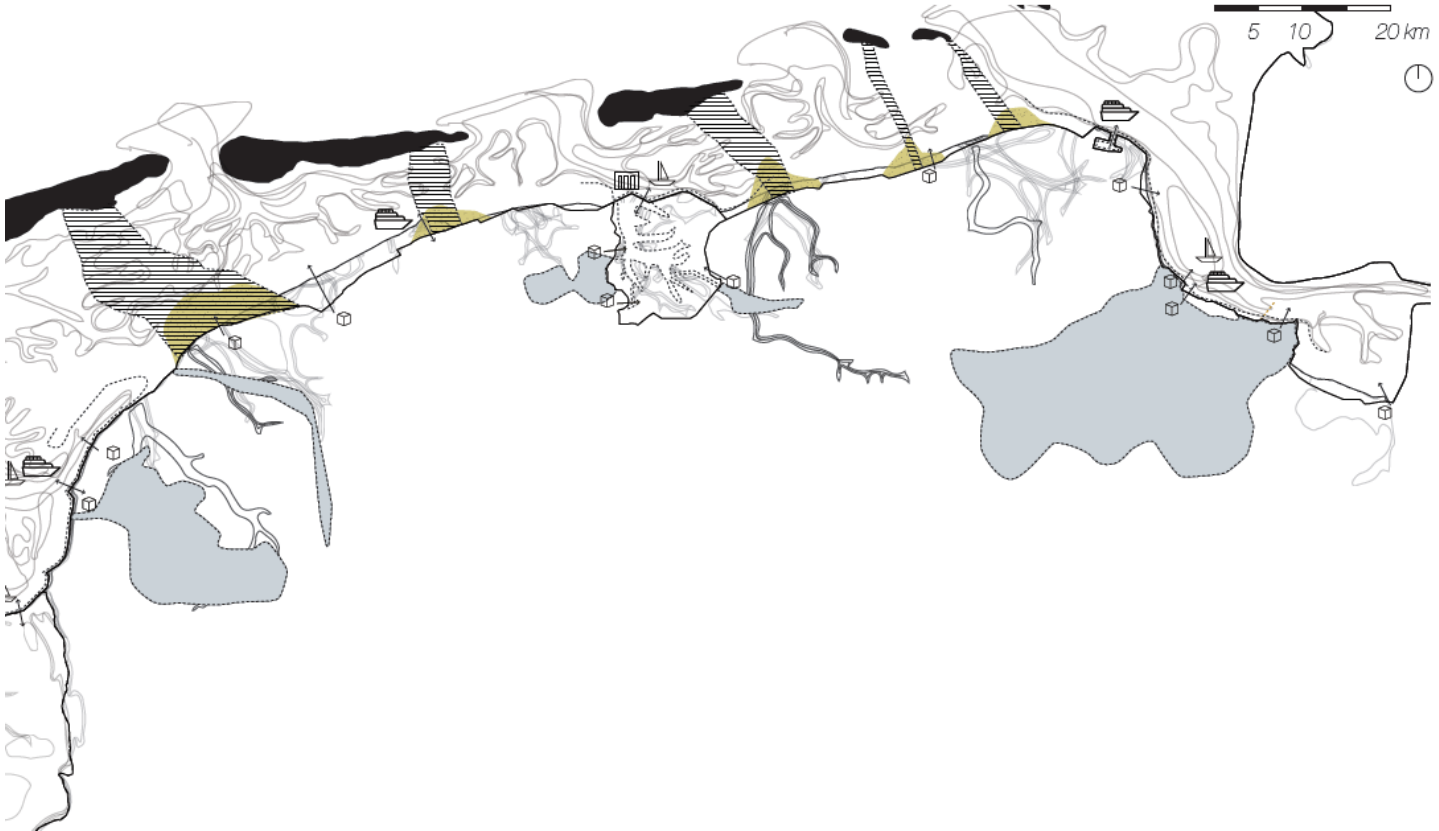
Old dobbe (fresh water pool) as bird watch look-out

Mound as destination for visitors (spotlights etc.)

Old gullie as canalized recreation route in polder system

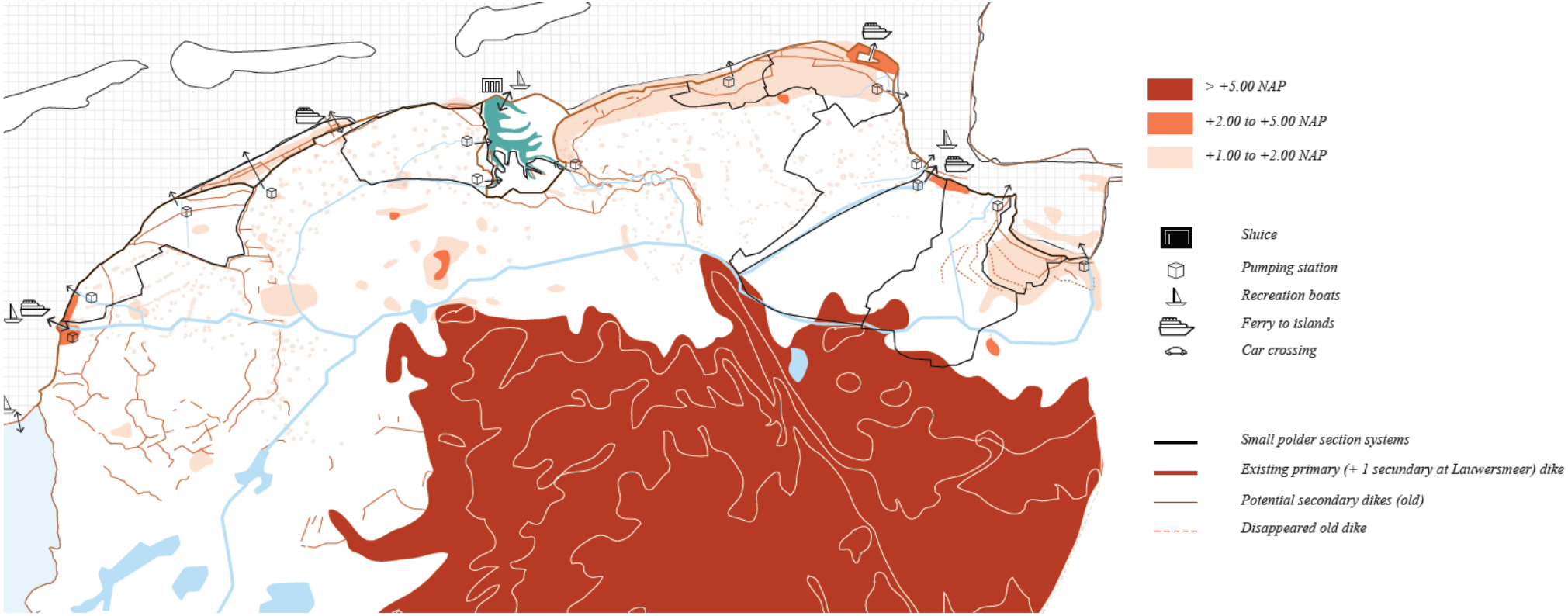
2. INDICATING

- Elements of dynamic: **current water exchange**, lower topography along the dike, **sedimentation& erosion**, old sea arms



2. INDICATING

- Elements of control: **Primary dike**, harbour quays, stretching dams, **water regulators**, **secondary dikes**, terps



3. LOCATING

- Landscape Layer-analysis:

  secondary dike-system (cultural)

  fresh- salt water systems (cultural)

  dynamic geomorphology (natural)

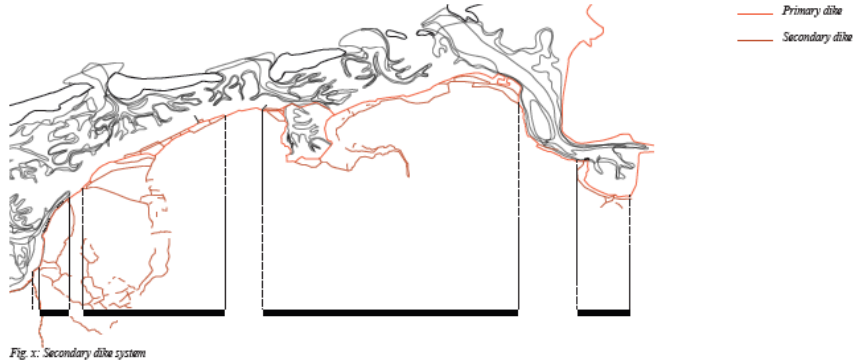


Fig. x: Secondary dike system

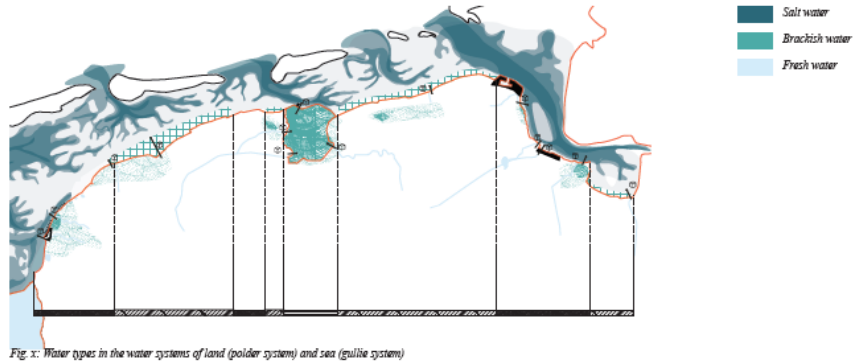


Fig. x: Water types in the water systems of land (polder system) and sea (gullie system)

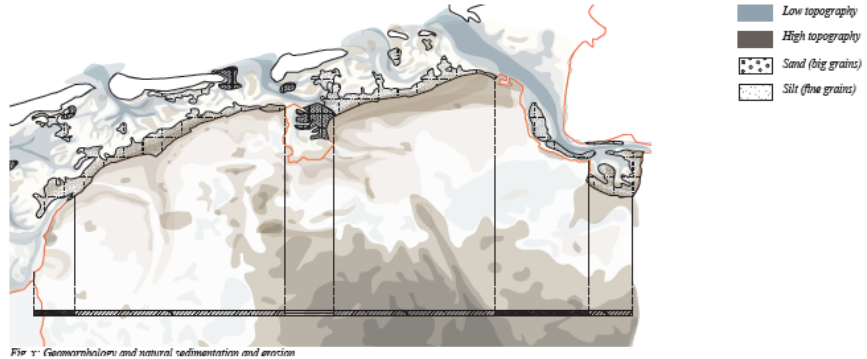


Fig. x: Geomorphology and natural sedimentation and erosion

3. LOCATING

- Landscape Layer-analysis:

  secondary dike-system (cultural)

  water systems (cultural)

  geomorphology (natural)

  ecological system (ecological)

  human uses (urban)

  water patterns (architectonic)

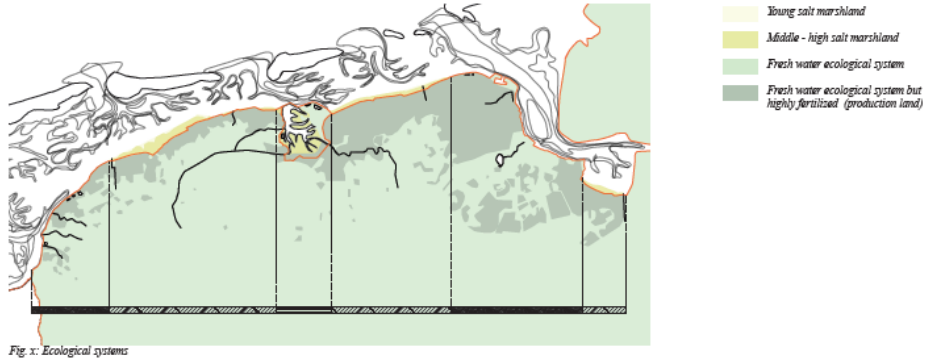


Fig. x: Ecological systems

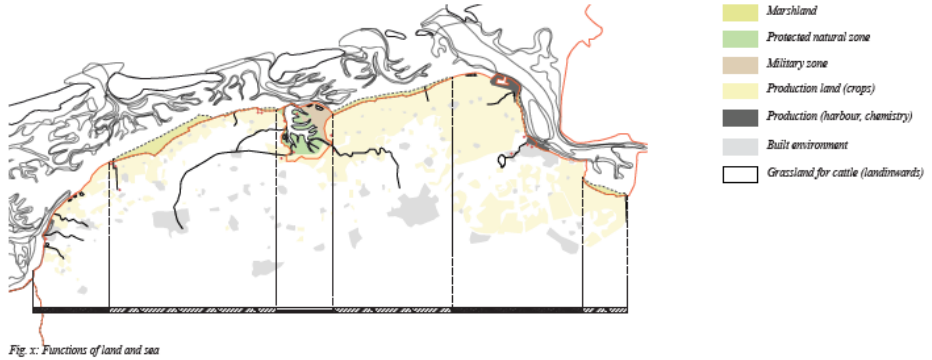


Fig. x: Functions of land and sea

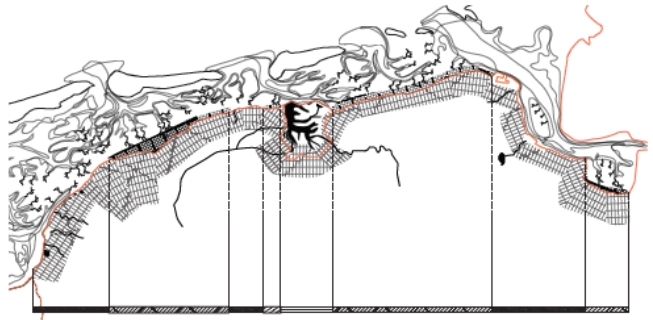


Fig. x: Water drainage patterns

3. LOCATING

- **Spatial outline & structure** borderscape re-positioning the primary dike

3. LOCATING

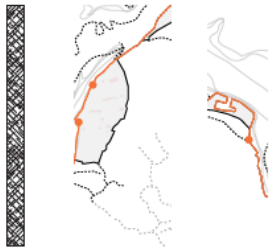
- **Categorization** borderscape

Reclamation land (sedimentation)

