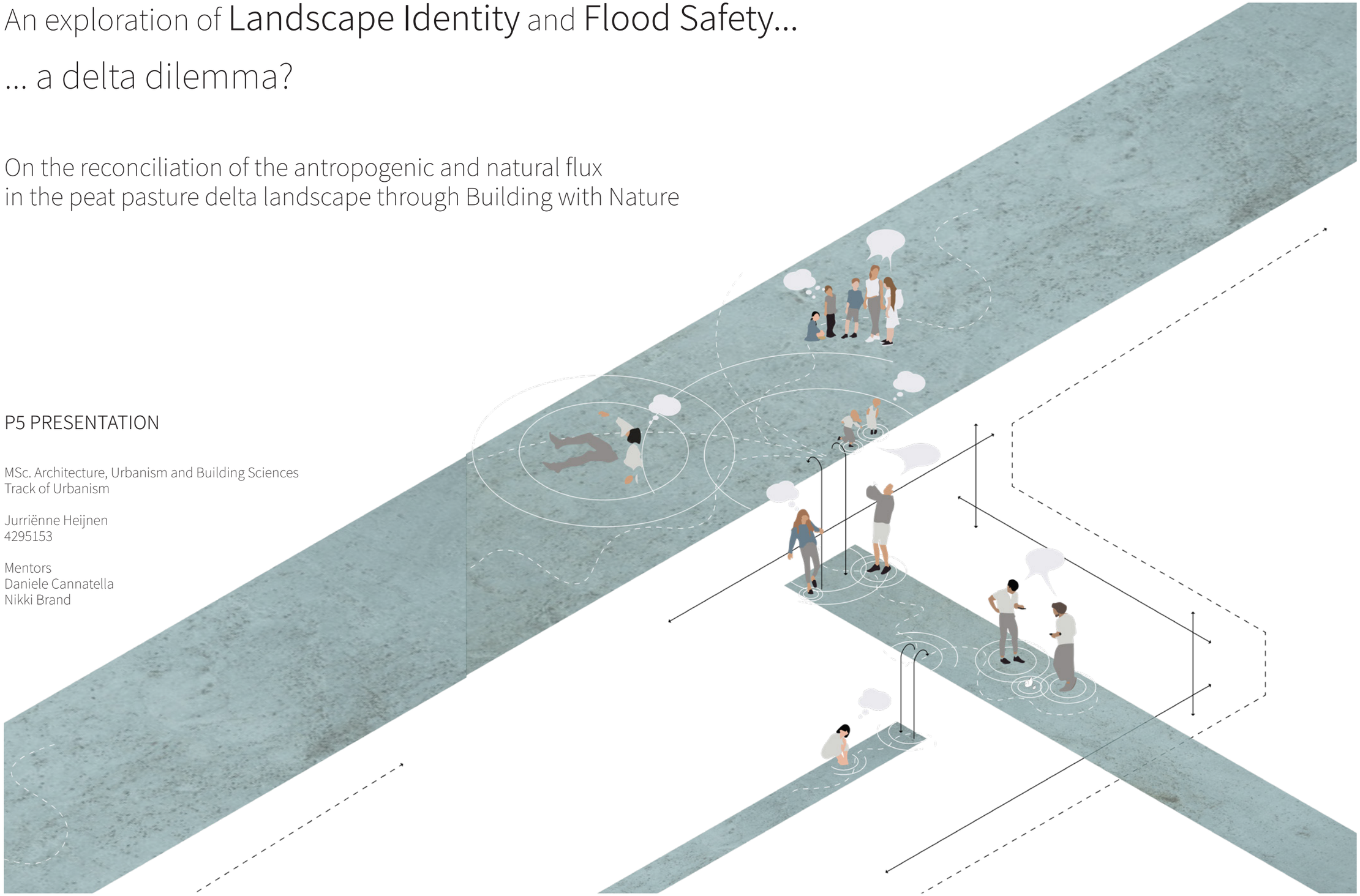
An exploration of **Landscape Identity** and **Flood Safety**...

... a delta dilemma?

On the reconciliation of the antropogenic and natural flux
in the peat pasture delta landscape through Building with Nature



P5 PRESENTATION

MSc. Architecture, Urbanism and Building Sciences
Track of Urbanism

Jurriënne Heijnen
4295153

Mentors
Daniele Cannatella
Nikki Brand

URBANIZATION, CLIMATE CHANGE AND **FLOOD SAFETY**

Problem Statement

North sea

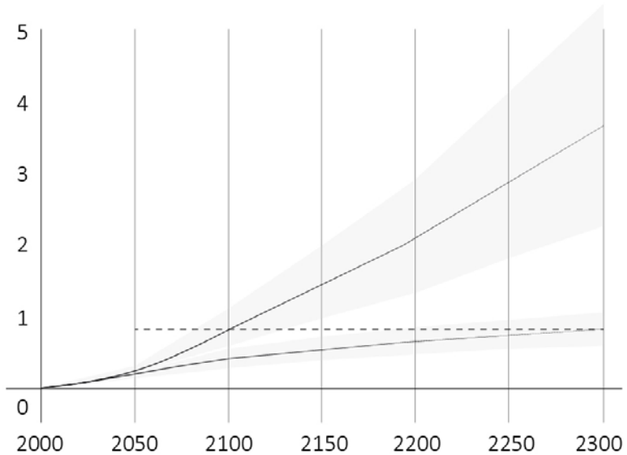
River

Below NAP area

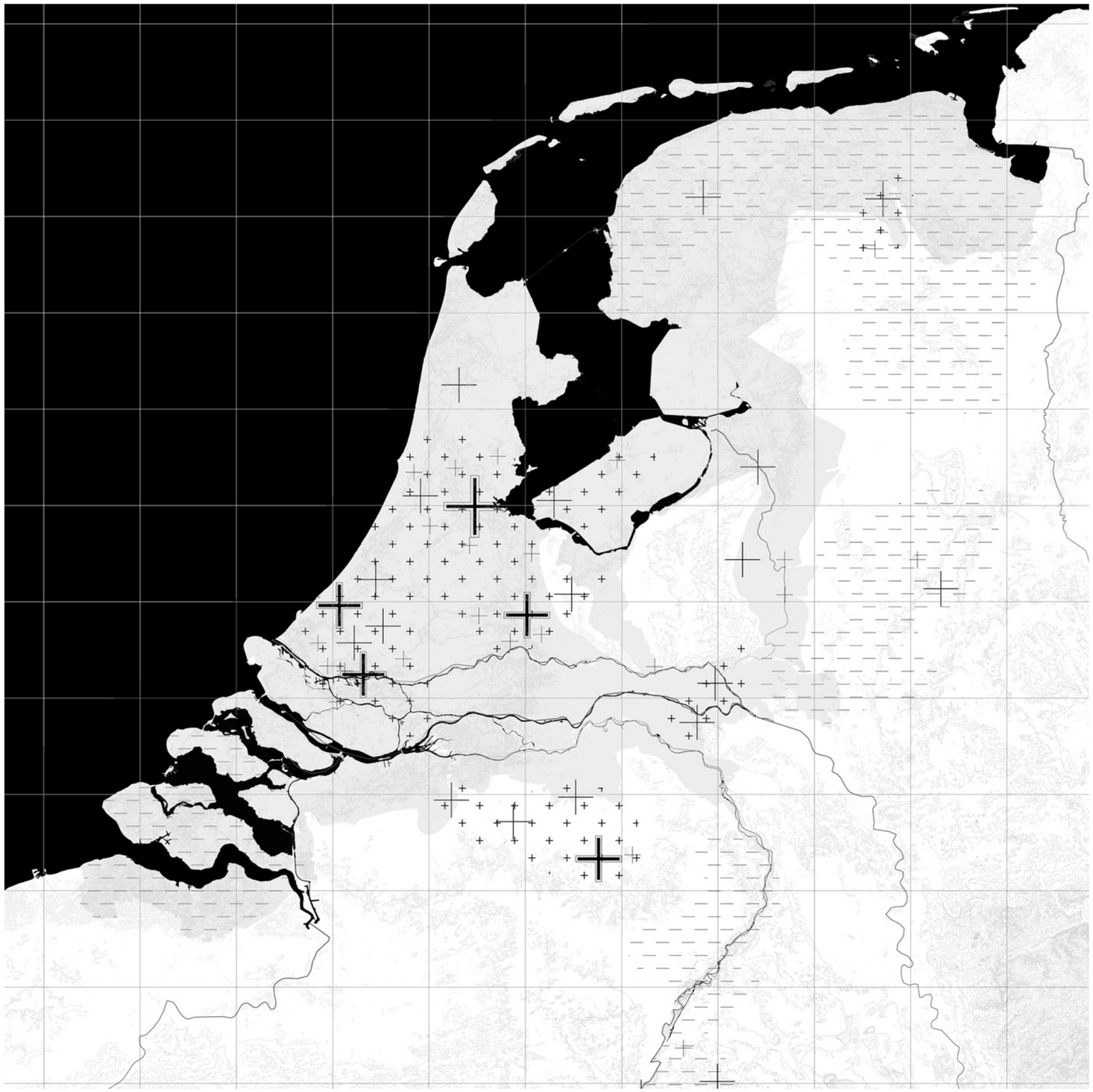
Planned urban development area

Urban region

Predicted urban shrinkage area



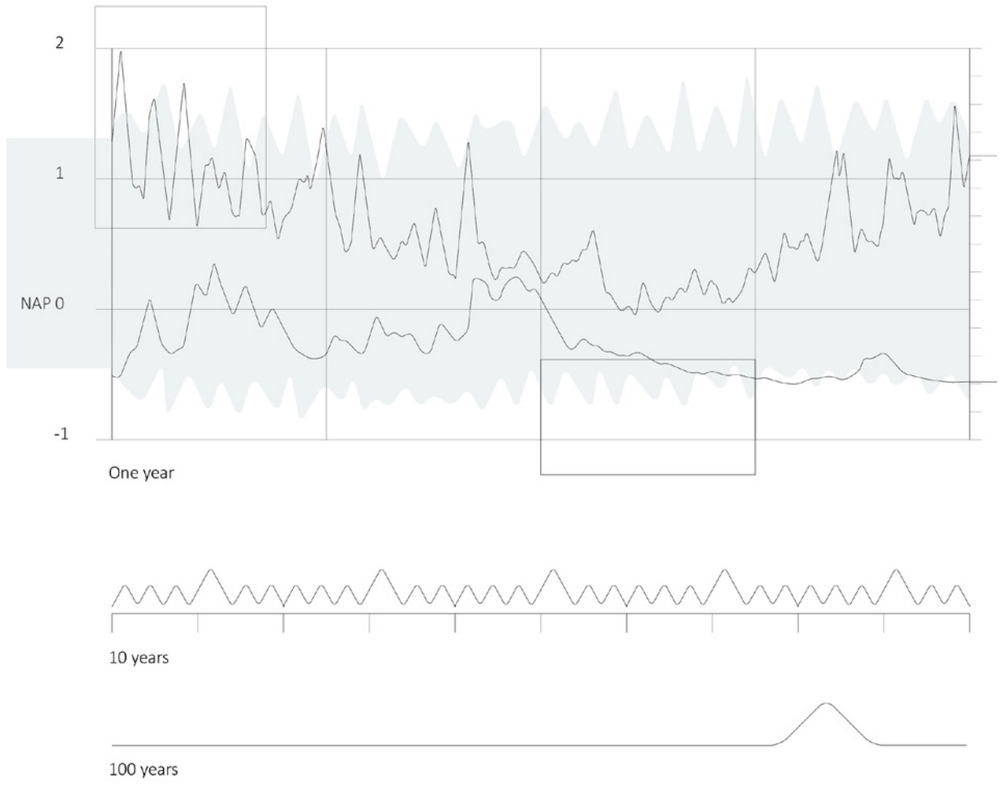
SEA LEVEL RISE
source: IPCC, 2019
image: Heijnen

