

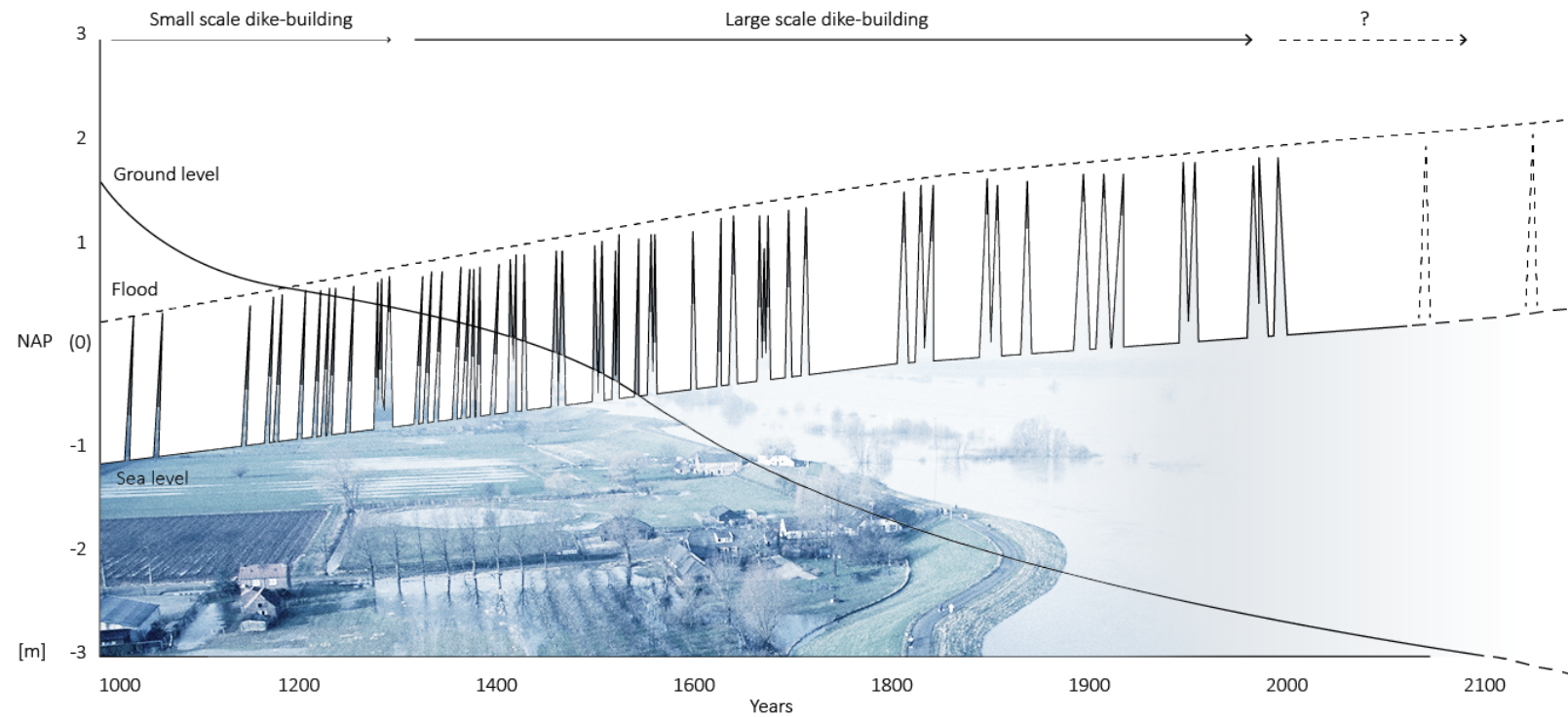
P5 Presentation 18/06/2025  
Master track: Urbanism  
Studio: Metropolitan Ecologies of Places  
Student: Christel Diana Voncken 5653118  
First mentor: Luca Iuorio  
Second mentor: Laura Cipriani



# FACING THE TIDE

Challenging the prevailing perspectives on coastal management by re-imagining the existing flood management in the Scheldt Estuary as means to harmonise human and non-human processes.

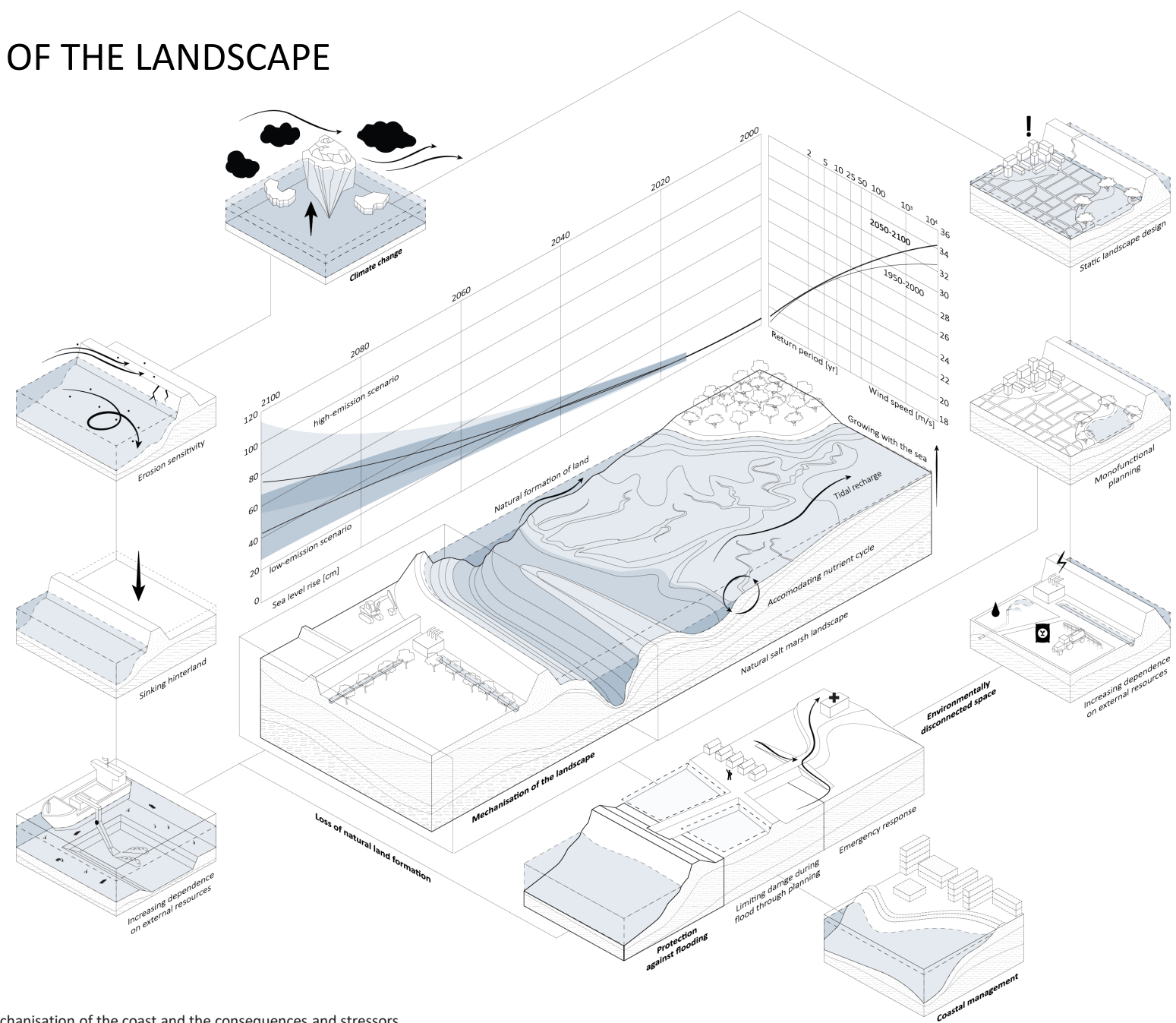
# RISING SEA AND SINKING LAND



[Fig. 1] Changing conditions: Sea level rise and soil subsidence.  
Source: (Van Eyck, 1993; Pleijster & Van Der Veeke, 2014).

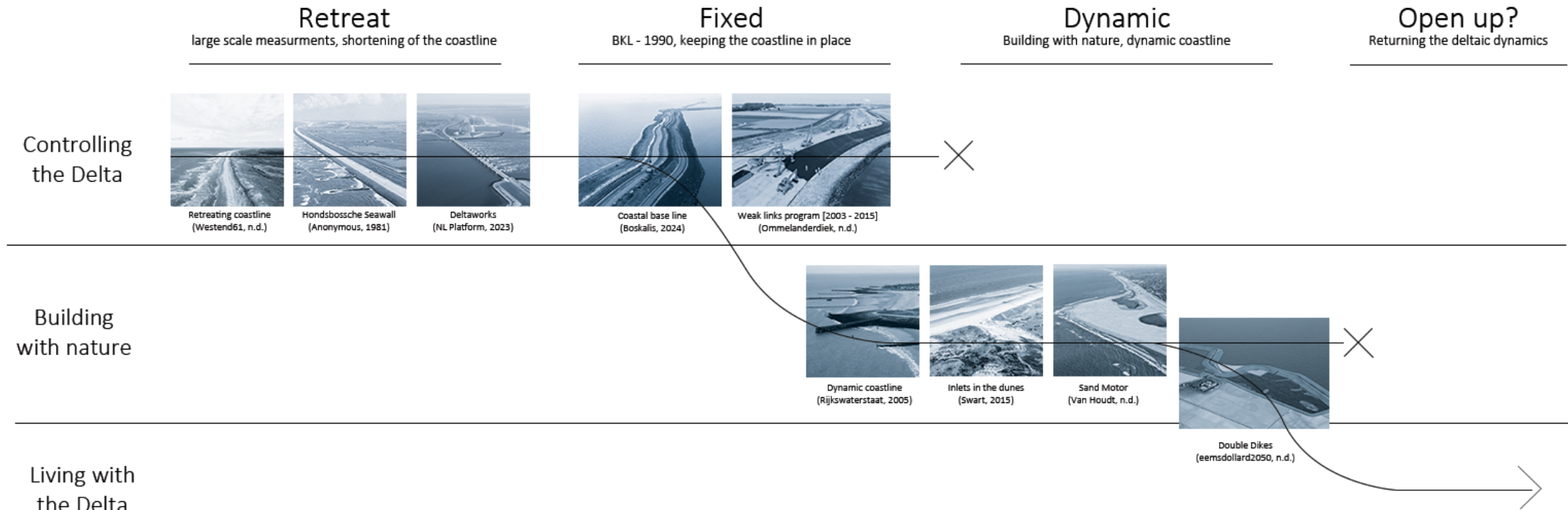


# MECHANISATION OF THE LANDSCAPE



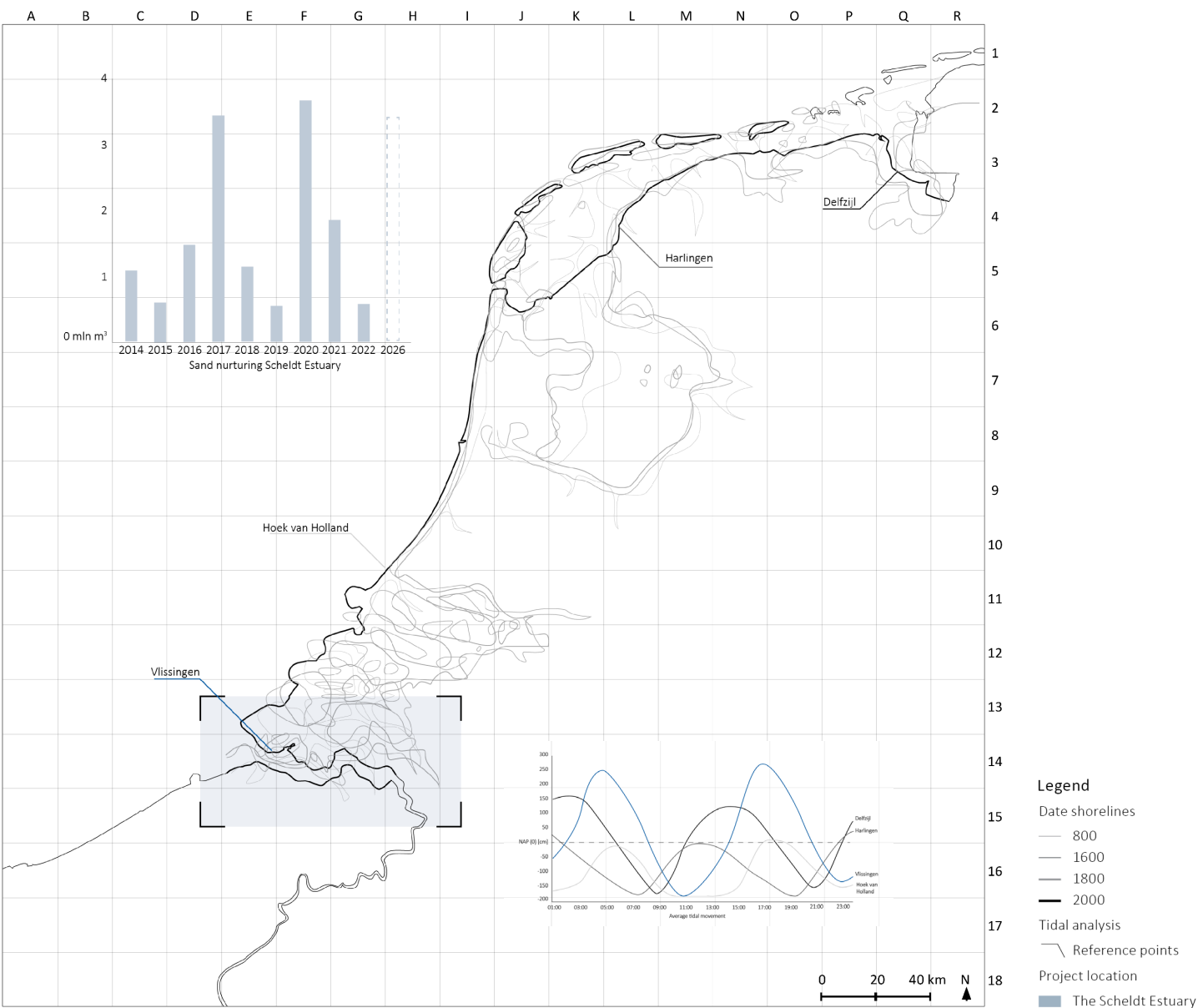
[Fig.2] Illustration mechanisation of the coast and the consequences and stressors.  
Source: (KNMI, 2023)

# PARADIGM SHIFT IN COASTAL MANAGEMENT



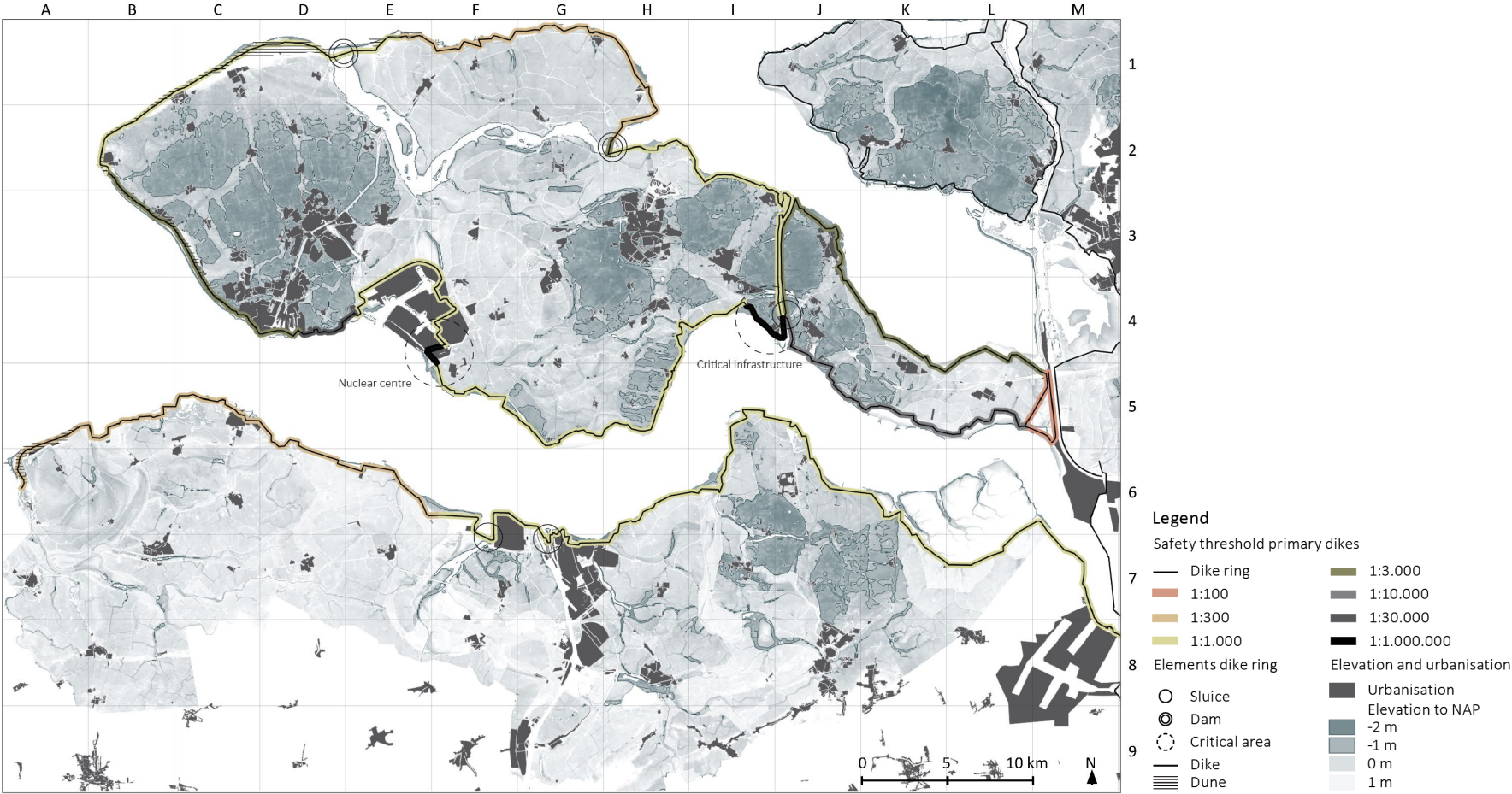


THE SCHELDT  
ESTUARY,  
WHERE THE SEA  
MEETS THE RIVER



[Fig.4] Shortening of the shoreline, last direct connection between sea and river.  
Source: (Kok et al., 2008; Dutch Ministry of Defence, 2022; Taal et al., 2023; Rijkswaterstaat, 2024).

# ISOLATION BY PREVENTION



[Fig.5] Flood prevention Scheldt Estuary.  
Source: (Elias & Van Der Spek, 2015; Jongejan et al., 2016; CartoNext, 2024; TU Delft, 2024).



# SETTLING BELOW SEA LEVEL



[Fig.7] West-Kapelle.



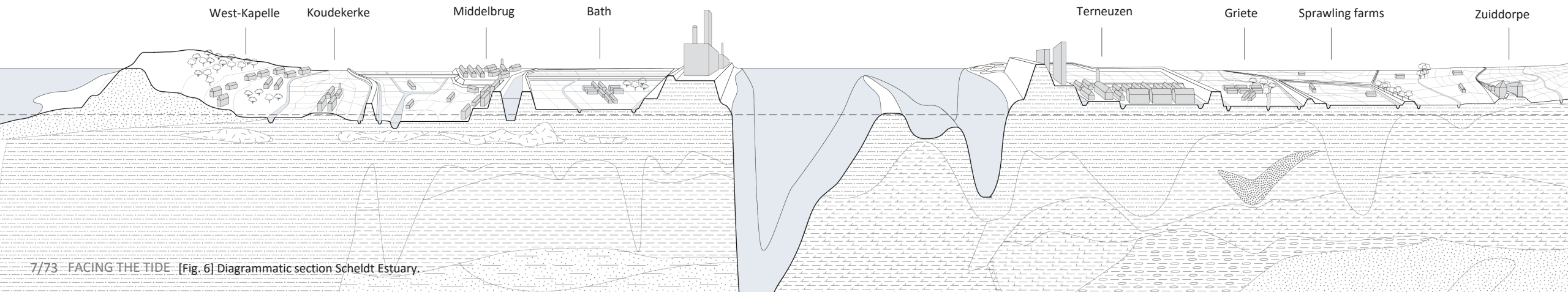
[Fig.8] Bath.



[Fig.9] Terneuzen.



[Fig.10] Griete.



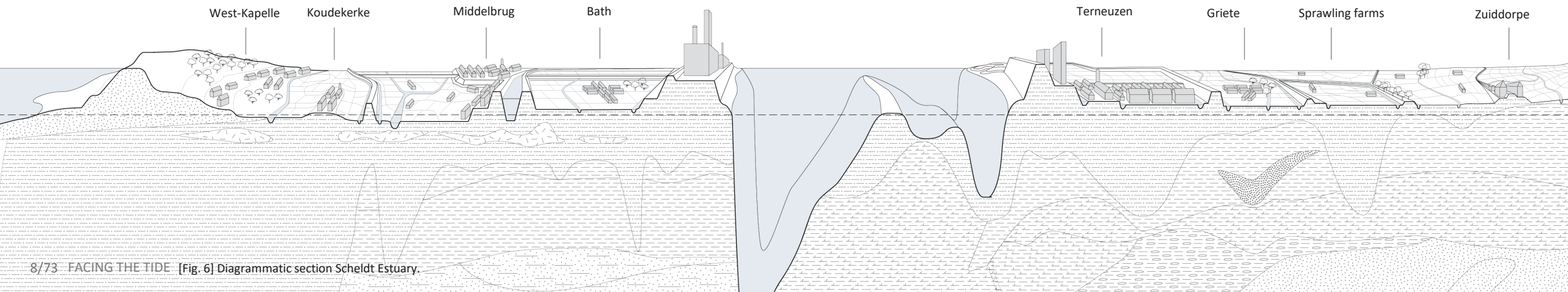
# SETTLING BELOW SEA LEVEL



[Fig.11] North Sea Port (Gundlach, 2025)



[Fig.12] Agricultural plots (Swart, 2013)





# RESEARCH QUESTIONS

How can the re-imagining of existing flood management [1] in the Scheldt Estuary inform landscape design [2] enhancing deltaic and climate adaptivity [3] and promotes symbiosis between human and non-human ecosystems [4]?