Further away from tidal gullies

Positioning of the dike 'in the middle'

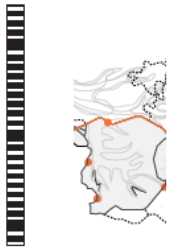
Seperation polder vs. reclamation structure



Close to tidal gullies (erosion)

Quays/ harbours

Positioning of the dike 'at the end'



Existing secundairy dike system

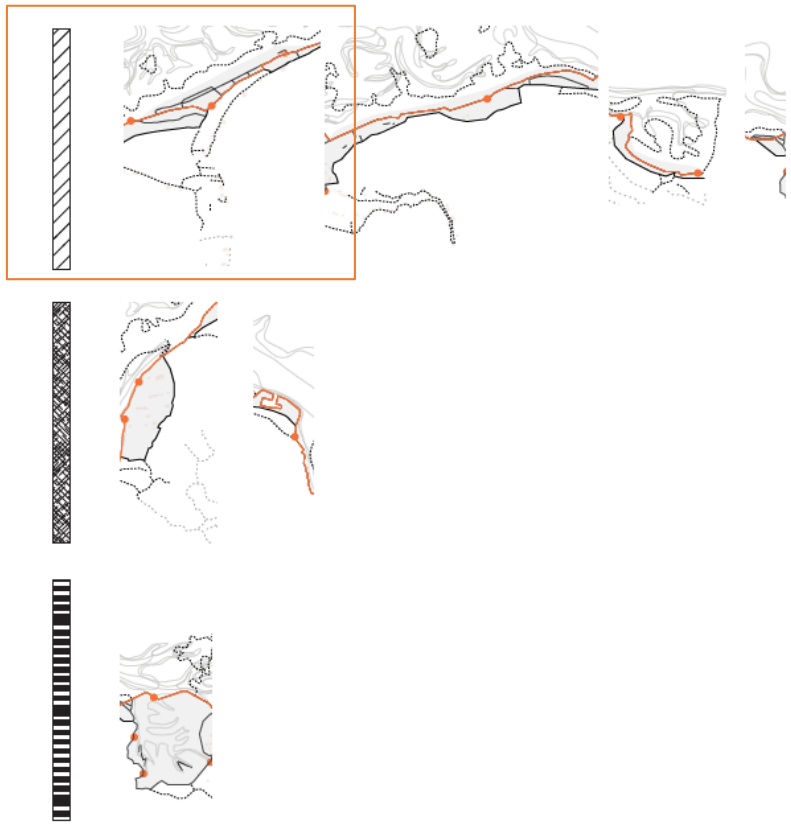
Ecological development & recreation

Old sea arm intact

Gradual course patterns

3. LOCATING

- *Categorization borderscape*



Reclamation land (sedimentation)

Further away from tidal gullies

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Ecological development & recreation

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DESIGN EXPERIMENTS & ANALYSIS

- Inspiration for

Spatial structure

Zwarte Haan

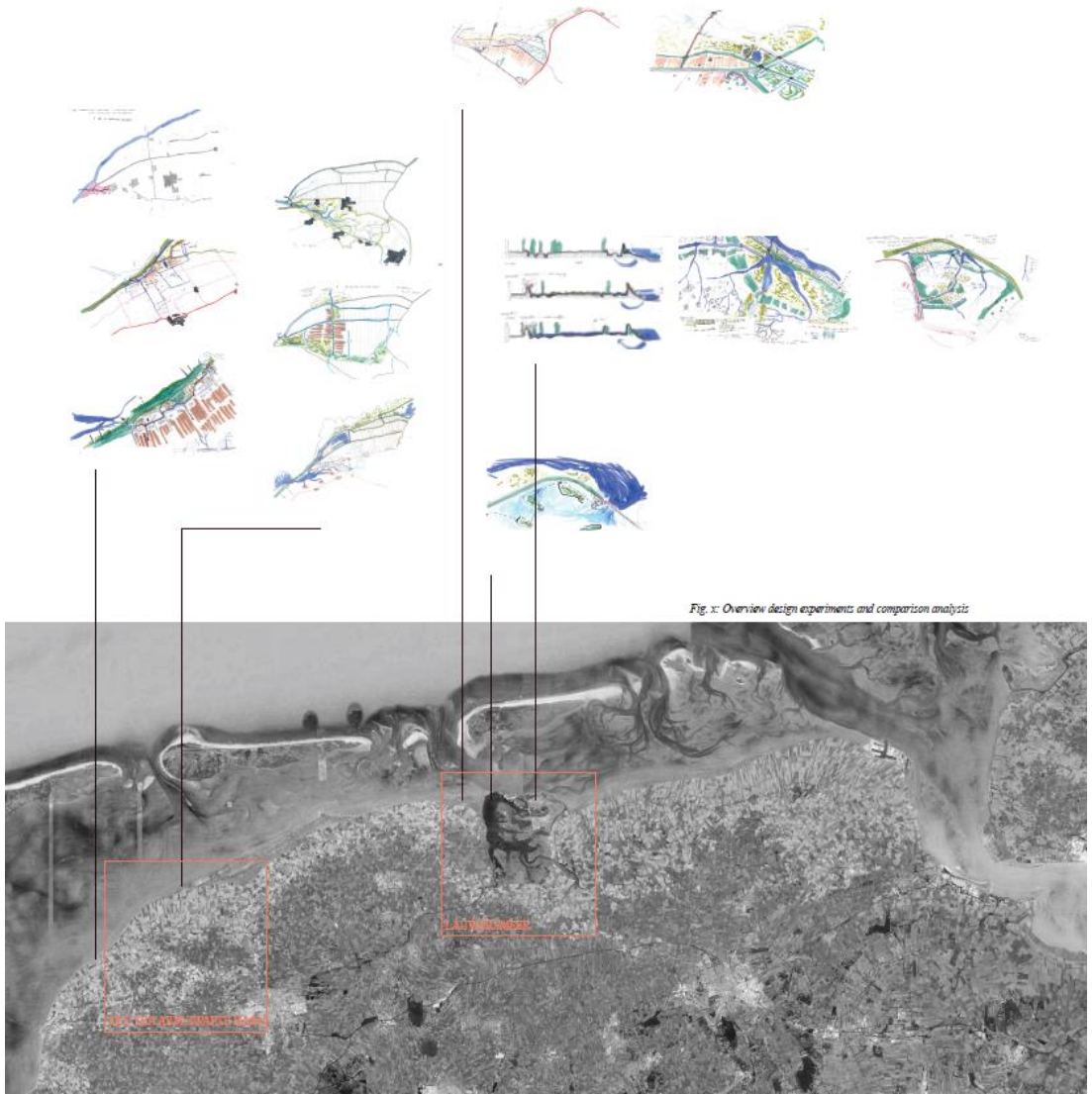


Fig. x: Overview design experiments and comparison analysis

DESIGN EXPERIMENTS & ANALYSIS

- **Returning themes**, e.g. regulated salt-fresh water systems, permeability of functions, multifunctional role dike, social involvement, human experiences

New drainage pattern

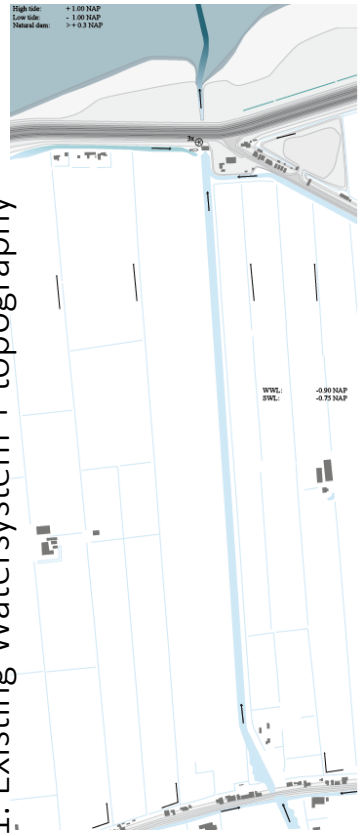
Acceptance of the current ditch pattern

4. APPLYING

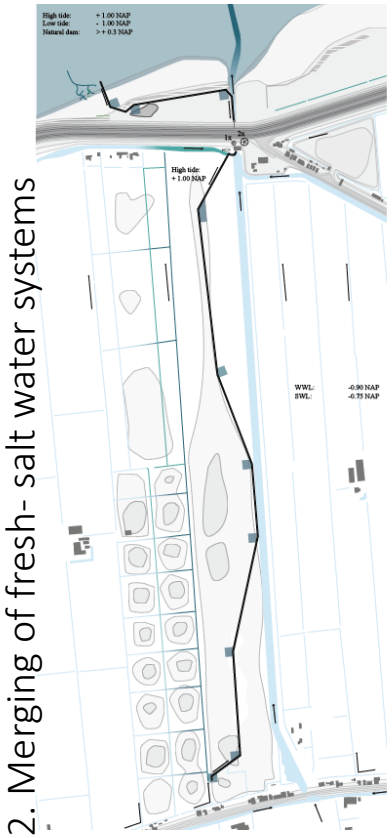
- Design principle I*:* Role dense point is **starting point** for development bigger area