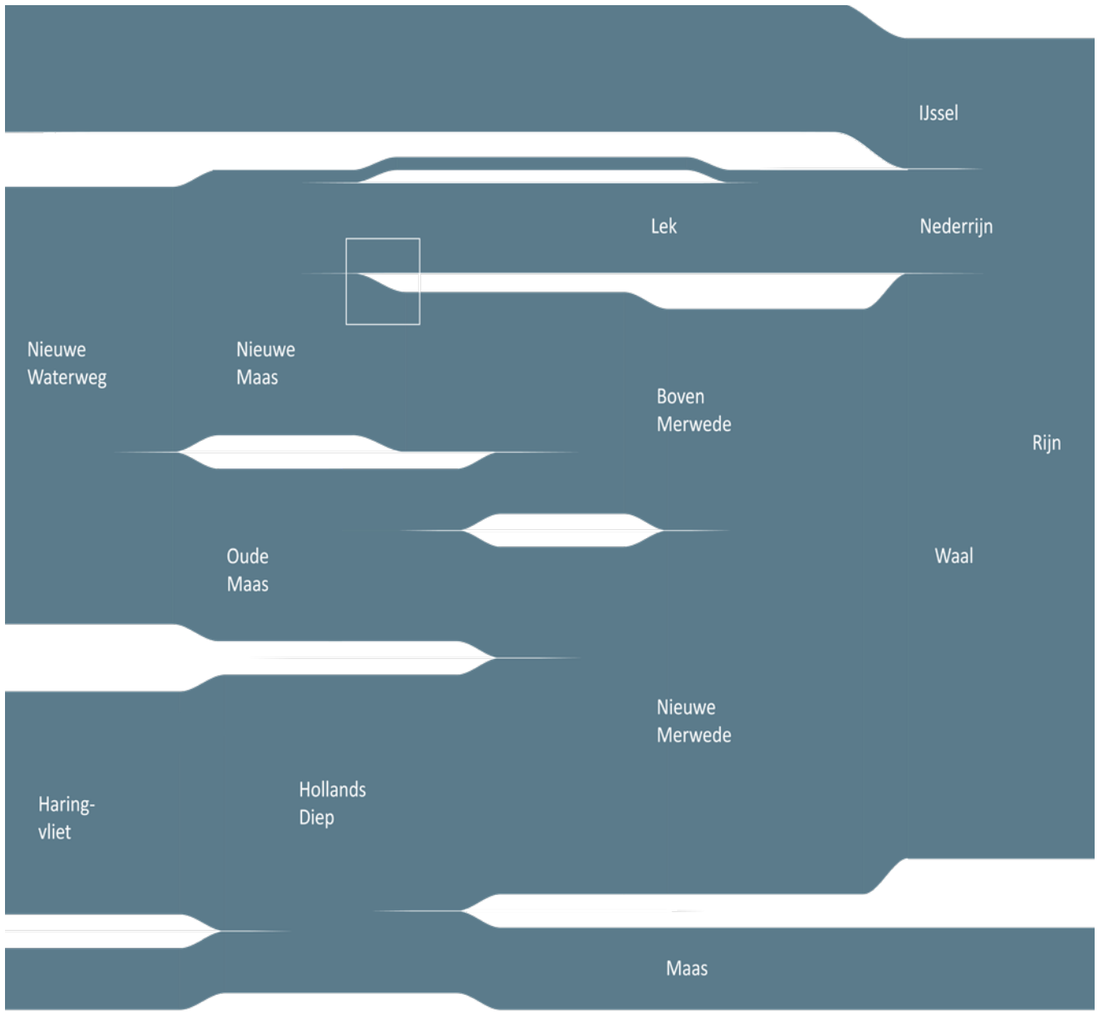


URBANIZATION AND FLOOD RISK
source: PBL, 2020; NOVI, 2020

FLOOD SAFETY,
COASTAL, FLUVIAL AND PLUVIAL PEAKS AND LOWS

N





FLOOD SAFETY,
PROBABILITY REDUCTION

Risk = **Probability** x Consequences

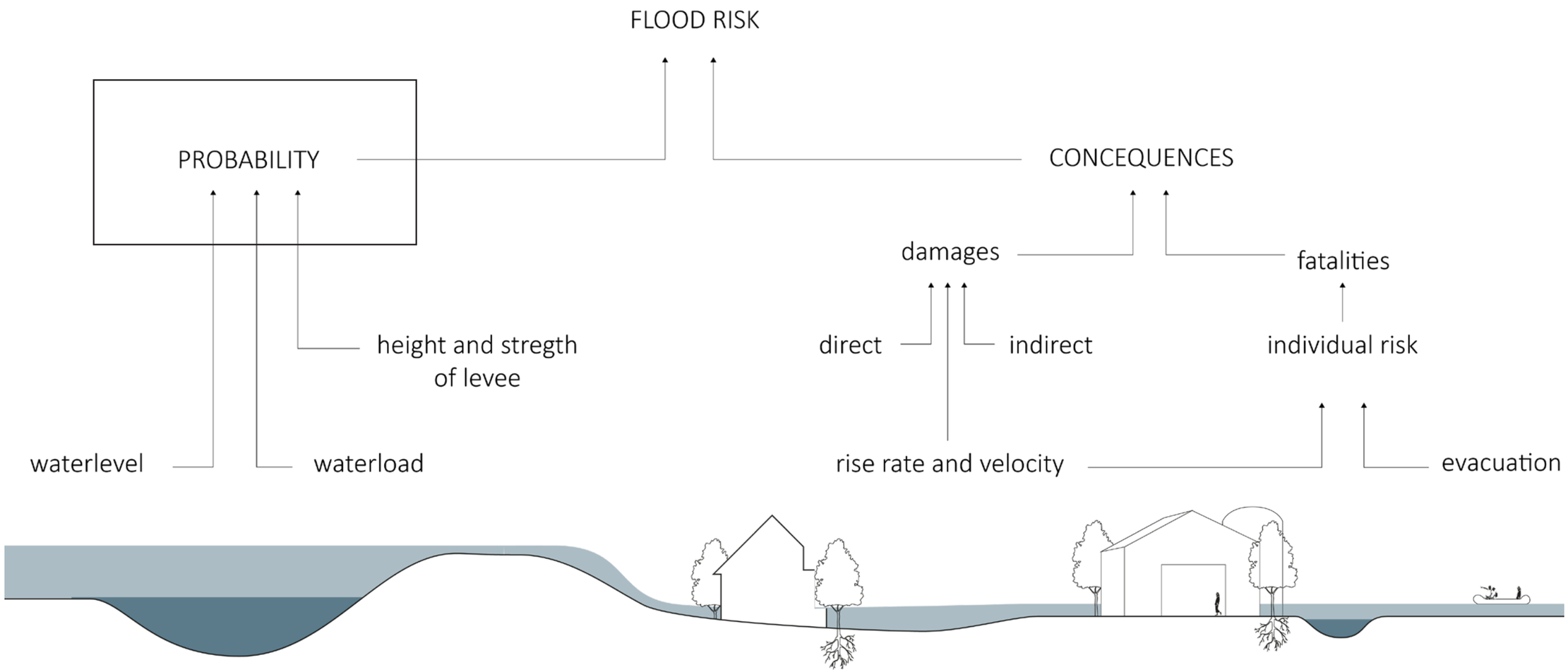
N

OOSTERSCHELDE BARRIER
Probability reduction as flood safety approach

FLOOD SAFETY,
PROBABILITY REDUCTION

N

Risk = **Probability** x Consequences



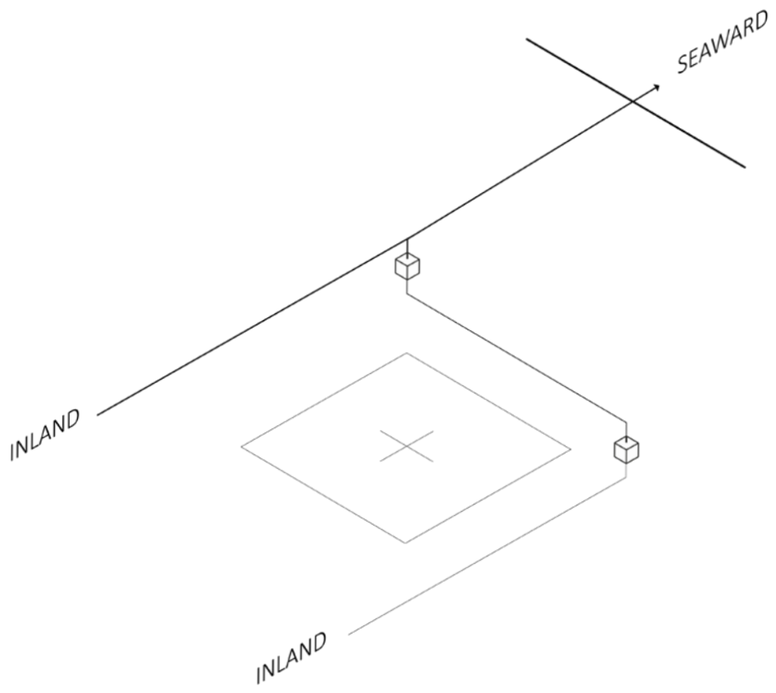
FLOOD SAFETY,
PROBABILITY REDUCTION

System

Nodes

Edges

Infill



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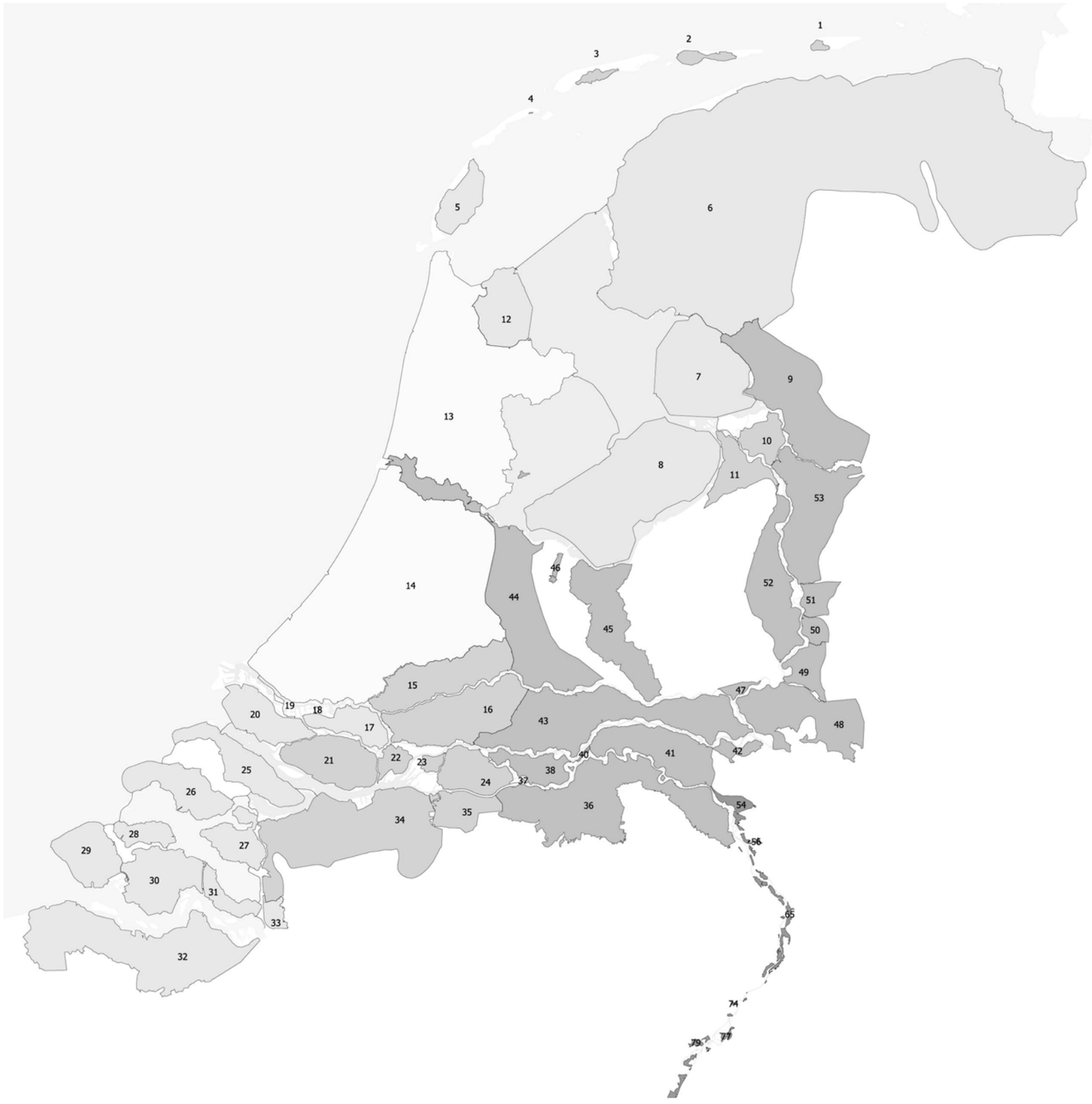


0 km 25 km

FLOOD SAFETY COMPARTMENTS
data: Rijkswaterstaat, 2010
image: Heijnen, 2020

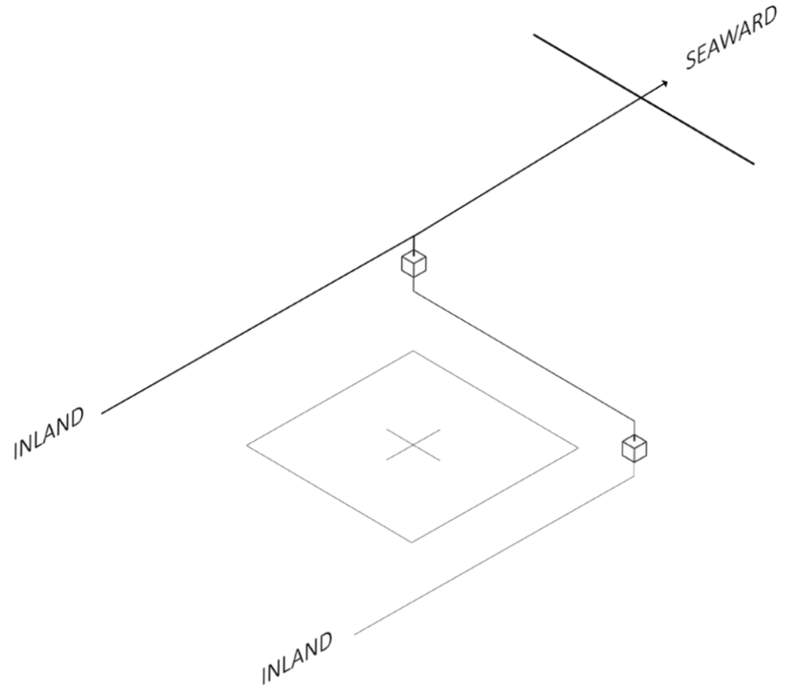
FLOOD SAFETY,
PROBABILITY REDUCTION

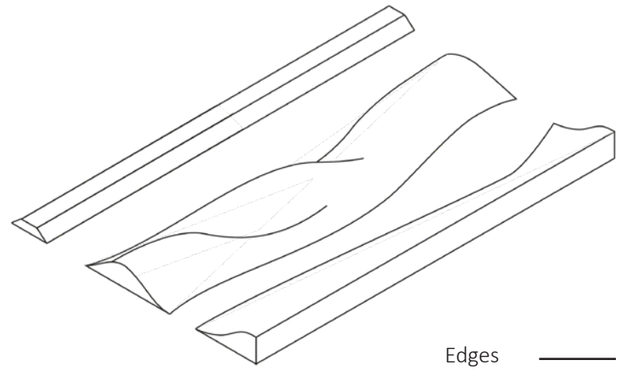
Artefacts

Nodes

Edges

Infill





Edges

N

FLOOD SAFETY,
PROBABILITY REDUCTION

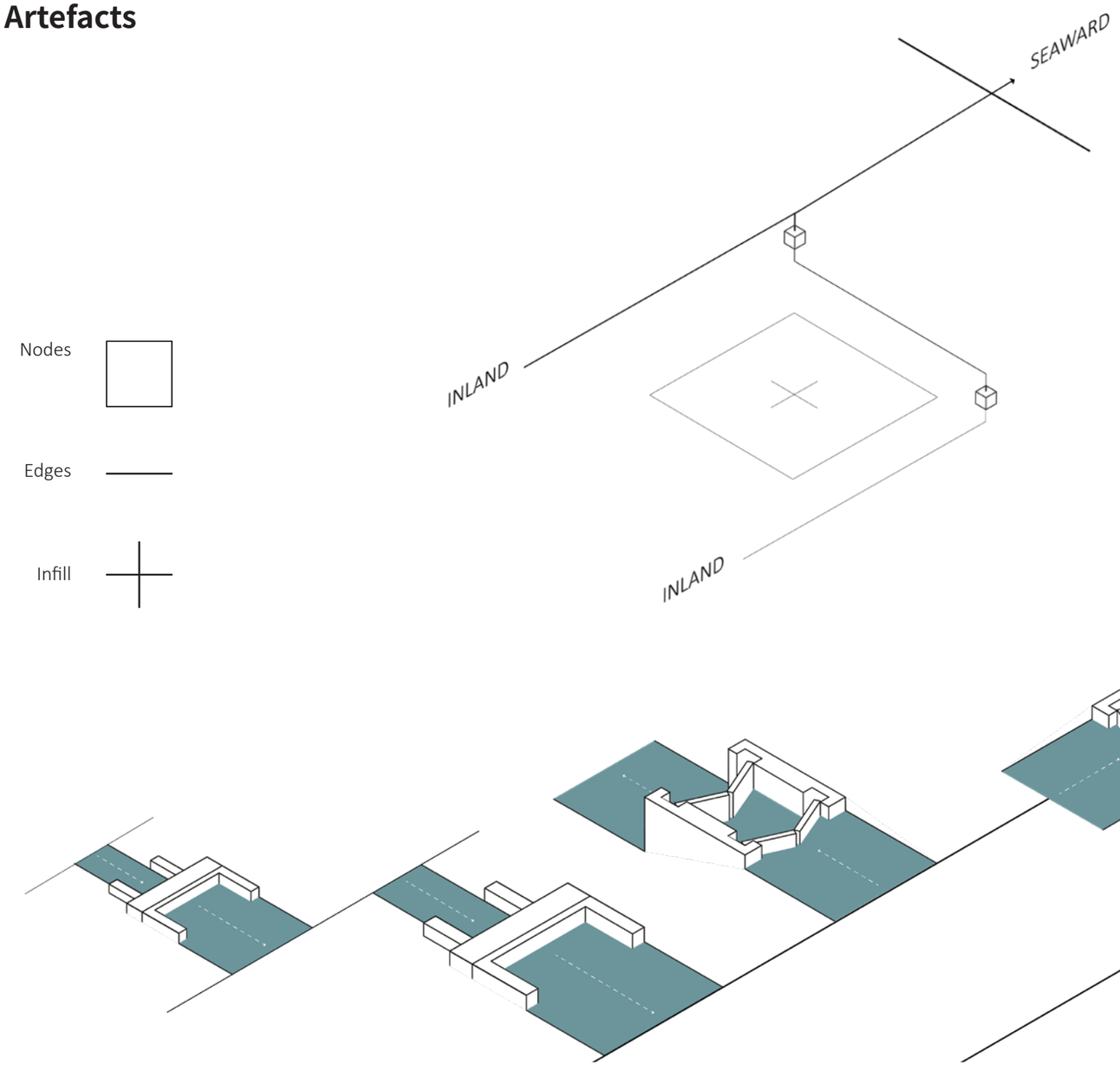
Artefacts

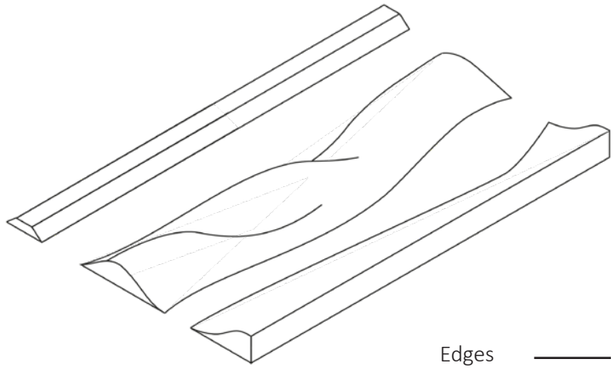
N

Nodes

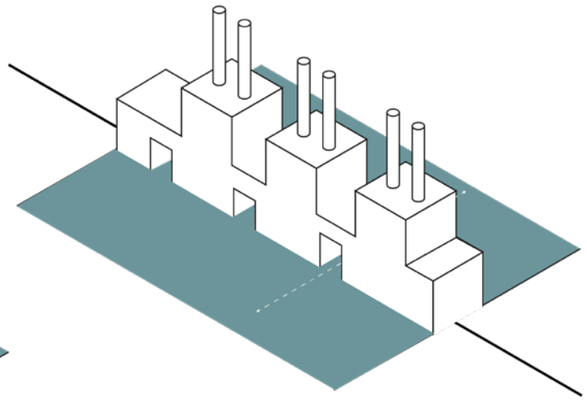
Edges

Infill





Edges



Nodes

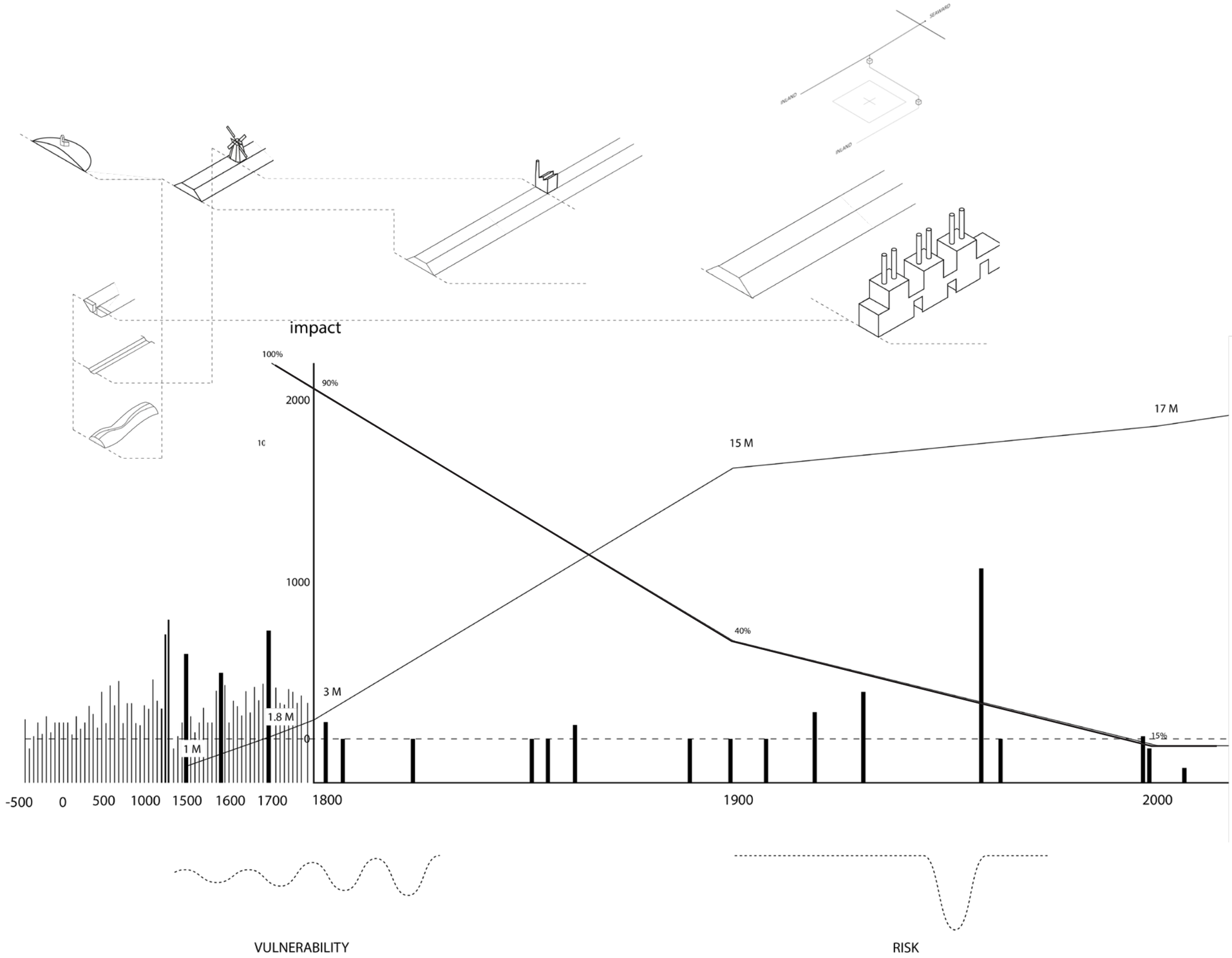
Polder

Boezem

Riverine

FLOOD SAFETY, AT COST OF BIODIVERSITY

Problem Statement



FLOOD SAFETY, ALLOWING URBANIZATION AT COST OF BIODIVERSITY

Problem Statement

A sectoral flood safety approach has been a prerequisit for Delta Urbanization in the Netherlands. This, however, has gone at the cost of biodiversity and resilience.

