

New Port-Island Connector

Designing a landscape infrastructure frame to connect Voorne-Putten Island and the Port of Rotterdam

Graduation Lab-LBU | 2024-24

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TU Delft | Department of Urbanism | Section of Landscape Architecture | 2024

- METROPOLITAN
- DELTA
- LANDSCAPE

Source: © Guido Pijper/Rotterdam Partners



REGIONAL LOCATION



SITE LOCATION-LAKE BELT BETWEEN HARBOR AND ISLAND



SITE LOCATION-LAKE BELT BETWEEN HARBOR AND ISLAND



How this
landscape
performs.....

- **Radical Expansion-Fragmented ecosystem and Low attachment with Landscape**

The construction of the new waterway was initially a major attack on De beer. But amazingly, it has accelerated growth along the coast.



Source: <https://duinenenmensen.nl/>

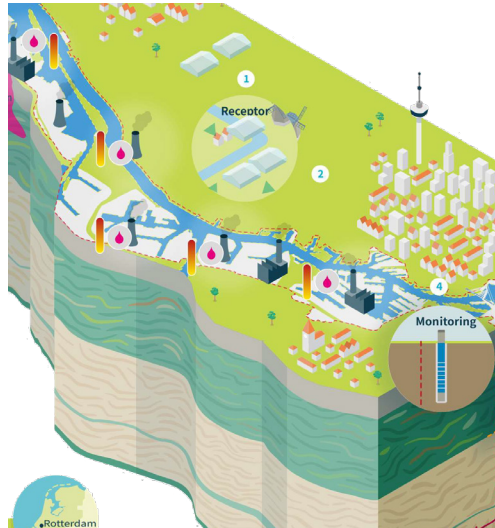
Many respondents associate Voorne-Putten with both positive terms like “beach” and “sea,” and negative or vague terms like “nothing” or “none,” indicating a lack of clear identity for the island.



Source: BUREAU VOOR RUIMTE & VRIJE TIJD

- **Intensive Production-Depriving natural resources and Poor ecosystem services**

Between Voorne and the Port of Rotterdam, agricultural and industrial activities together contribute to significant environmental pollution, especially in terms of carbon emissions, nitrogen emissions and fertilizer use



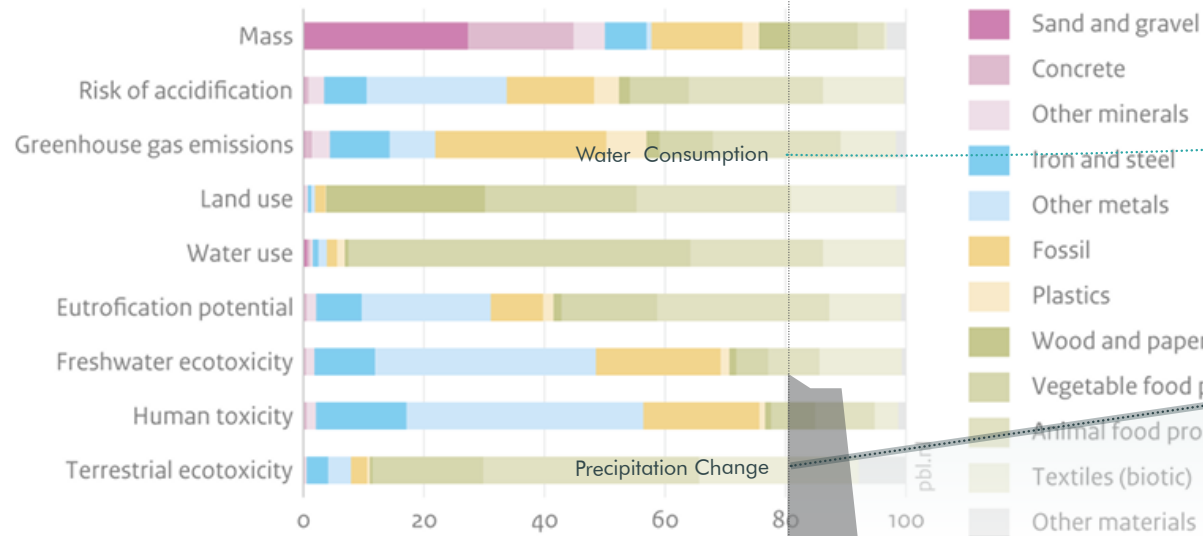
The Port of Rotterdam, as Europe's largest port, is one of the main sources of industrial carbon emissions in the Netherlands, accounting for about 19% of the national total in terms of annual GHG emissions (CBS, 2022)