- Design principle II*:* **Order of layers** for new spatial structure

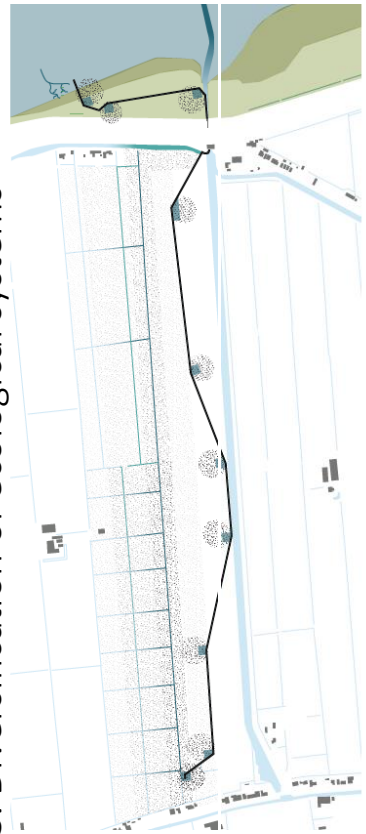
1. Existing Watersystem + topography



2. Merging of fresh- salt water systems



3. Diversification of ecological systems

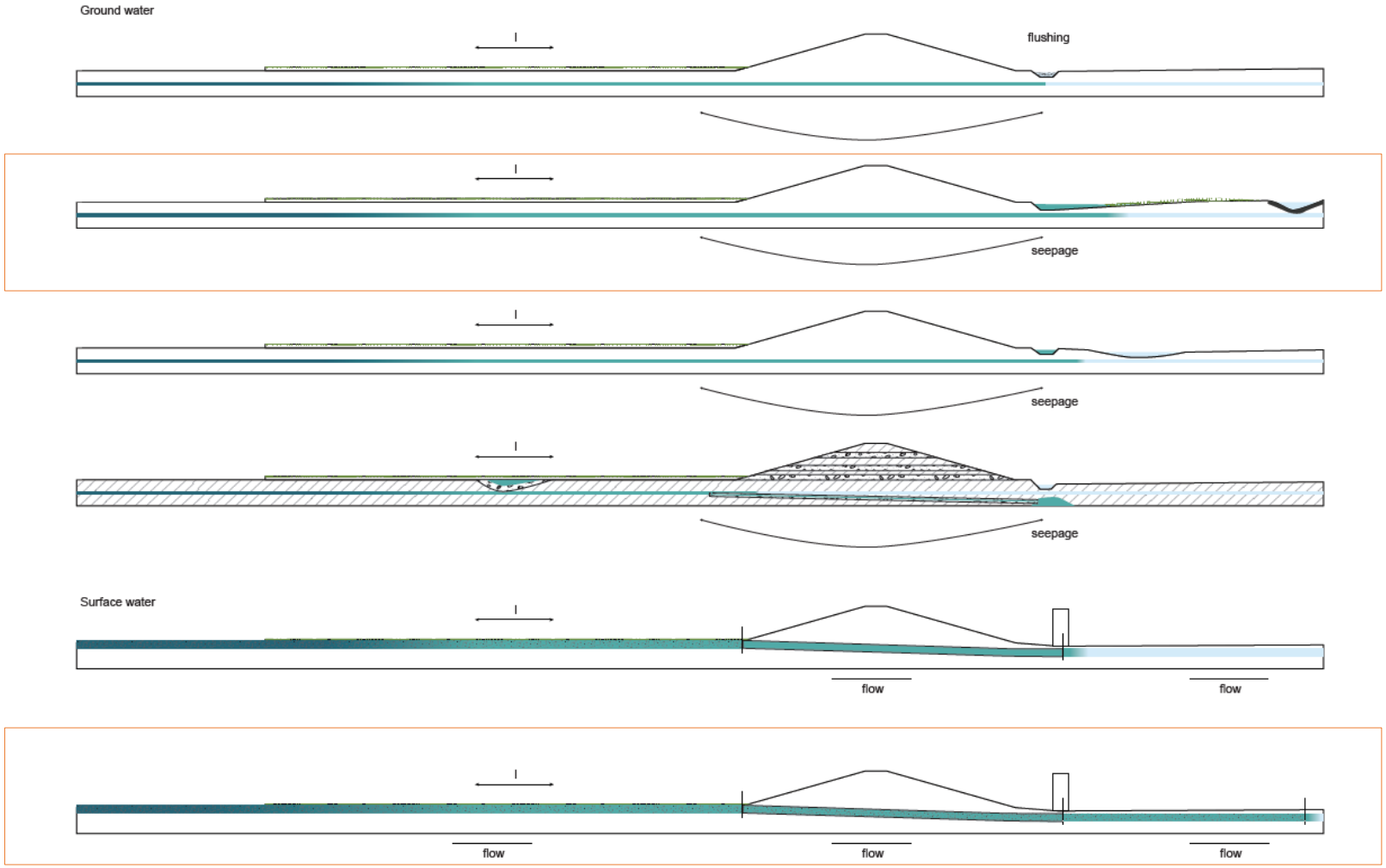


4. Merged/new uses

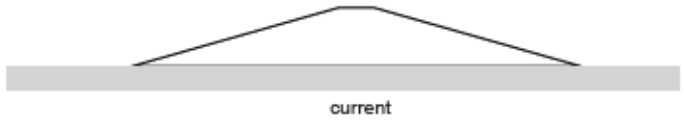
5. Attractive human experiences

- Design principle III*:* **Role primary dike** in transformation
  - *Wider safety system*

- Design principle III*:* **Role primary dike** in transformation
  - *Wider safety system*
  - *Regulator of water types*



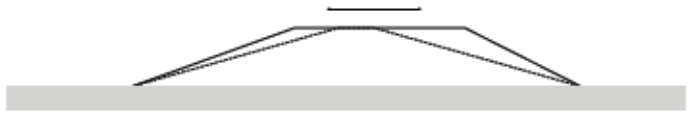
- Design principle III*:* **Role primary dike** in transformation
  - *Wider safety system*
  - *Regulator of water types*
  - *Architectonic element*



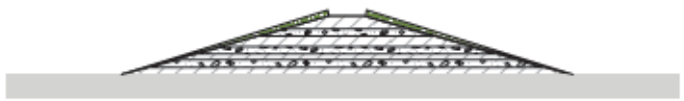
current

change grade slopes

change curve



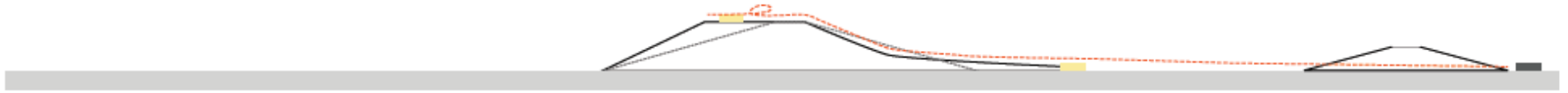
change width platform



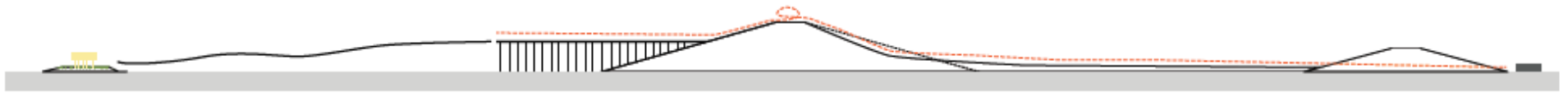
diverse ecological system

- Design principle III*:* **Role primary dike** in transformation
  - *Wider safety system*
  - *Regulator of water types*
  - *Architectonic element*
  - *Controller of experience*

current ascent



vertical route to dike



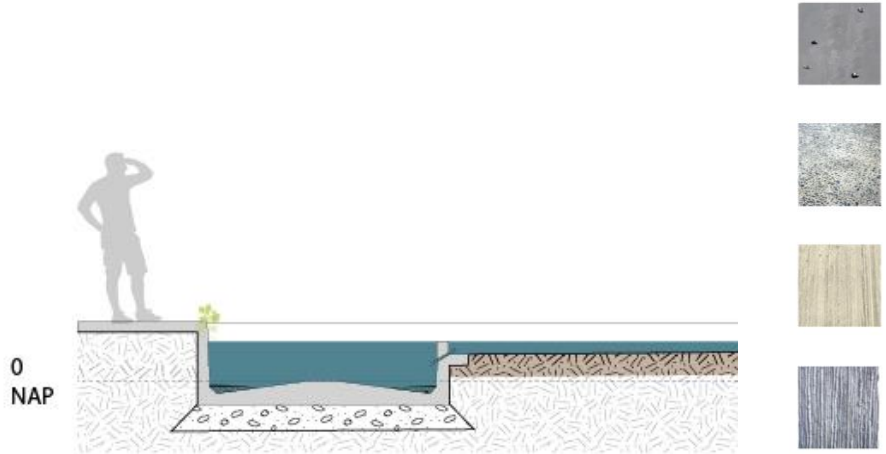
vertical route over dike

horizontal route

- 1. Mixing **water types***:*

New salt water system using high tide together with existing fresh water system

Reference Wijkeroogpark, Velzen



- 1. Mixing **water types***:*

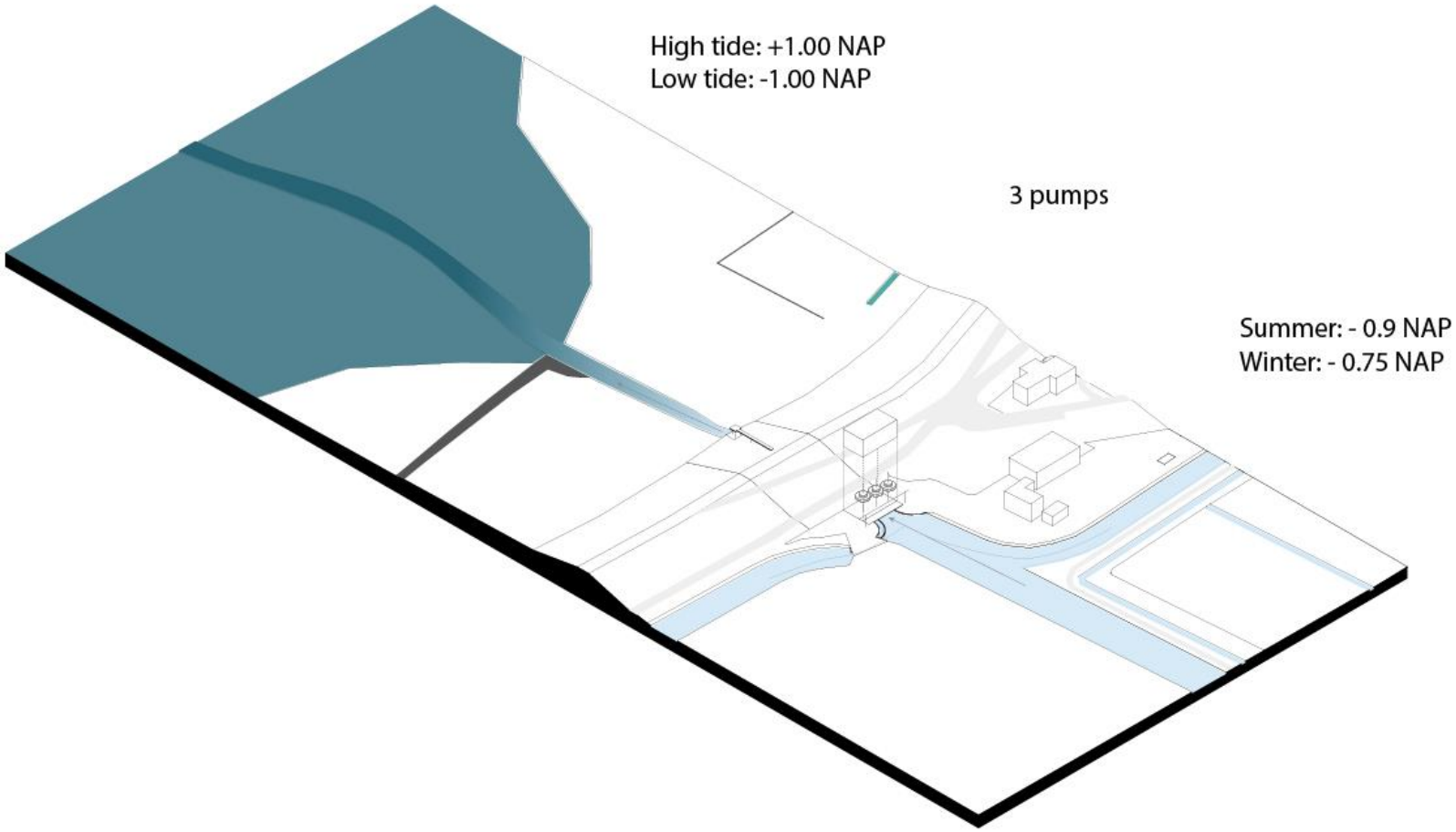
Adding regulable

dams along the way

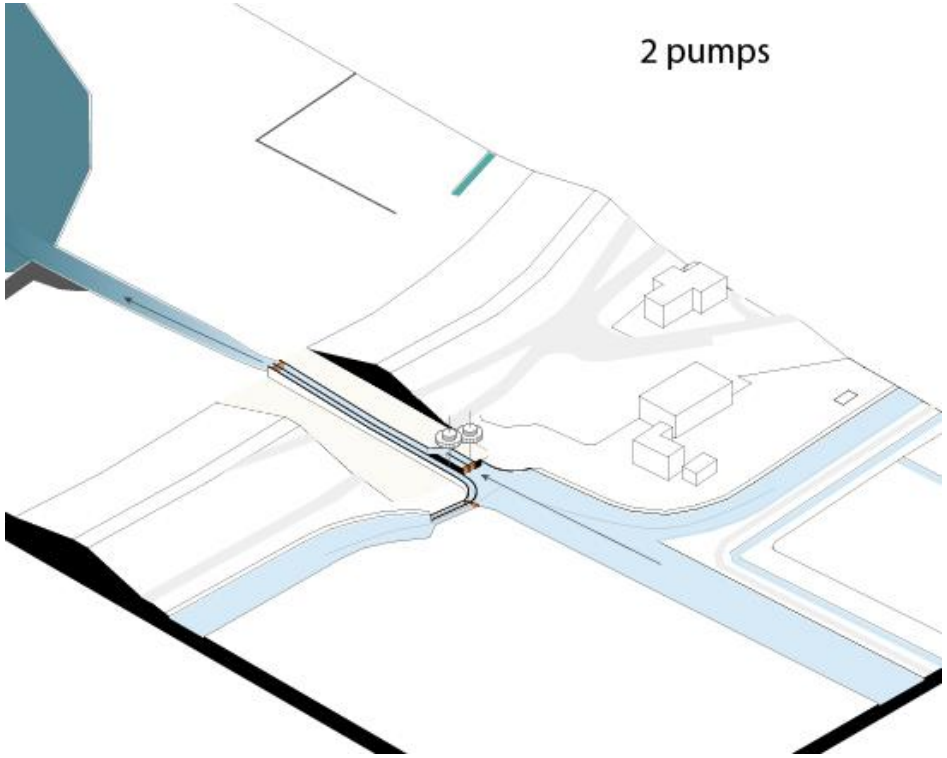
Slowing down water velocity

Regulating mixing of water types

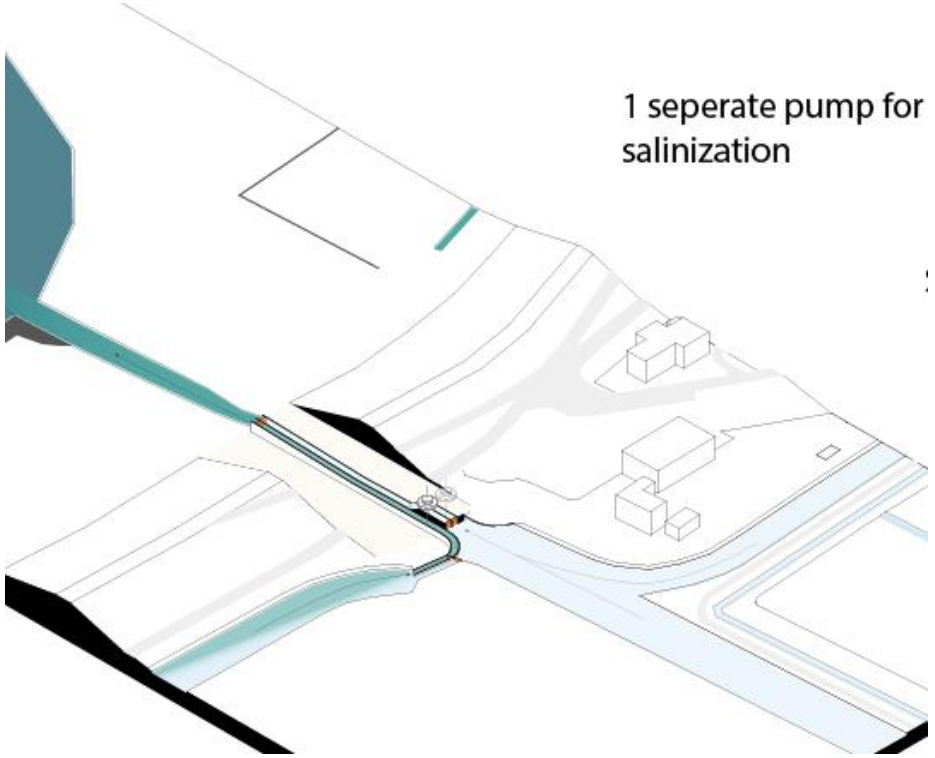
- Zooming in: functioning existing **pumping station**
  - Pumps have no cooperation with tides