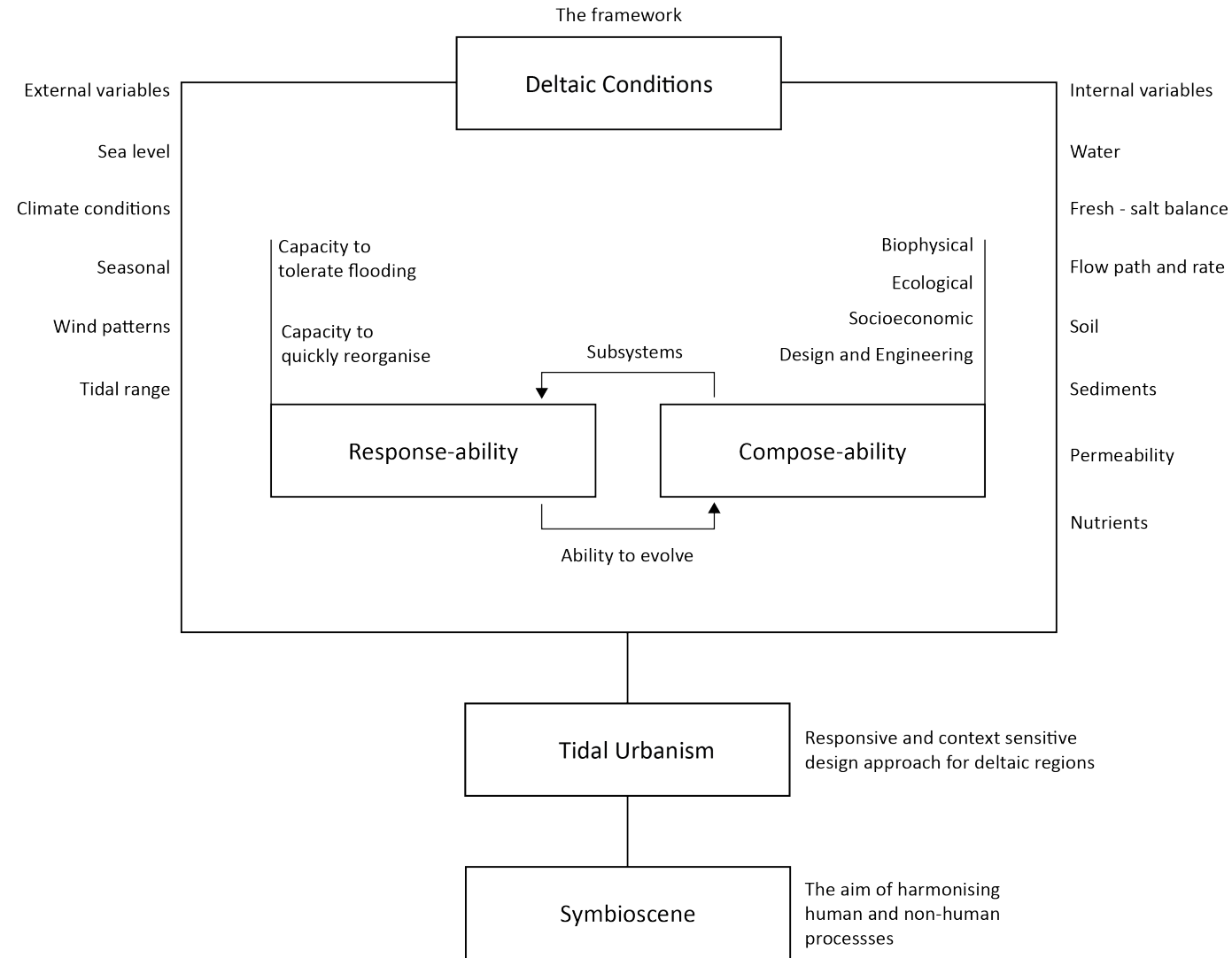
[1] What are the historical and social precedents that need to be redefined in rewriting the Dutch coastal management paradigm?

[2] What deltaic conditions will arise in the Scheldt Estuary when the flood defences are deactivated?

[3] What are the landscape designs in which different forms of flooding events in the delta can be reframed from a risk to an opportunity?

[4] Which strategies will accommodate deltaic conditions in the Scheldt Estuary while realising a symbiosis between human and non-human systems?

# THEORY & CONCEPTS



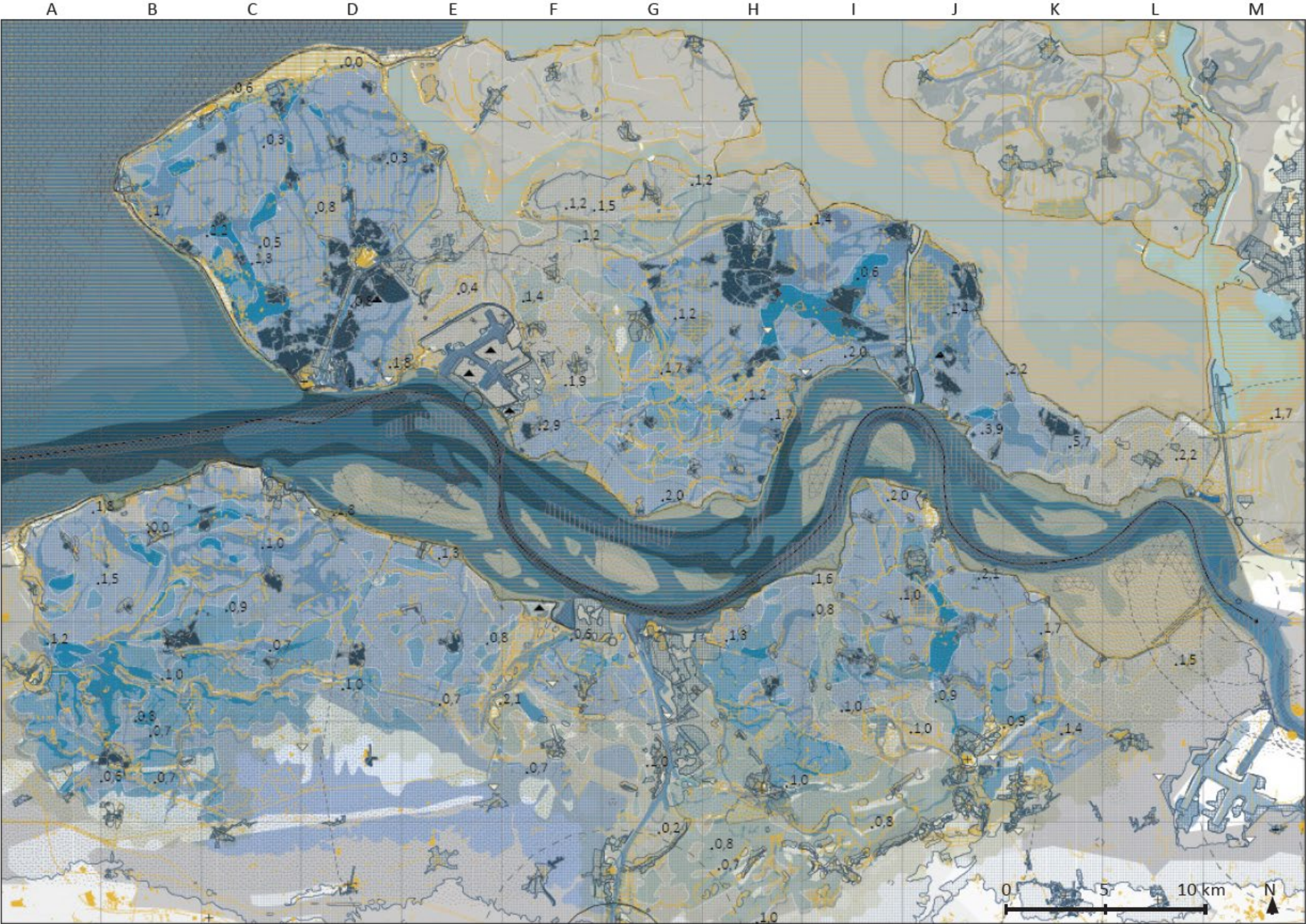
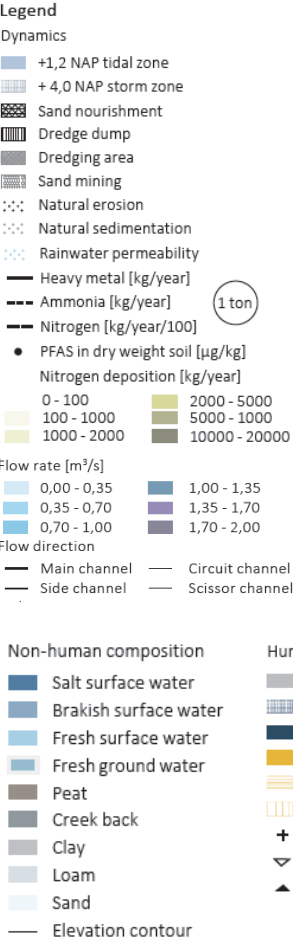


# WHAT IF WE REINTRODUCE THE DELTAIC CONDITIONS?



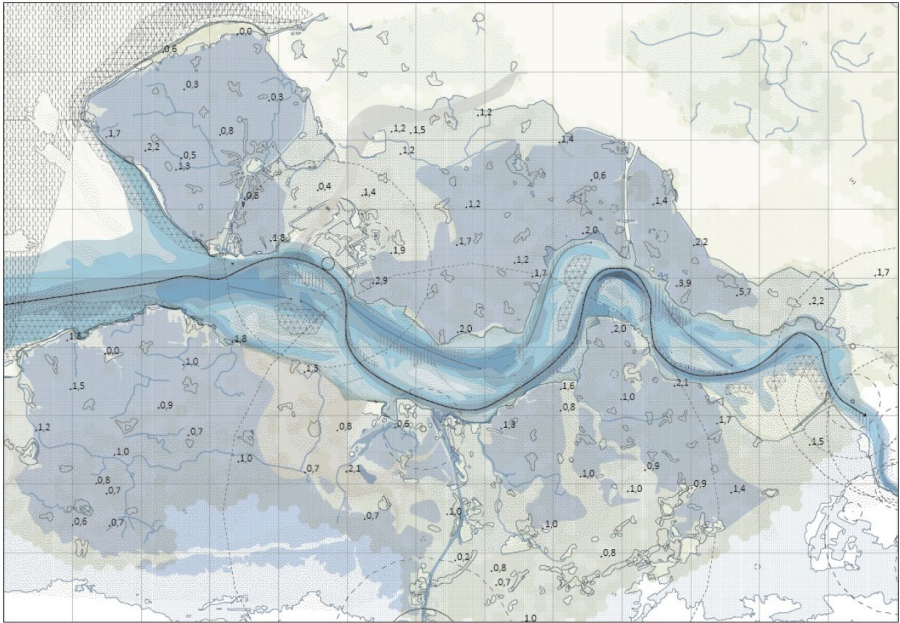


# RETURN OF THE DELTAIC CONDITIONS

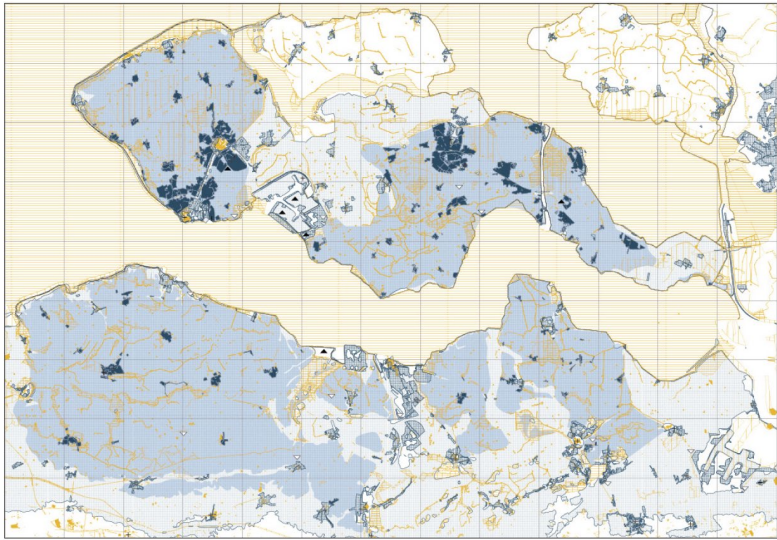




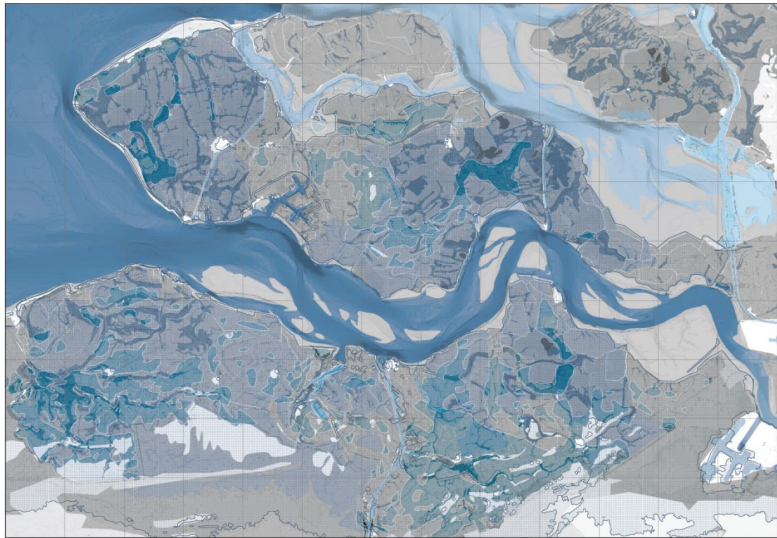
# RETURN OF FLOWS



[Fig. 15] Deltaic conditions: Flows.  
Source: Extract from the Deltaic Condition map.



[Fig. 16] Deltaic conditions: Human composition.  
Source: Extract from the Deltaic Condition map.



[Fig. 17] Deltaic conditions: Non-human composition.  
Source: Extract from the Deltaic Condition map.



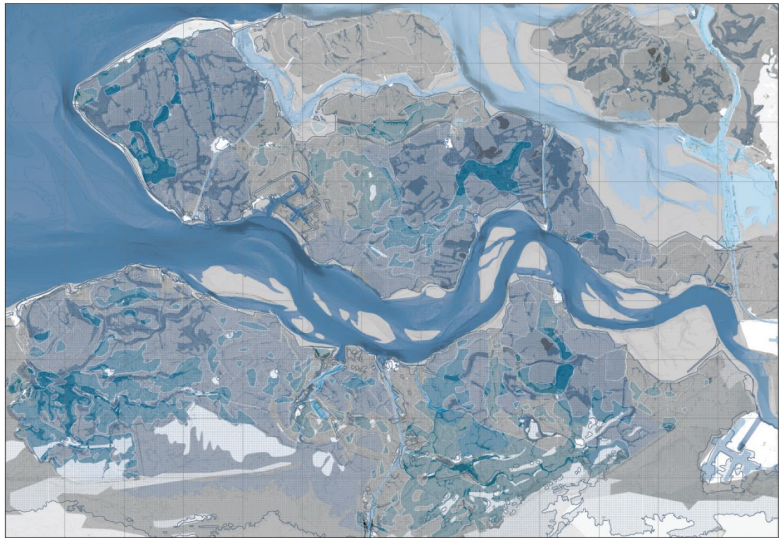
# RETURN OF FLOWS



[Fig. 15] Deltaic conditions: Flows.  
Source: Extract from the Deltaic Condition map.



[Fig. 16] Deltaic conditions: Human composition.  
Source: (H2O waternetwerk, 2020).



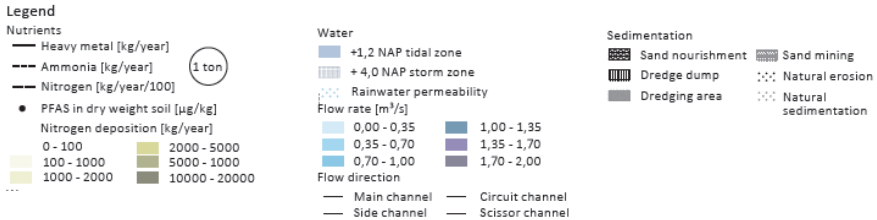
[Fig. 17] Deltaic conditions: Non-human composition.  
Source: (Financieel Dagblad, 2011).



# RETURN OF FLOWS



[Fig. 15] Deltaic conditions: Flows.  
Source: Extract from the Deltaic Condition map.



[Fig. 16] Deltaic conditions: Human composition.  
Source: (H2O waternetwerk, 2020).



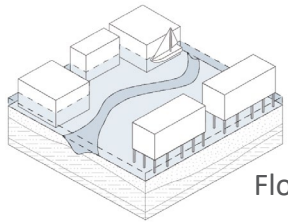
[Fig. 17] Deltaic conditions: Non-human composition.  
Source: (Financieel Dagblad, 2011).

WHAT DESIGN PRINCIPLES ENABLES THE RETURN OF THE DELTAIC CONDITIONS TO BE POSITIVE?

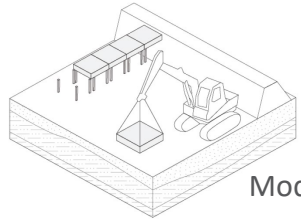
# WHAT DESIGN PRINCIPLES ENABLES THE RETURN OF THE DELTAIC CONDITIONS TO BE POSITIVE?



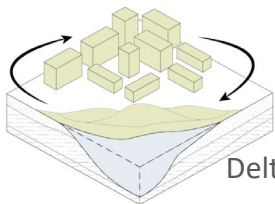
Delta-sensitive city



Flood-Proof Living Spaces



Modular Infrastructure



Deltaic Circularity

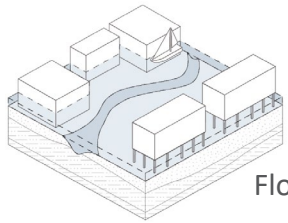
# WHAT DESIGN PRINCIPLES ENABLES THE RETURN OF THE DELTAIC CONDITIONS TO BE POSITIVE?



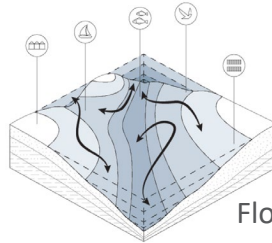
Delta-sensitive city



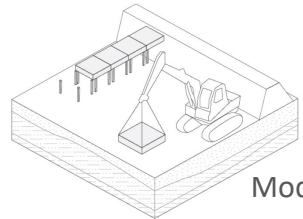
Dynamic Deltascapes



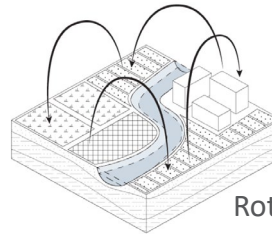
Flood-Proof Living Spaces



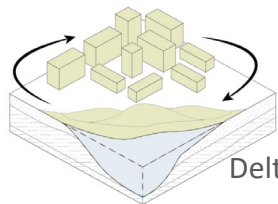
Flow-Driven Land Use



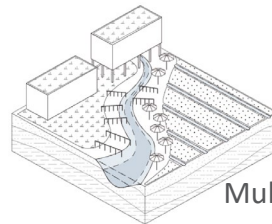
Modular Infrastructure



Rotational Eco-Management



Deltaic Circularity



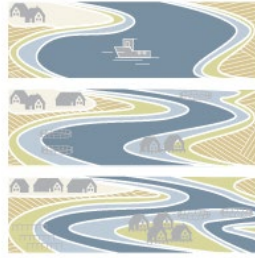
Multifunctional Landscapes



# WHAT DESIGN PRINCIPLES ENABLES THE RETURN OF THE DELTAIC CONDITIONS TO BE POSITIVE?



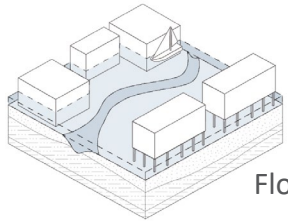
Delta-sensitive city



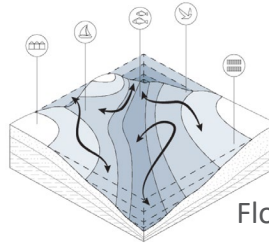
Dynamic Deltascape



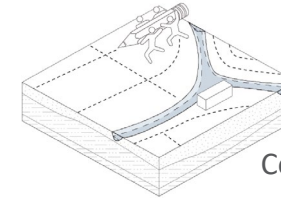
Making with the Delta



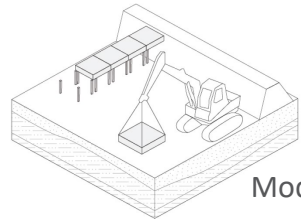
Flood-Proof Living Spaces



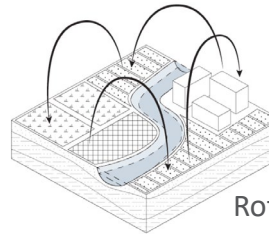
Flow-Driven Land Use



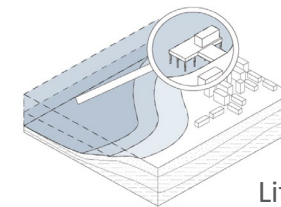
Community-Led Landscaping



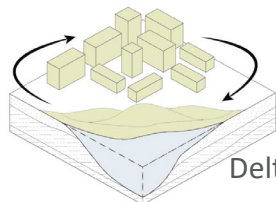
Modular Infrastructure



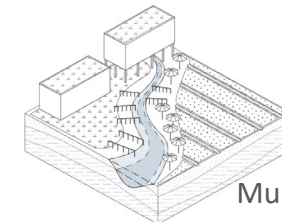
Rotational Eco-Management



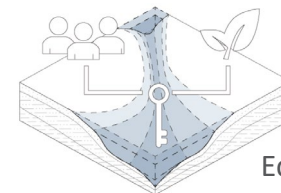
Life-as-Lab



Deltaic Circularity



Multifunctional Landscapes



Eco-collective Landownership

## VISION: RISE OF THE MARSHIANS



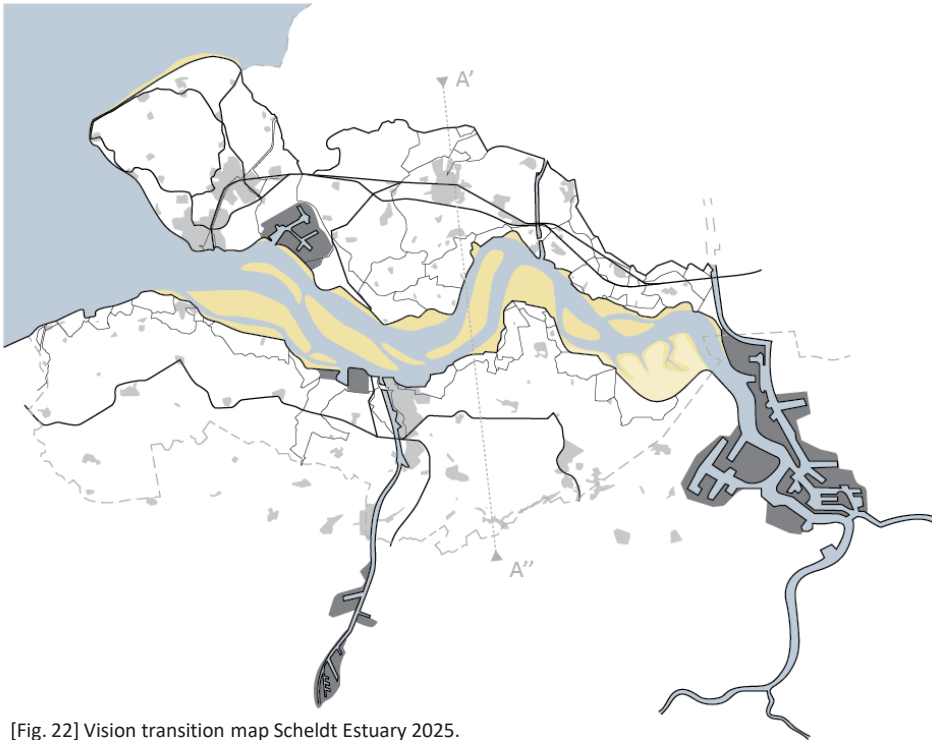


# VISION: RISE OF THE MARSHIANS

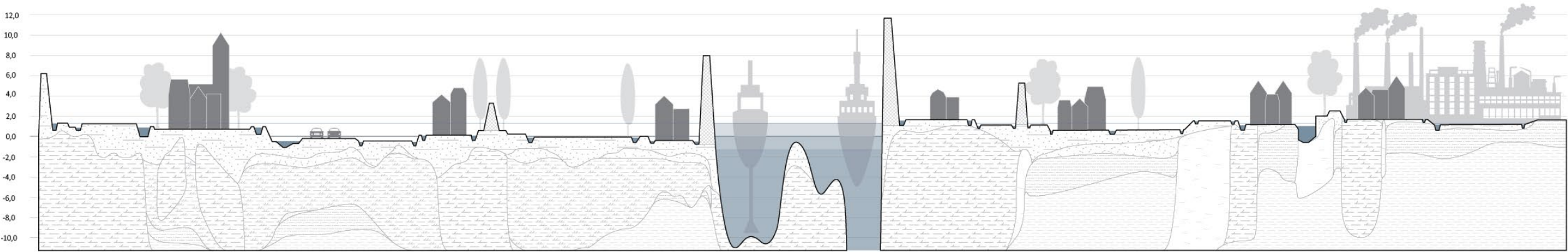


[Fig. 20] Vision map: Rise of the Marshians.  
Source: Extract from the Deltaic Condition map & TU Delft (2024).