As a result, a dilemma appears to exist between sectoral flood safety on the one hand, and biodiversity and flood resilience on the other. The pursuit of flood safety, especially within the perspective of extreme climate scenario' s, may continue to go at the cost of biodiversity and resilience.

In the case of the Dutch delta, flood safety and landscape are inseperably linked and a certain relationship of people mastering over nature becomes apparent of this intertwining.

P

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FLOOD SAFETY, AND LANDSCAPE

N

In the case of the Dutch delta, flood safety and landscape are inseperably linked and a certain relationship of people mastering over nature becomes apparent of this intertwining.

P

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Kinderdijk Heritage site

Image: Heijnen, 2020

Alblasserwaard peat pastures

Image: Heijnen, 2020

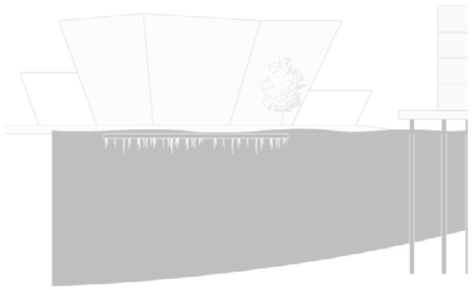
Cattle Farming

Image: Heijnen, 2020

TRANSITION TOWARDS A MORE BIODIVERSE AND FLOOD RESILIENT DELTA

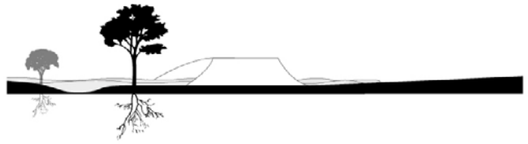
Knowledge Gap

Seaward ←



Remain ↑

Embrace [advance] ↔

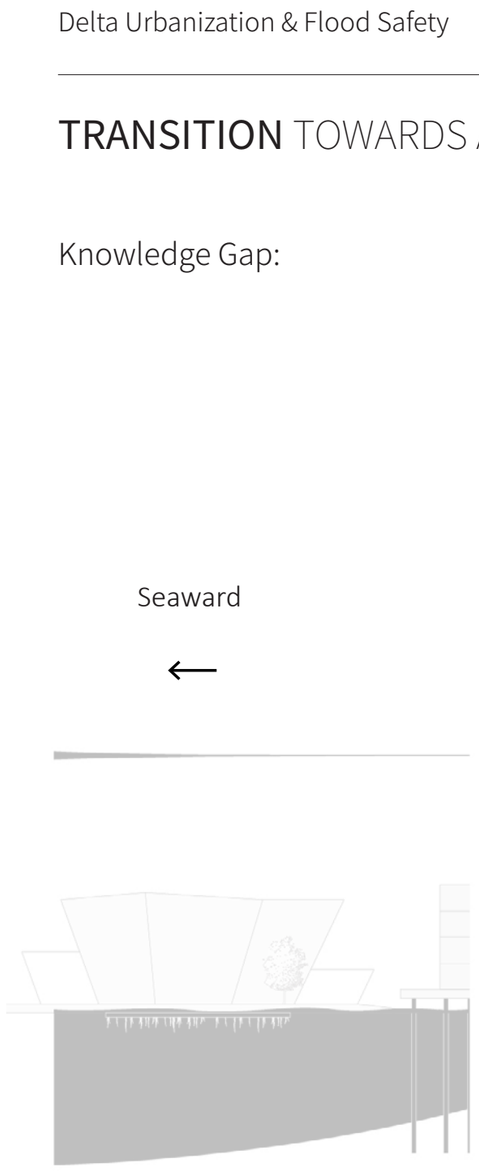


Retreat →

TRANSITION TOWARDS A MORE BIODIVERSE AND FLOOD RESILIENT DELTA

Knowledge Gap:

Seaward ←



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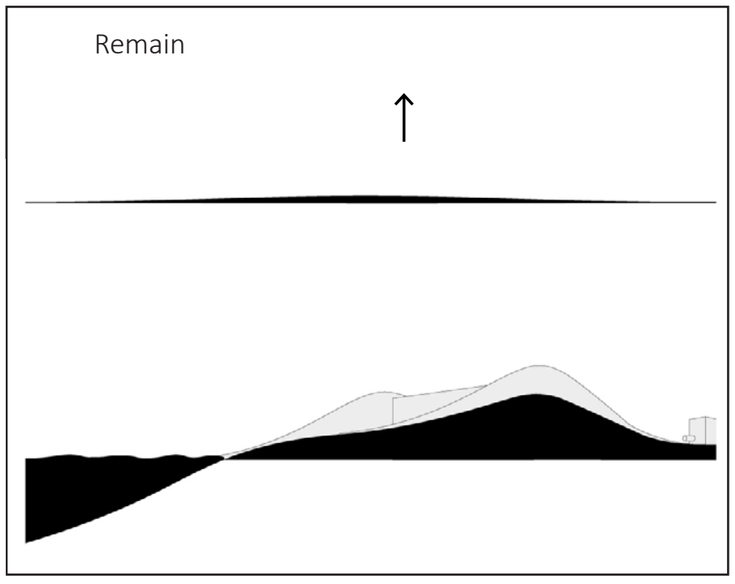
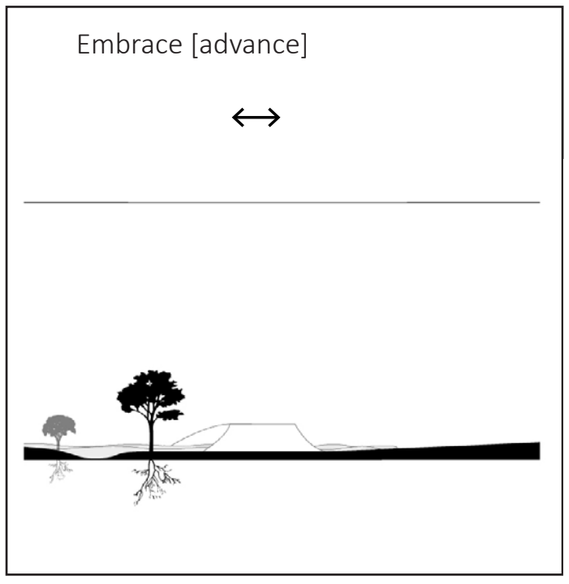


- One solution to fit all

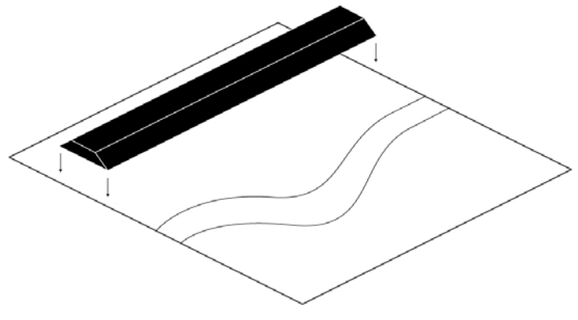
Embrace [advance] ↔



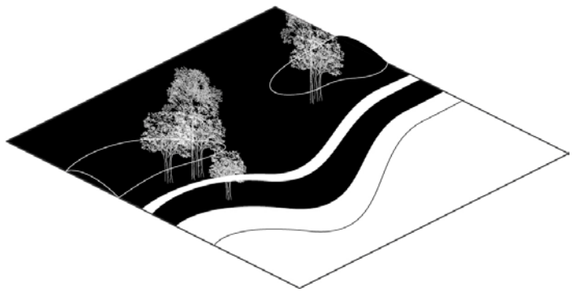
- Dynamic hydrology

- Tailor - made solutions

Retreat →



→



TRANSITION EMBRACIVE APPROACH

Building with Nature

"... developing coastal and river works, making use of the dynamics of the natural environment. And additionally, providing opportunities for natural processes."

The Sand Engine

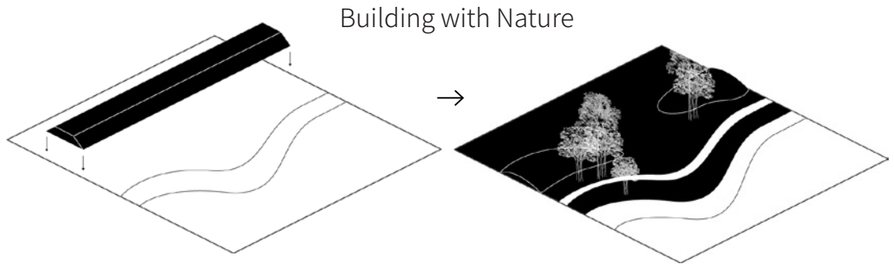
Image: Rijkswaterstaat, J. Brobbel, 2020

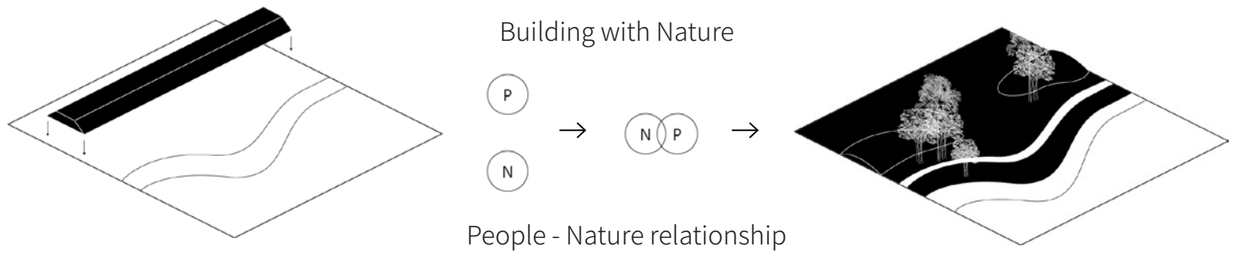
A FLAWED **RELATIONSHIP BETWEEN PEOPLE AND NATURE**

Hypothesis

Building with Nature can provide the tailor- made flood safety solutions needed to transition towards a more biodiverse and resilient delta. Shifting the sectoral flood safety appraoch to concequence reduction, embracing the dynamics of water, soil and air as the critical condition for delta urbanization.

The building with Nature solutions aimed to transition the flood safety approach, besides promoting biodiversity and flood resilience in space, need to address the people – nature relationship as well.



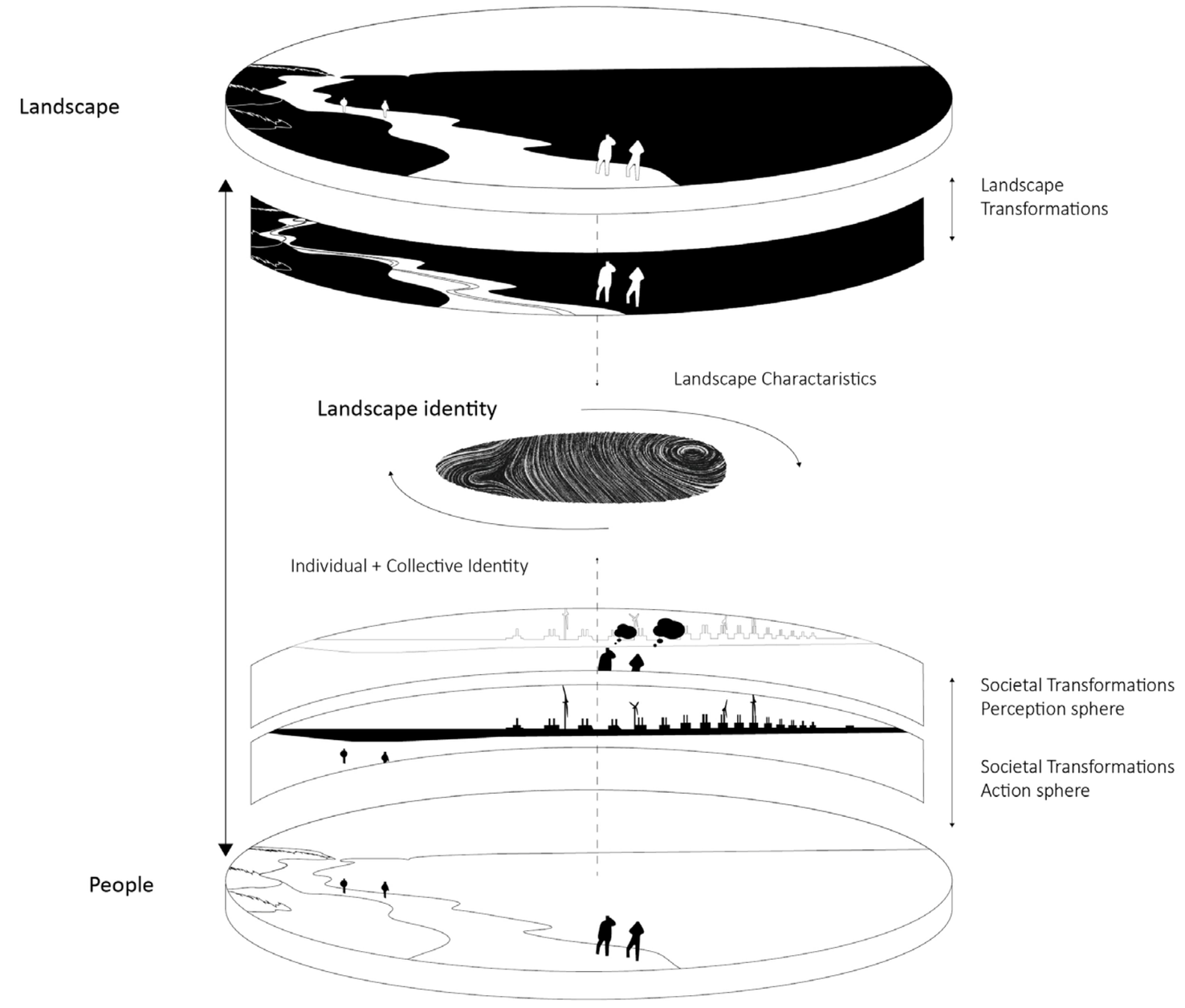


LANDSCAPE IDENTITY, THE MUTUAL RELATIONSHIP BETWEEN PEOPLE AND LANDSCAPE

Theoretical underpinning

“ ... landscape changes through the action and perception of people of the landscape ”

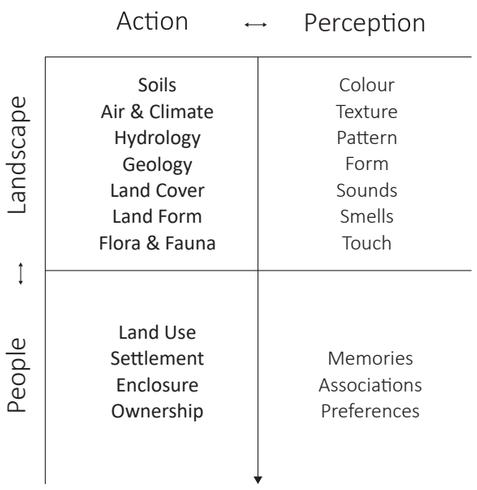
- Expression of People - Nature relationships