- Zooming in: transforming the existing **pumping station**
  - *Pumps have no cooperation with tides*
  - *Seperate channel for salinization ditch in summer*
  - *If sea level rises > +1.80 NAP (storm), system closes*

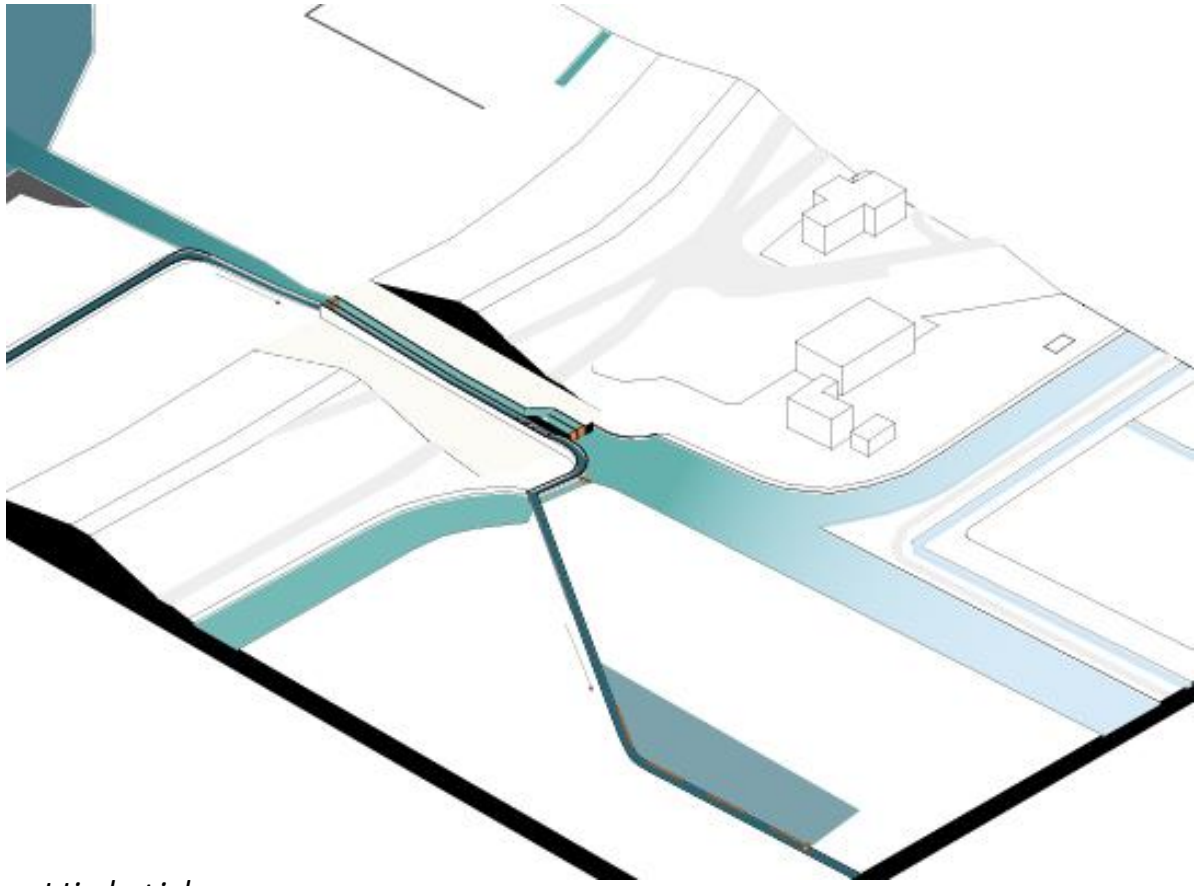


Winter

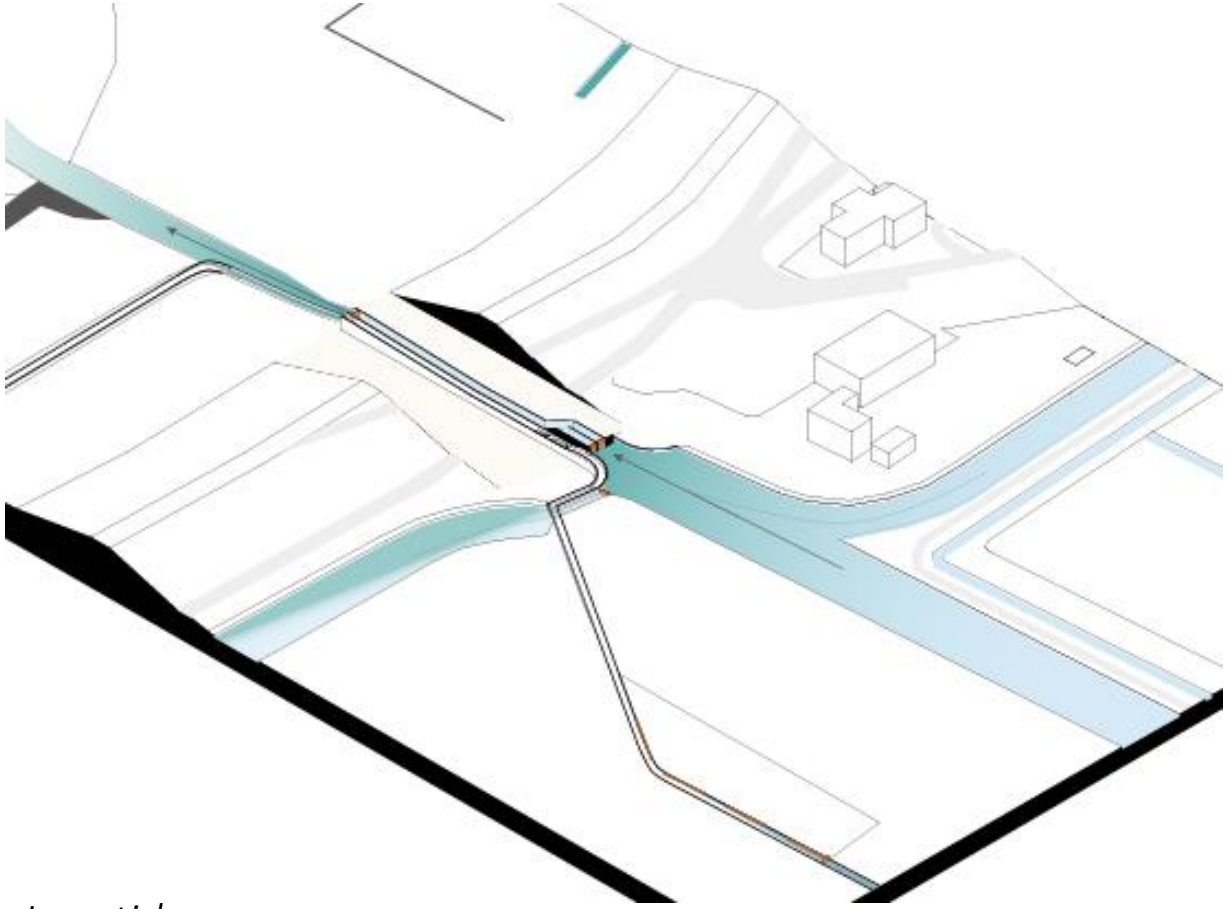


Summer

- Transforming existing pumping station: **use of tides**
  - *Use seperate ditch as **salt water inlet** during high tide*
  - ***Flushing out** during low tide*
  - *Accept salinization in the ditch*



High tide



Low tide

- **2. Diversification** of ecological systems by salinization

Salinization

Young/middle marshland

Old marshland

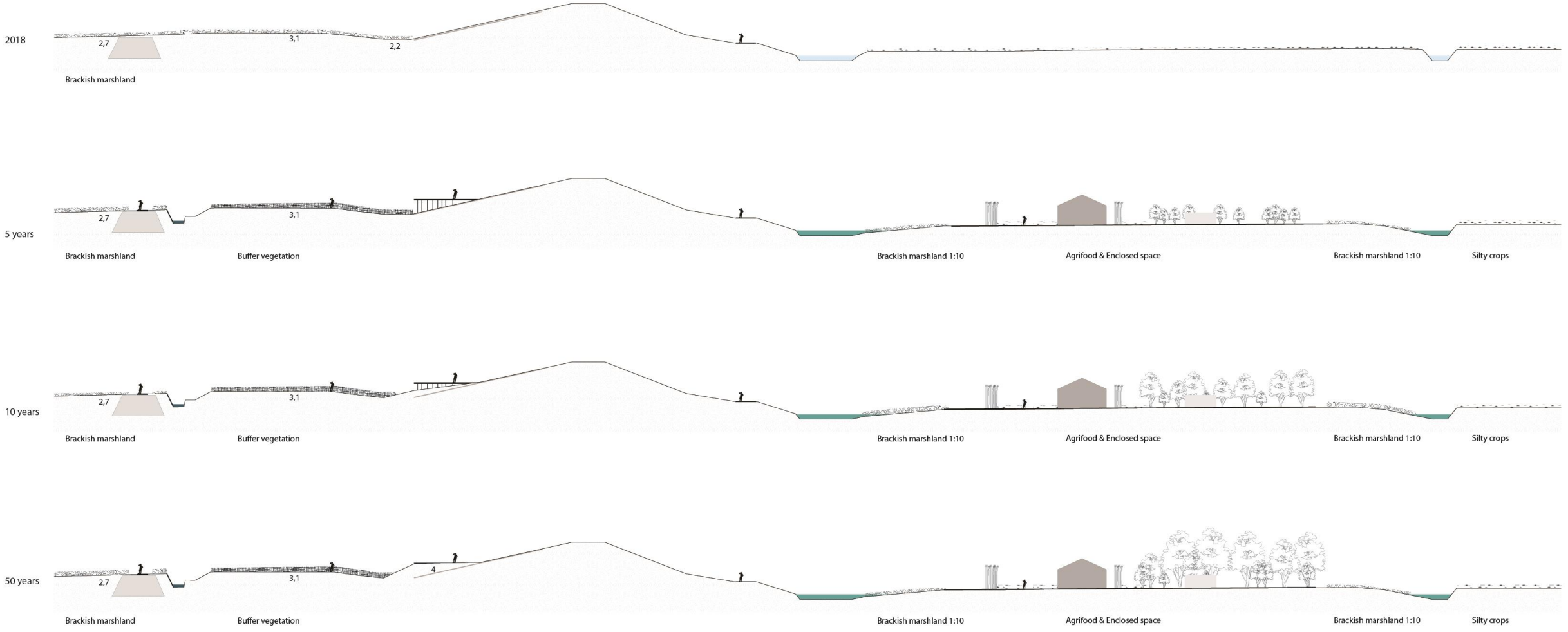
- **Palette** of atmospheres salt and brackish marshlands & fresh (grass)lands

Water type →

Prevention of erosion/waves

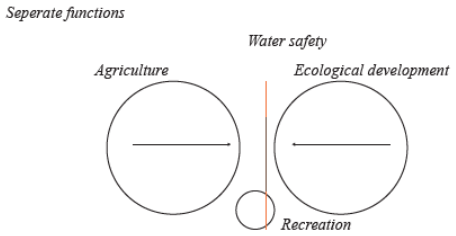
Succession ↓

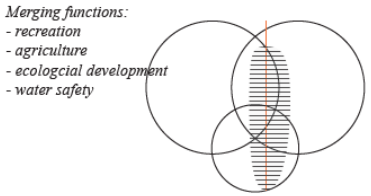
- ***Same ecological systems*** *on both sides of the dike*