VISION PHASING:  
2025 - CURRENT SITUATION

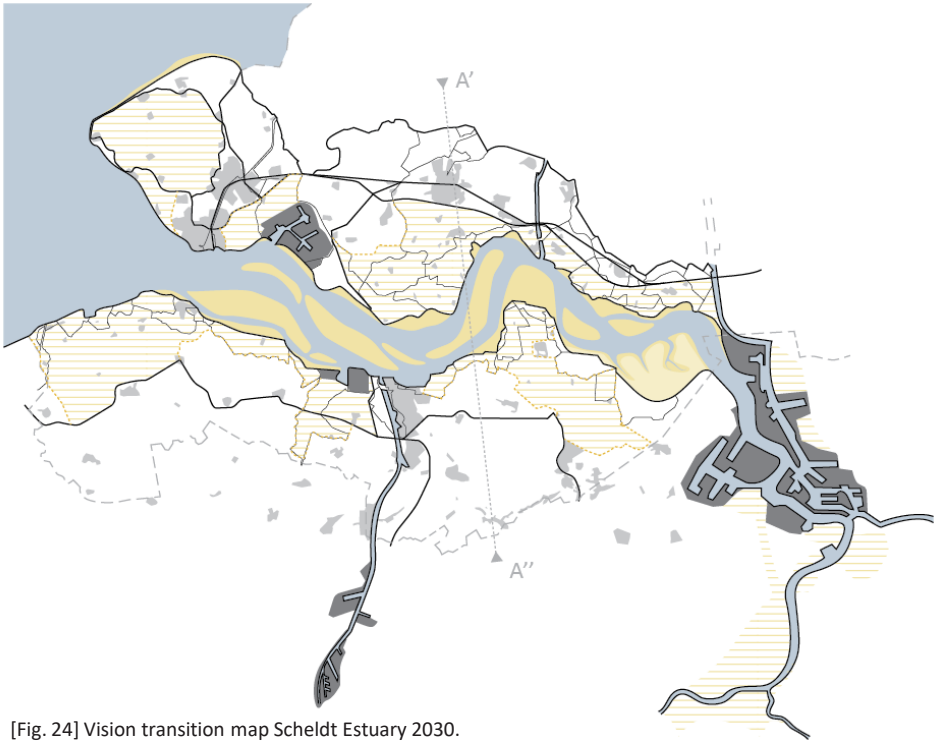


[Fig. 22] Vision transition map Scheldt Estuary 2025.

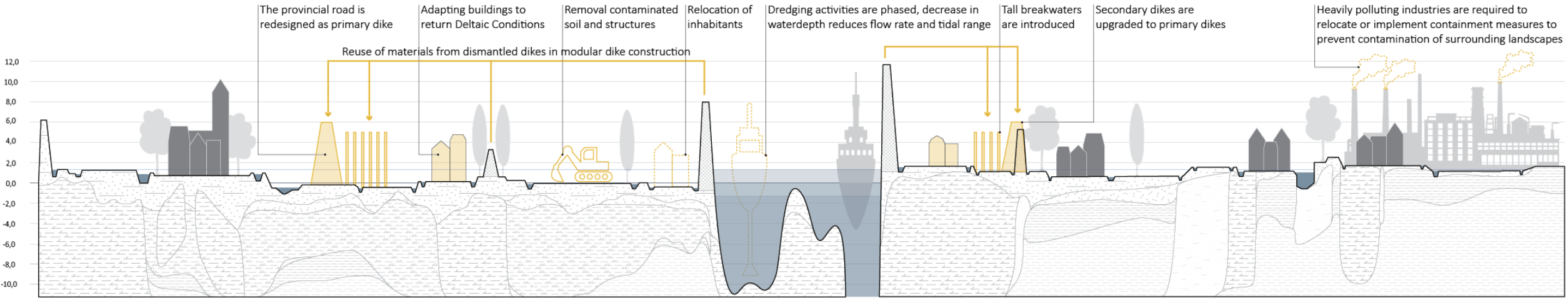




VISION PHASING:  
2025 - CURRENT SITUATION  
2030 - PREPARATION FOR OPENING THE COAST



[Fig. 24] Vision transition map Scheldt Estuary 2030.

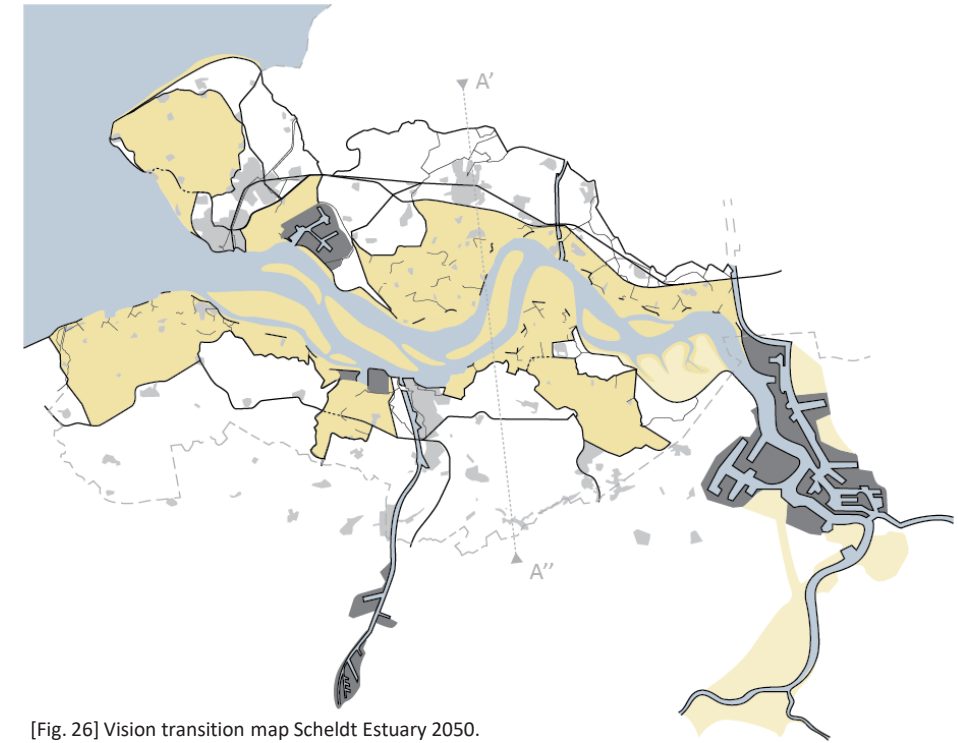


## VISION PHASING:

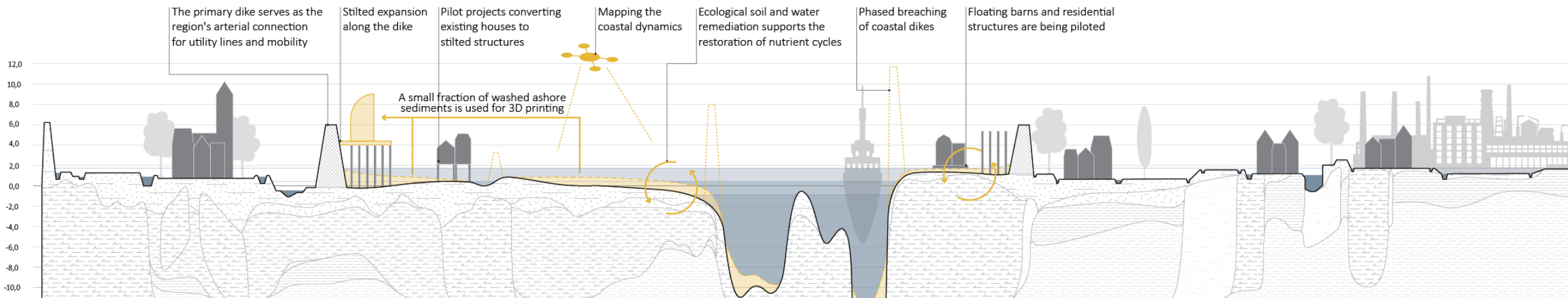
2025 - CURRENT SITUATION

2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING



[Fig. 26] Vision transition map Scheldt Estuary 2050.



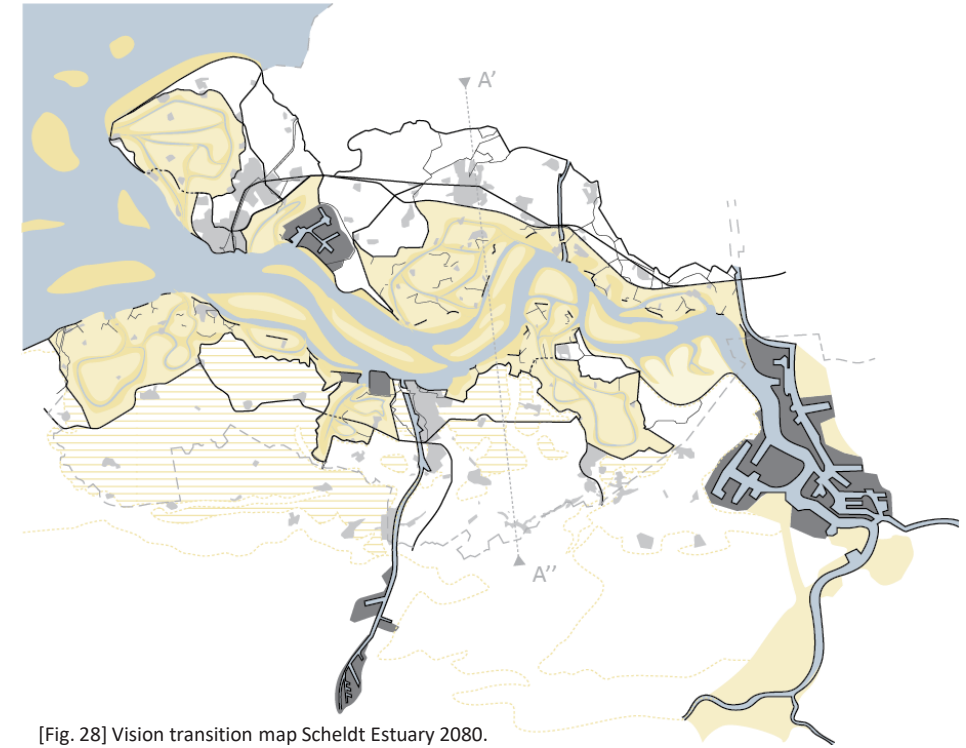
## VISION PHASING:

2025 - CURRENT SITUATION

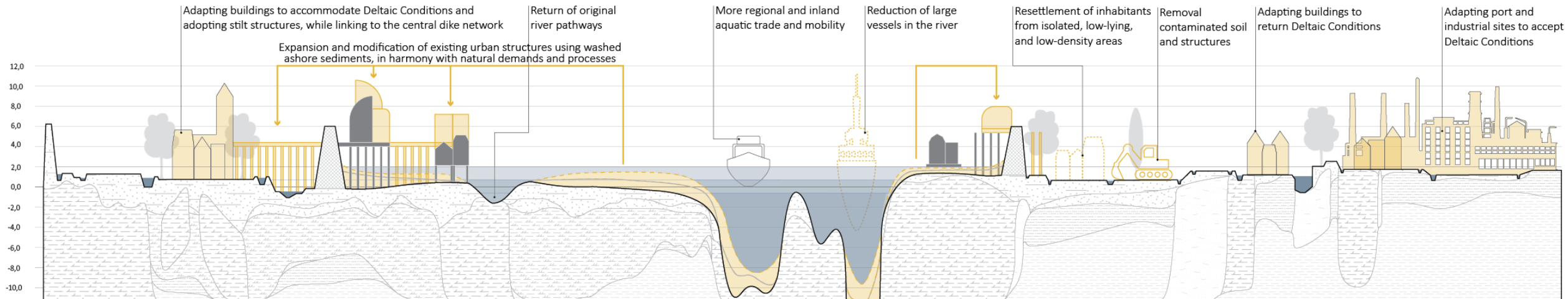
2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING

2080 - ACCELERATION



[Fig. 28] Vision transition map Scheldt Estuary 2080.



## VISION PHASING:

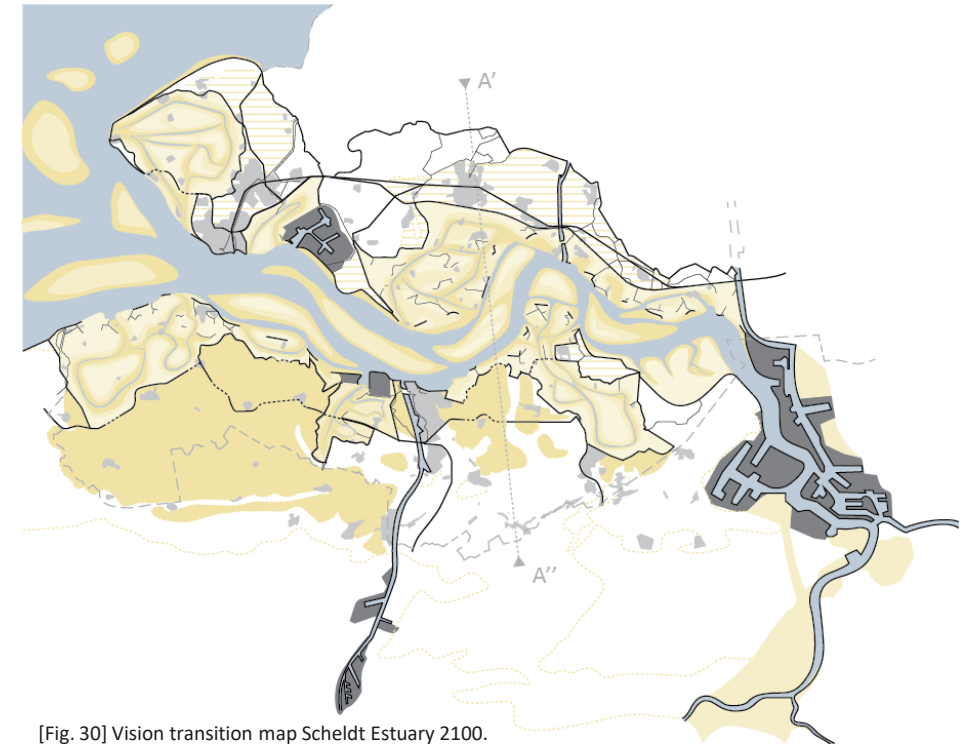
2025 - CURRENT SITUATION

2030 - PREPARATION FOR OPENING THE COAST

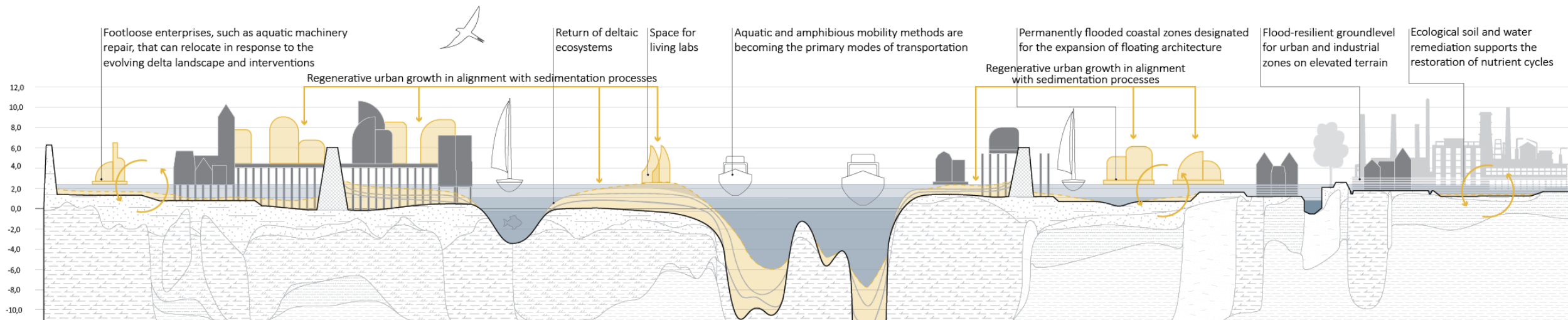
2050 - CLEANING & EXPERIMENTING

2080 - ACCELERATION

2100 – FLIPPING THE LANDSCAPE



[Fig. 30] Vision transition map Scheldt Estuary 2100.





## VISION PHASING:

2025 - CURRENT SITUATION

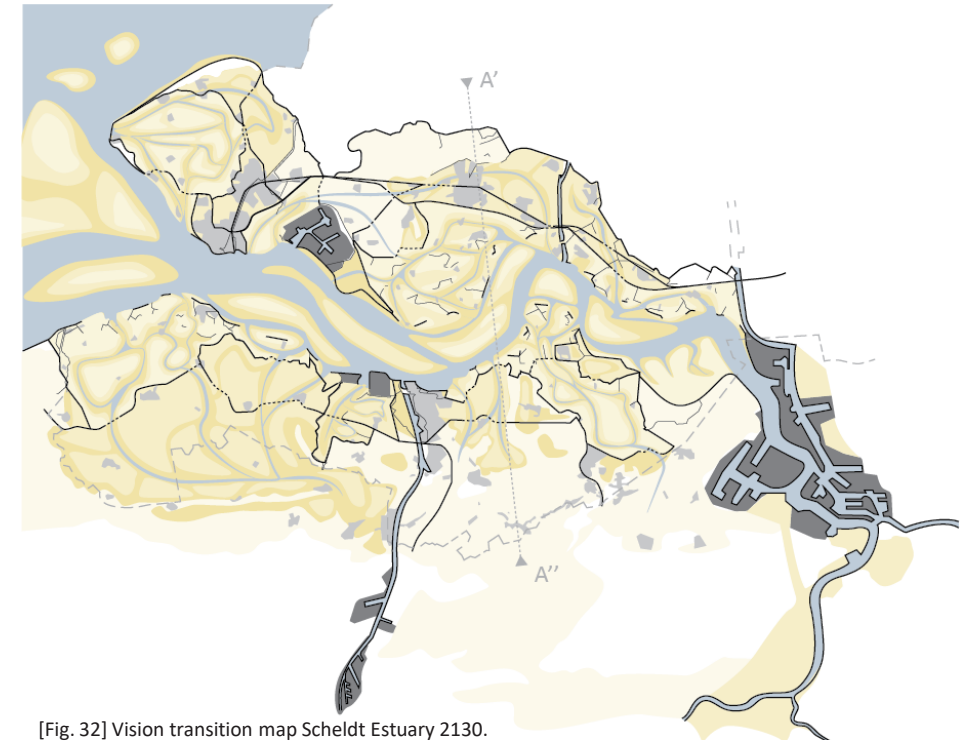
2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING

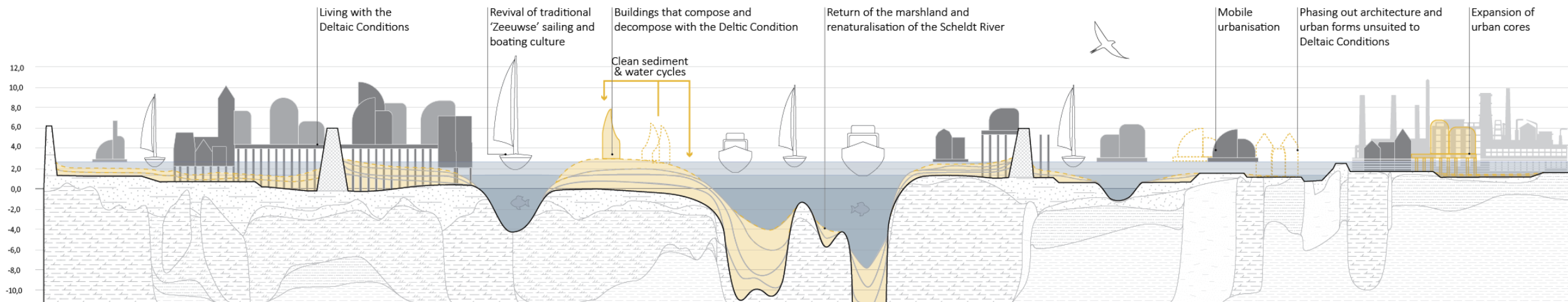
2080 - ACCELERATION

2100 – FLIPPING THE LANDSCAPE

2130 – RETURN TO MARSH



[Fig. 32] Vision transition map Scheldt Estuary 2130.



# EXPLORATIONS: LOCATIONS



[Fig. 33] Exploration location.  
Sources: (Vision layers combined with Bing Satellite Map (2024)).



## EXPLORATION: GENERAL TRANSFORMATIONS

DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE

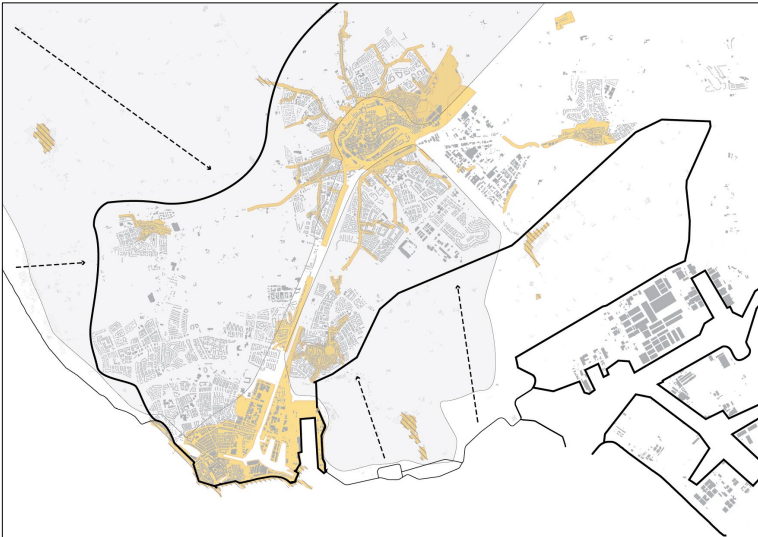


LIVING LAB HOOFDPLAAT

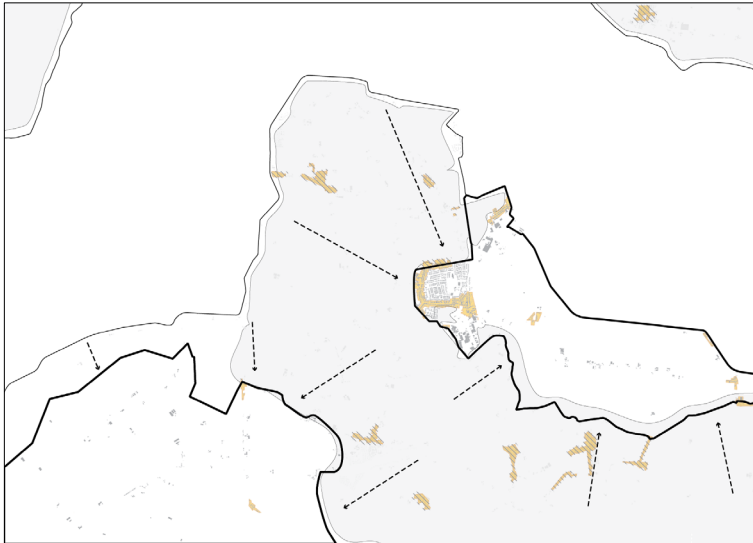


# EXPLORATION: GENERAL TRANSFORMATIONS

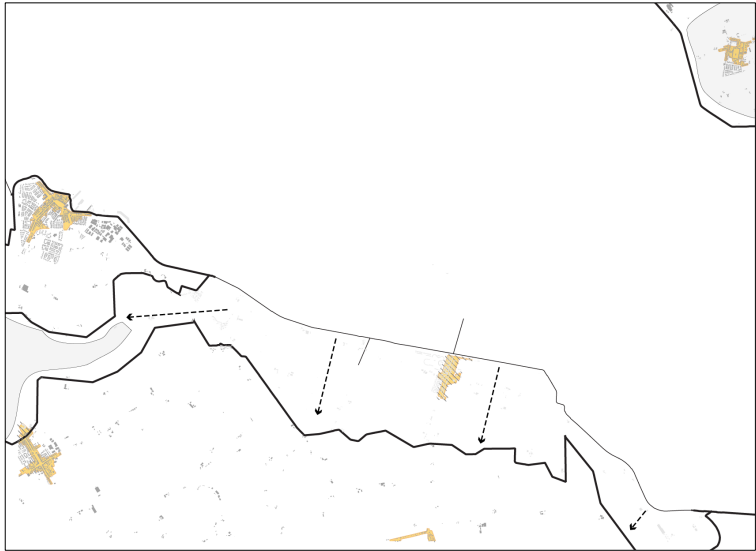
DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE