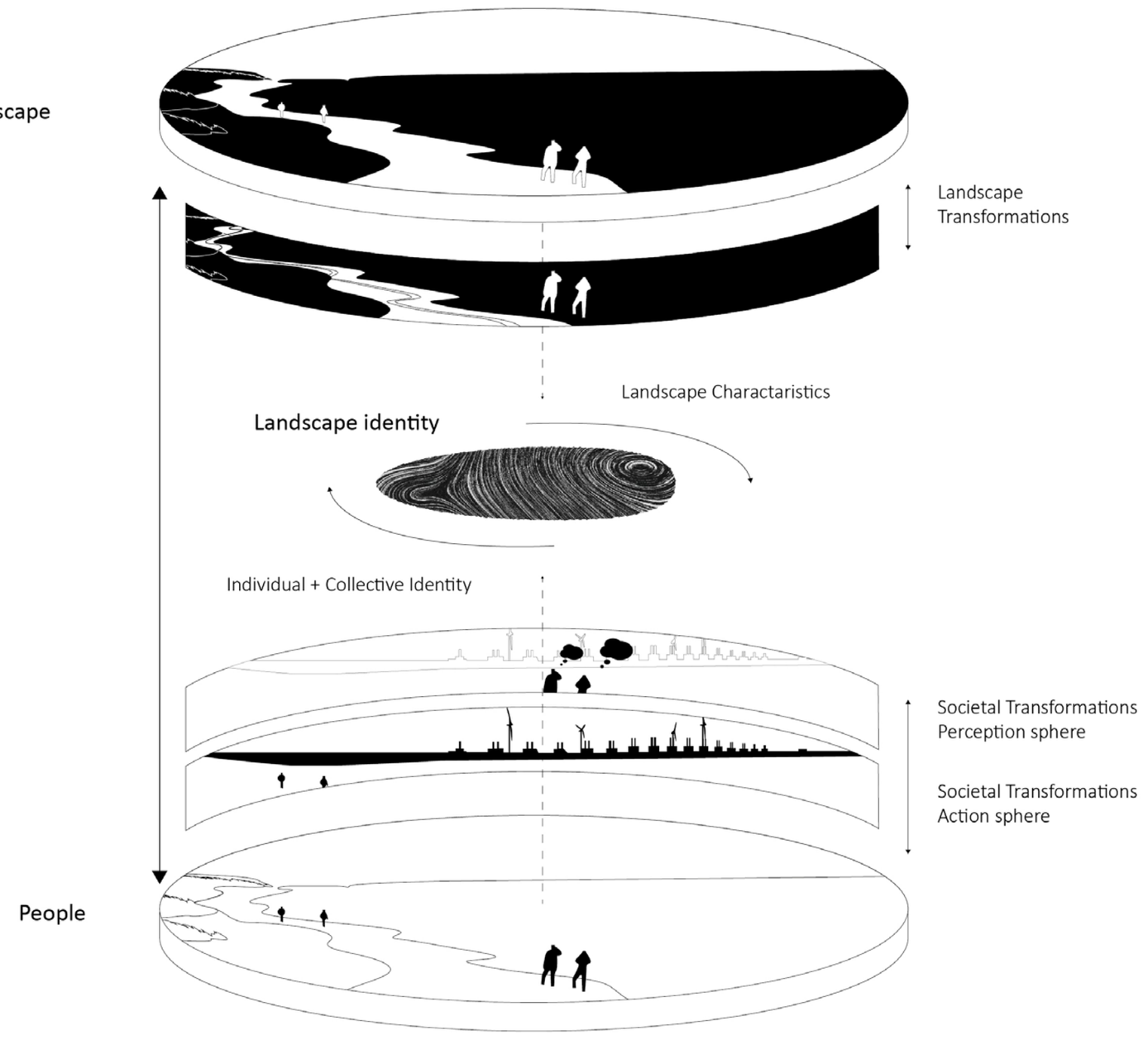
Landscape Identity
[Ramos et al, 2016]

LANDSCAPE IDENTITY, THE MUTUAL RELATIONSHIP BETWEEN PEOPLE AND LANDSCAPE

Theoretical underpinning



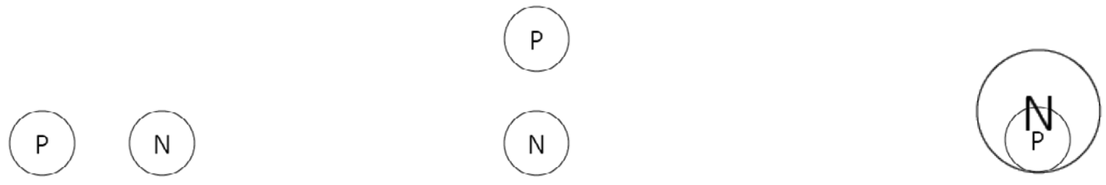
Landscape Character Assessment
[Swanwick, 2017]



Landscape Identity
[Ramos et al, 2016]

LANDSCAPE IDENTITY, THE MUTUAL RELATIONSHIP BETWEEN PEOPLE AND LANDSCAPE

Theoretical underpinning



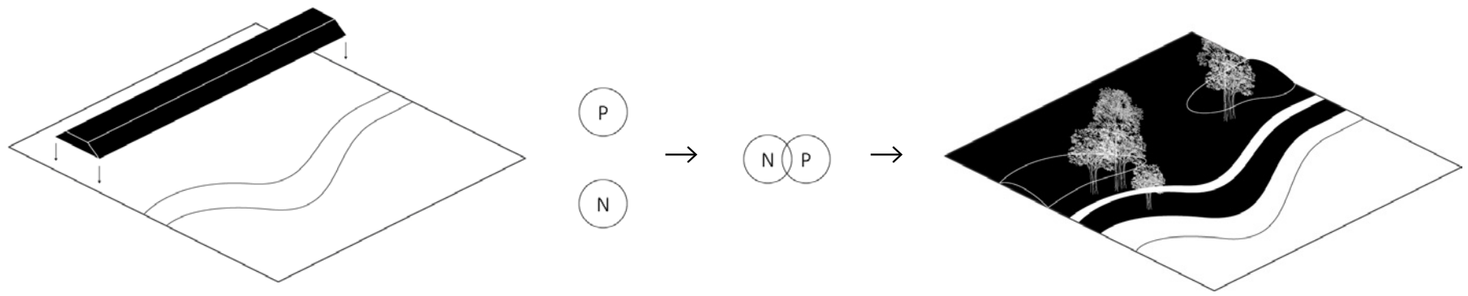
In partnership with nature | Mastery over nature | Participant in nature

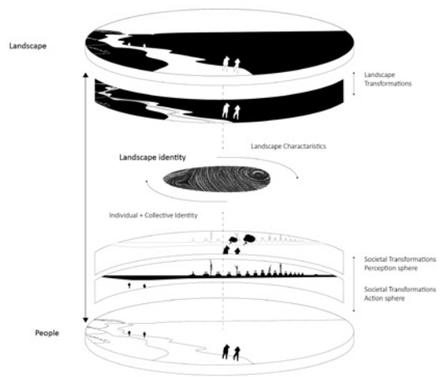
[Van den Born, 2008]

FLOOD SAFETY, LANDSCAPE IDENTITY AND BUILDING WITH NATURE

Research Question

“ How can an understanding of Landscape Identity promote a biodiverse and flood resilient urbanized delta? “





FLOOD SAFETY, LANDSCAPE IDENTITY AND BUILDING WITH NATURE

N

Research Questions

Problem Field

1. [How] are flood safety and landscape identity related?

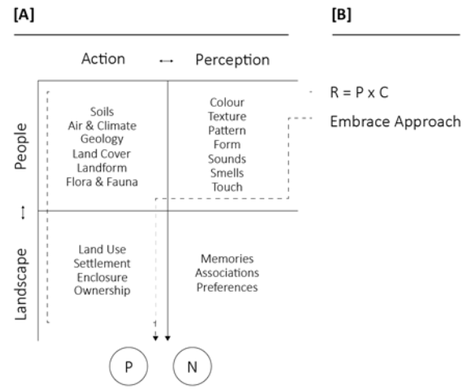
Research by design

2. How does an understanding of landscape identity inform the application of Building with Nature solutions in pursuit of flood safety?

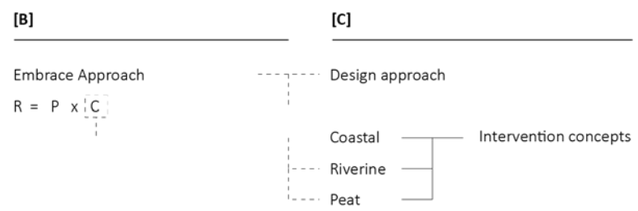
[Research by Design]

3. How can BwN solutions be applied to alter the human-nature relationship?

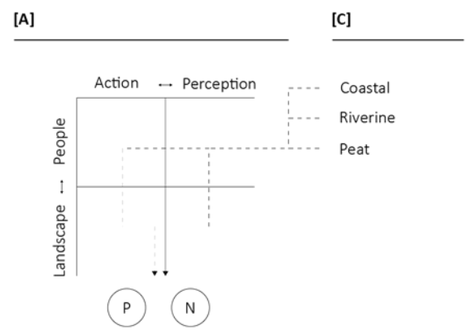
[AB] Landscape Identity and Flood safety



[BC] Flood safety and building with nature



[AC] Landscape Identity and Building with Nature

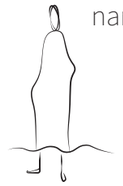


scale 1: x 000

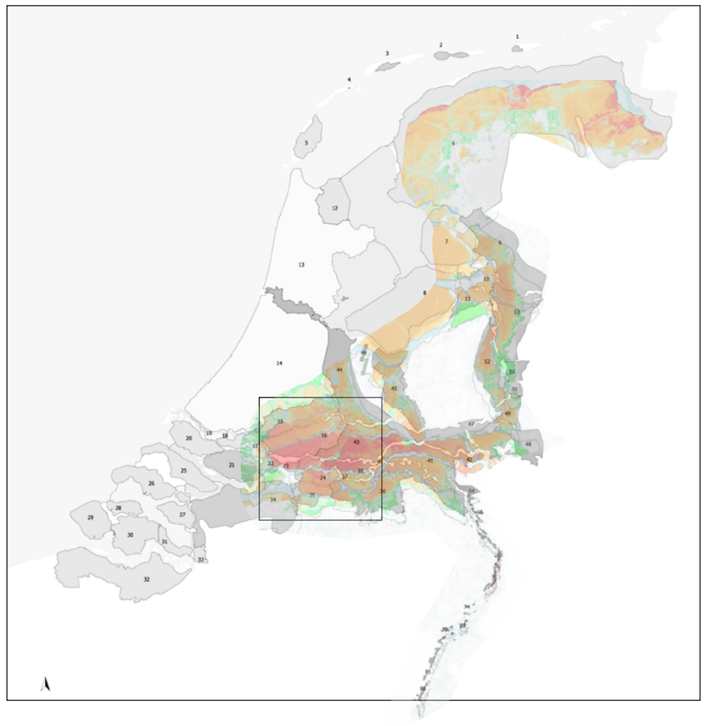
SCALES, NATIONAL, REGIONAL, LOCAL, INDIVIDUAL