AA'

- 3. Merging functions





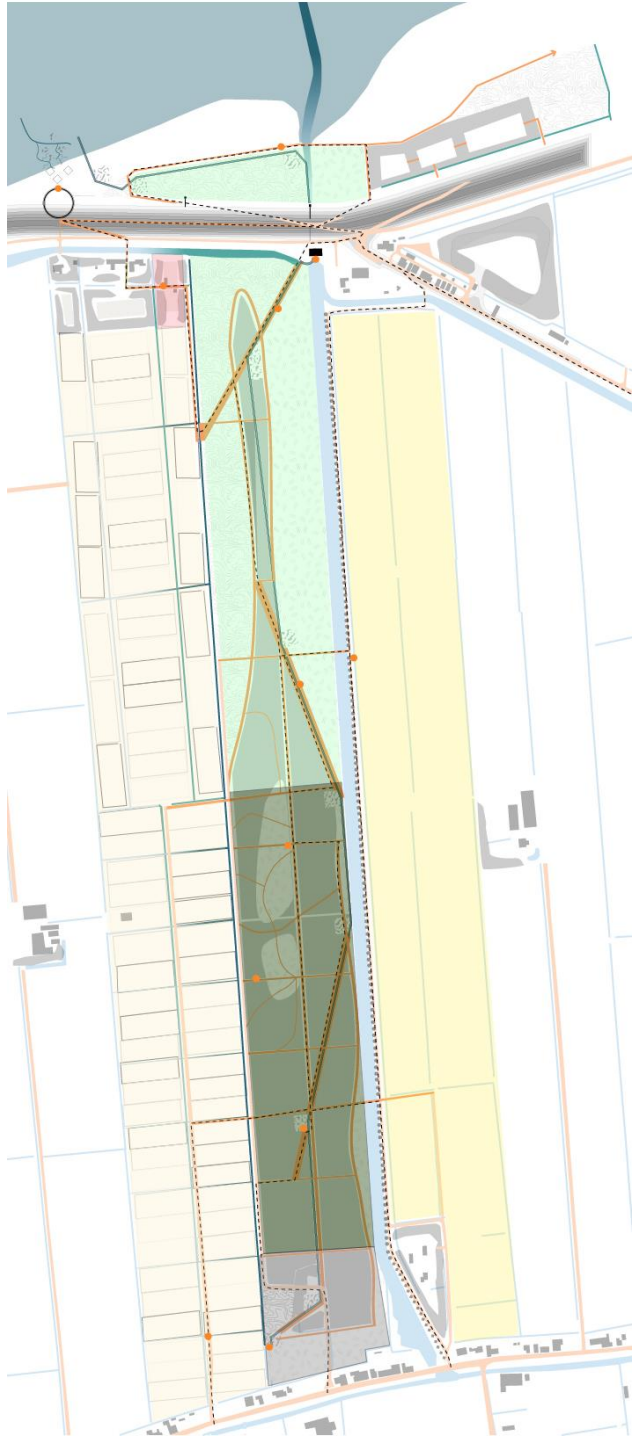
Experimental agriculture

Massive reed fields + open fields

Wide grass lanes

Programmed gardens

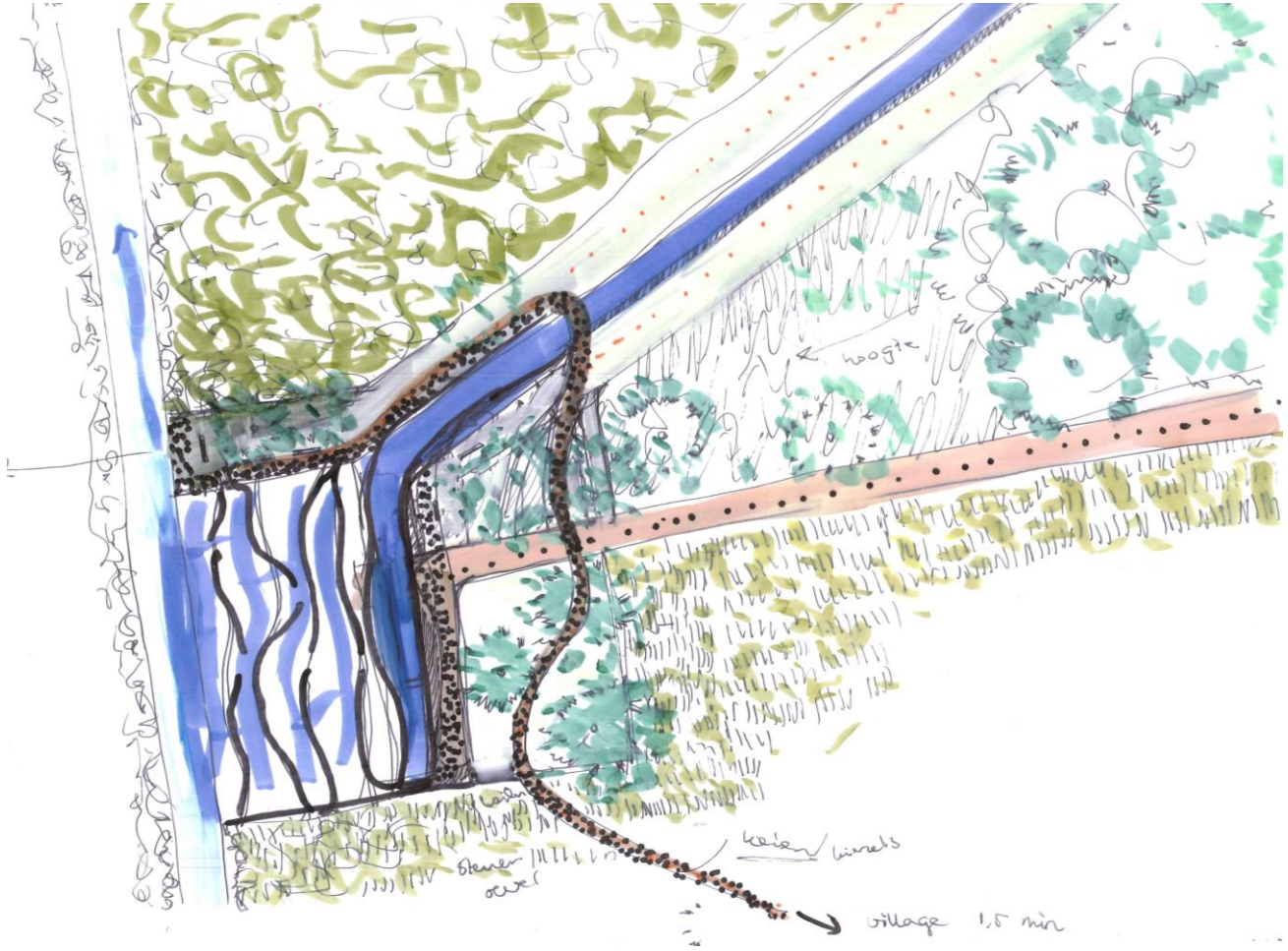
- Landscape park
  - Reed fields
  - Lanes
  - Gardens (25x25m)
    - *Dug garden*
    - ***Open garden***
    - *Enclosed garden*
    - *Urban garden*
    - ***Agricultural garden***

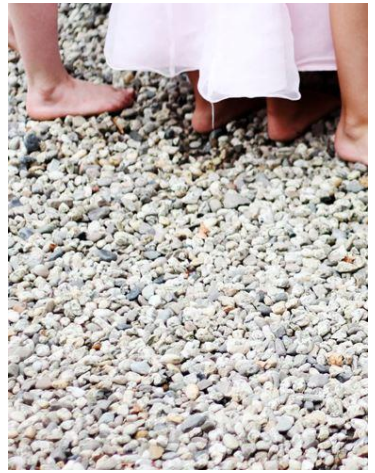


Experimental agriculture

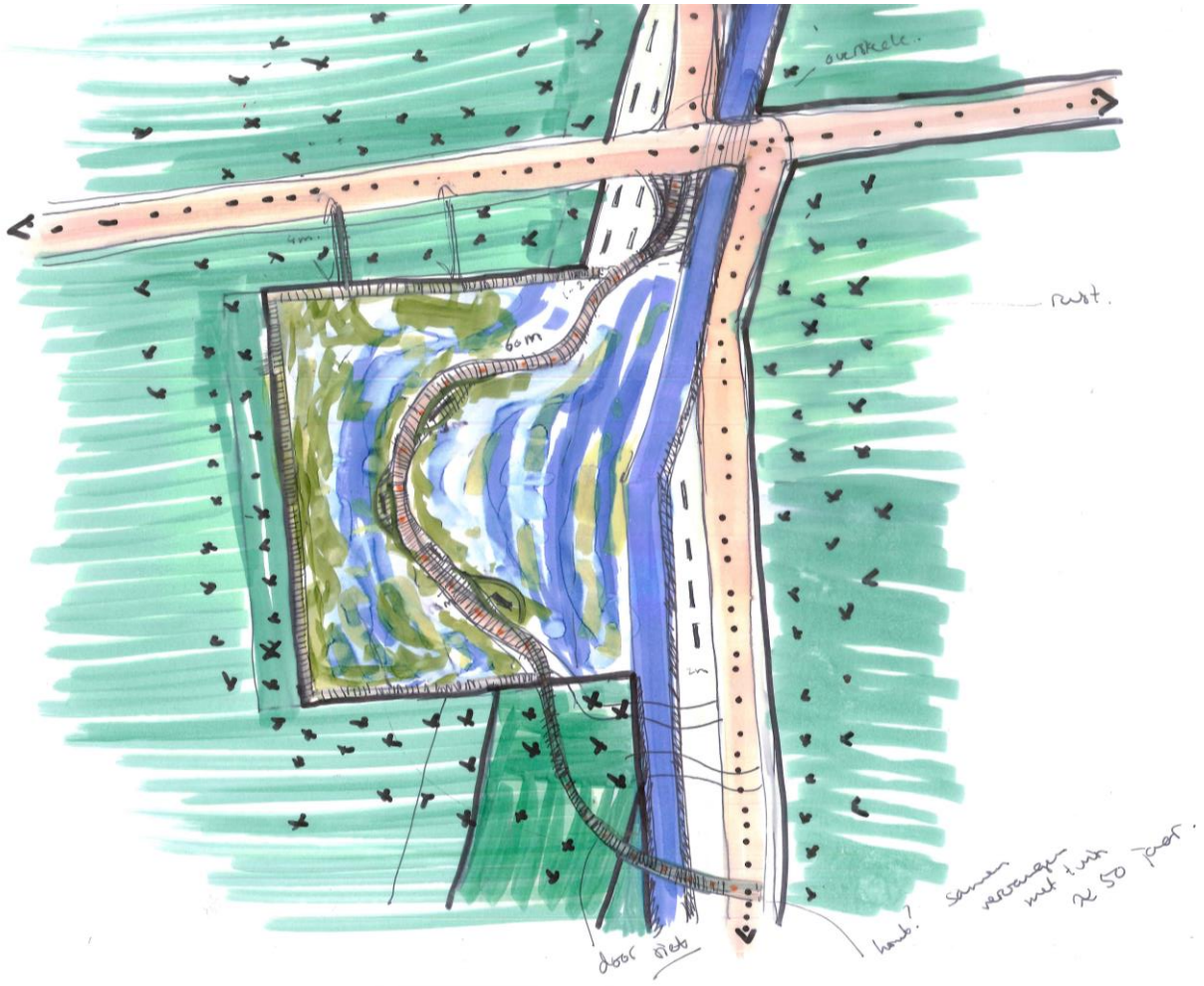
Production agriculture

- Urban garden
  - ‘Hard’ materialization
  - Merging of salt and fresh as an experience