LIVING LAB HOOFDPLAAT



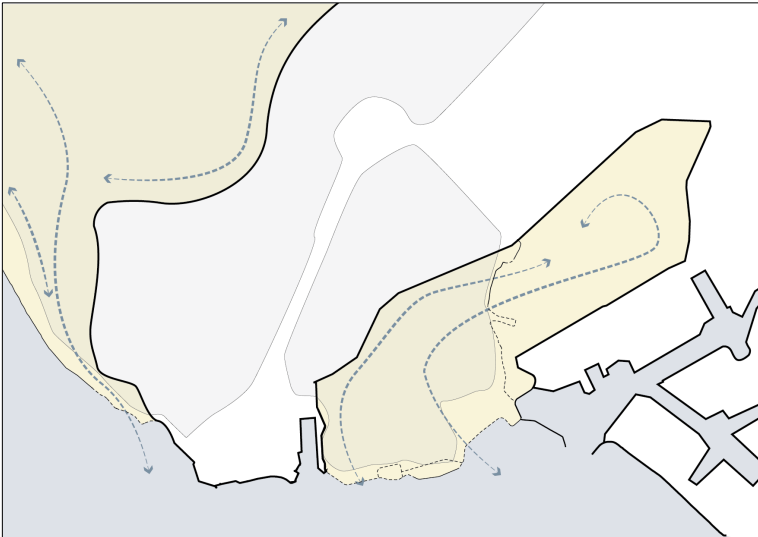
**Legend**

Building	New Dike Ring
Below Sea Level	Original Dike Ring
Lead Contamination	Retreat

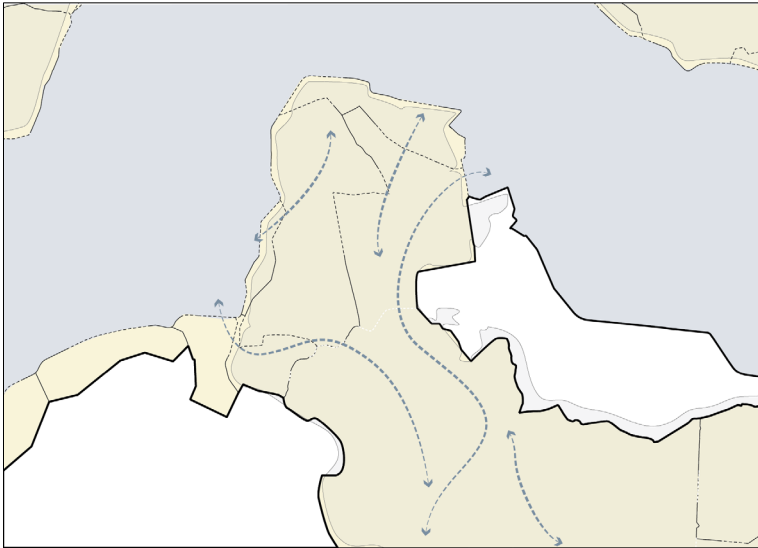


# EXPLORATION: GENERAL TRANSFORMATIONS

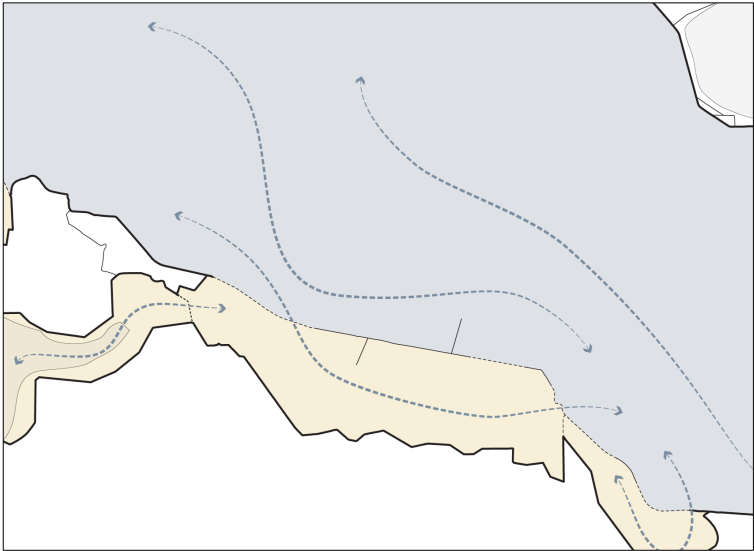
DELTAIC SPINE VLISINGEN



MARSH CULTIVATION KLOOSTERZANDE



LIVING LAB HOOFDPLAAT



**Legend**

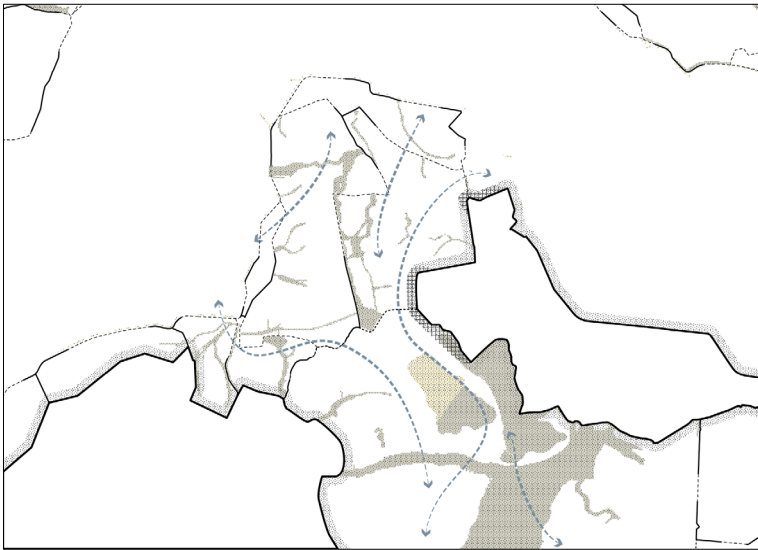
New Marsh Lands	New Dike Ring
River	Original Dike Ring
Below Sea Level	Opened Dikes

EXPLORATION: GENERAL TRANSFORMATIONS

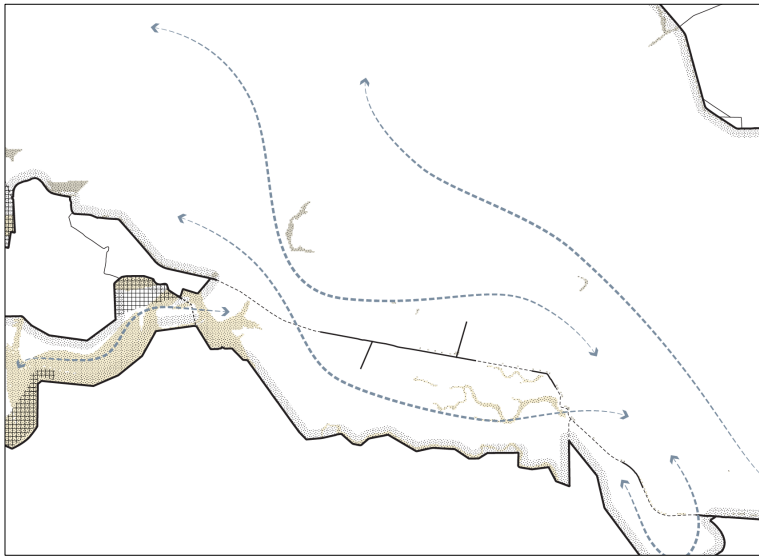
DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE

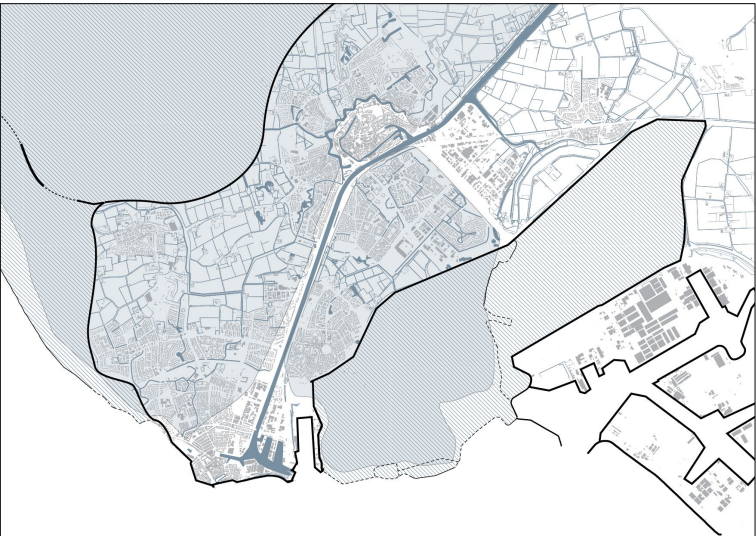


LIVING LAB HOOFDPLAAT

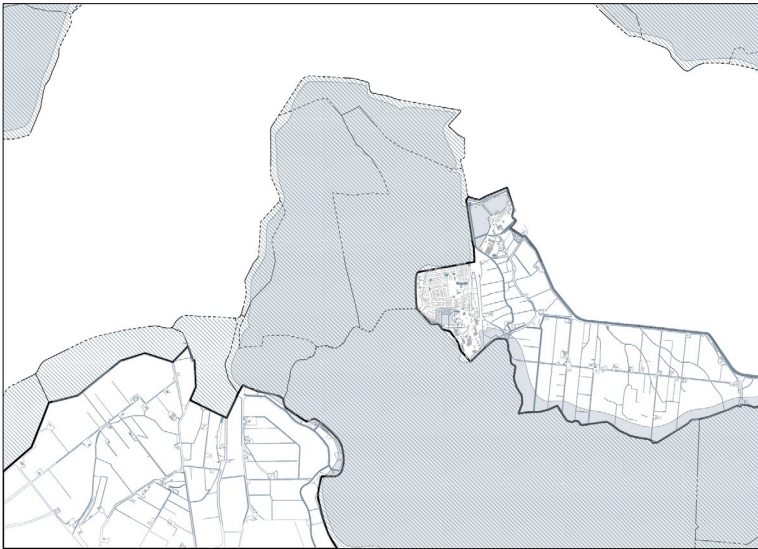


# EXPLORATION: GENERAL TRANSFORMATIONS

DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE



LIVING LAB HOOFDPLAAT



Legend

Building	New Dike Ring
Below Sea Level	Original Dike Ring
Drainage System	Dynamic Zoning



# EXPLORING THE SITUATED TRANSFORMATIONS

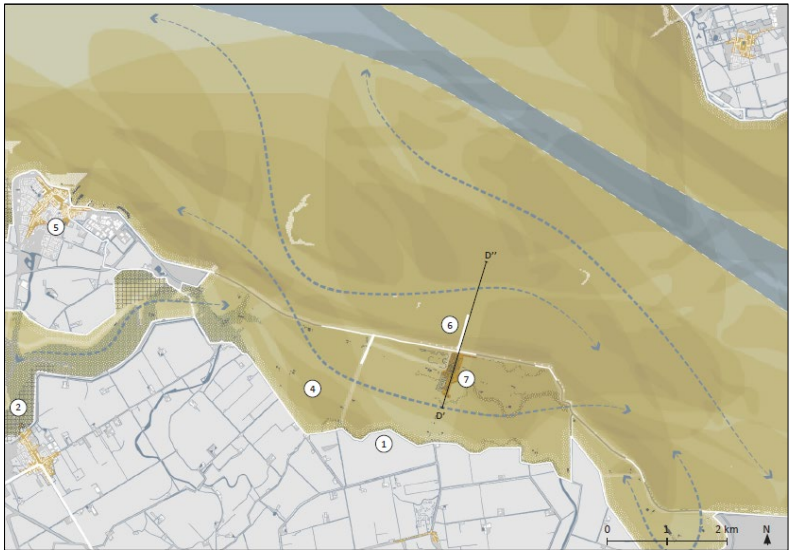
DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE



LIVING LAB HOOFDPLAAT



## Legend

- Inner dike area
- Traditional agriculture
- Water
- Marshland with Dynamic farming
- Preserved dike
- Added dike
- Porous dike
- Removed dike

- Preserved urbanisation
- Adapted urbanisation
- Water pathway
- Stilt expansion
- Creek ridge
- Sand
- Nature bufferzone
- Potential lead contamination

## Situated Transformations

- 1 Modular Dikes
- 2 Sandscaping
- 3 Wet-Proof Urbanism
- 4 Dynamic Farming
- 5 Flood-proof Urbanism
- 6 Dike as Breakwater
- 7 Living-Lab



# EXPLORING THE SITUATED TRANSFORMATIONS

DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE



LIVING LAB HOOFDPLAAT



## Legend

- Inner dike area
- Traditional agriculture
- Water
- Marshland with Dynamic farming
- Preserved dike
- Added dike
- Porous dike
- Removed dike

- Preserved urbanisation
- Adapted urbanisation
- Water pathway
- Stilt expansion
- Creek ridge
- Sand
- Nature bufferzone
- Potential lead contamination

## Situated Transformations

- 1 Modular Dikes
- 2 Sandscaping
- 3 Wet-Proof Urbanism
- 4 Dynamic Farming
- 5 Flood-proof Urbanism
- 6 Dike as Breakwater
- 7 Living-Lab

**B'**

2025- Current situation

2030- Preparation for return of the Deltaic Condition

2050- Cleaning & Experimenting

2080- Acceleration

**Transformation 3:**  
Wet Proof Urban Settlements

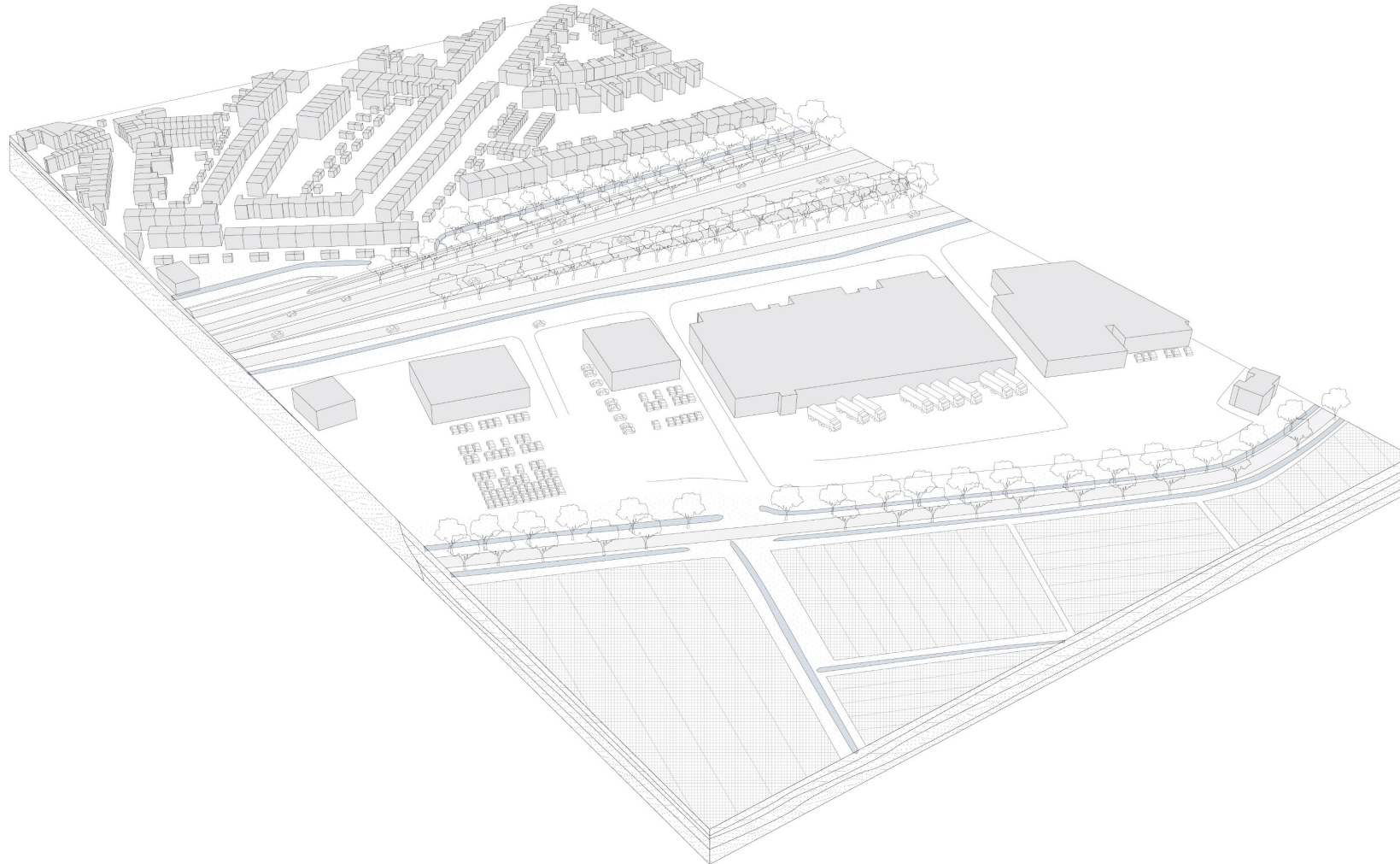
**Transformation 1:**  
Dike as Leverage for Modularity

**Transformation 2:**  
Sandscaping

**B''**

# DELTAIC SPINE VLISSINGEN

## 2025 - CURRENT SITUATION

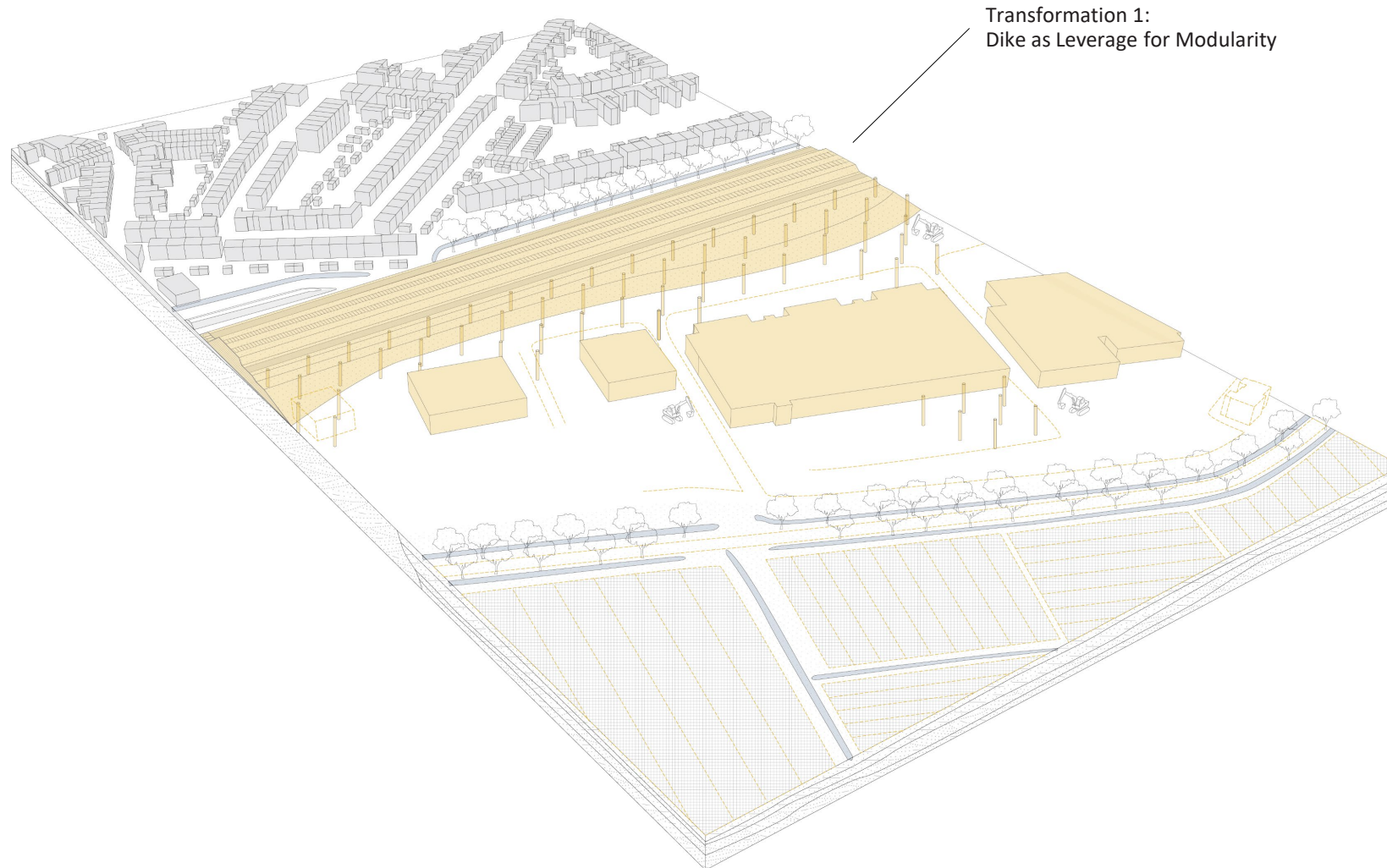




# DELTAIC SPINE VLISSINGEN

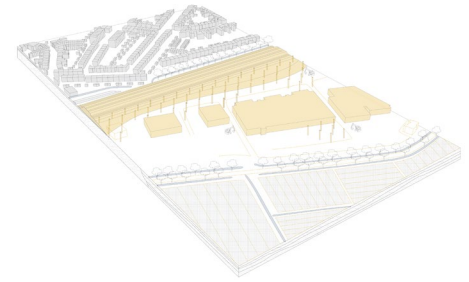
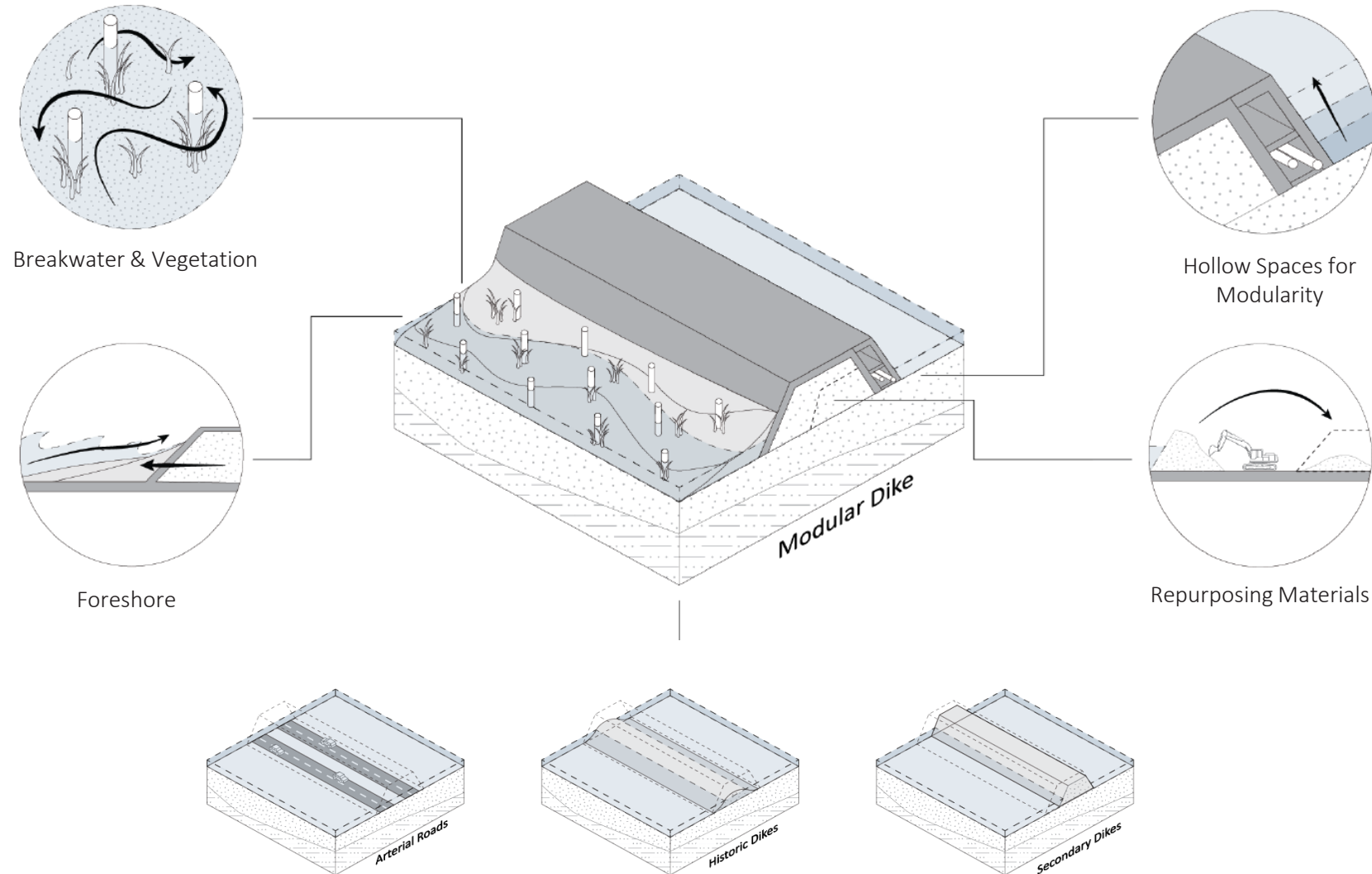
2025 - CURRENT SITUATION