N

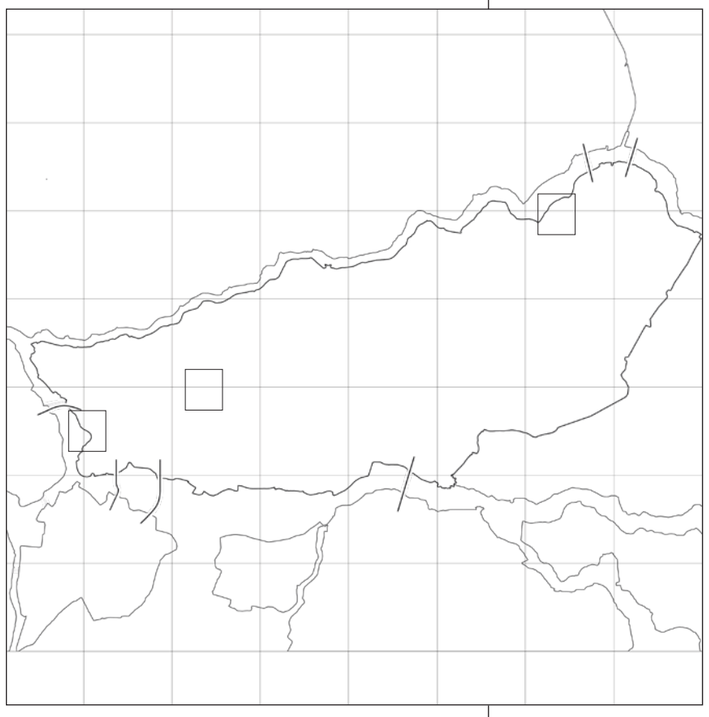
nano



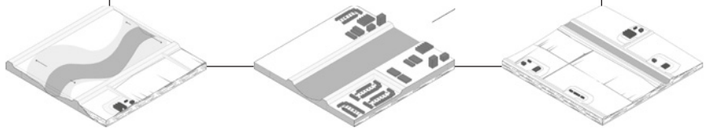
macro



meso



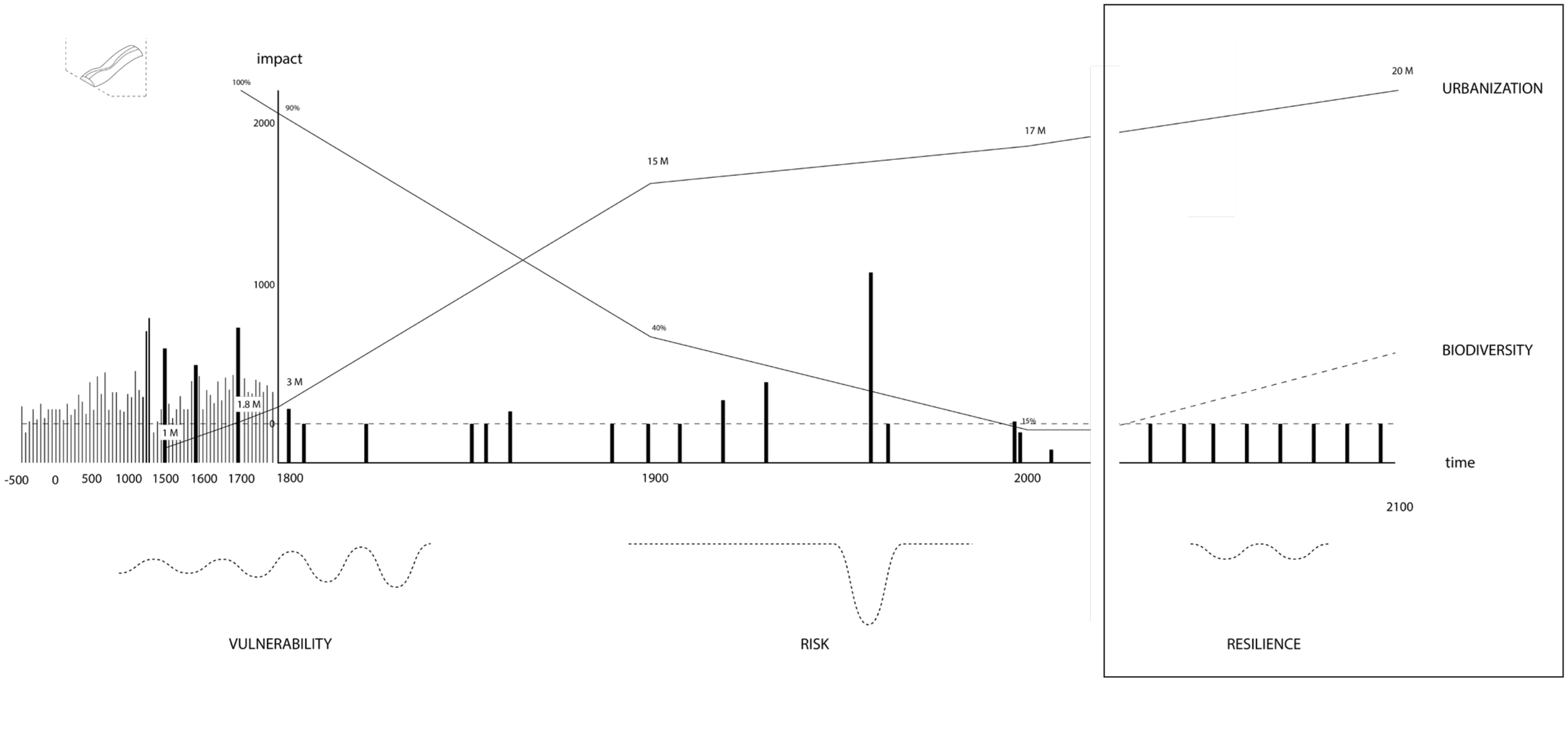
micro



Problem Field analysis

Research by Design

PROPOSAL FLOOD SAFETY, LANDSCAPE IDENTITY AND BUILDING WITH NATURE



SCALES, NATIONAL, REGIONAL, LOCAL, INDIVIDUAL

N

meso

micro

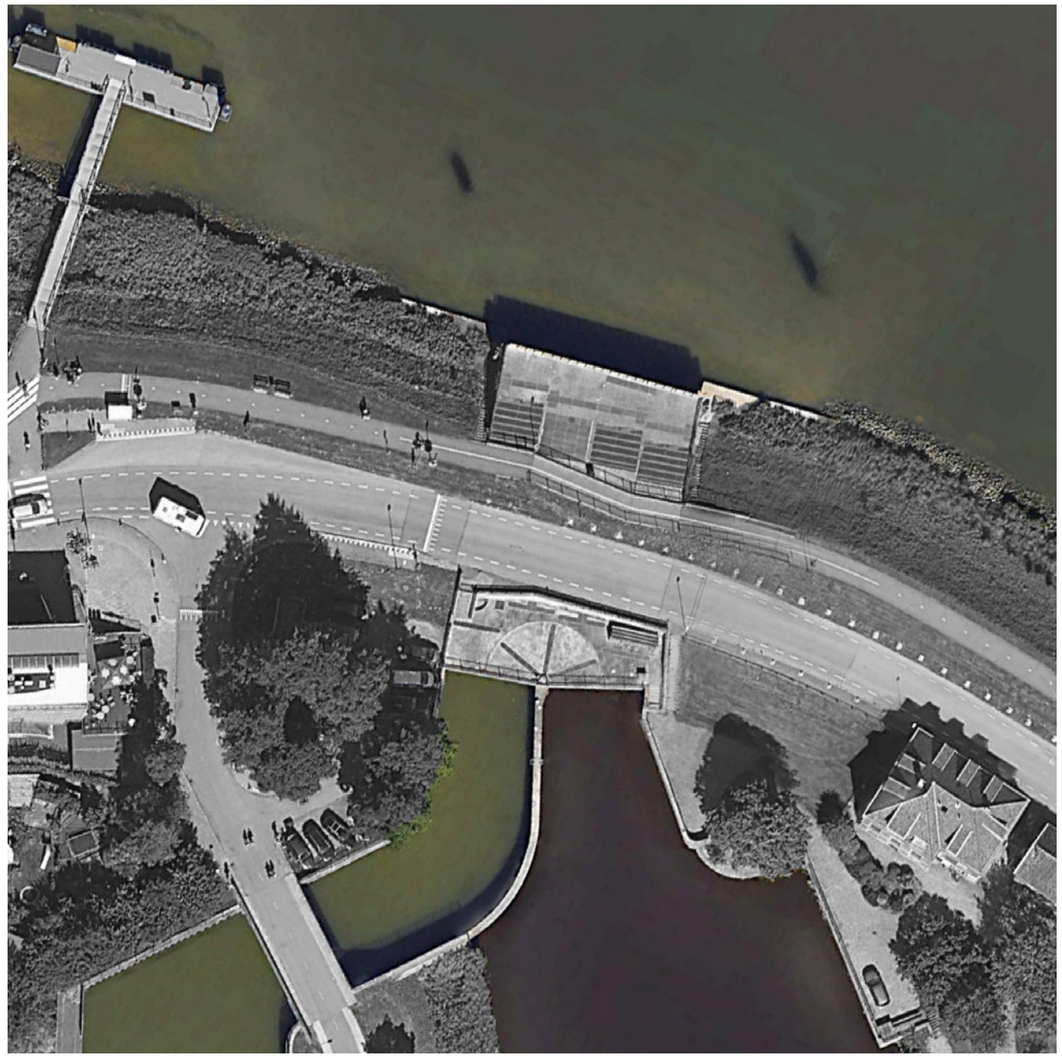
Problem Field analysis

ALBLASSERWAARD,
FLOOD SAFETY AND LANDSCAPE IDENTITY

Peat Pastures

N

VEENWEIDE LANDSCAPE, DETERMINED THROUGH THE LAND USE OF CATTLE FARMING

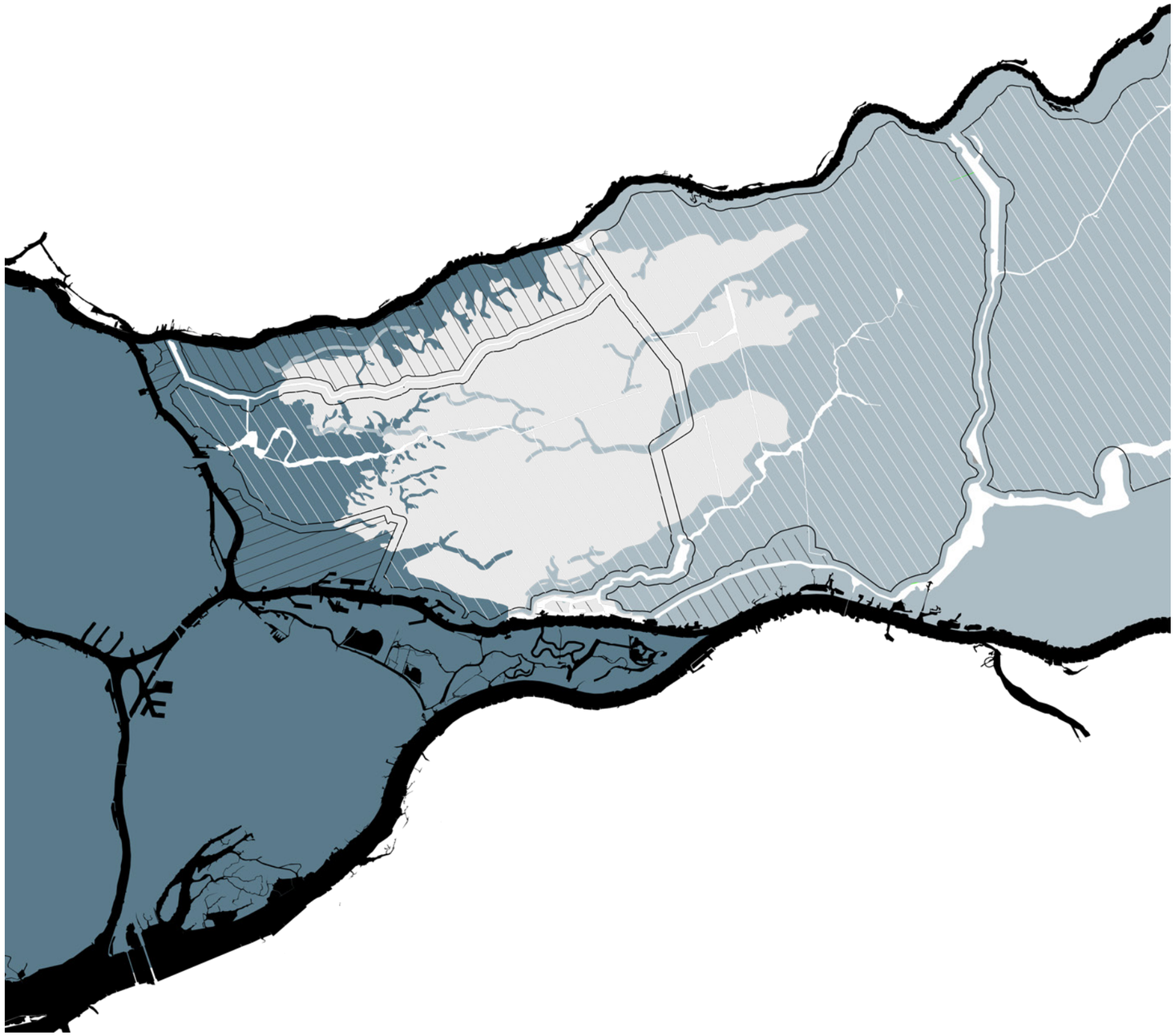


GEOLOGY, HYDROLOGY AND AIR & CLIMATE, CONTROLLED THROUGH HYDRAULIC INFRASTRUCTURES.

scale 1: 150 000

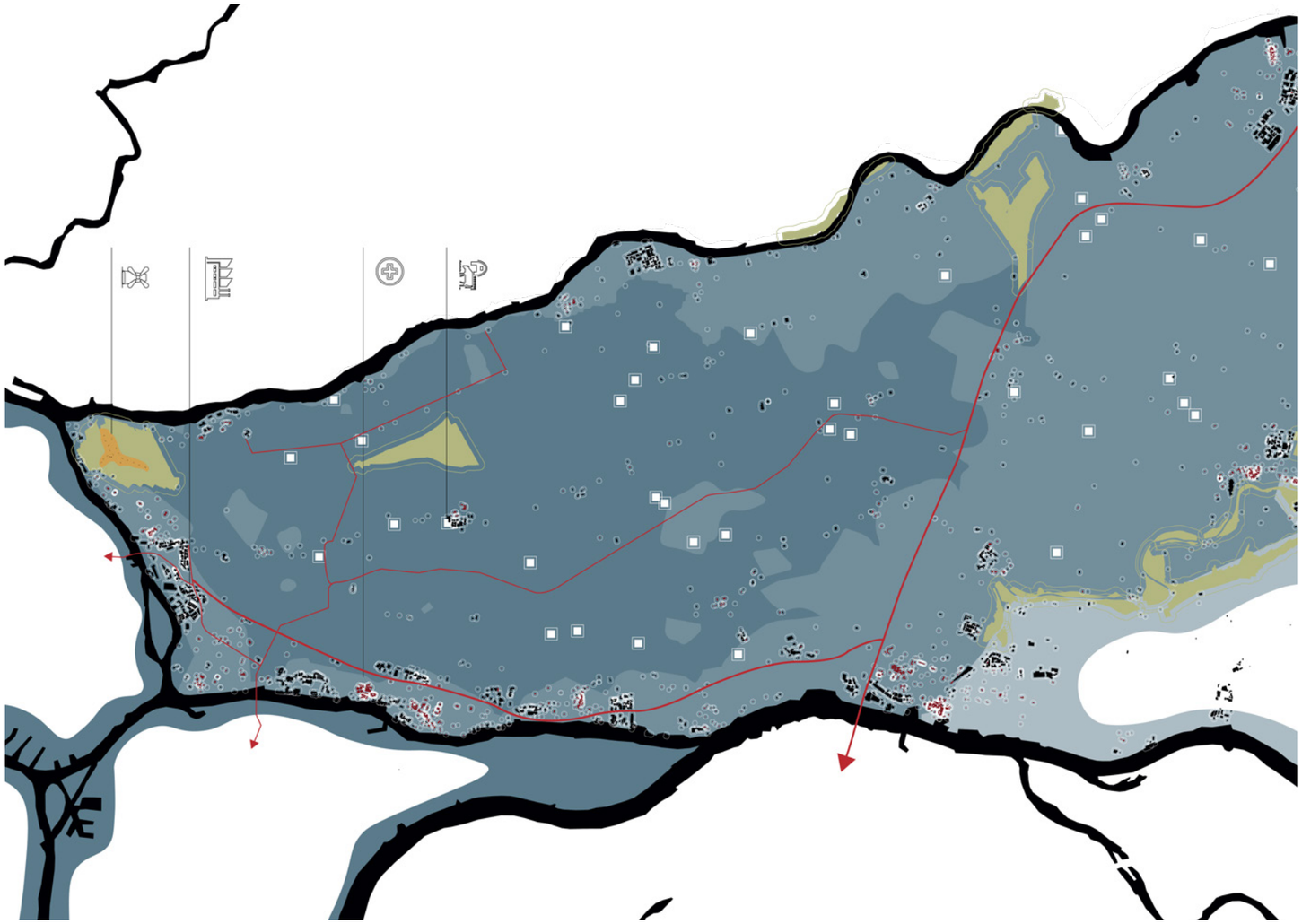
ALBLASSERWAARD,
FLOOD SAFETY AND LANDSCAPE IDENTITY

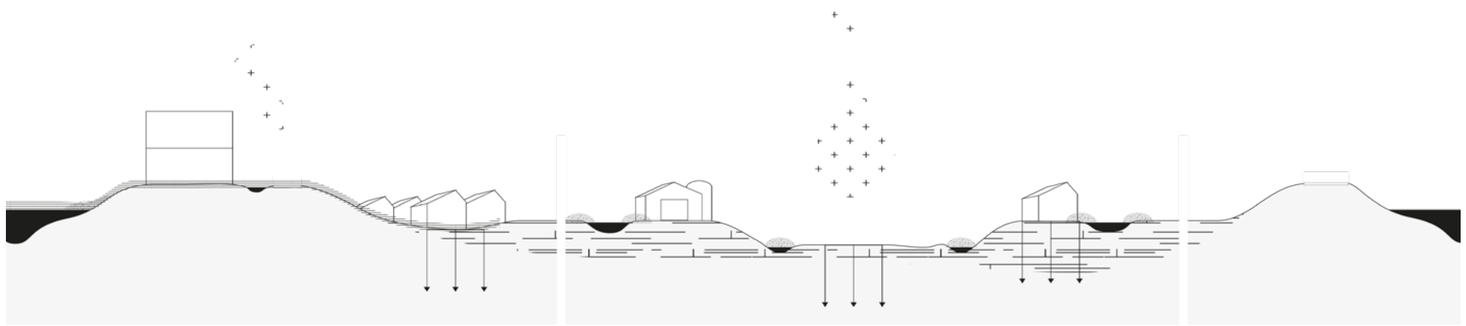
Peat Pastures



ALBLASSERWAARD,
FLOOD SAFETY AND LANDSCAPE IDENTITY

Peat Pasture



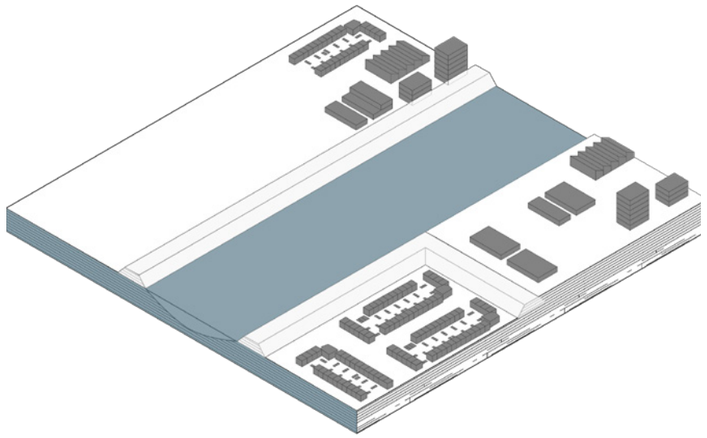


ALBLASSERWAARD,
FLOOD SAFETY AND LANDSCAPE IDENTITY

VEENWEIDE POLDER

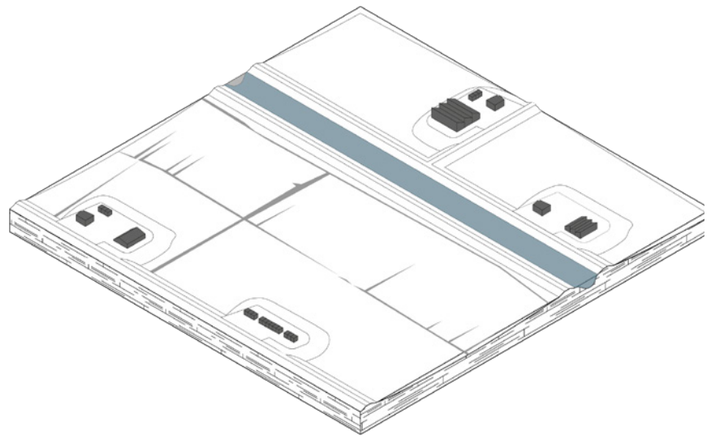
N

FSI	1,59
GSI	0,87
OSR	0,08

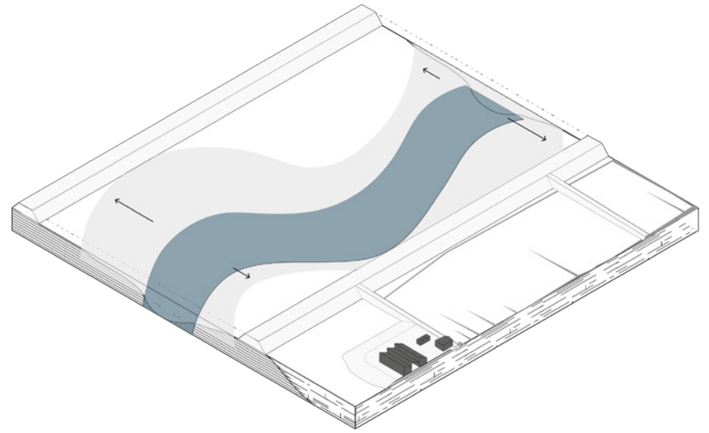


Urban Riverine

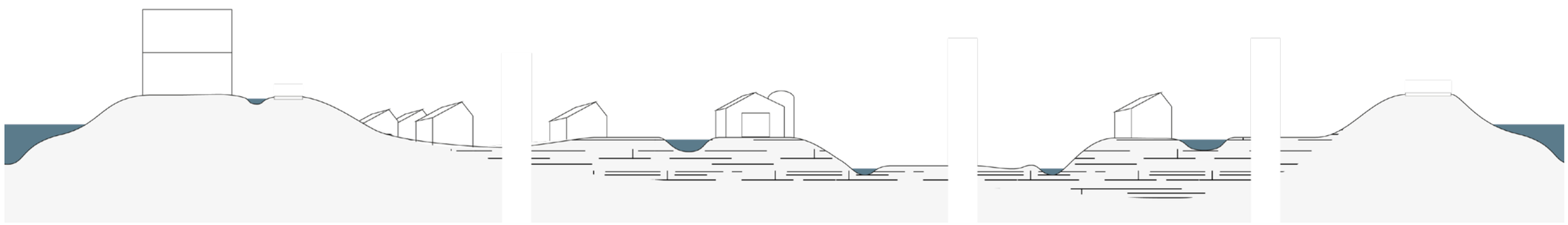
FSI	0,25
GSI	0,18
OSR	3,17



Rural



Riverine



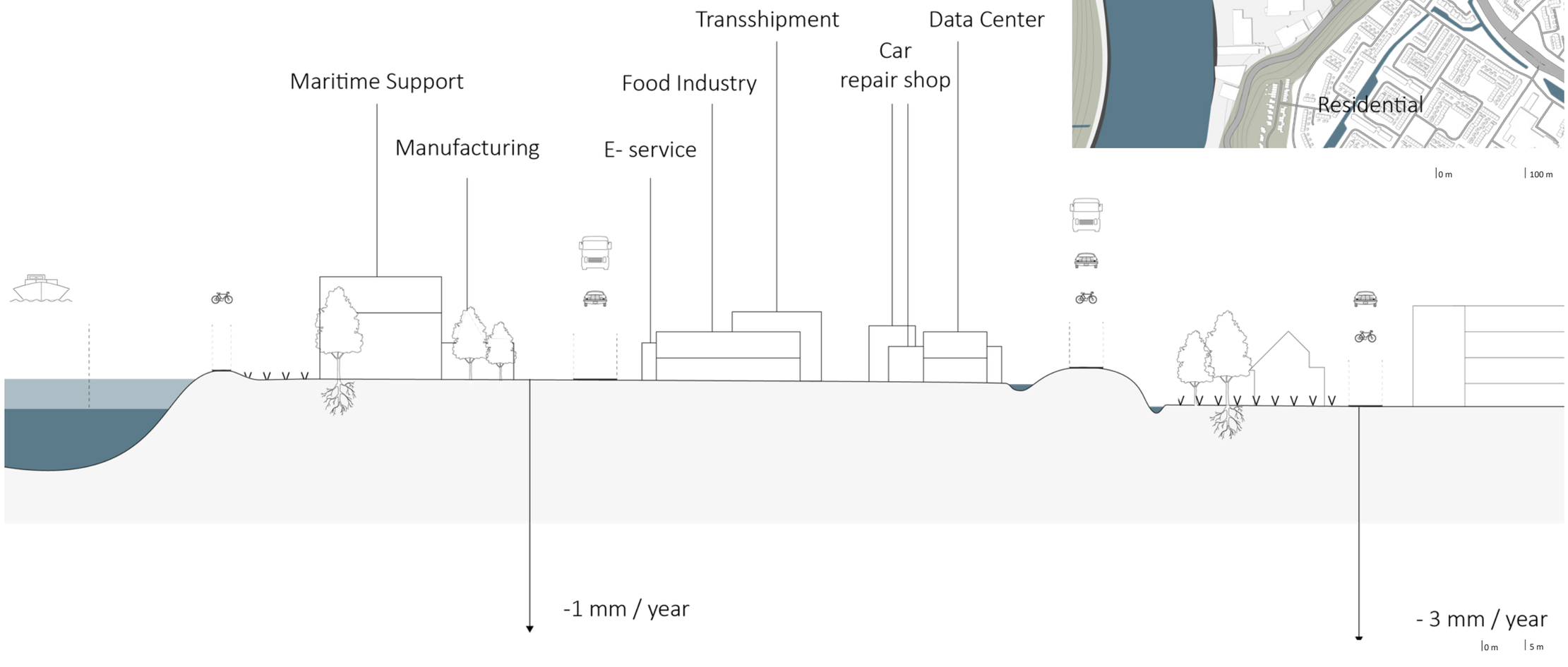
0 km | 2,5 km

ALBLASSERWAARD,
FLOOD SAFETY AND LANDSCAPE IDENTITY

VEENWEIDE POLDER

ALBLASSERWAARD,
FLOOD SAFETY AND LANDSCAPE IDENTITY

VEENWEIDE POLDER



ALBLASSERWAARD
FLOOD SAFETY AND LANDSCAPE IDENTITY

Conclusion

LANDSCAPE IDENTITY

PEAT PASTURE
[VEENWEIDE]