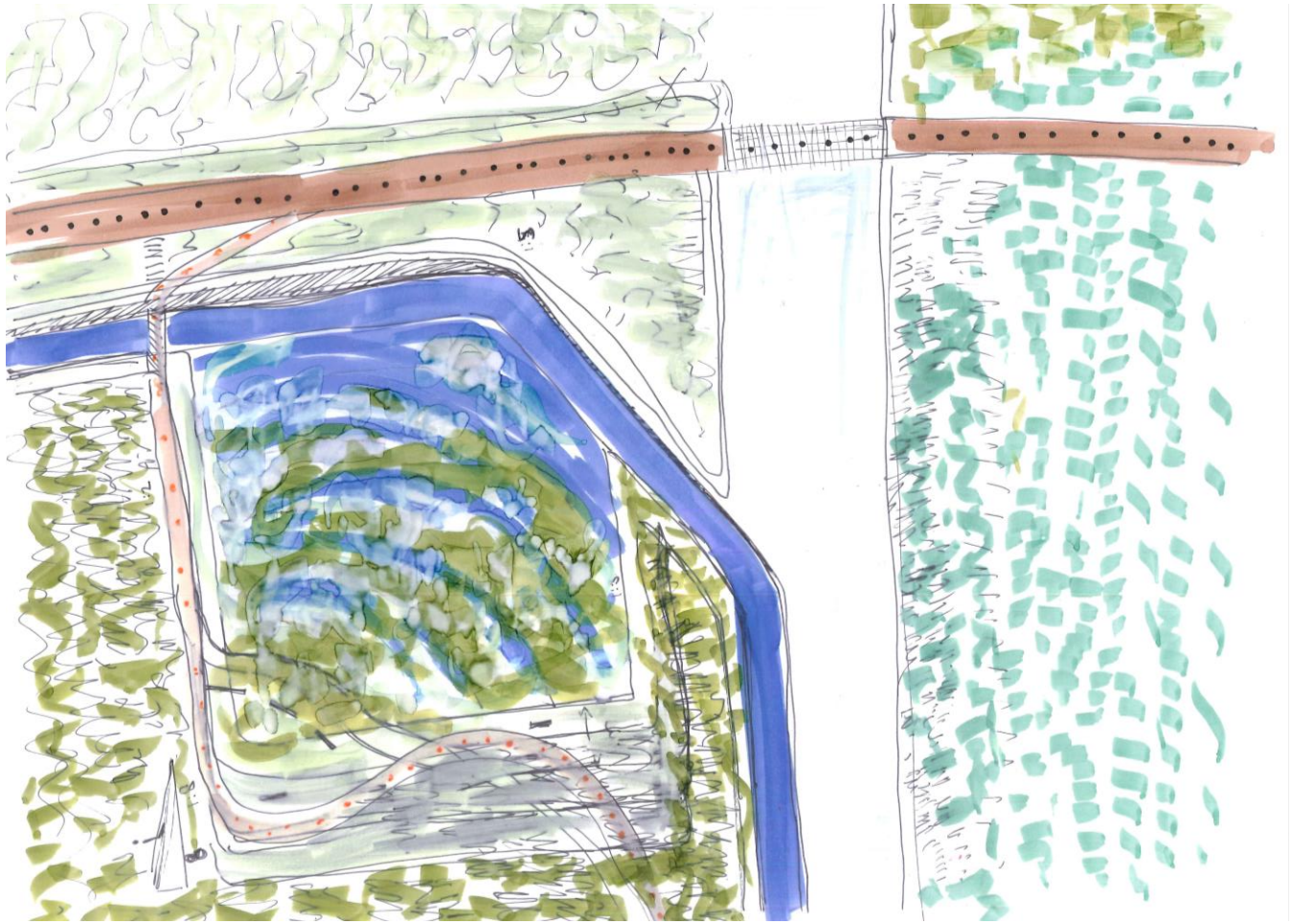


- Enclosed garden
  - Wooden paths along and through the garden
  - Surrounded by massive reed fields



- Enclosed garden
  - Wooden paths along and through the garden
  - An opening cut-out in massive reed fields

- Dug garden
  - Different gradients of slopes



- Dug garden
  - Different gradients of slopes

- Existing dense point Zwarte Haan

- Dense point Zwarte Haan becomes a destination for **recreation and education**

- Agricultural garden (1:500)
  - *Education*
  - *Recreation*

Lokal market/ picking garden

Agrifood

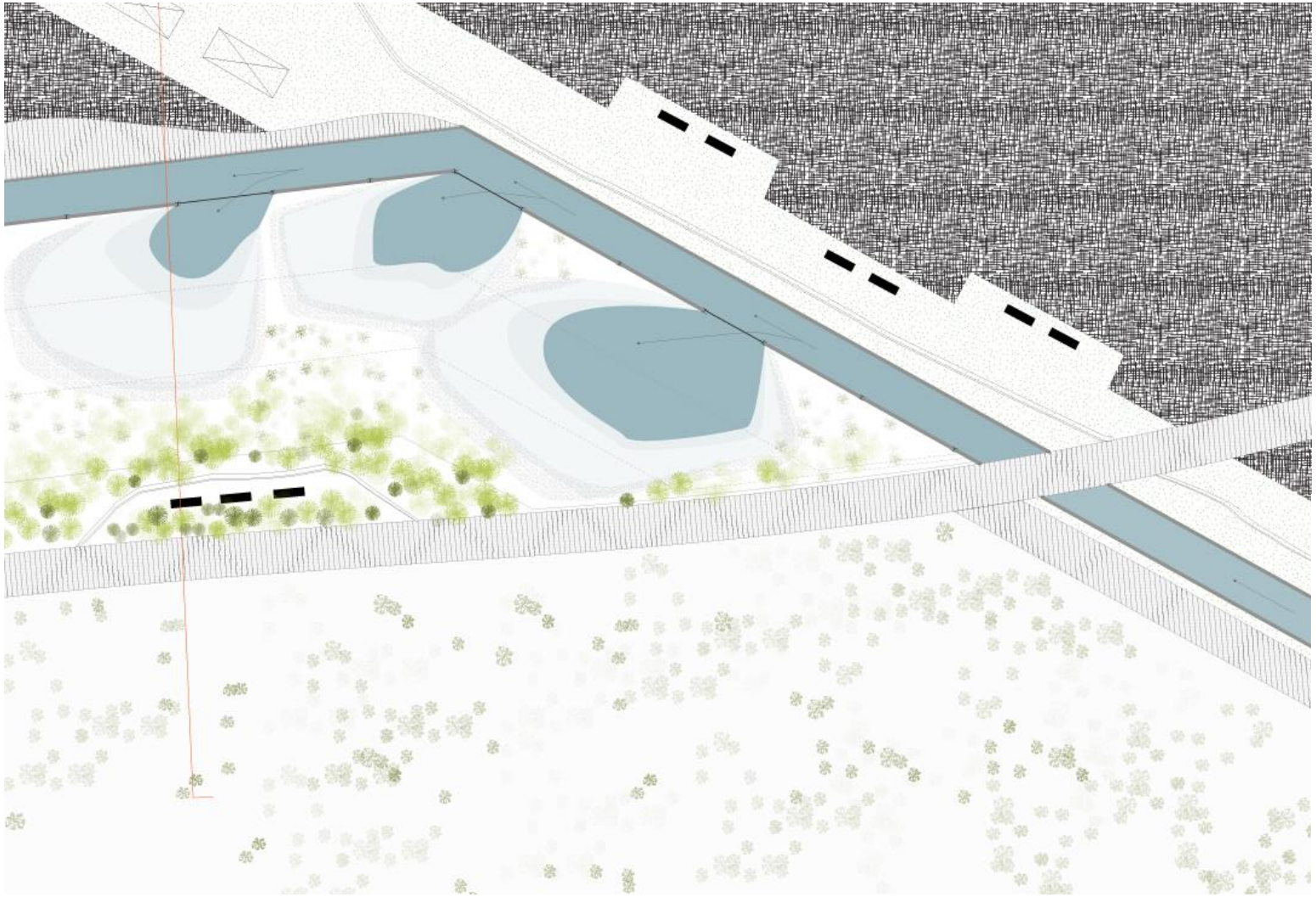
Agrifood

Pop-up restaurant

N

- Dense point Zwarte Haan becomes a destination for **recreation and education**

- Open garden: maintenance plan; situation at start high tide (1:200)



N

Reed (cut each winter)

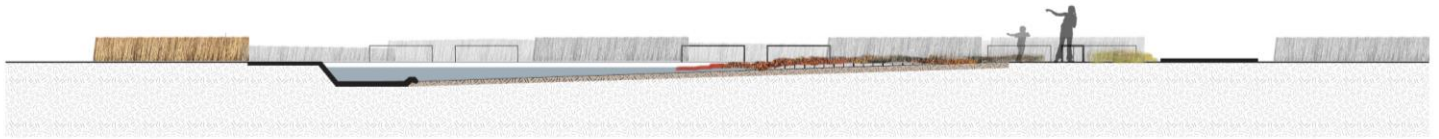
Grass lane (mow frequently)

Grassland (graze in summer)

Salt marshland (remove if fully reached last stage of succession)

- Open garden: section (1:100)

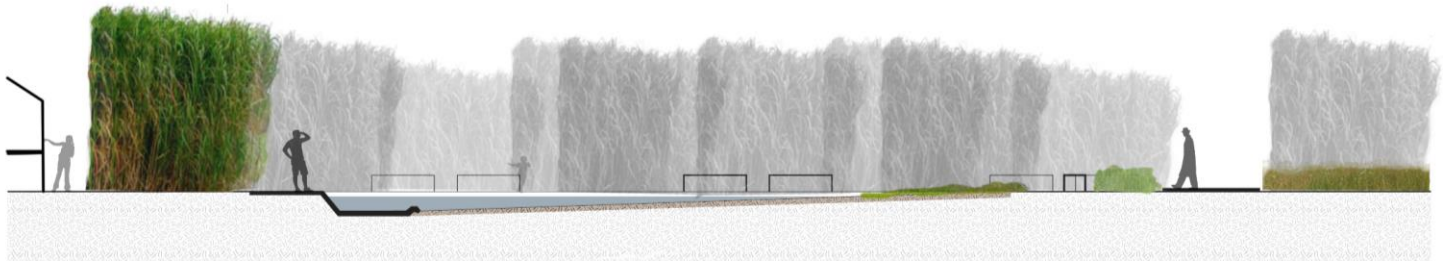
5 years winter



10 years summer

20 years winter

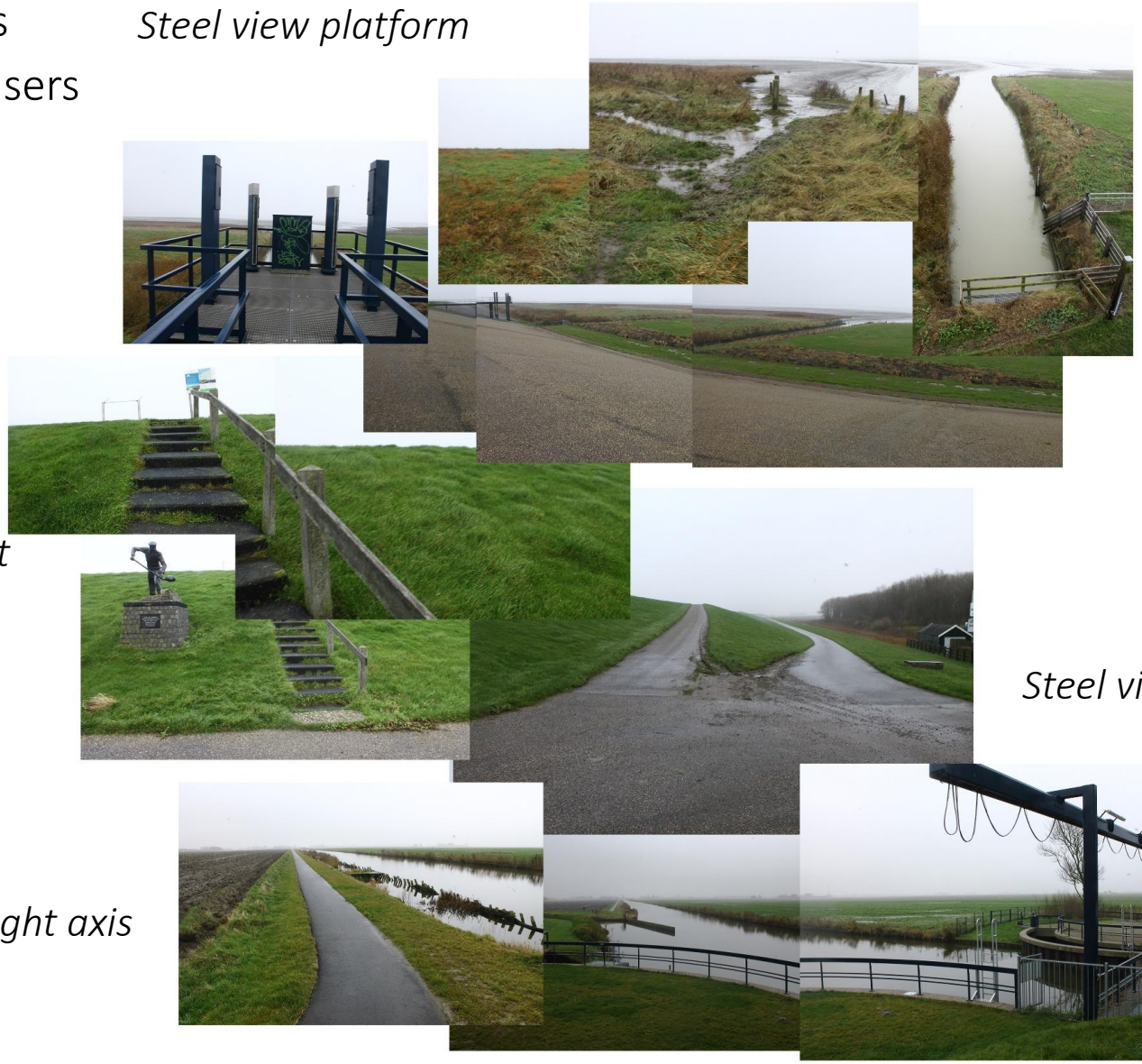
+/-50 years summer



- 5. **Attractive** human experiences
  - Start from existing experiences
  - Create a routing for different users
  - Connect both sides of the dike