2030 - PREPARATION FOR OPENING THE COAST

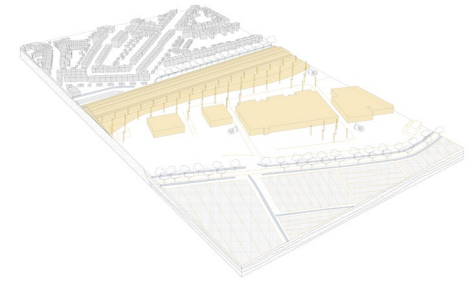
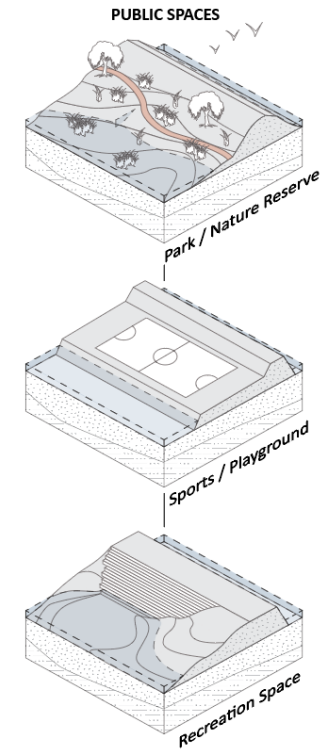
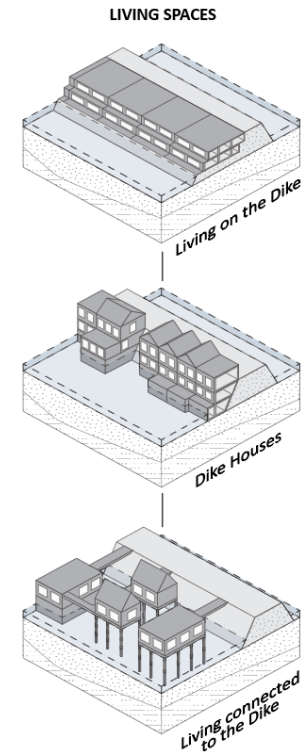
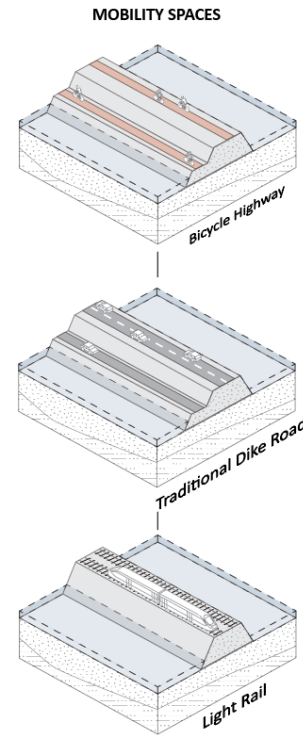
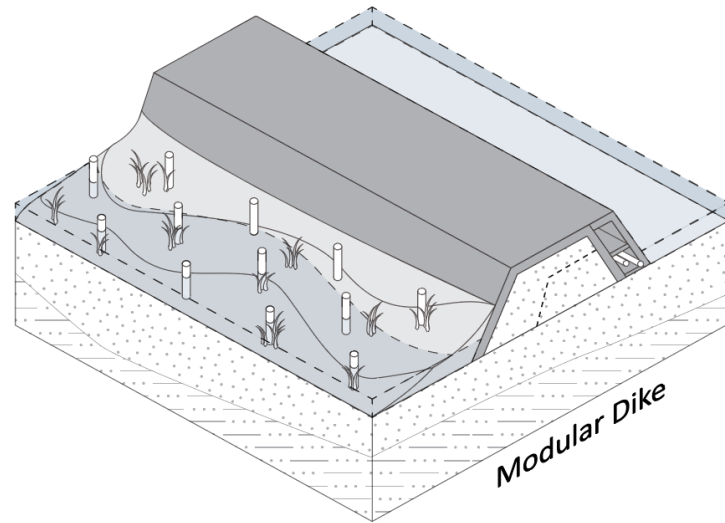




# SITUATED TRANSFORMATION 1: DIKE AS LEVERAGE FOR MODULARITY



# SITUATED TRANSFORMATION 1: DIKE AS LEVERAGE FOR MODULARITY

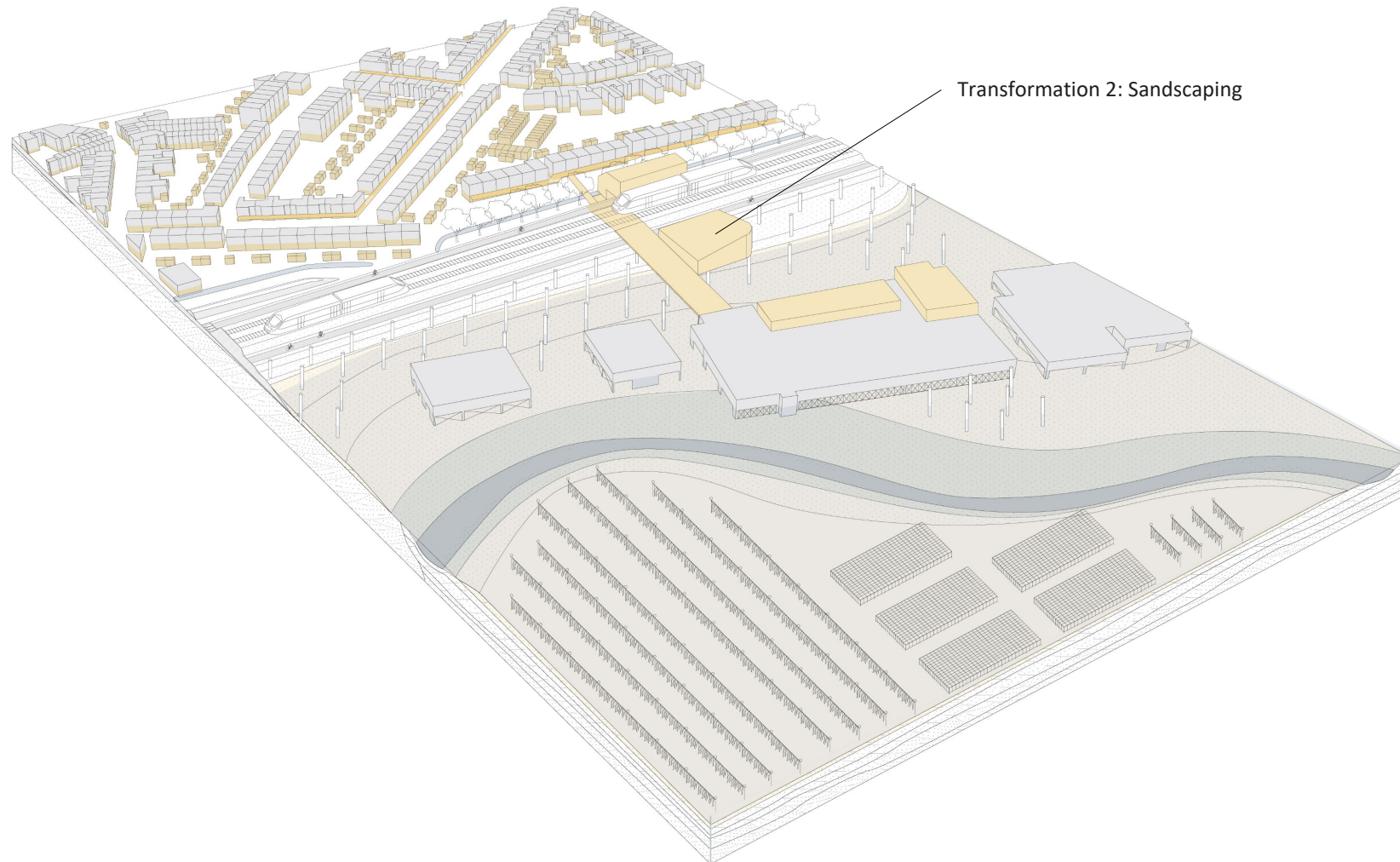


# DELTAIC SPINE VLISSINGEN

2025 - CURRENT SITUATION

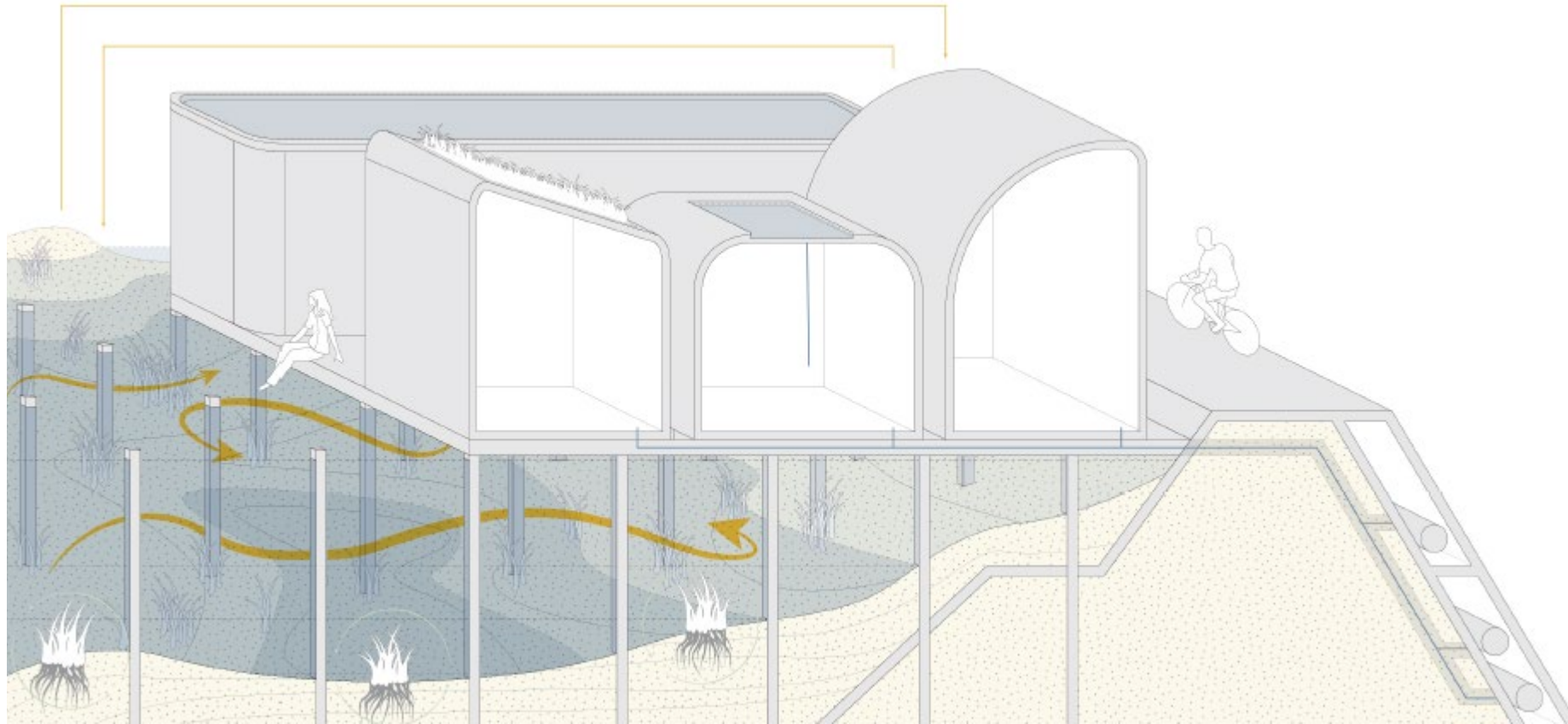
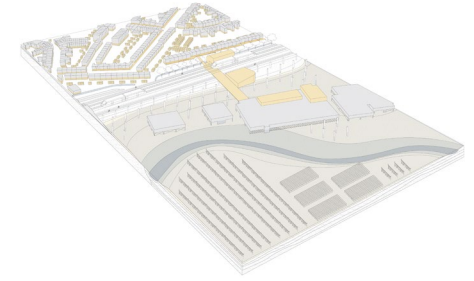
2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING





## SITUATED TRANSFORMATION 2: SANDSCAPING



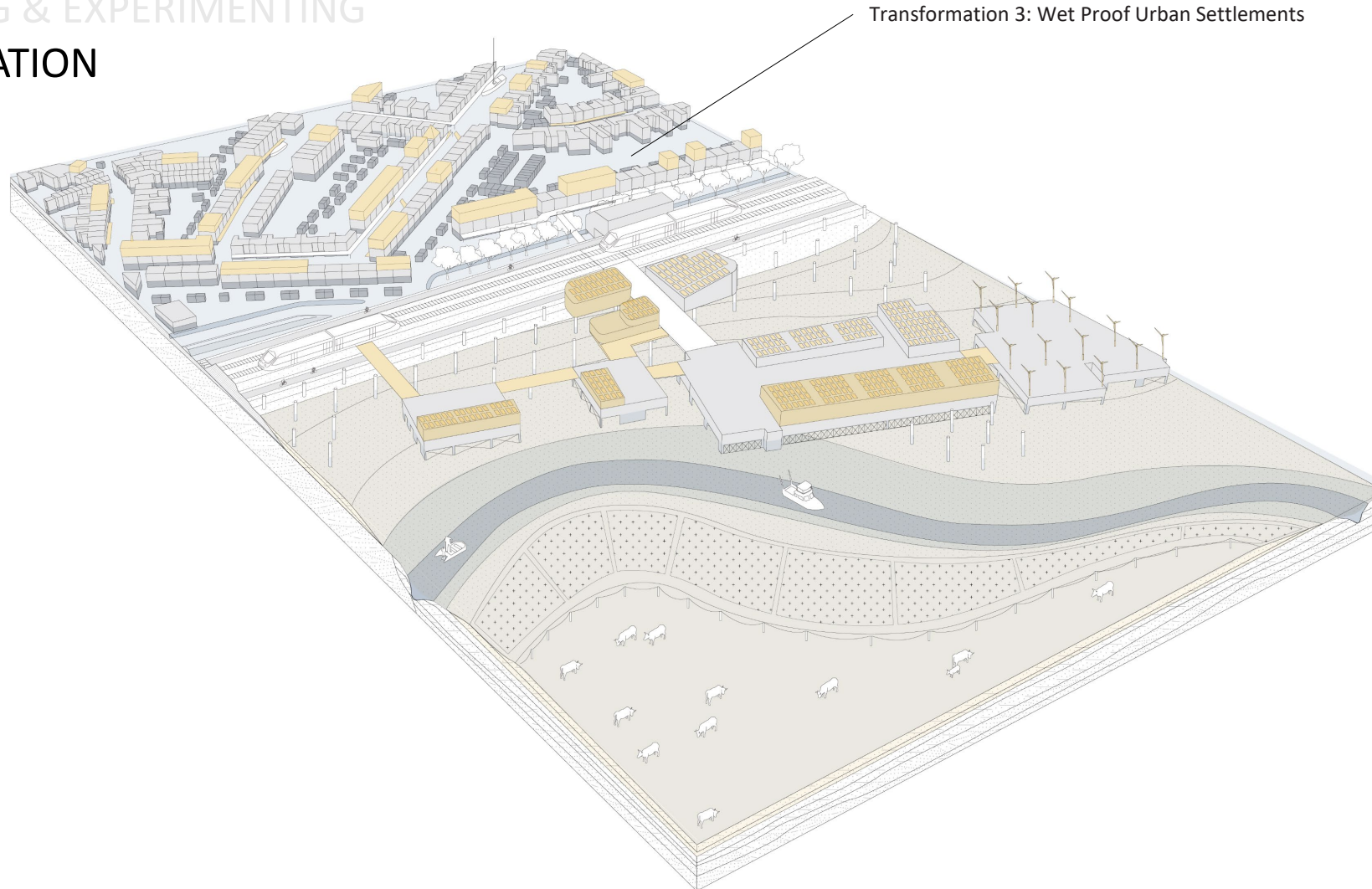
# DELTAIC SPINE VLISSINGEN

2025 - CURRENT SITUATION

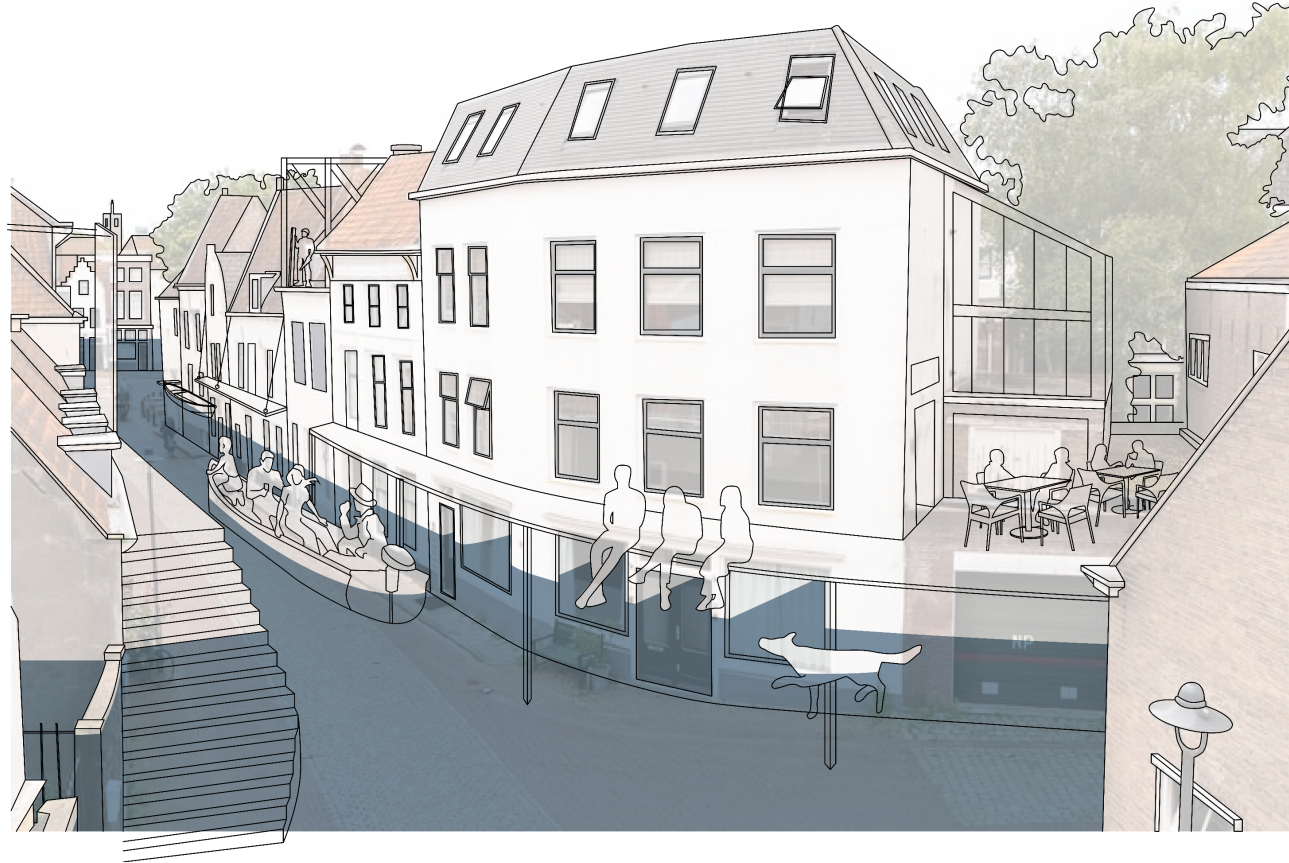
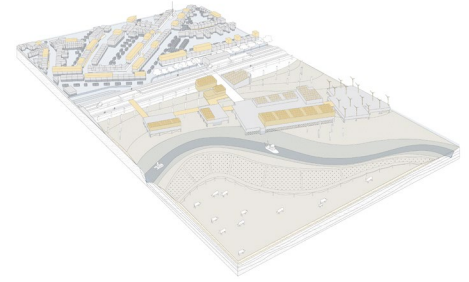
2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING

2080 - ACCELERATION



## TRANSFORMATION 3: WET PROOF URBAN SETTLEMENTS





# EXPLORING THE SITUATED TRANSFORMATIONS

DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE



LIVING LAB HOOFDPLAAT



## Legend

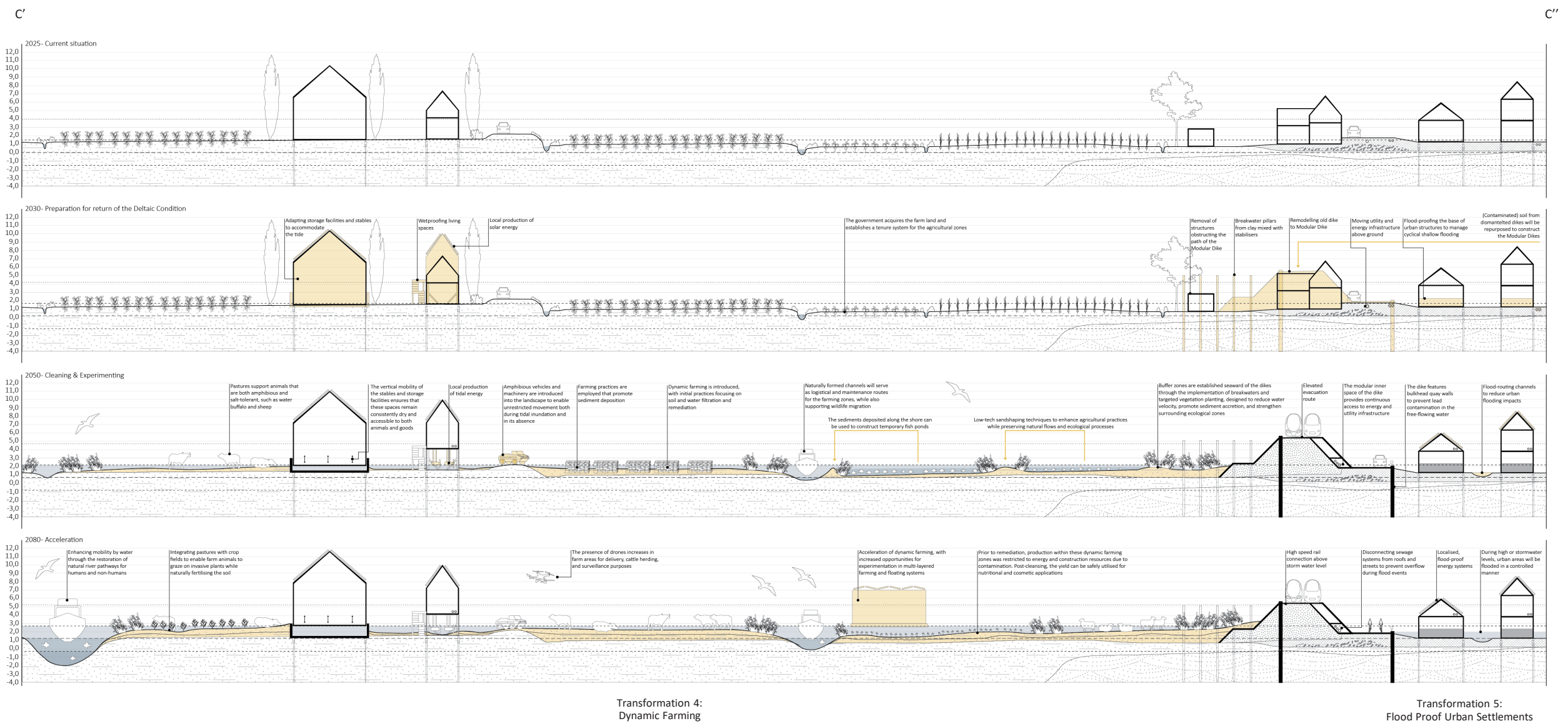
- Inner dike area
- Traditional agriculture
- Water
- Marshland with Dynamic farming
- Preserved dike
- Added dike
- Porous dike
- Removed dike