PEOPLE - NATURE RELATIONSHIP

Mastery over nature

P

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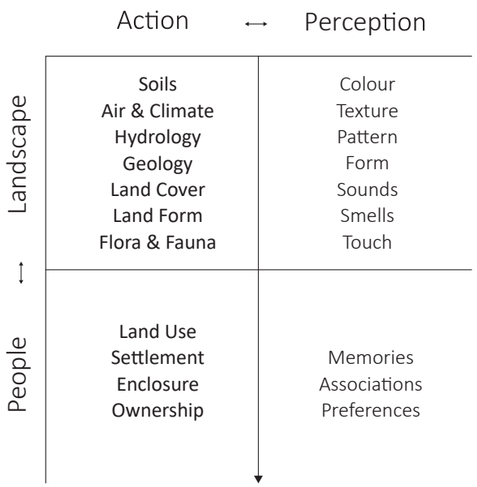
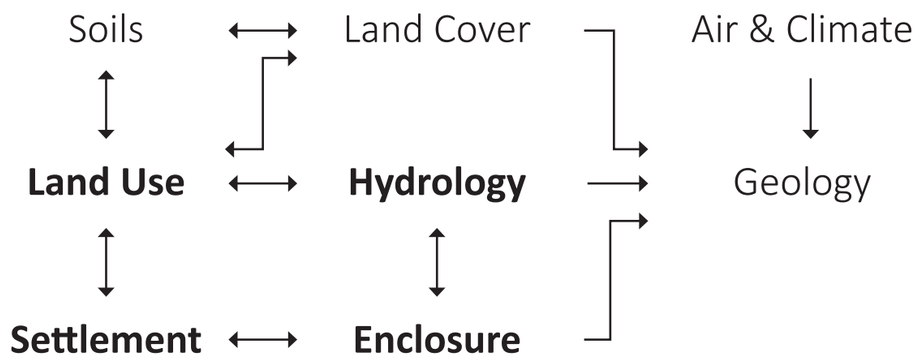
LANDSCAPE CHARACTER





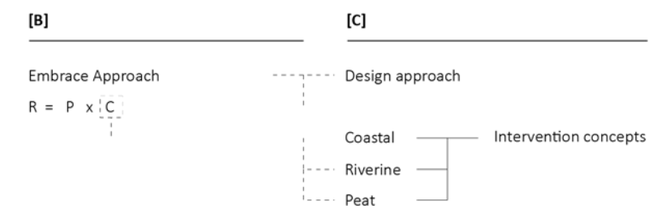
RESEARCH BY DESIGN
BUILDING WITH NATURE, FLOOD SAFETY AND LANDSCAPE IDENTITY

Alblasserwaard

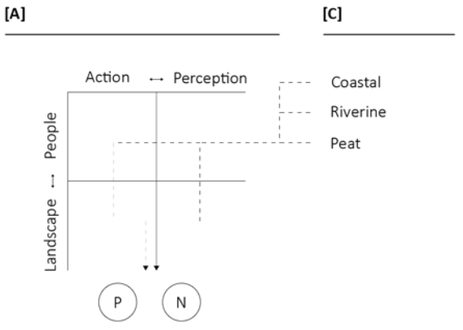
2. AC: What are the potentials and restrictions [spatial and societal] in the application of a Building with Nature approach to the landscape identities that exist in the Alblasserwaard? [Research by Design]

3. BC: What are the [spatial] implications of applying a Building with nature approach to the development of flood safety in the Alblasserwaard? [Research by Design]

[BC] Flood safety and building with nature

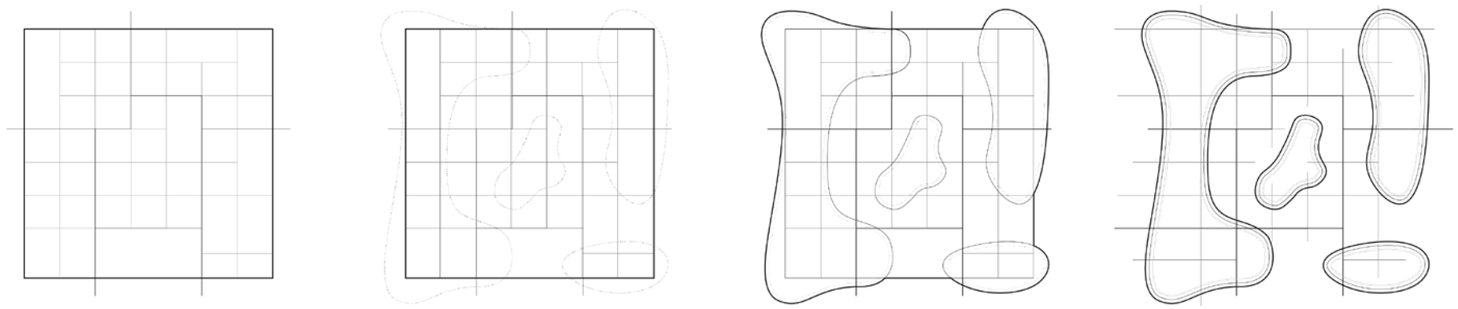


[AC] Landscape Identity and Building with Nature

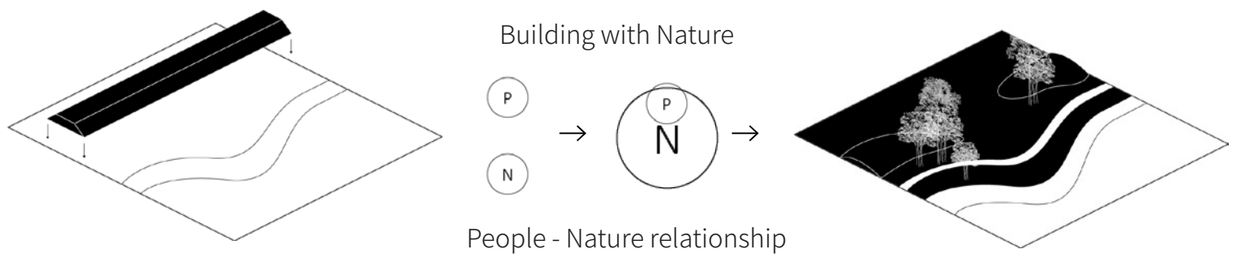


ALBLASSERWAARD,
BUILDING WITH NATURE AND FLOOD SAFETY

Reconciliation of the antropogenic compartments and natural flux of water, soil and air



From a one size fits all to tailor made solutions fitting the landscape, adressing the people - nature relationship



ALBLASSERWAARD,
BUILDING WITH NATURE AND FLOOD SAFETY

Reconciliation of the antropogenic compartments and natural flux of water, soil and air

Nodes

Edges

Infill

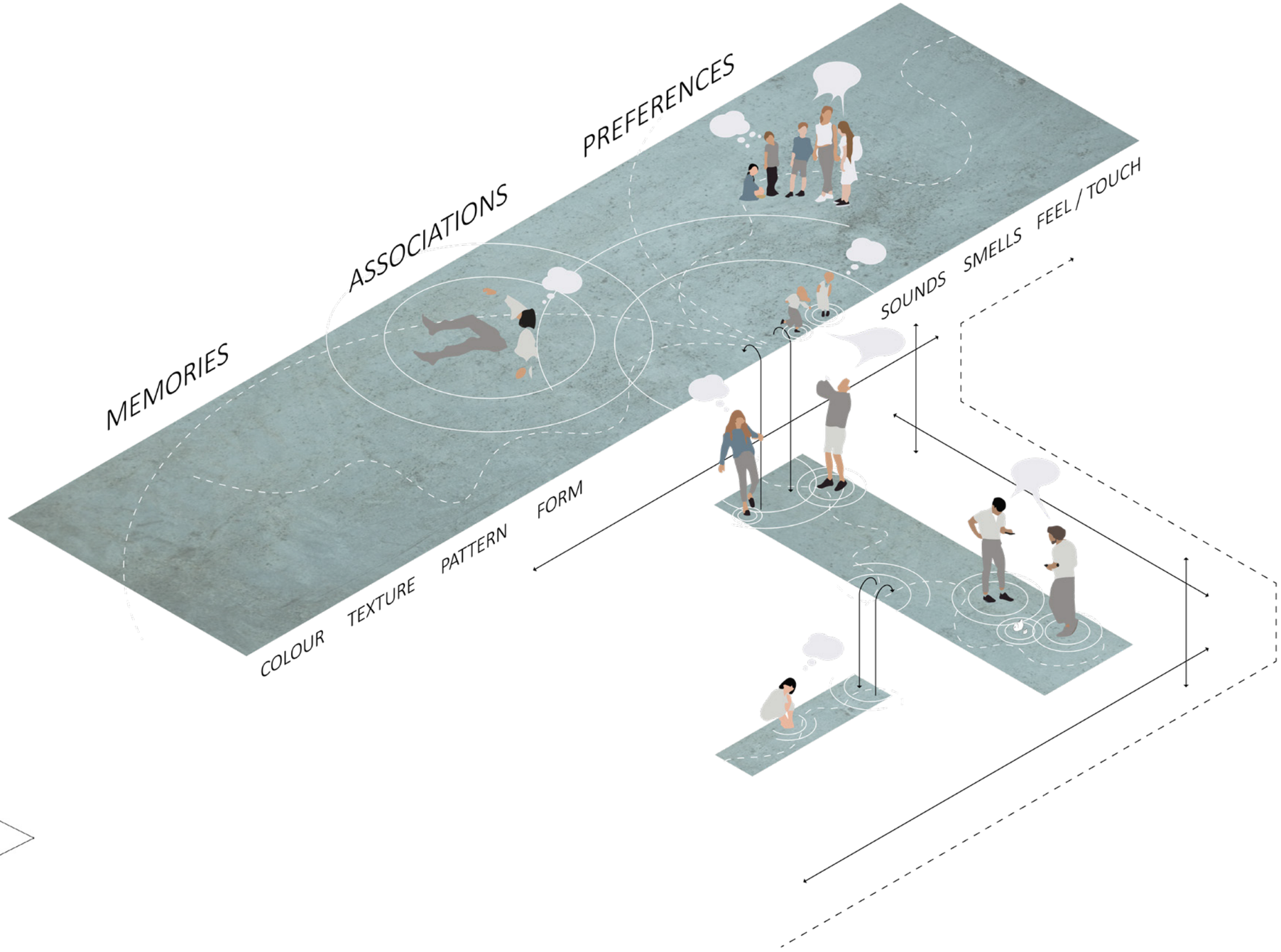
BUILDING WITH NATURE,
LAND USE AND URBANIZATION

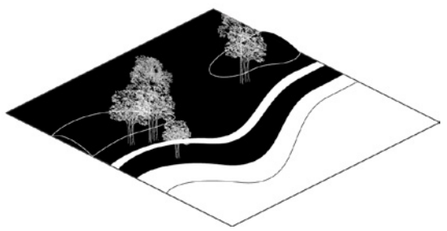
Adressing the perceptive sphere

Nodes

Edges

Infill





BUILDING WITH NATURE,
INLAND, RIVERINE, URBAN RIVERINE

Adressing the action sphere

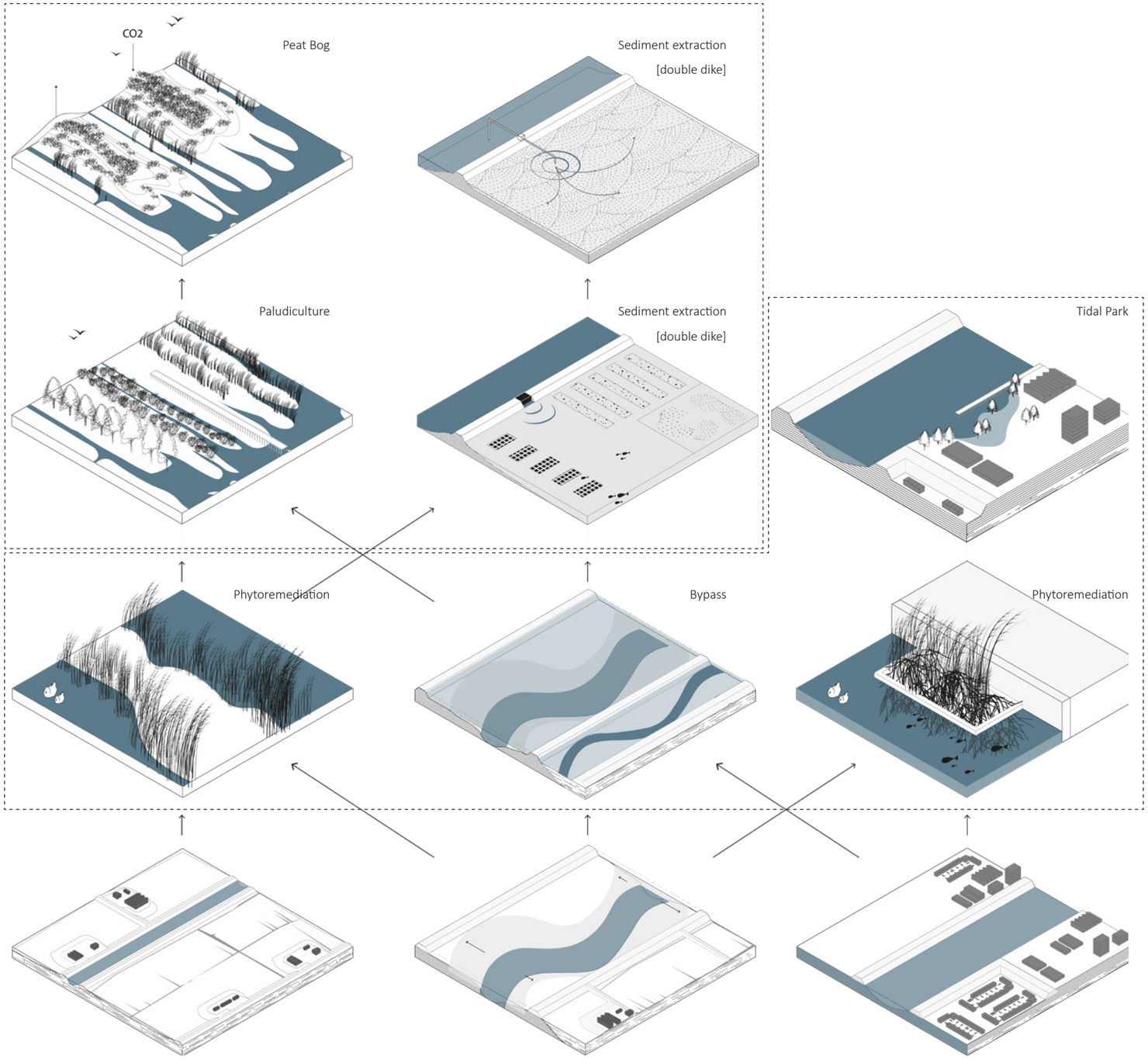
Edges

Infill

Productive

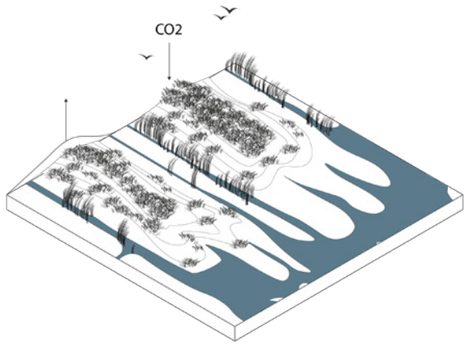
Remediation / Buffer

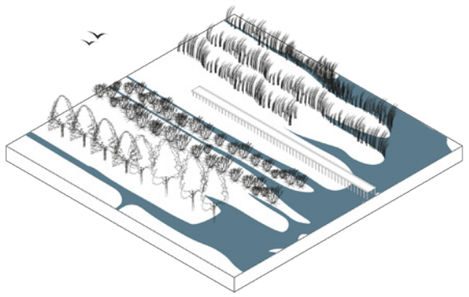
Landscape Characteristic



INLAND [PEAT] | **RIVERINE [CLAY]** | **URBAN RIVERINE [CLAY]**

BUILDING WITH NATURE,
INLAND

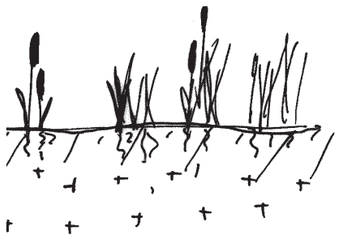




Peat Bog [Sphagnum] formation [Veenmos]

Remediaton 3 - 5 years

- 30 cm water level increase / fluctuation
- Reeds and Cattail for insulation and cattle feed



Peat Growing 5 - 10 years

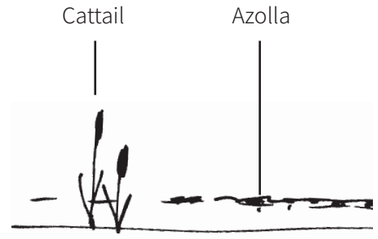
- 1 month innundation resilient
- reversing subsidence 1 - 2 mm per year