Wide view Wadden area

Steel view platform



Angular/straigh ascent

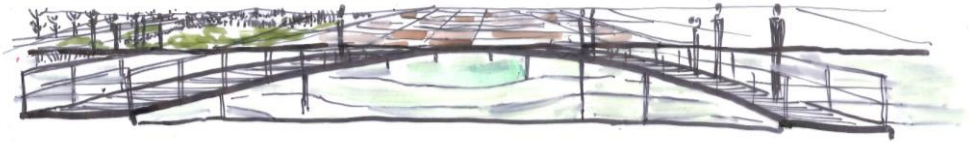
Steel view balcony

Straight axis

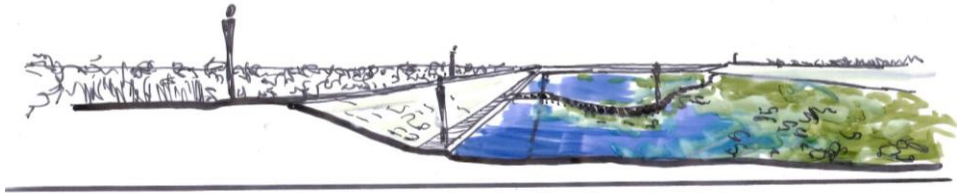
- **Routing** of human experiences on both sides (e.g. pedestrians 1 m/s)

6 min

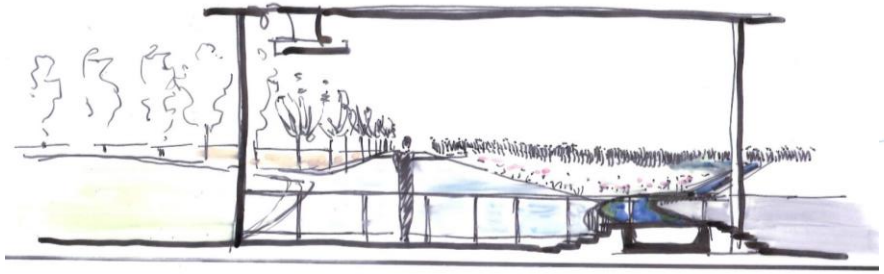
2,5 min



7/9 min

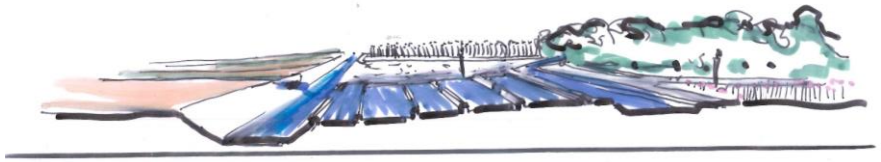


2 min

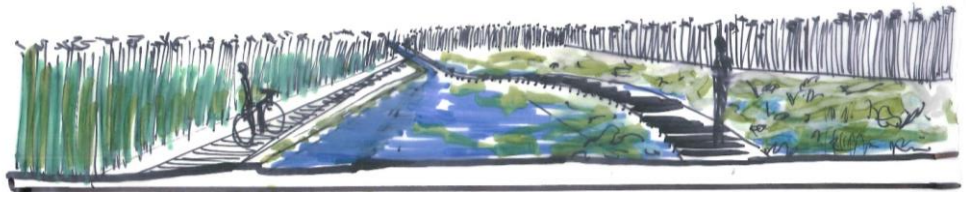


6 min

8 min



7 min



5 min

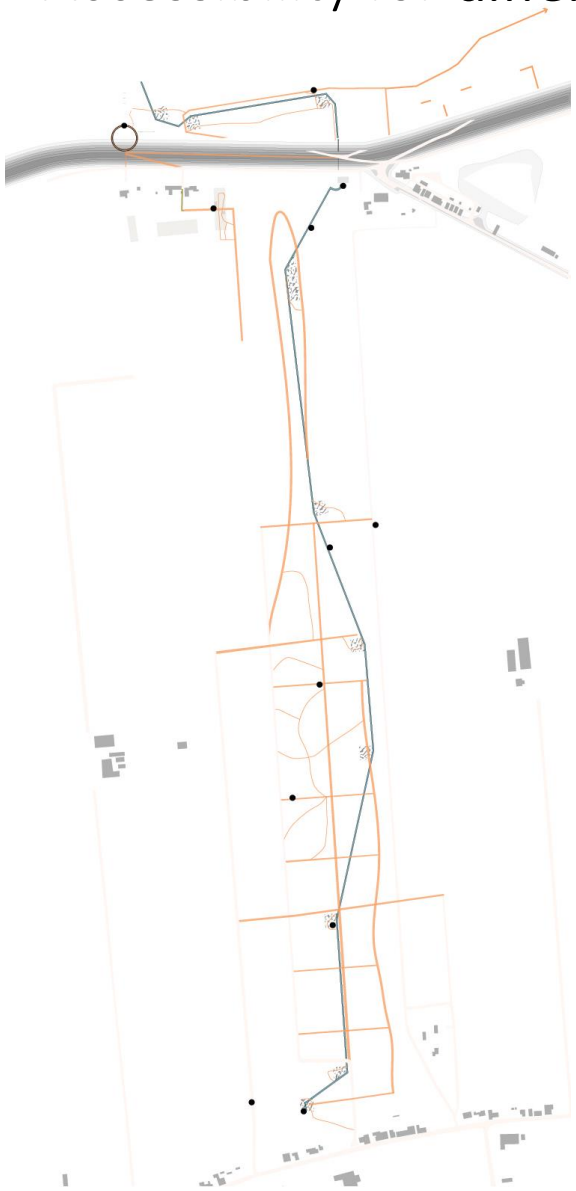
12 min

3 min

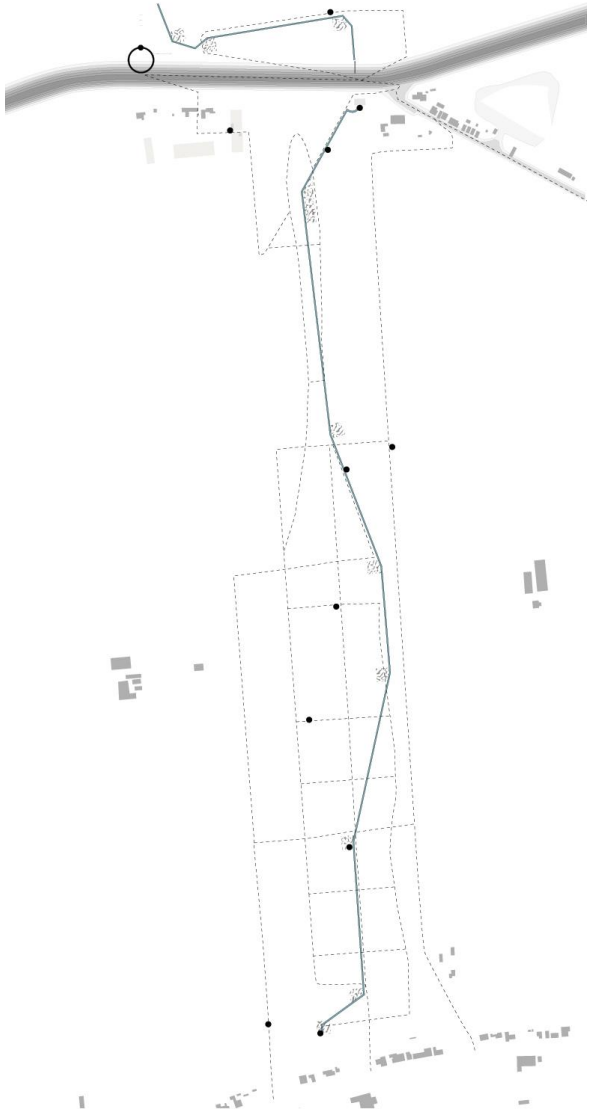
5 min

6 min

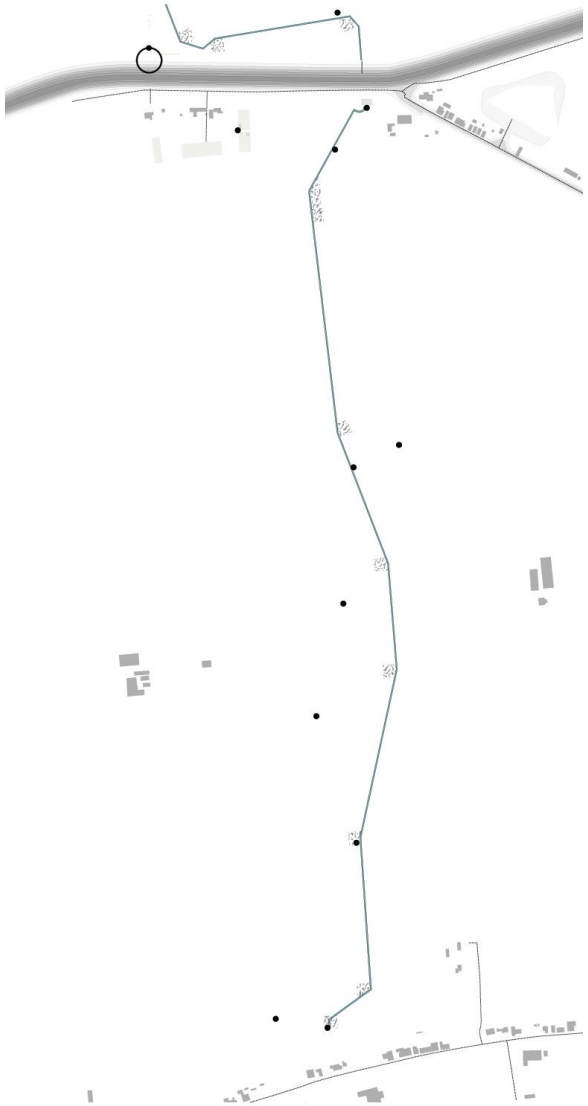
- Accessibility for **different users**



By feet: intensive incl. gardens



Bike: along gardens

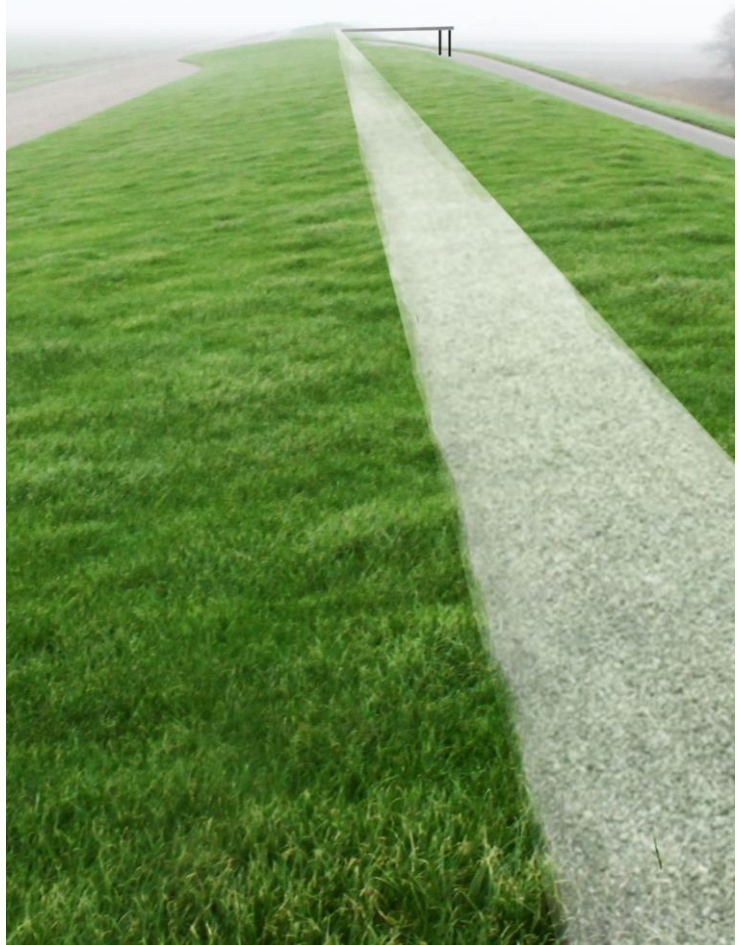


Car: entrance landscape park

- Thus, rather than this abrupt change while crossing the narrow primary dike…

- Thus, rather than this abrupt change while crossing the narrow primary dike…

The primary dike becomes positioned in the **middle** of the borderscape…



“…Able to have the same uses, atmospheres and human experiences on both sides…

“…Able to have the same uses, atmospheres and human experiences on both sides…

“Walking on the highest point of the dike…

“And bringing human closer to the experience of the dynamics of the Wadden sea…

“In different circumstances…”

“Walking in a loop that gives a panorama view of both sides…

“…While setting the primary dike in motion.