- Preserved urbanisation
- Adapted urbanisation
- Water pathway
- Stilt expansion
- Creek ridge
- Sand
- Nature bufferzone
- Potential lead contamination

## Situated Transformations

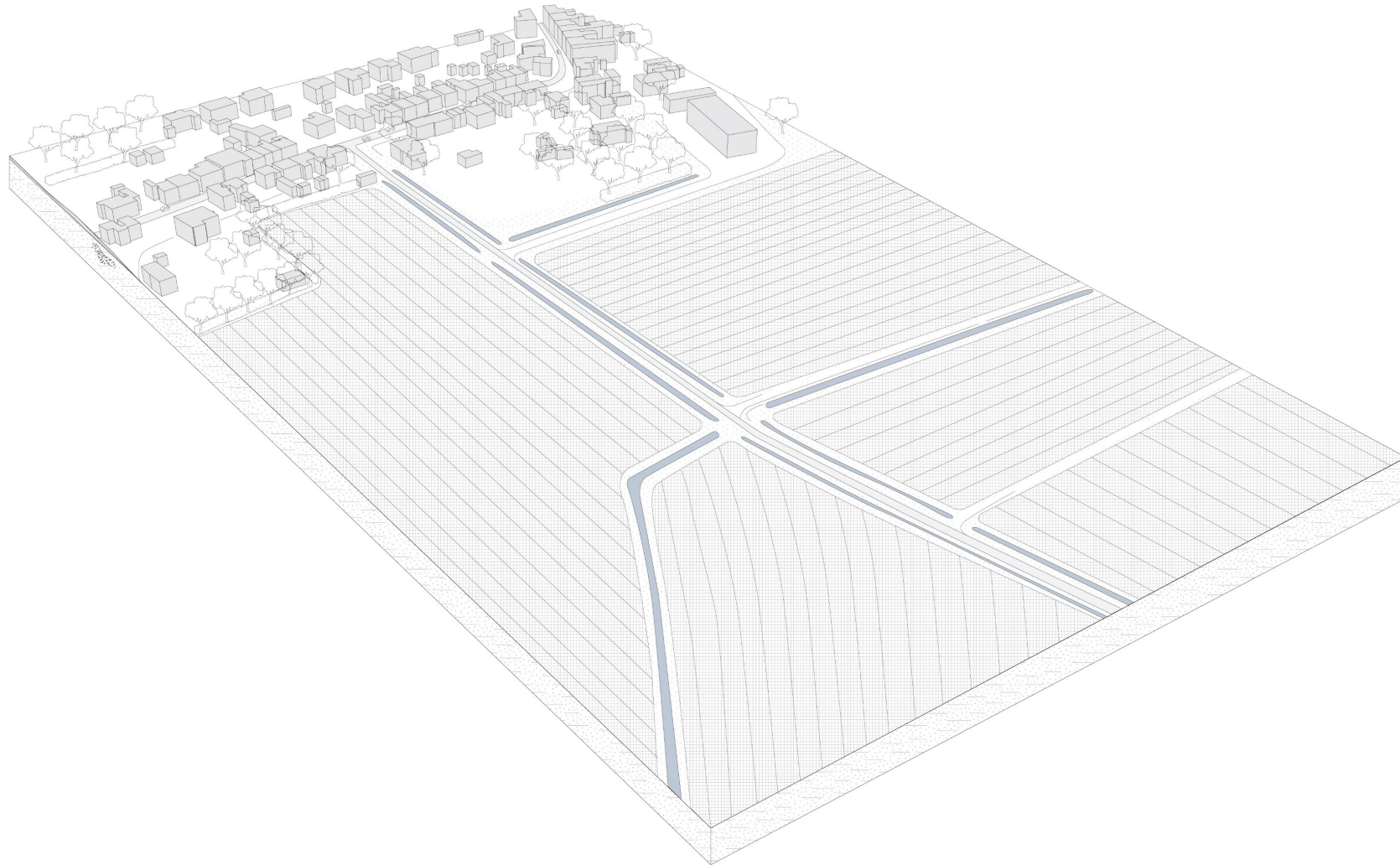
- 1 Modular Dikes
- 2 Sandscaping
- 3 Wet-Proof Urbanism
- 4 Dynamic Farming
- 5 Flood-proof Urbanism
- 6 Dike as Breakwater
- 7 Living-Lab

# MARSH CULTIVATION KLOOSTERZANDE



# MARSH CULTIVATION KLOOSTERZANDE

## 2025 - CURRENT SITUATION

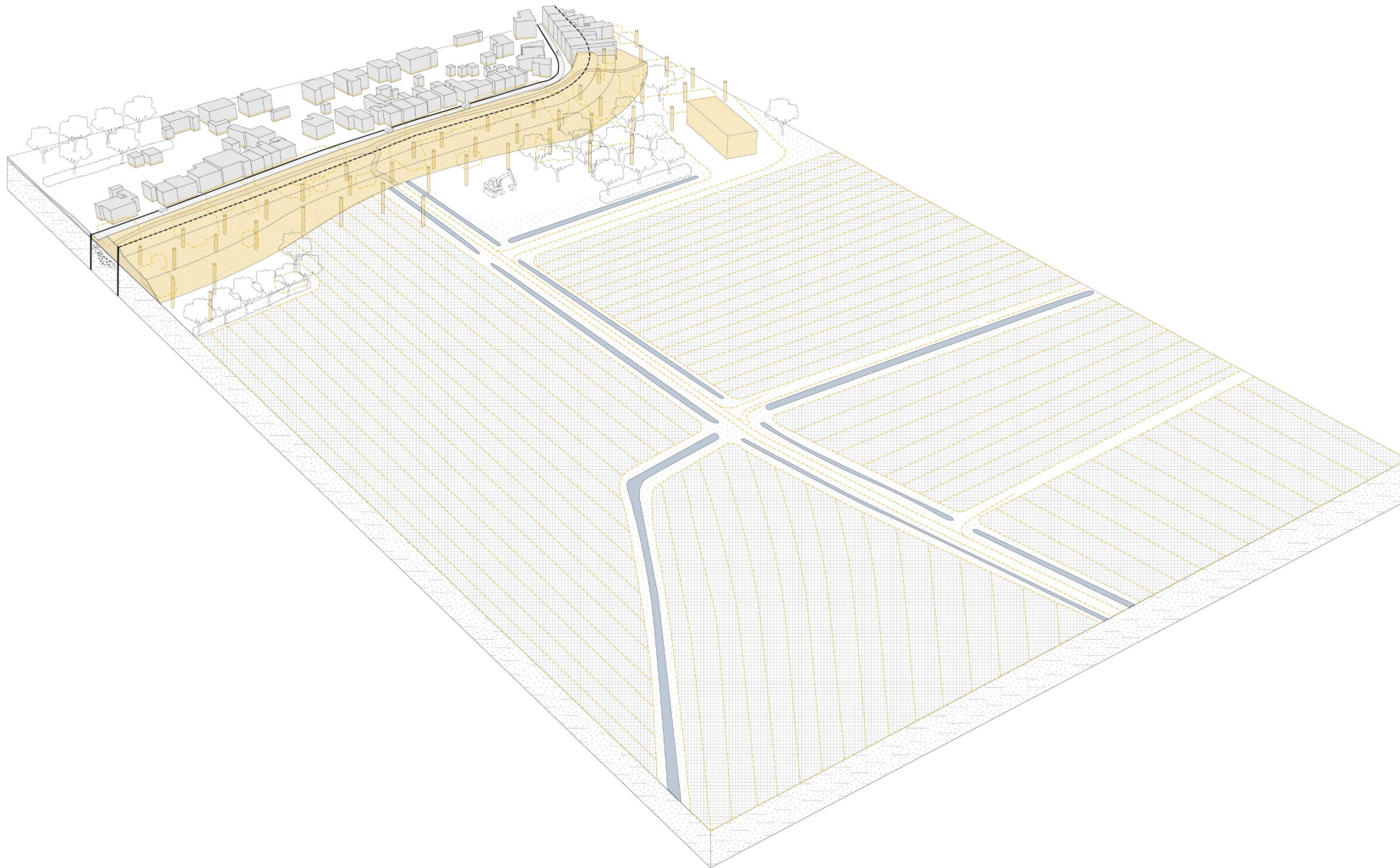




# MARSH CULTIVATION KLOOSTERZANDE

2025 - CURRENT SITUATION

2030 - PREPARATION FOR OPENING THE COAST

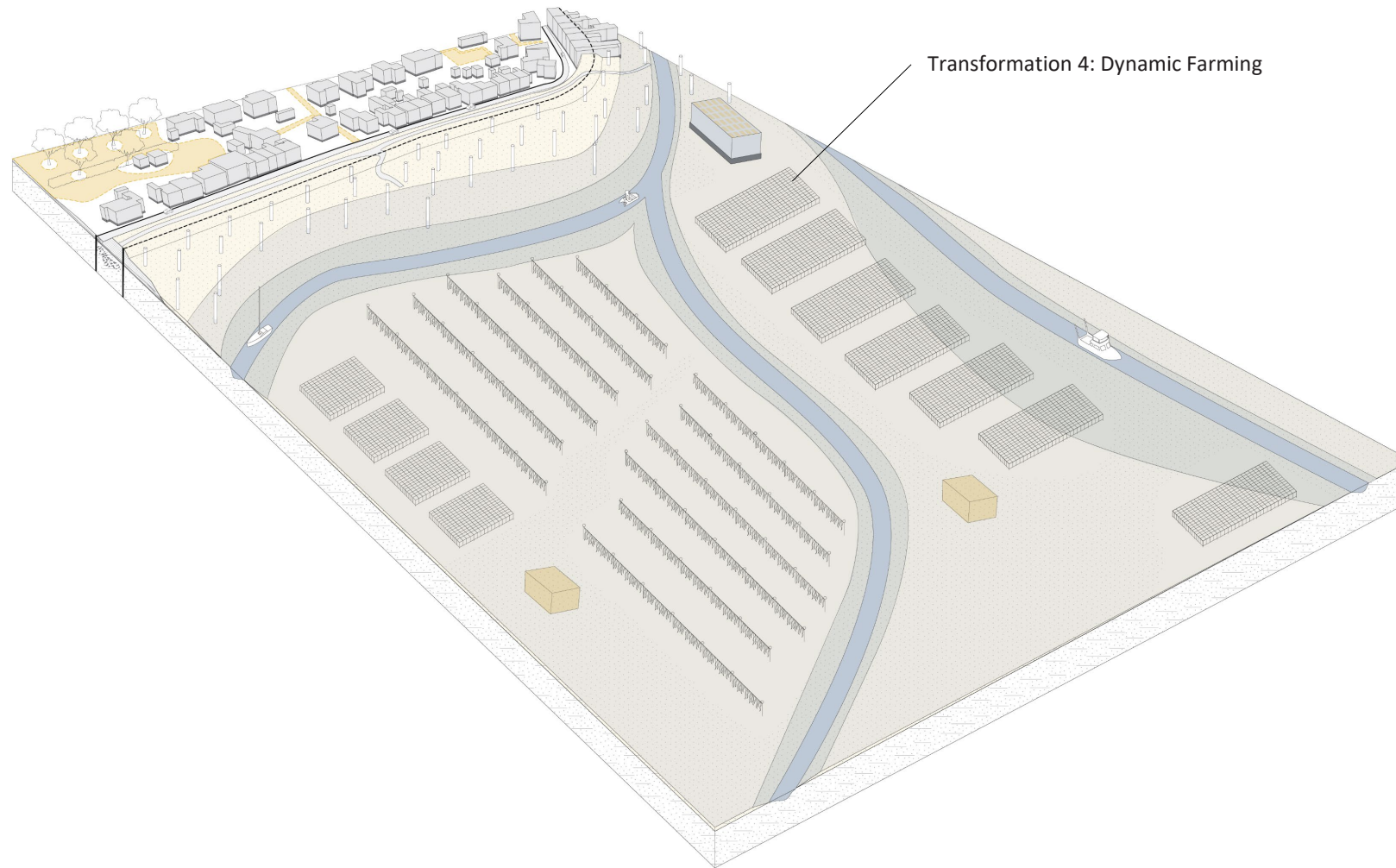


# MARSH CULTIVATION KLOOSTERZANDE

2025 - CURRENT SITUATION

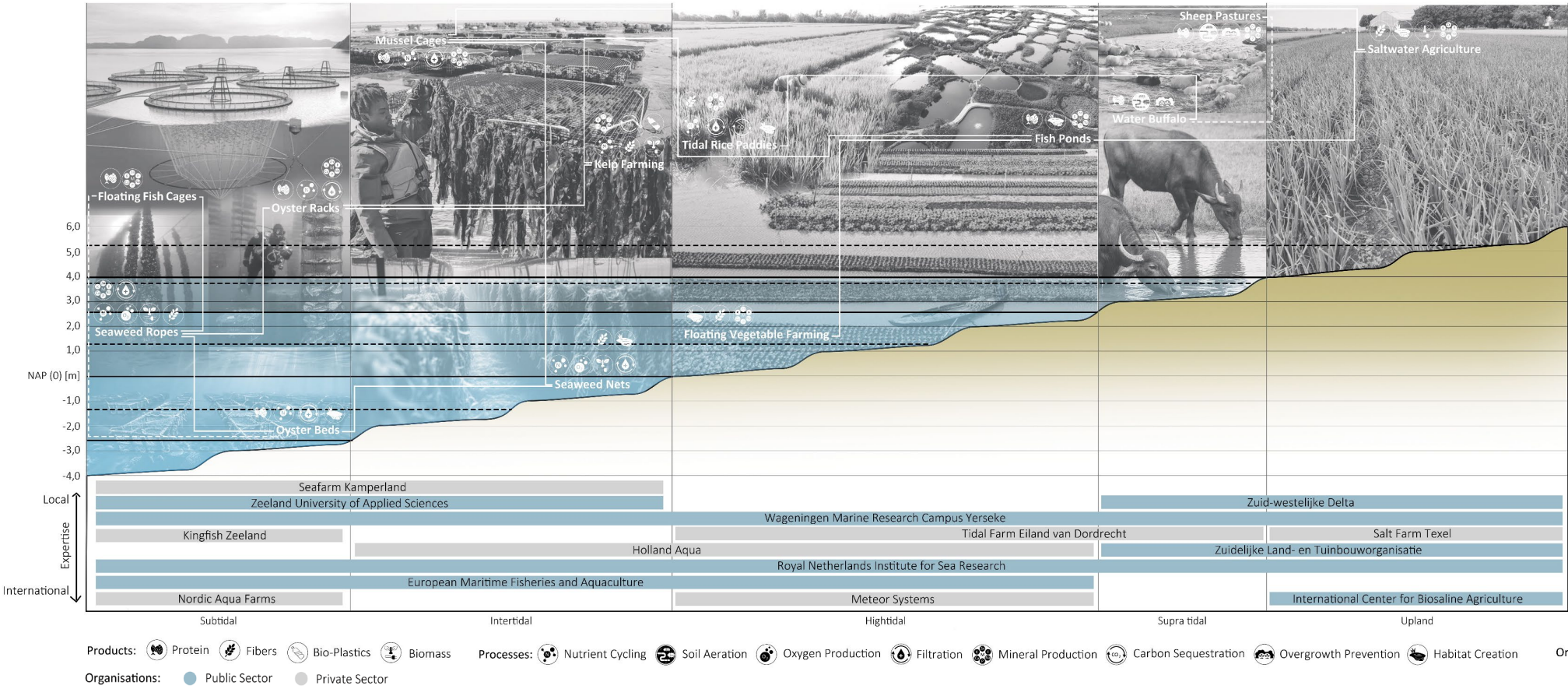
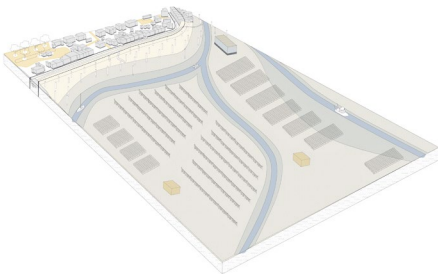
2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING



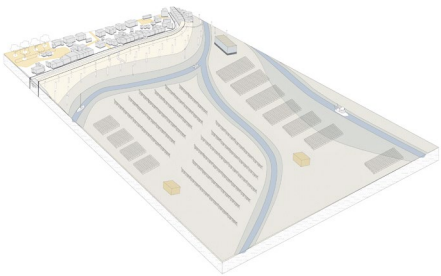


# TRANSFORMATION 4: DYNAMIC FARMING

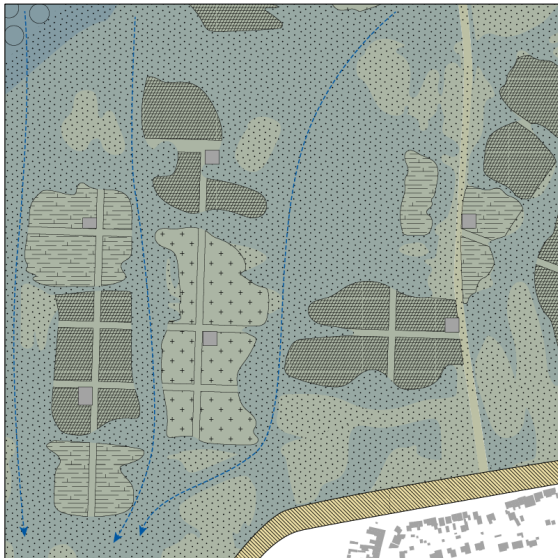




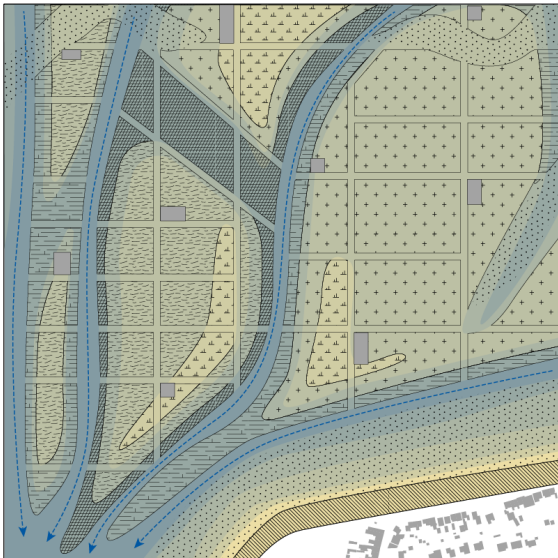
# TRANSFORMATION 4: DYNAMIC FARMING



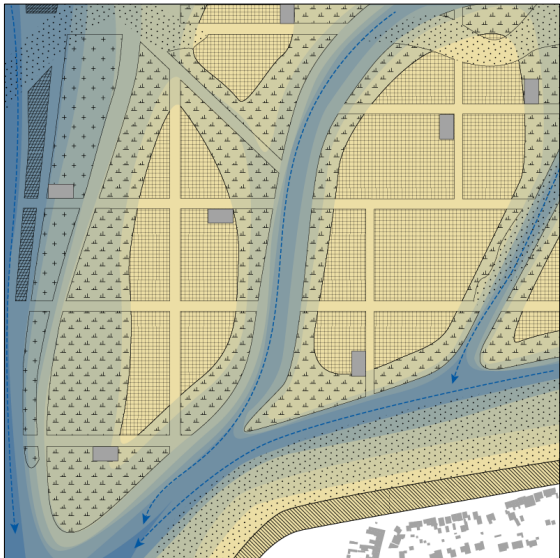
2025 - Current farming situation.



2050 – Intertidal Dynamic Farming.