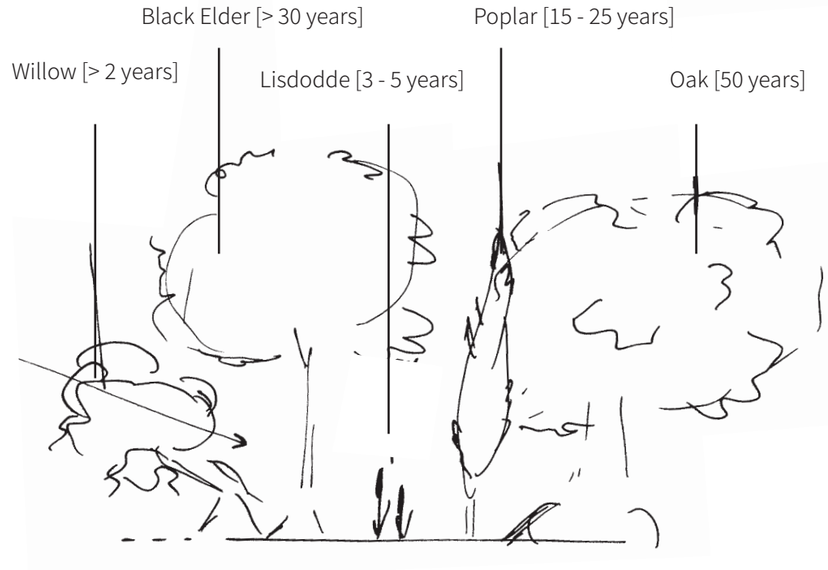
Paludiculture

Crops

- Cattail [insulation / cattle feed]
- Azolla [Meat substitute / cattle feed]
- Sphagnum

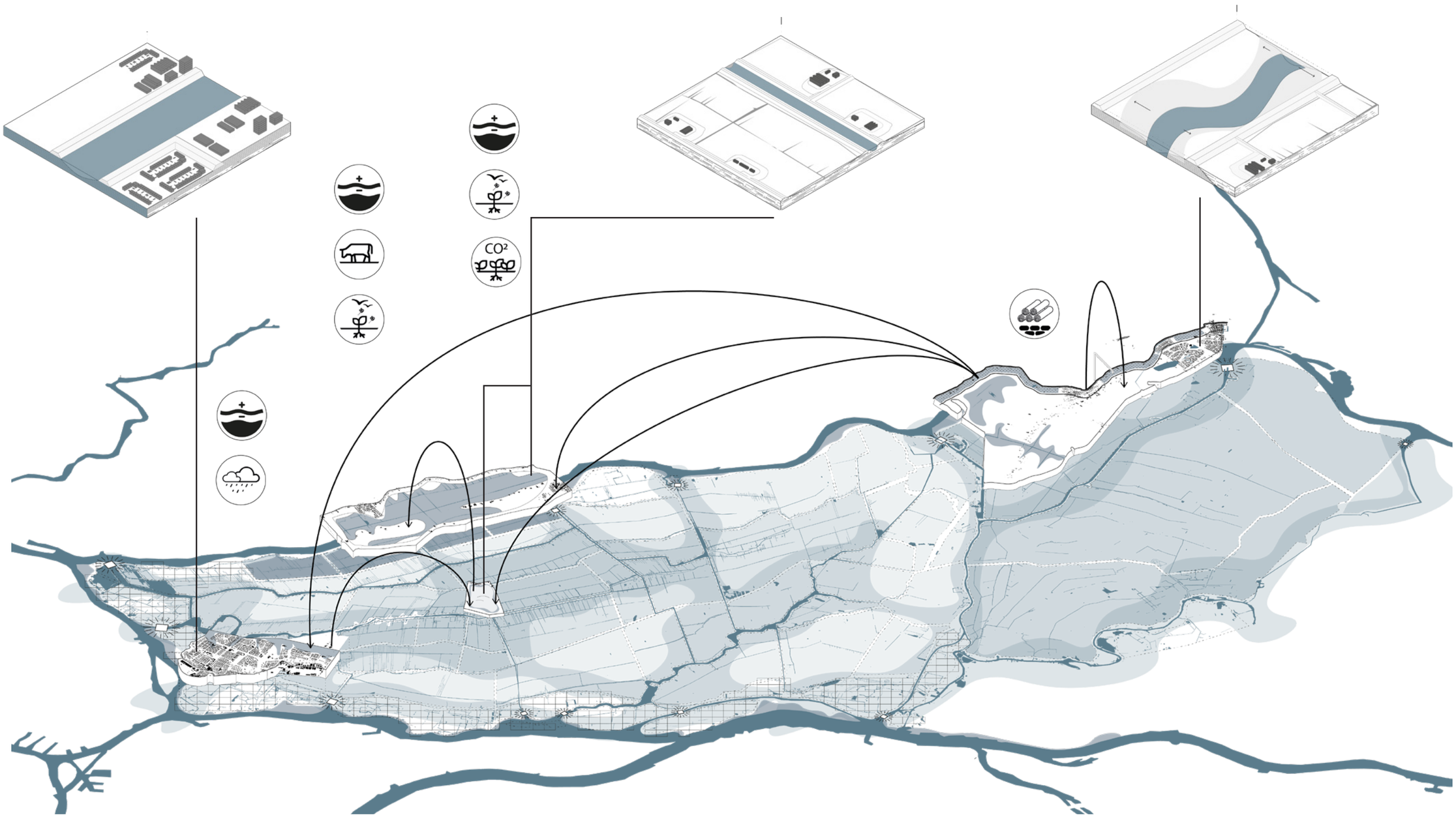
Building Material 2 - 5 years





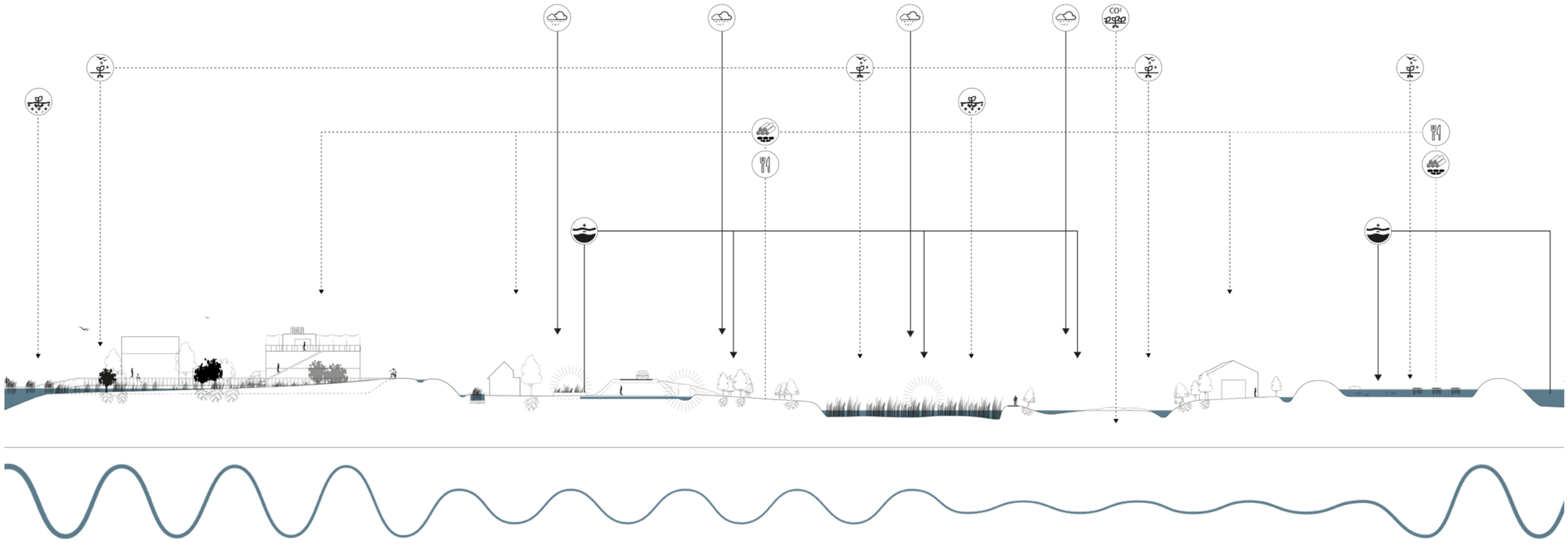
BUILDING WITH NATURE,
INLAND, RIVERINE, URBAN RIVERINE

Systemic application



BUILDING WITH NATURE,
INLAND, RIVERINE, URBAN RIVERINE

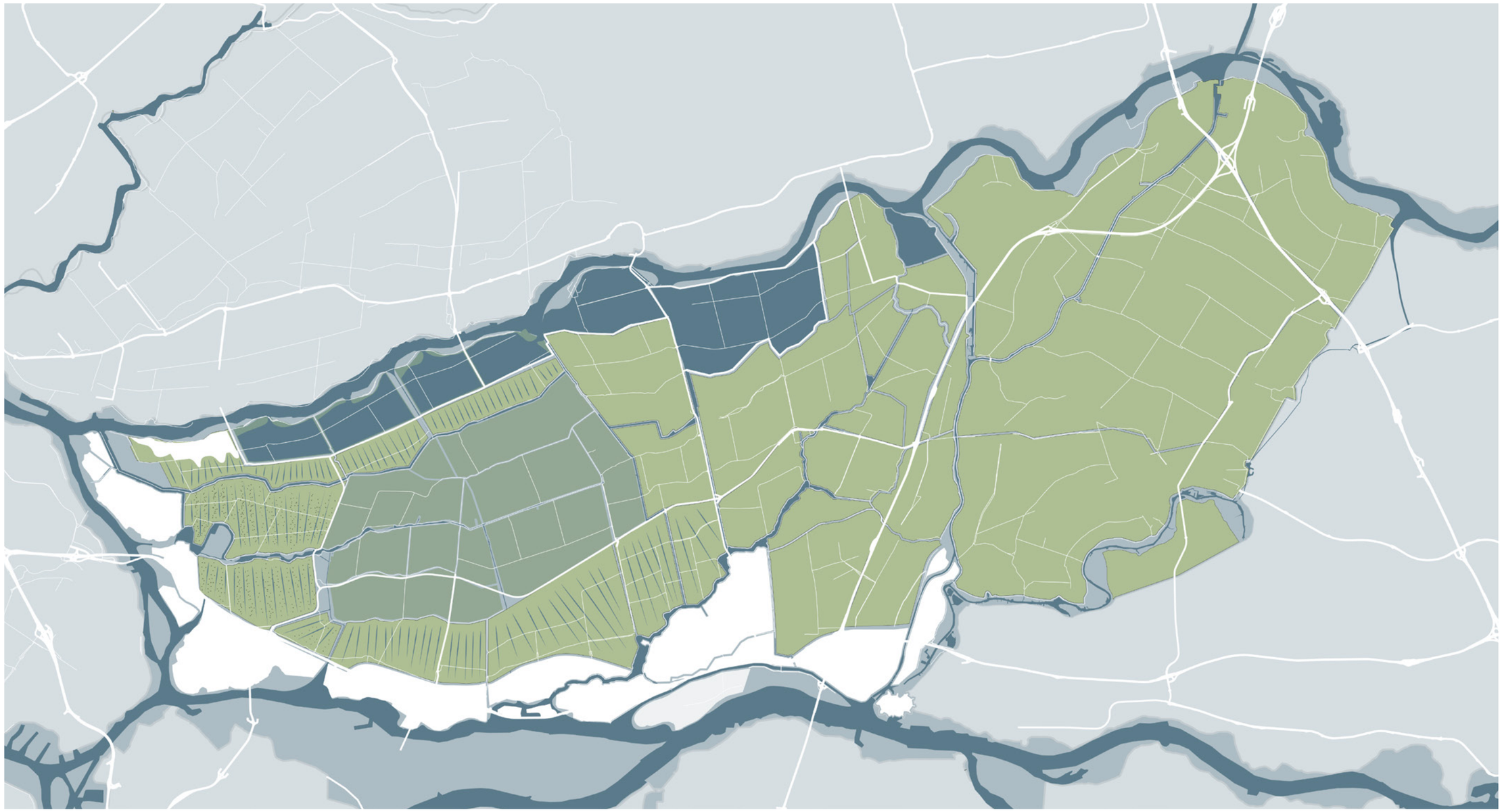
Systemic application



0 m | 5 m

BUILDING WITH NATURE,
LAND USE AND URBANIZATION

Following the hydrological dynamics and zones

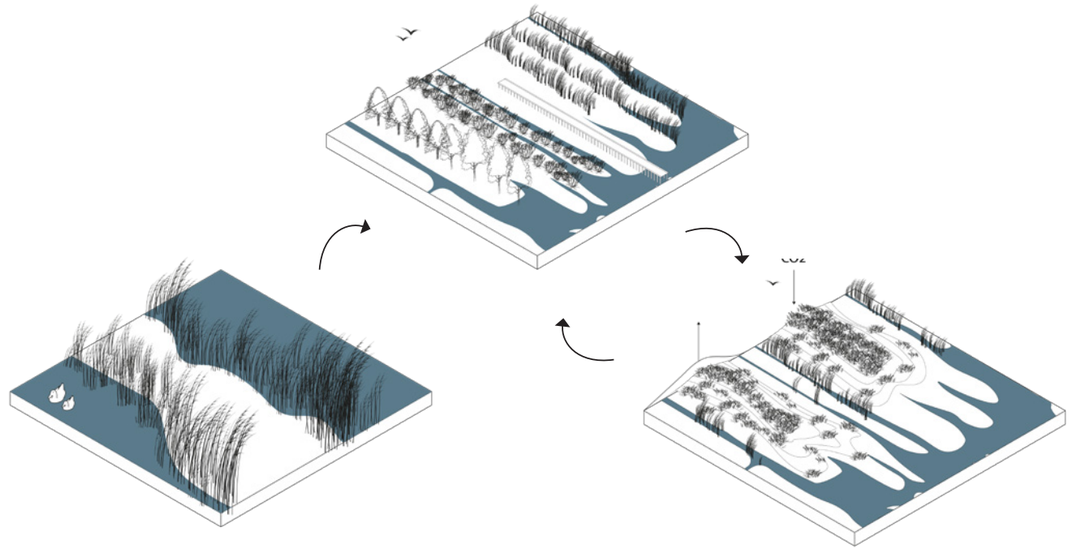


BUILDING WITH NATURE,
LAND USE AND URBANIZATION

Following the hydrological dynamics and zones

Crop diversity

Crop rotation

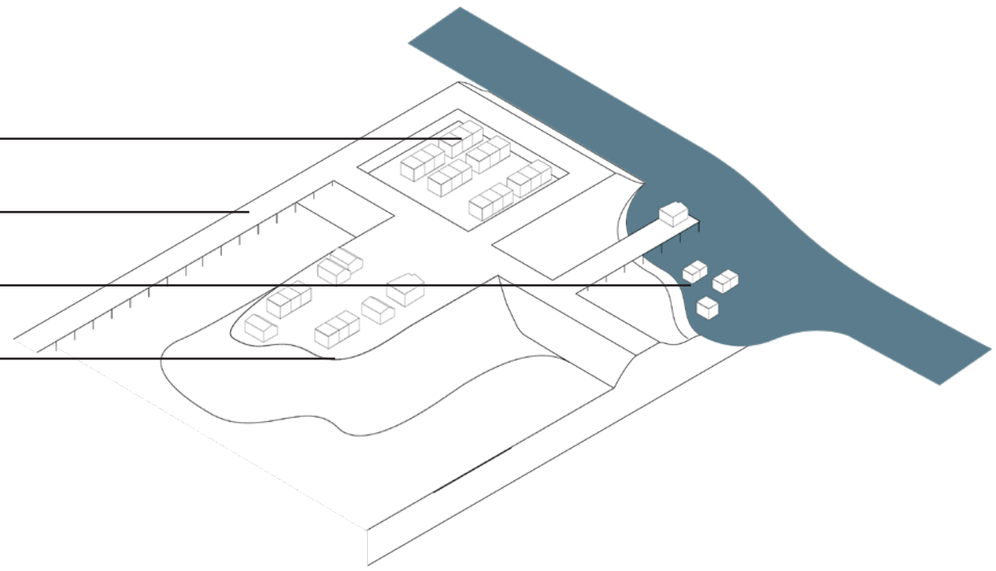


Enlcosed settlement

Elevated Infrastructures

Flood proof

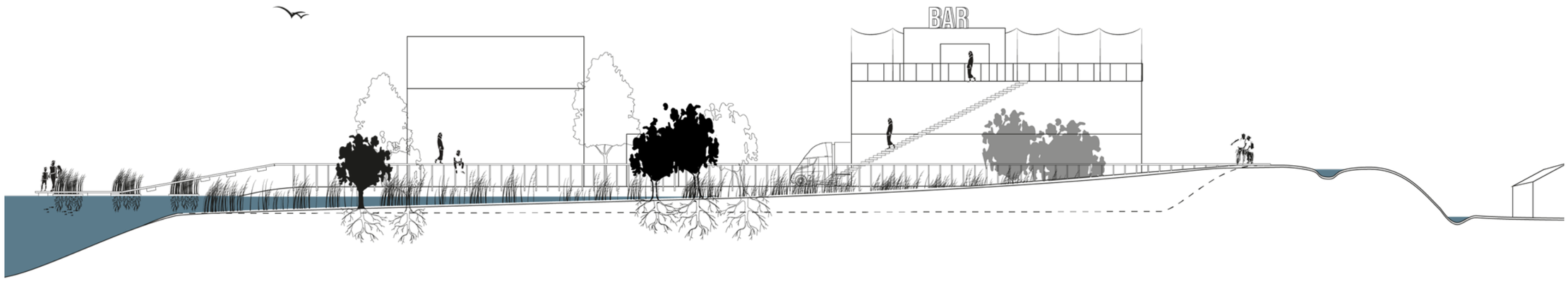
Mounds



BUILDING WITH NATURE,
URBAN RIVERINE

Inlet

- Softening the riverine edges
- Diversifying the [industrial program]
- Elevated infrastructures and flood proof settlement
- Public function attached to node



BUILDING WITH NATURE,
URBAN RIVERINE

Inlet

- Softening the riverine edges
- Diversifying the [industrial program]
- Elevated infrastructures and flood proof settlement
- Public function attached to node

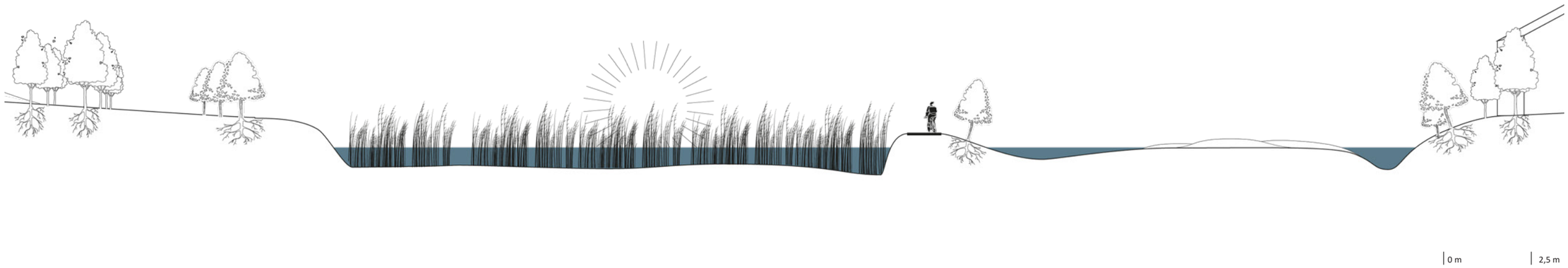
BUILDING WITH NATURE,
INLAND

Peat bog formation

- Increasing water levels

- Altering Land Use

- Elevated infrastructures and settlement



BUILDING WITH NATURE,
INLAND

- Increasing water levels

- Phytoremediation

- Peat bog formation

scale 1: x 000

CONCLUSIONS
HYPOTHESIS AND MAIN QUESTION

Hypothesis

Building with Nature can provide the tailor made flood safety solutions needed to transition towards a more biodiverse and resilient delta.