The loop: design proposal dense point Zwarte Haan

- Different possible spatial outcomes in 2050 using

Zwarte Haan as starting point and example

- Scenario I: **Regressive** sea water
  - Extension of salt water until a certain level
  - Seaward extension of land

- Scenario II: **Extreme storms** result of climate change
  - Water buffer zone in extreme situations
  - Permanent stays not suitable in borderscape, temporal stays are
  - More wetlands with reed vegetation in buffer zone

- Scenario III: Experimental agriculture as production
  - Investment in water infrastructure for regulation

- Scenario IV: Coastline as destination for tourism
  - More parks and temporal stays
  - Investment in routing system

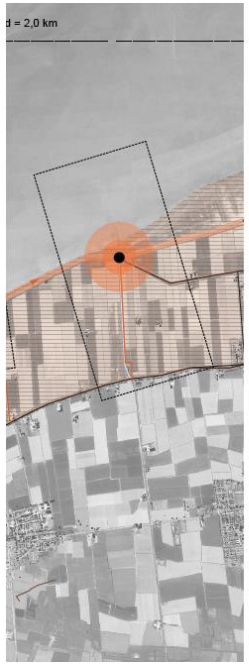
The loop: design proposal dense point Zwarte Haan

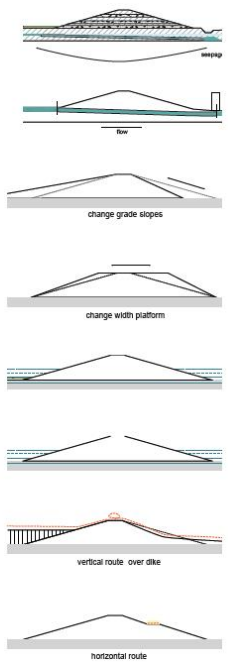
- Different possible spatial outcomes in 2050 using

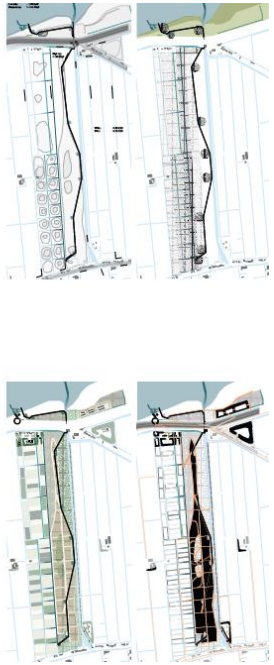
Zwarte Haan as starting point and example

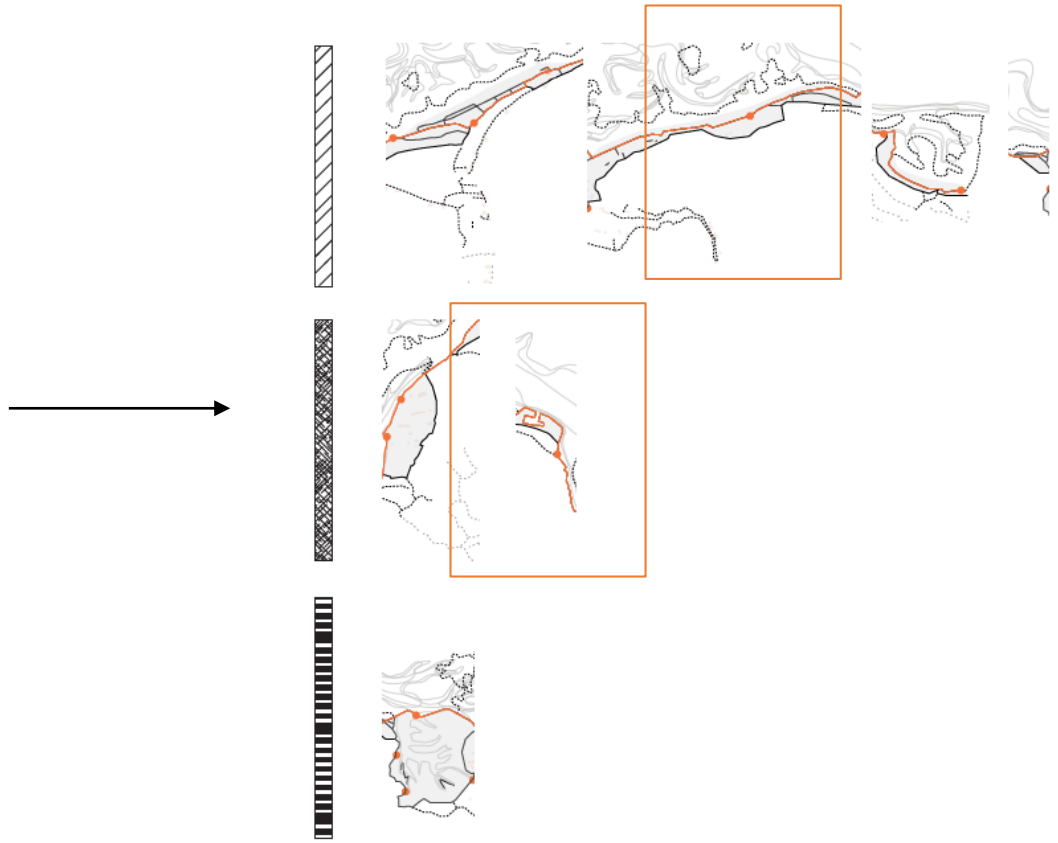
5. REFLECTING

- Projection of three design principles on other locations Northern NL

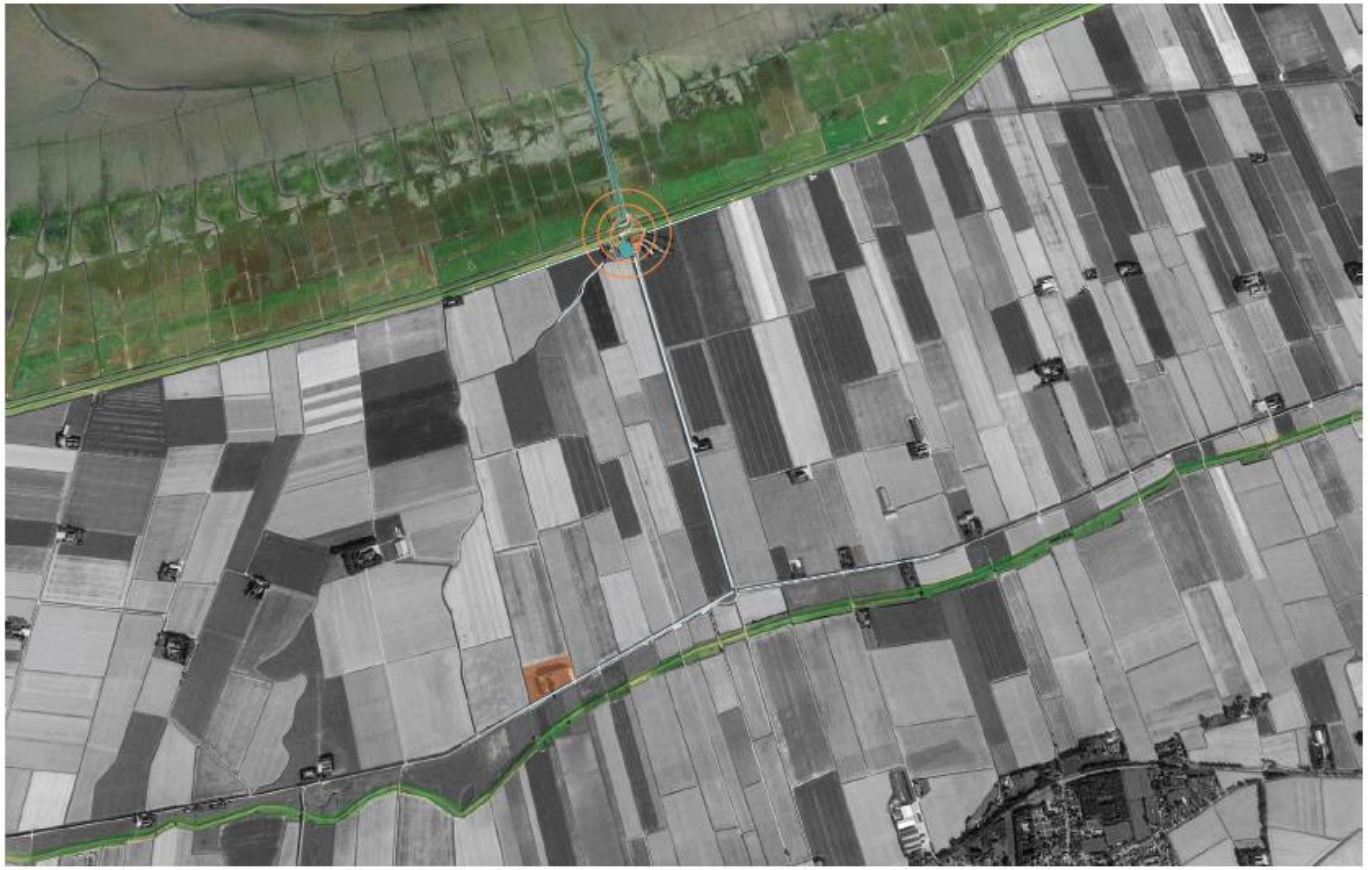








- Noordpolderzijl (same category): implementation is **suitable**

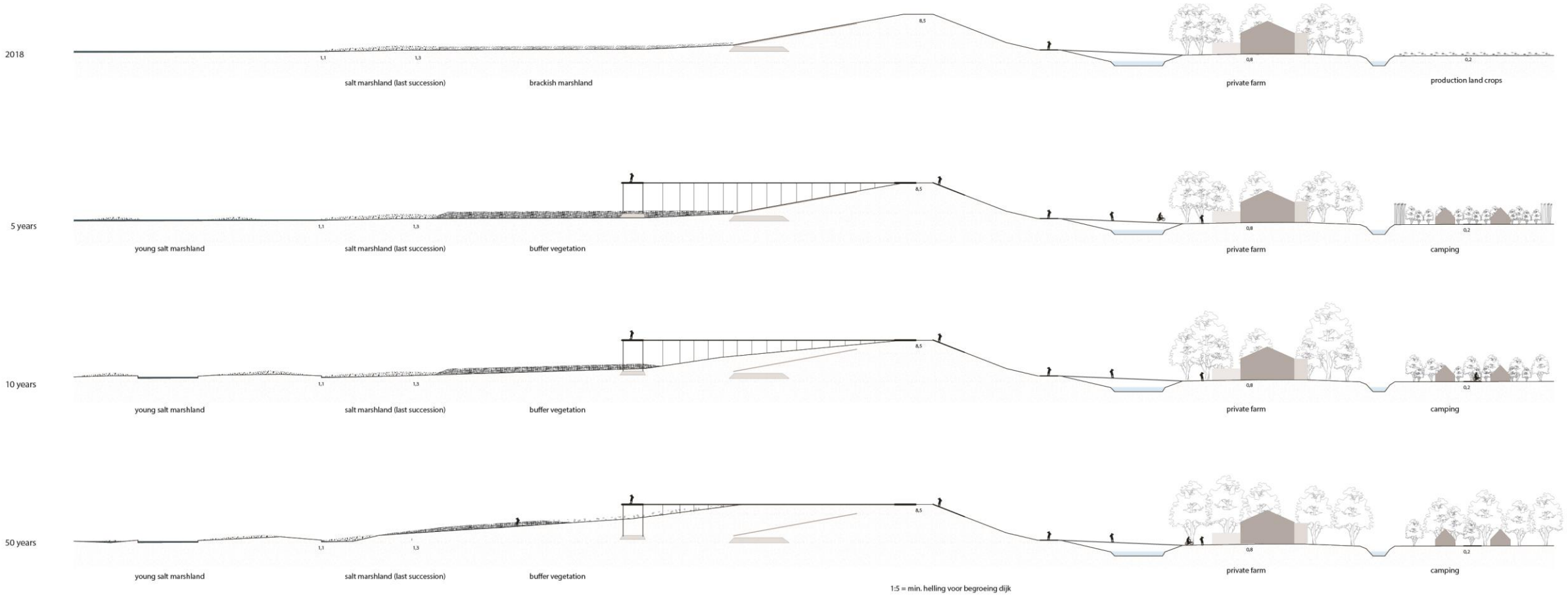


- Eemshaven (other category): implementation is **less suitable** because of harbour (function & scale) and positioning dike i.r.t. erosion

GENERAL REFLECTION

- *Design principles are implementable for regional strategy to certain extent*
- *Use of categorization of coastline is debatable (applied approach)*
- *Visionairy vs. Current achievable interventions (dilemma)*

- Section CC’


2018
salt marshland (last succession)
brackish marshland
private farm
production land crops
5 years
young salt marshland
salt marshland (last succession)
buffer vegetation
private farm
camping
10 years
young salt marshland
salt marshland (last succession)
buffer vegetation
private farm
camping
50 years
young salt marshland
salt marshland (last succession)
buffer vegetation
private farm
camping
1:5 = min. helling voor begroeing dijk

- **Flooding risk:** leads to economic and human damage

- *Flooding risk of primary dike* **and** *secondary dike strategy*