2080 – Hightidal Dynamic Farming



2100 – Mix Hightidal, Supratidal and Upland Dynamic Farming

## Legend

### Dynamic Farming

- Floating Fish Cages
- Oyster Beds

- Seaweed Nets
- Tidal Rice Paddies

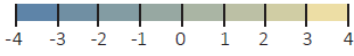
- Fish Ponds
- Pastures

- Arable agriculture
- Nature zone

### Urban structures

- Modular dike
- Buildings

### Elevation level in relation to NAP [m]



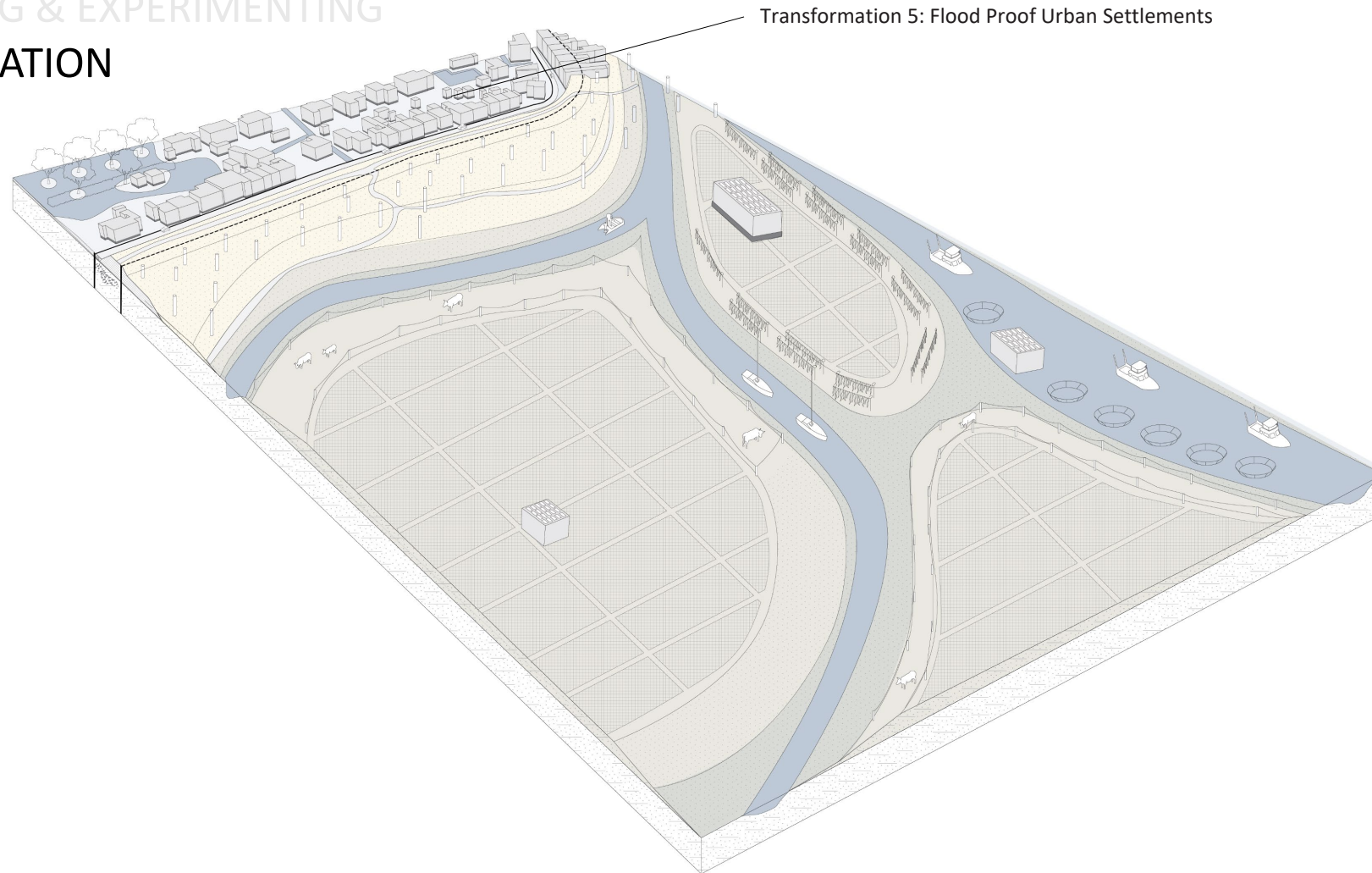
# MARSH CULTIVATION KLOOSTERZANDE

2025 - CURRENT SITUATION

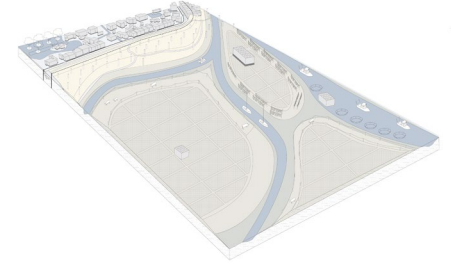
2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING

2080 - ACCELERATION



## TRANSFORMATION 5: FLOOD PROOF URBAN SETTLEMENTS



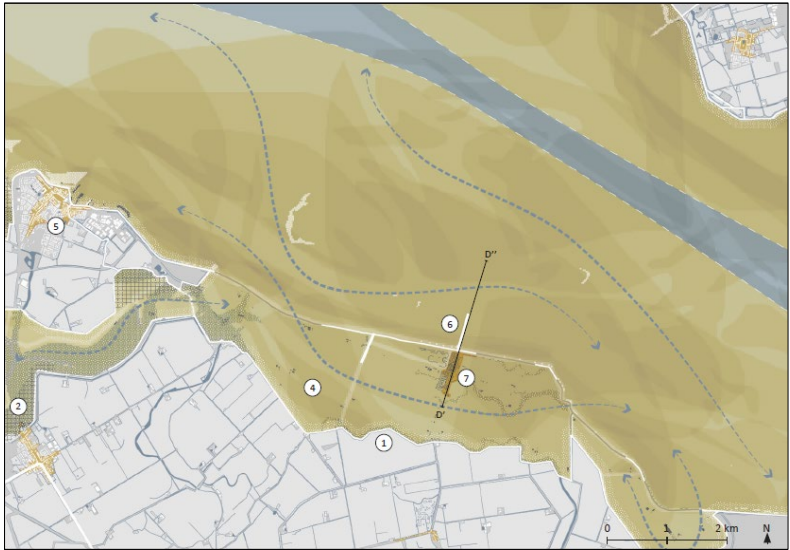


# EXPLORING THE SITUATED TRANSFORMATIONS

DELTAIC SPINE VLISSINGEN

MARSH CULTIVATION KLOOSTERZANDE

LIVING LAB HOOFDPLAAT



Legend

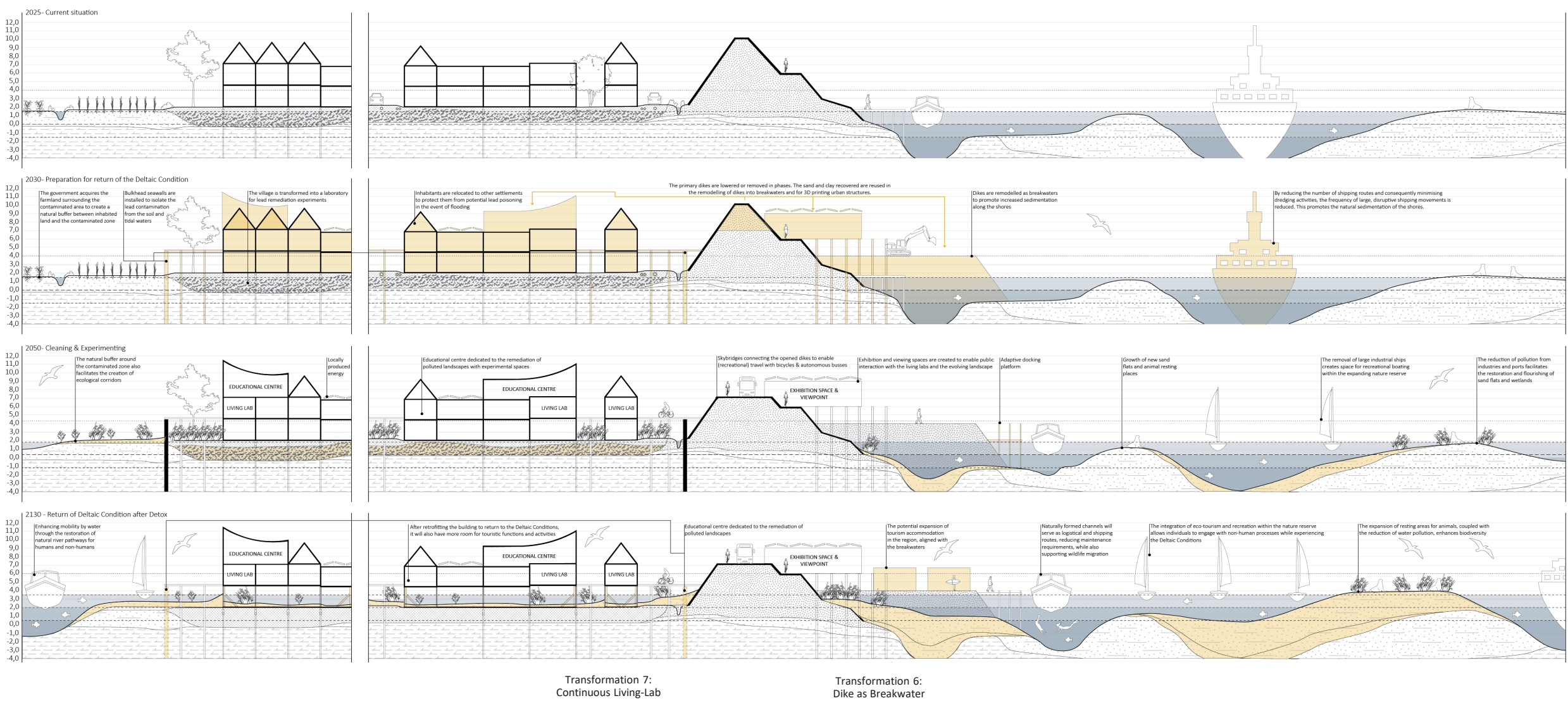
- Inner dike area
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- Removed dike

- Preserved urbanisation
- Adapted urbanisation
- Water pathway
- Stilt expansion
- Creek ridge
- Sand
- Nature bufferzone
- Potential lead contamination

Situated Transformations

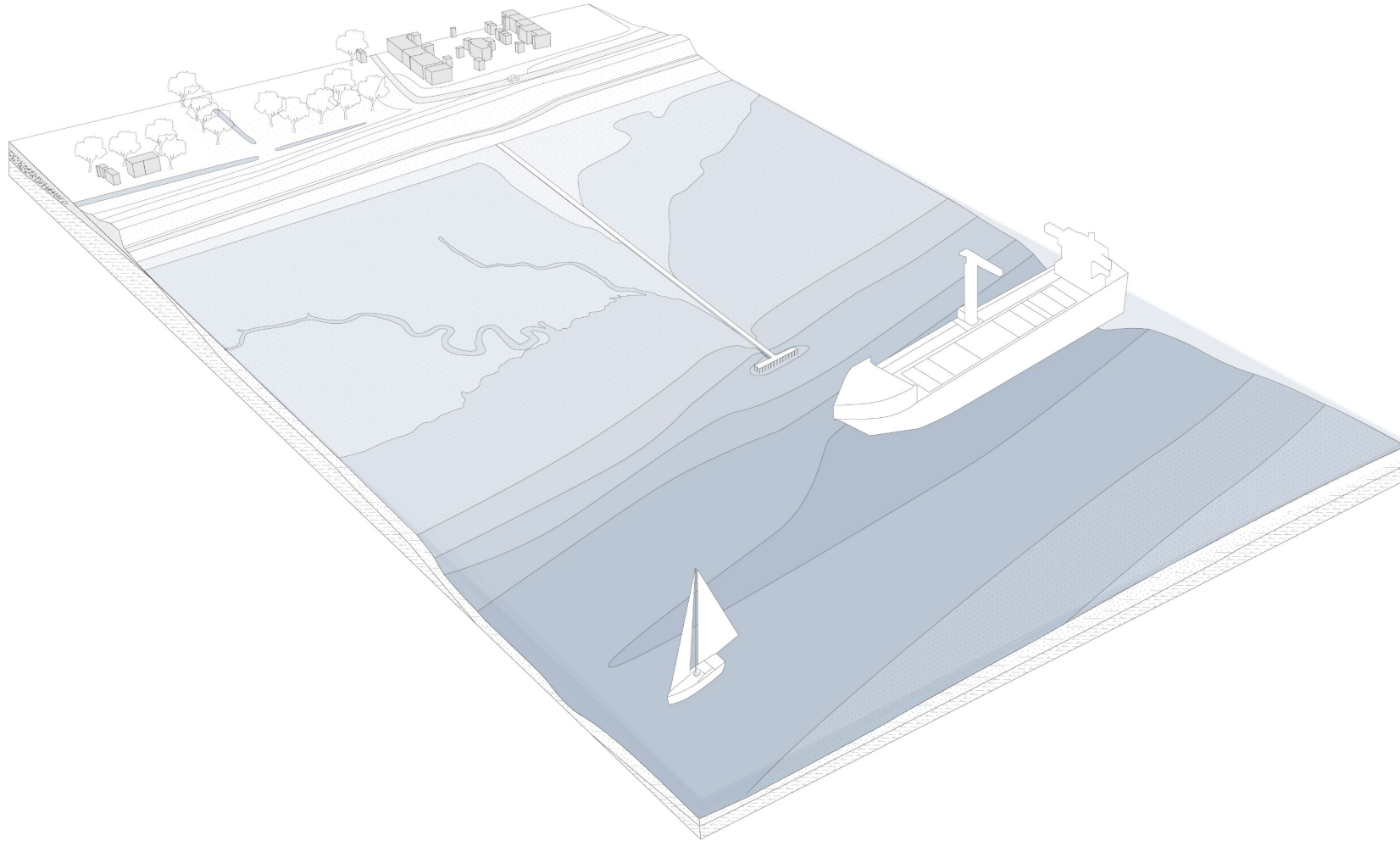
- 1 Modular Dikes
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- 5 Flood-proof Urbanism
- 6 Dike as Breakwater
- 7 Living-Lab

# LIVING LAB HOOFDPLAAT



# LIVING LAB HOOFDPLAAT

## 2025 - CURRENT SITUATION

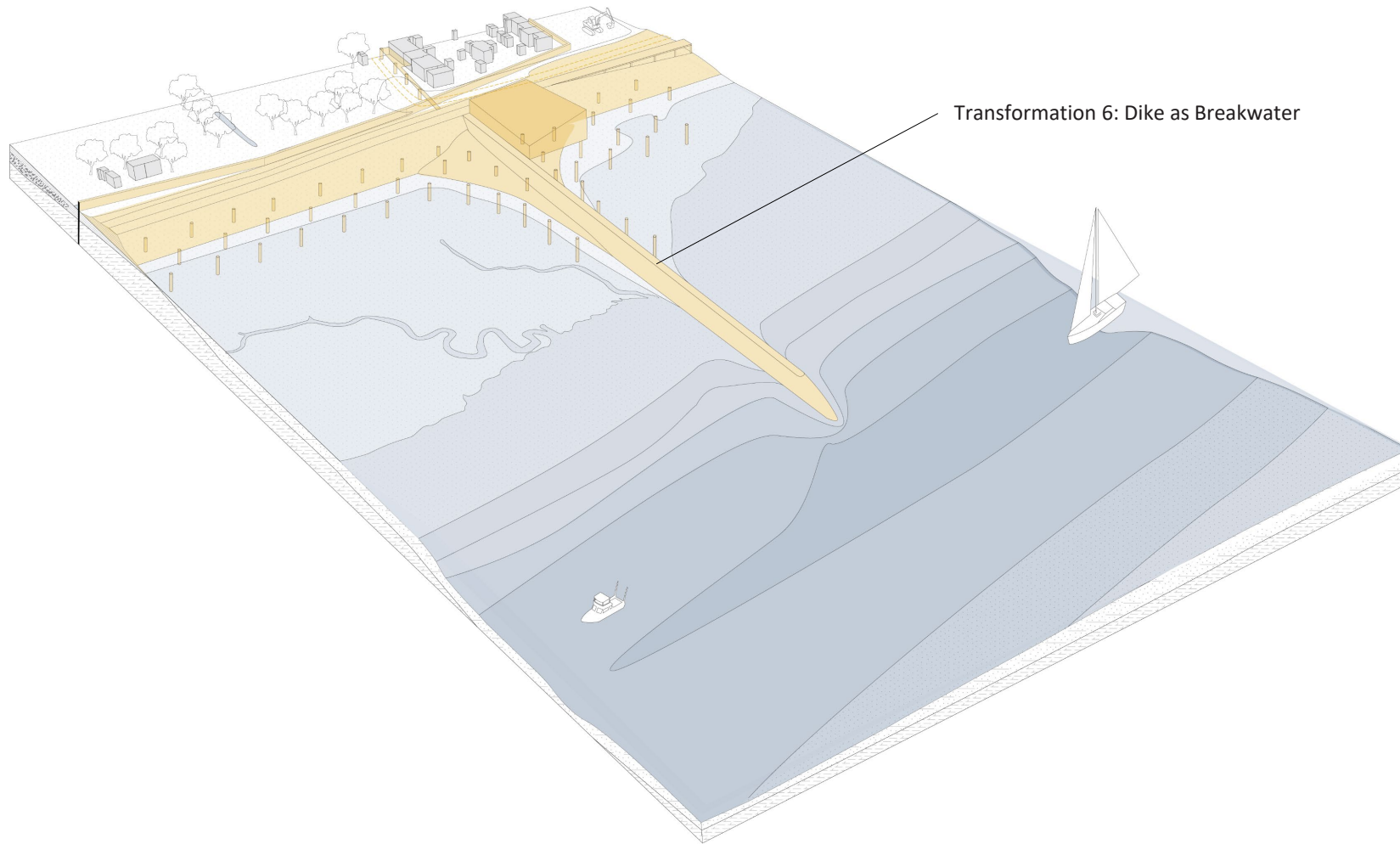




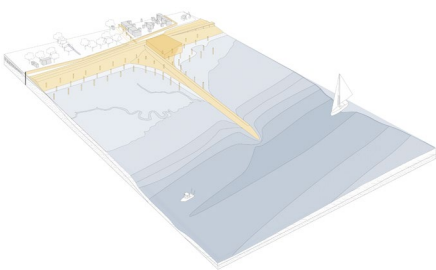
# LIVING LAB HOOFDPLAAT

2025 - CURRENT SITUATION

2030 - PREPARATION FOR OPENING THE COAST



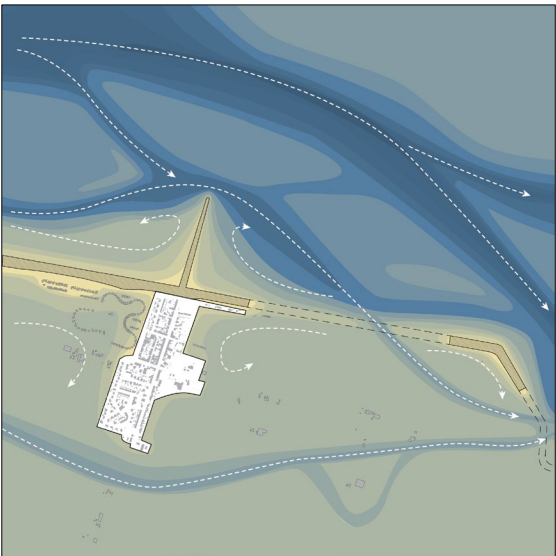
# TRANSFORMATION 6: DIKE AS BREAKWATER



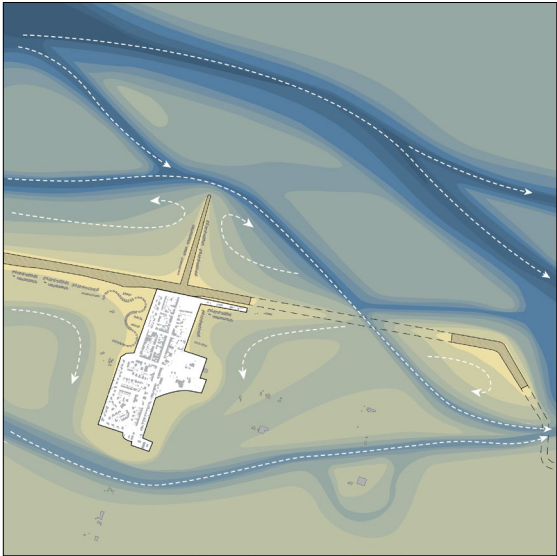
20525 – Current situation dikes prevent sedimentation.



2050 – Retrofitting Dikes.



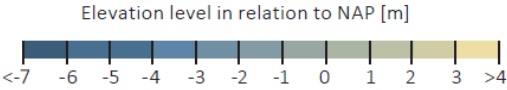
2080 – New land formations and return of river path.



2100 – Land rises and moves into the river.

## Legend

- Urban structures
  - Modular dike
  - Buildings
- Isolated lead zone by bulkhead barriers
- Water flow