Shifting towards a concequence reduction flood safety approach, embracing the dynamics of water, soil and air should be the critical prerequisite of delta urbanization. Building with Nature solutions aimed to transition the flood safety approach, besides promoting biodiversity and flood resilience, need to address and alter the people – nature relationship as well.

Main Research Question

“How can an understanding of Landscape Identity promote a biodiverse and flood resilient urbanized delta?

CONCLUSIONS
SUBQUESTIONS

[How] are flood safety and landscape identity related?

- Control over hydrology
- Land Use and Settlement are dependent on probability reduction
- Expression in landscape of people mastering over nature

How does an understanding of landscape identity inform the application of Building with Nature solutions in pursuit of flood safety?

- Suitability to the landscape
- Broadens the scope of influence [people- nature relationship]
- Provides tangible domains of intervention

- Limited to coastal and riverine territory

How can BwN solutions be applied to alter the human-nature relationship?

- Adress the action sphere
- Design for systemic implementation and adressing the perceptive sphere

REFLECTION
& LIMITATIONS

- Approach of Landscape Identity

- Scope of the project

- Limitations

CONCLUSIONS
MAIN QUESTION

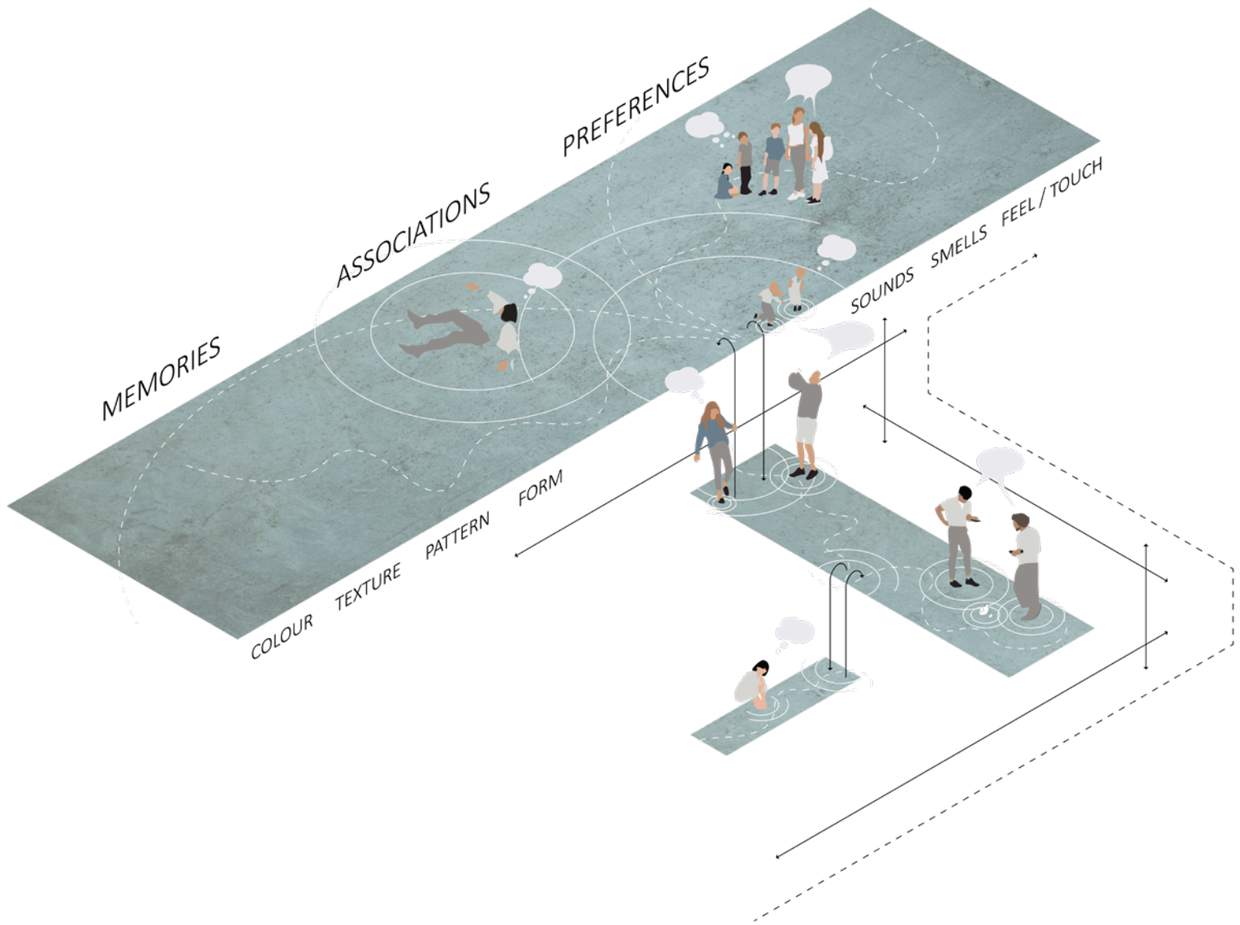
Main Research Question

"How can an understanding of Landscape Identity promote a biodiverse and flood resilient urbanized delta?

- Ideas of landscape influence landscape changes
- Dutch ideas of flood safety link to hydrologic control
- at cost of biodiversity and flood resilience

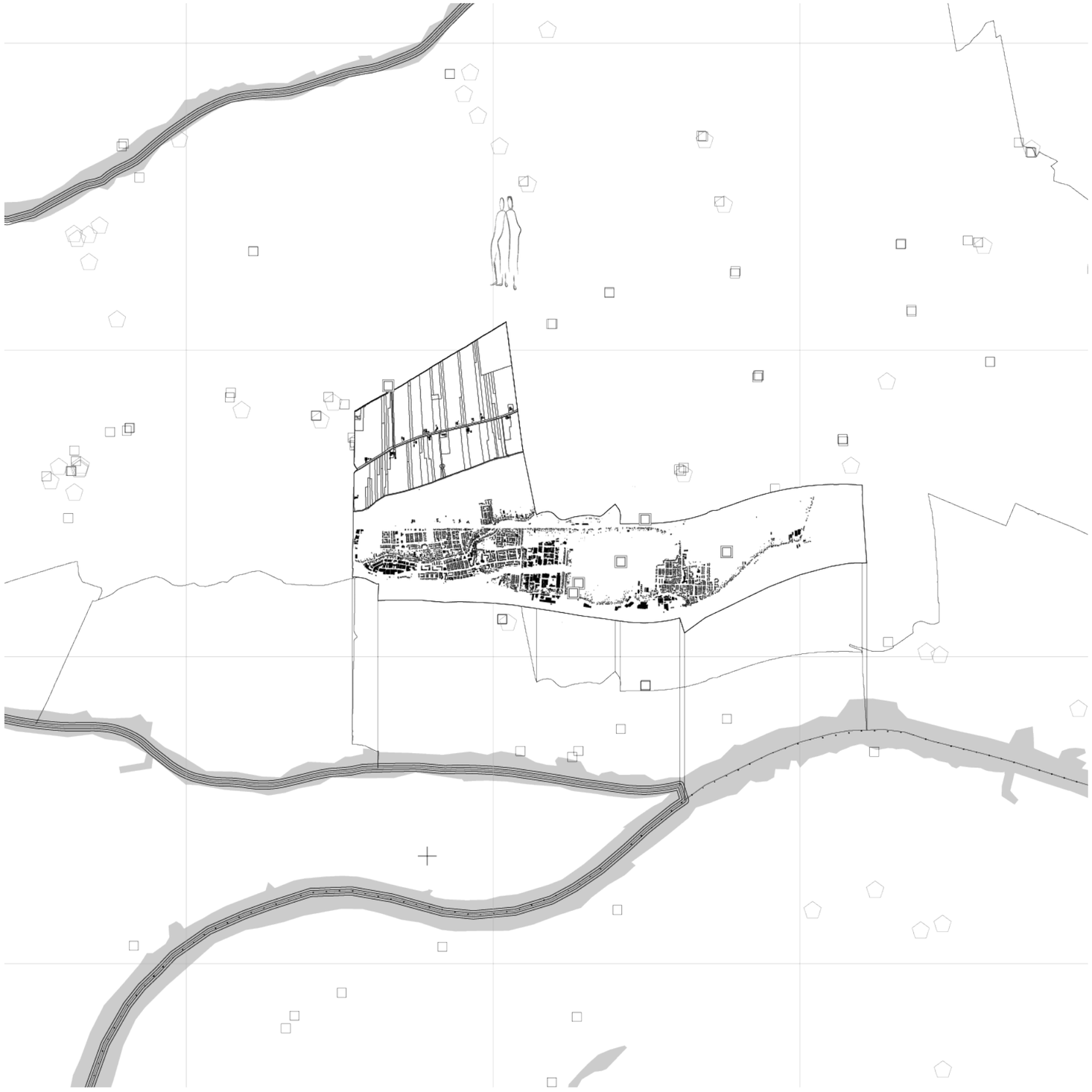
- Embrace approach through Building with Nature [action]
- Designing the nodes [perception]

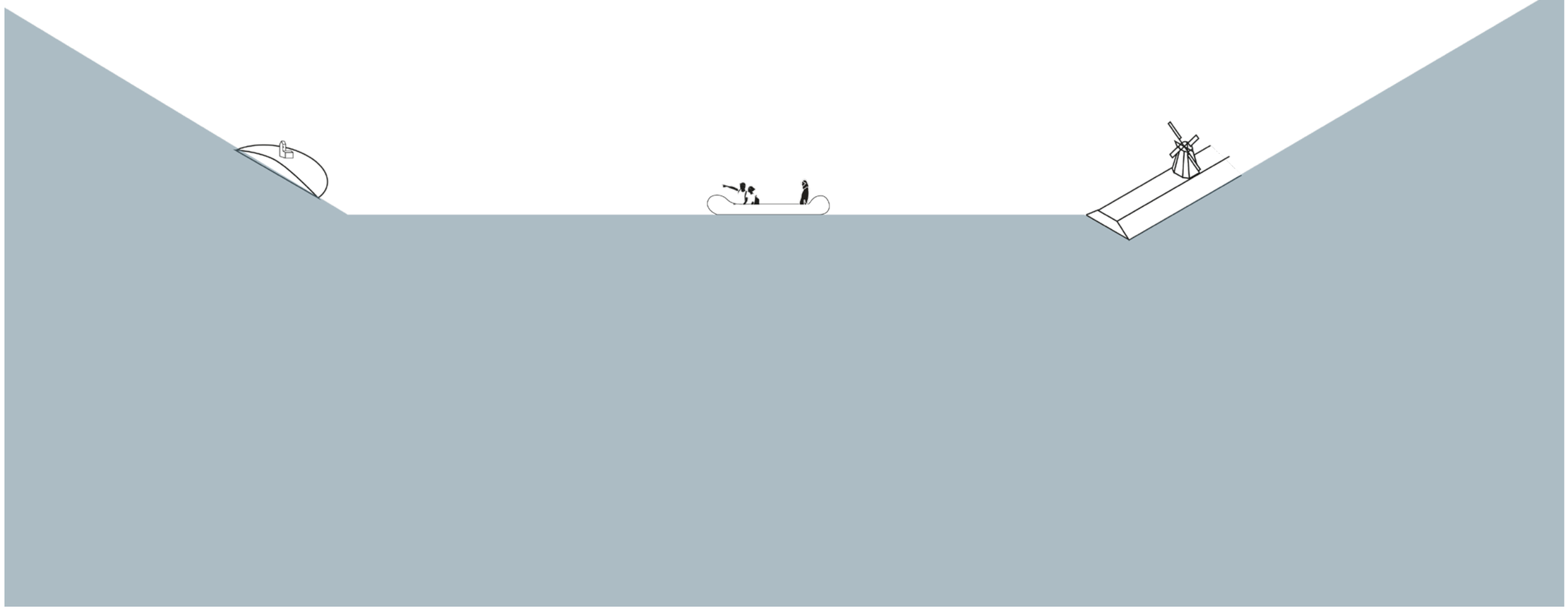
Thank you!

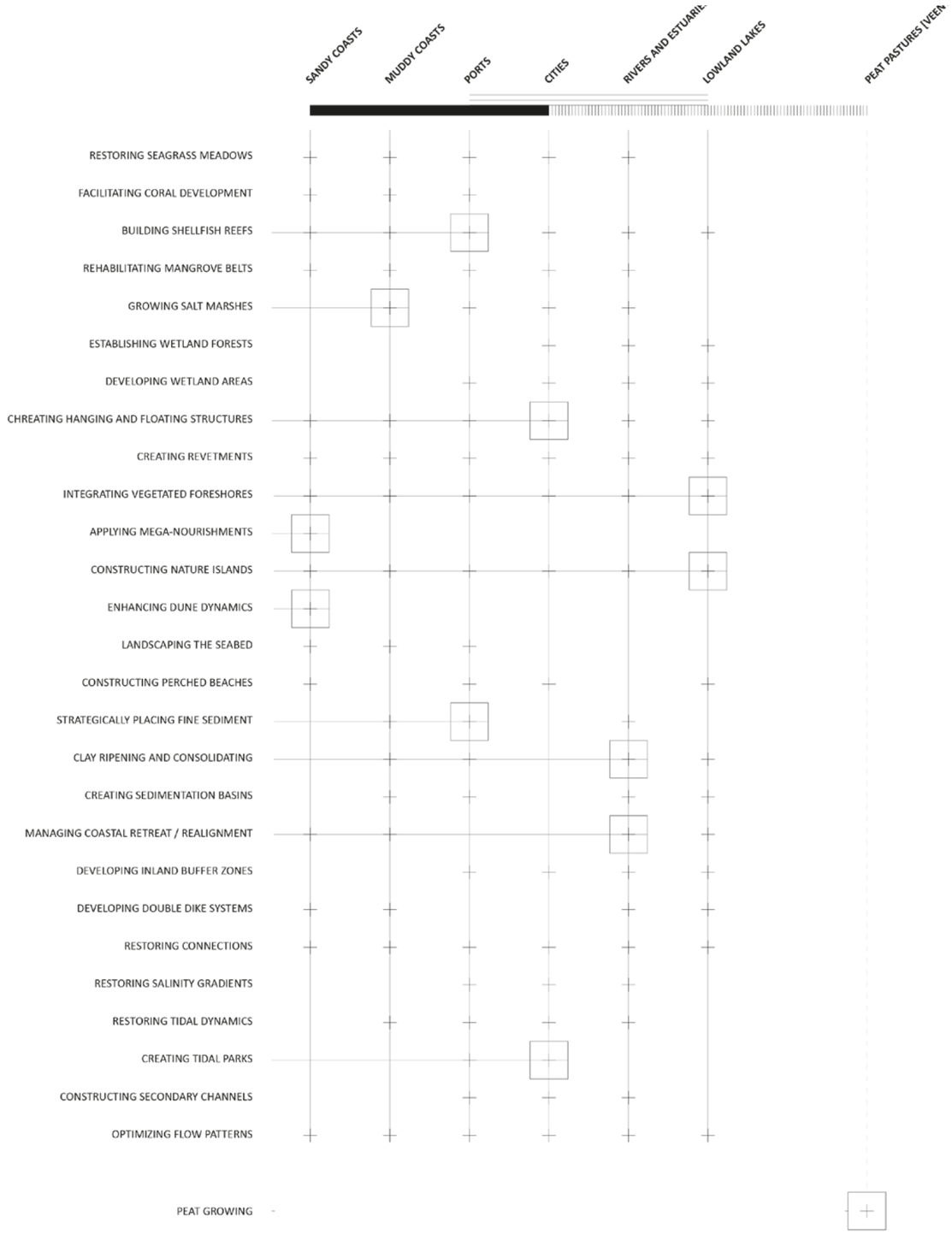

PREFERENCES
ASSOCIATIONS
MEMORIES
COLOUR
TEXTURE
PATTERN
FORM
SOUNDS
SMELLS
FEEL / TOUCH

ALBLASSERWAARD,
FLOOD SAFETY AND LANDSCAPE IDENTITY

PEAT POLDER
Peat Pasture







Building with Nature concepts

Source: Ecoshape, J. Brobbel, 2020
Image: Rijkswaterstaat, J. Brobbel, 2020