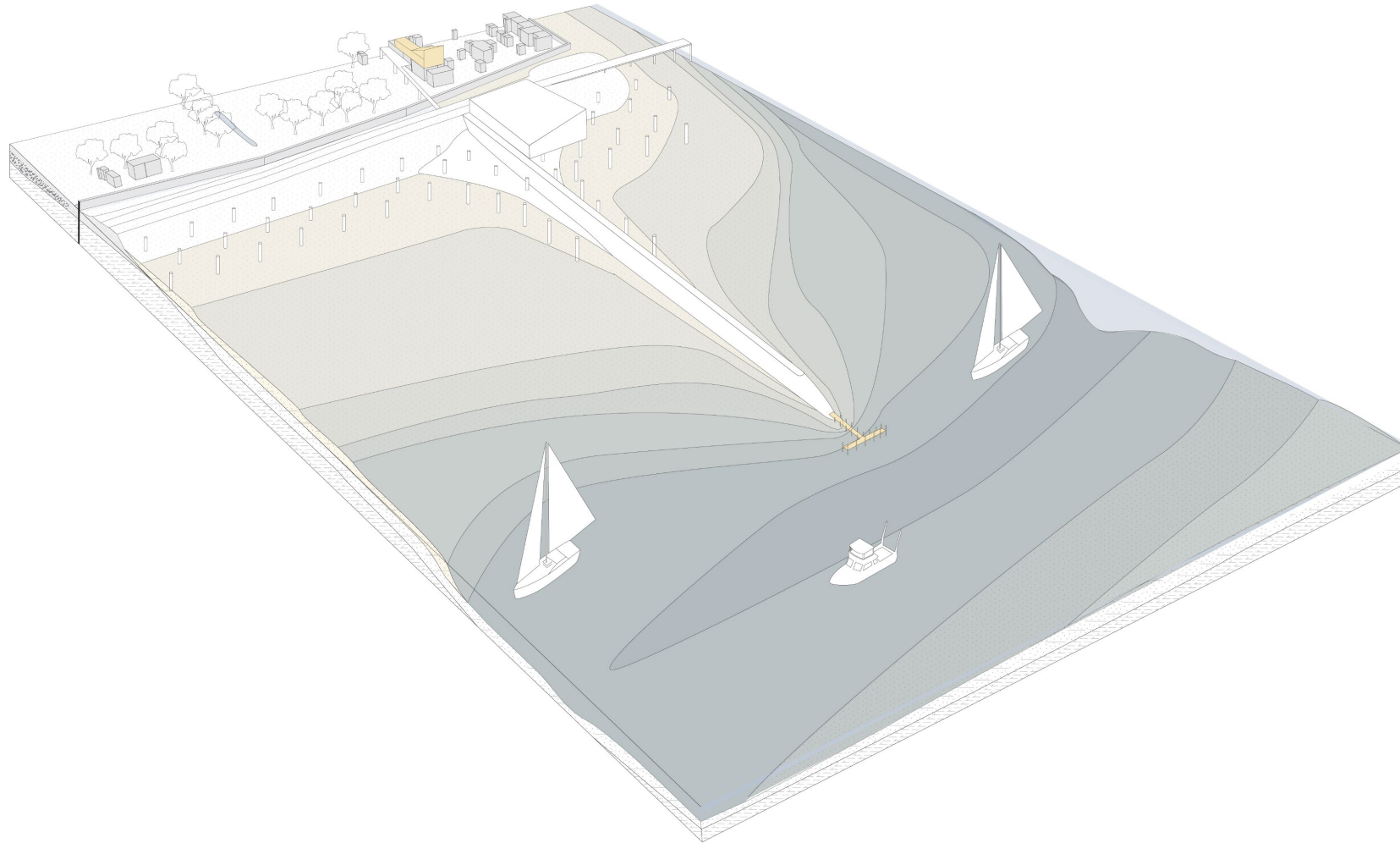


# LIVING LAB HOOFDPLAAT

2025 - CURRENT SITUATION

2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING





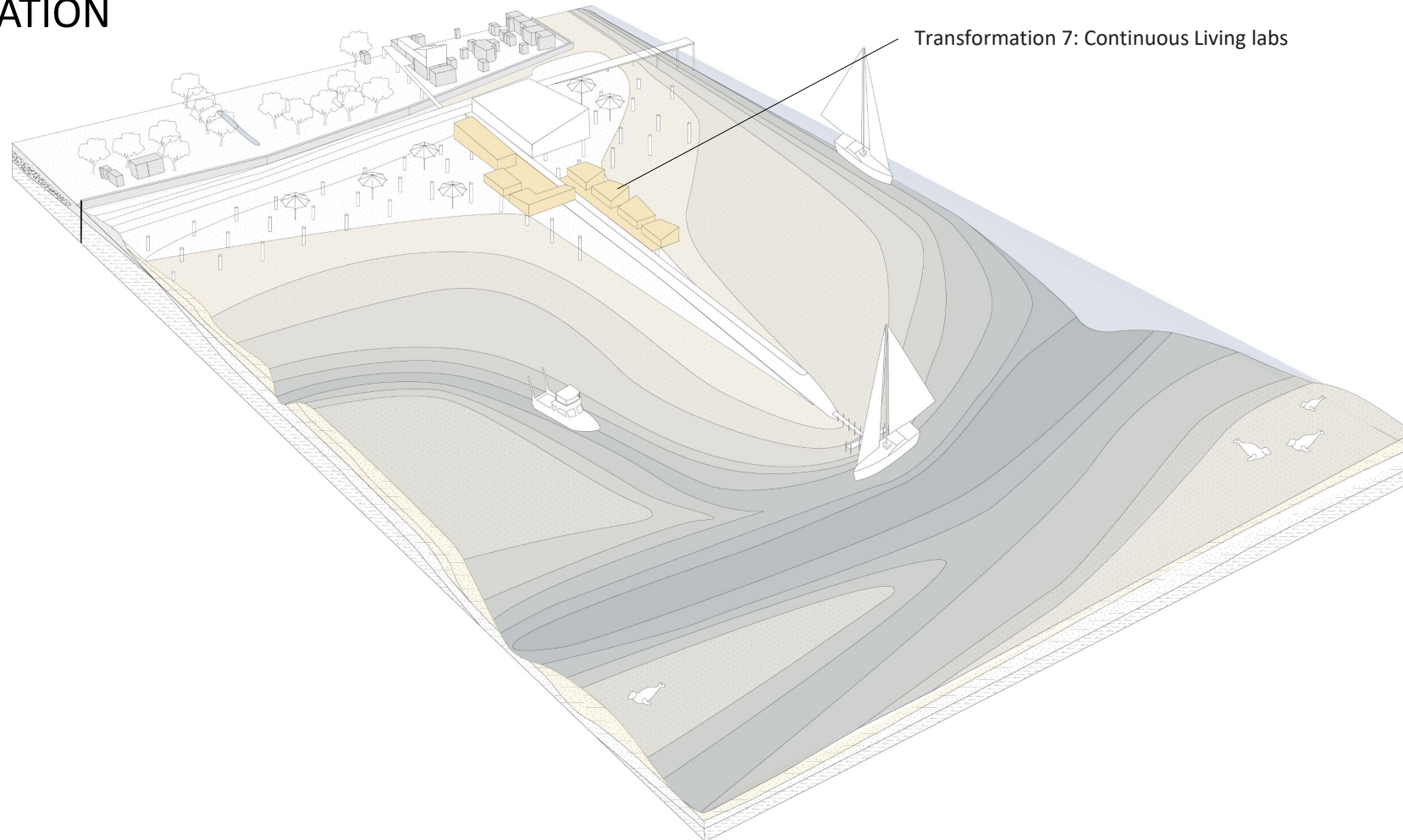
# LIVING LAB HOOFDPLAAT

2025 - CURRENT SITUATION

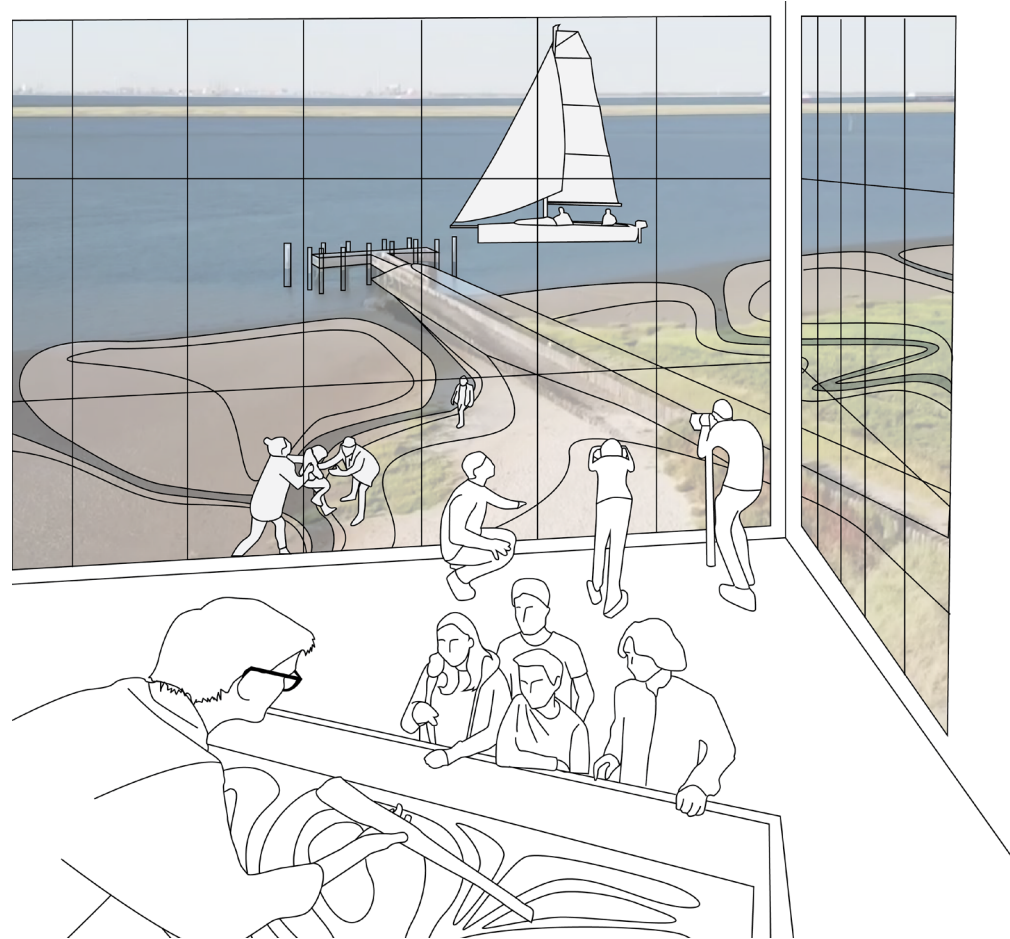
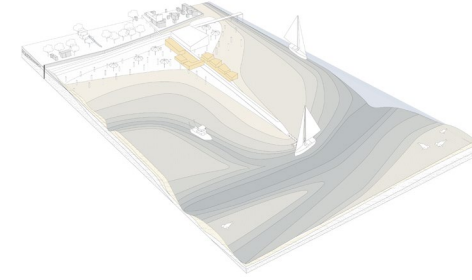
2030 - PREPARATION FOR OPENING THE COAST

2050 - CLEANING & EXPERIMENTING

**2080 - ACCELERATION**



## TRANSFORMATION 7: CONTINUOUS LIVING LAB



# EXPLORING THE SITUATED TRANSFORMATIONS

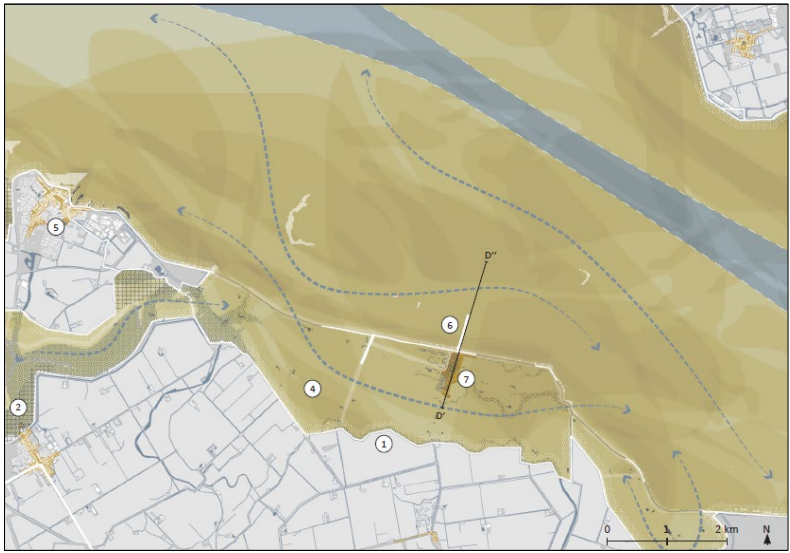
DELTAIC SPINE VLISSINGEN



MARSH CULTIVATION KLOOSTERZANDE



LIVING LAB HOOFDPLAAT



Legend

- Inner dike area
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Situated Transformations

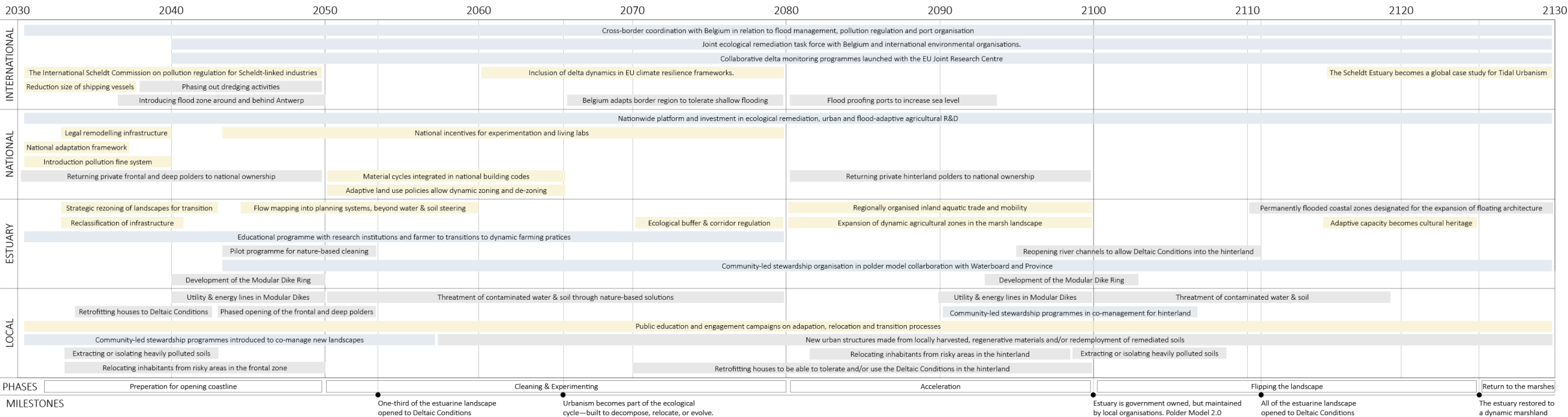
- 1 Modular Dikes
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- 5 Flood-proof Urbanism
- 6 Dike as Breakwater
- 7 Living-Lab



HOW WOULD THE VISION ALTER POLICIES AND GOVERNANCE IN THE SCHELDT ESTUARY?



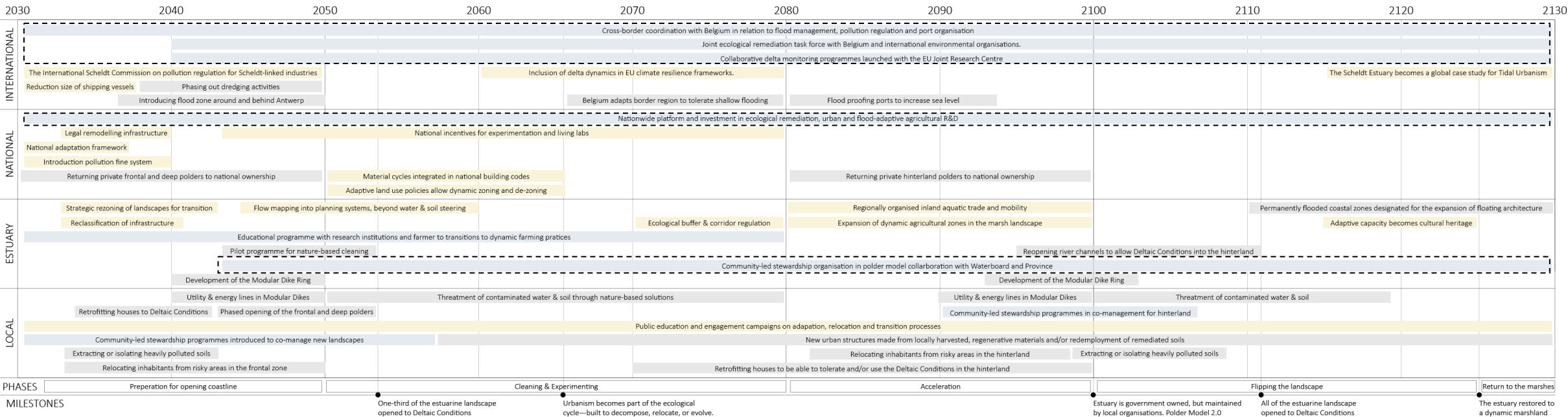
POLICY & GOVERNANCE



- Policy & Regulation
- Programmes & Collaboration
- Spatial Interventions

# POLICY & GOVERNANCE

Cross-scalar cooperation and knowledge sharing.



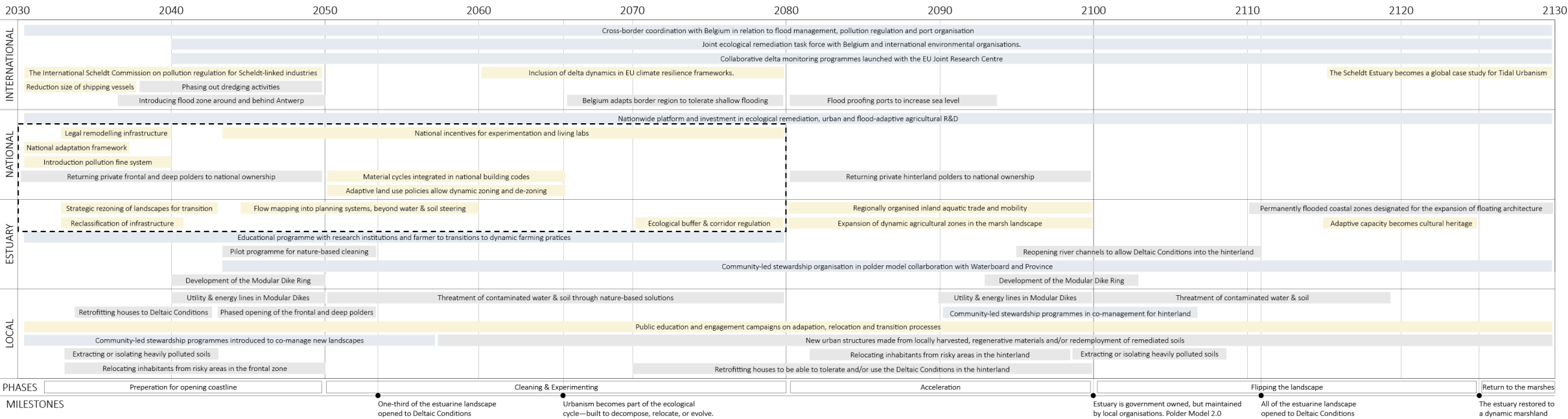
- Policy & Regulation
- Programmes & Collaboration
- Spatial Interventions



# POLICY & GOVERNANCE

Cross-scalar cooperation and knowledge sharing.

Structural changes in zoning regulations to enable dynamic Coastal Management.

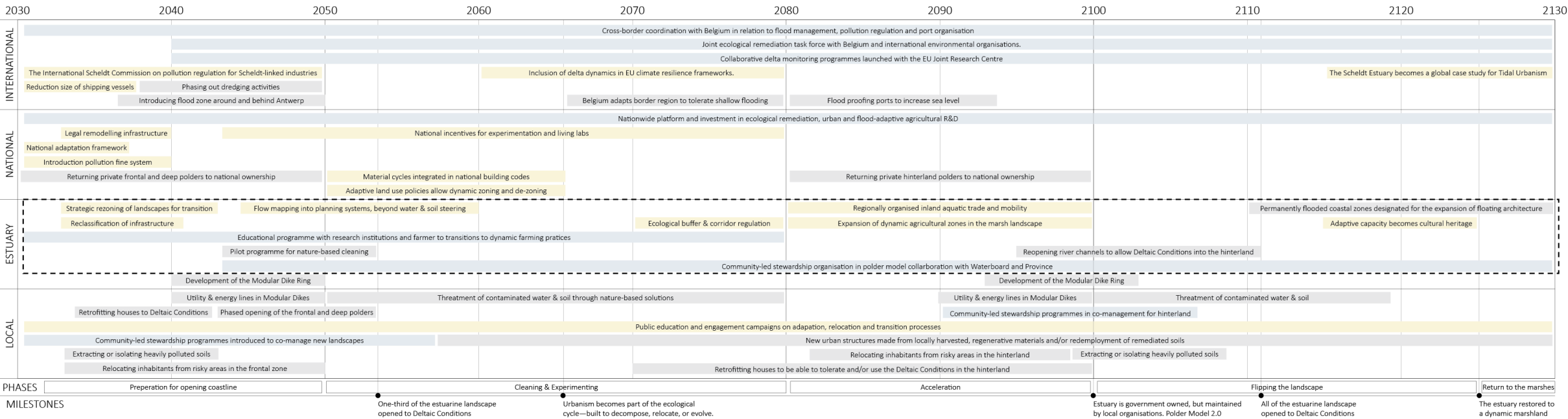


# POLICY & GOVERNANCE

Cross-scalar cooperation and knowledge sharing.

Structural changes in zoning regulations to enable dynamic Coastal Management.

New mentality around ownership and localisation of Flood/Flow Management

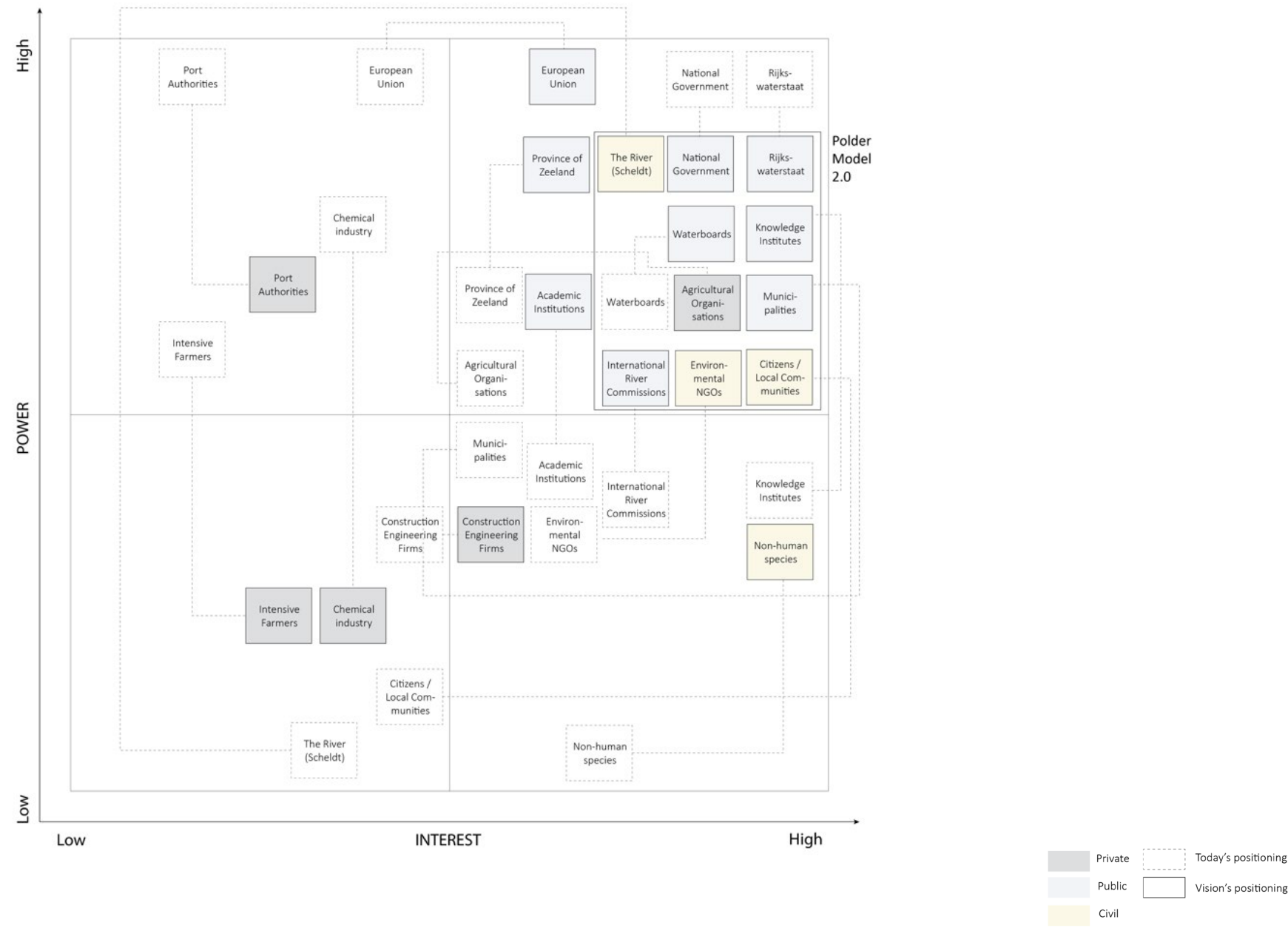


Policy & Regulation

Programmes & Collaboration

Spatial Interventions

# POLICY & GOVERNANCE





## REFLECTING ON THE RISE OF THE MARSHIANS



## FEASIBILITY OF TRANSFORMING THE STATUS QUO



[Fig. 66] Noordwaardpolder in the Biesbosch.  
Source: (Omroep Brabant, 2020).



## LIMITATIONS OF DYNAMIC PLANNING





## VIABILITY OF HUMAN–NON-HUMAN SYMBIOSIS

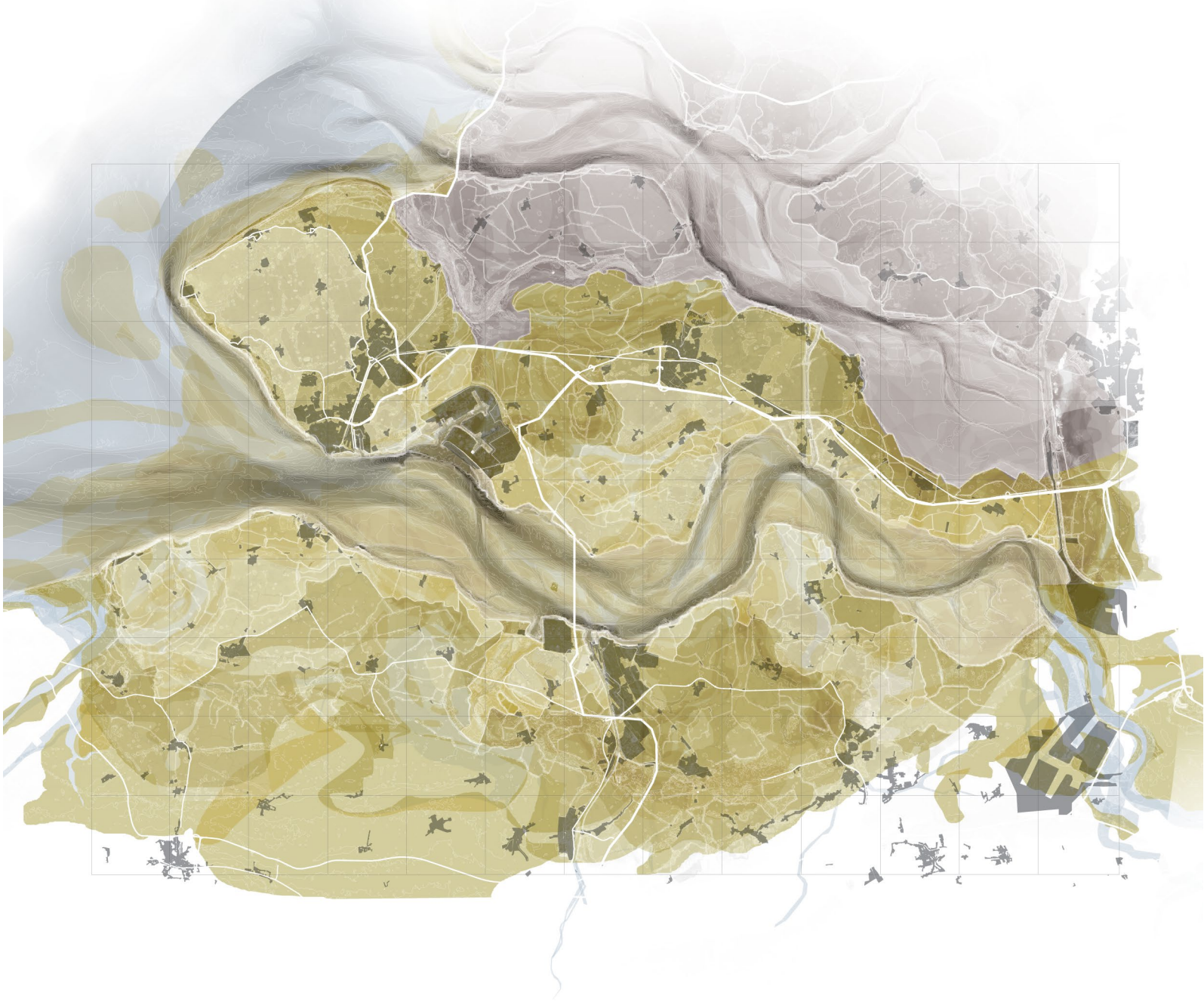


## BEING TRULY PRESENT





# FACING THE TIDE





# References

All references and sources can be found in the reference list of the P5 report: Facing The Tide, in the repository of the TU Delft.