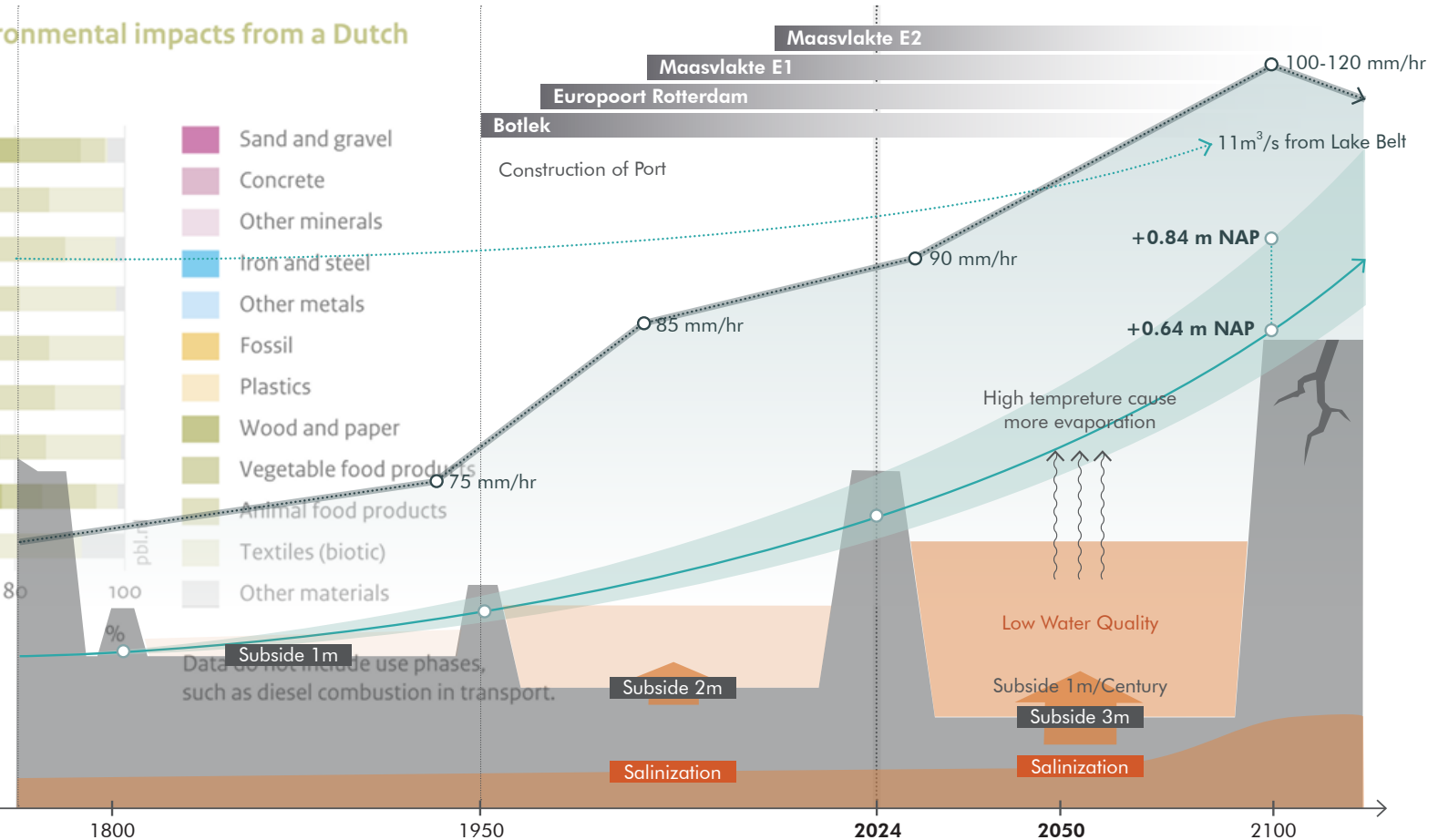
Source: Gezamenlijk model voor aanpak verontreiniging grondwater in de haven en de stad Rotterdam-Deltares

- Climate Crisis-Vulnerable facing climate change and Low resilience

Relevance of various resources and materials for environmental impacts from a Dutch consumption perspective, 2018

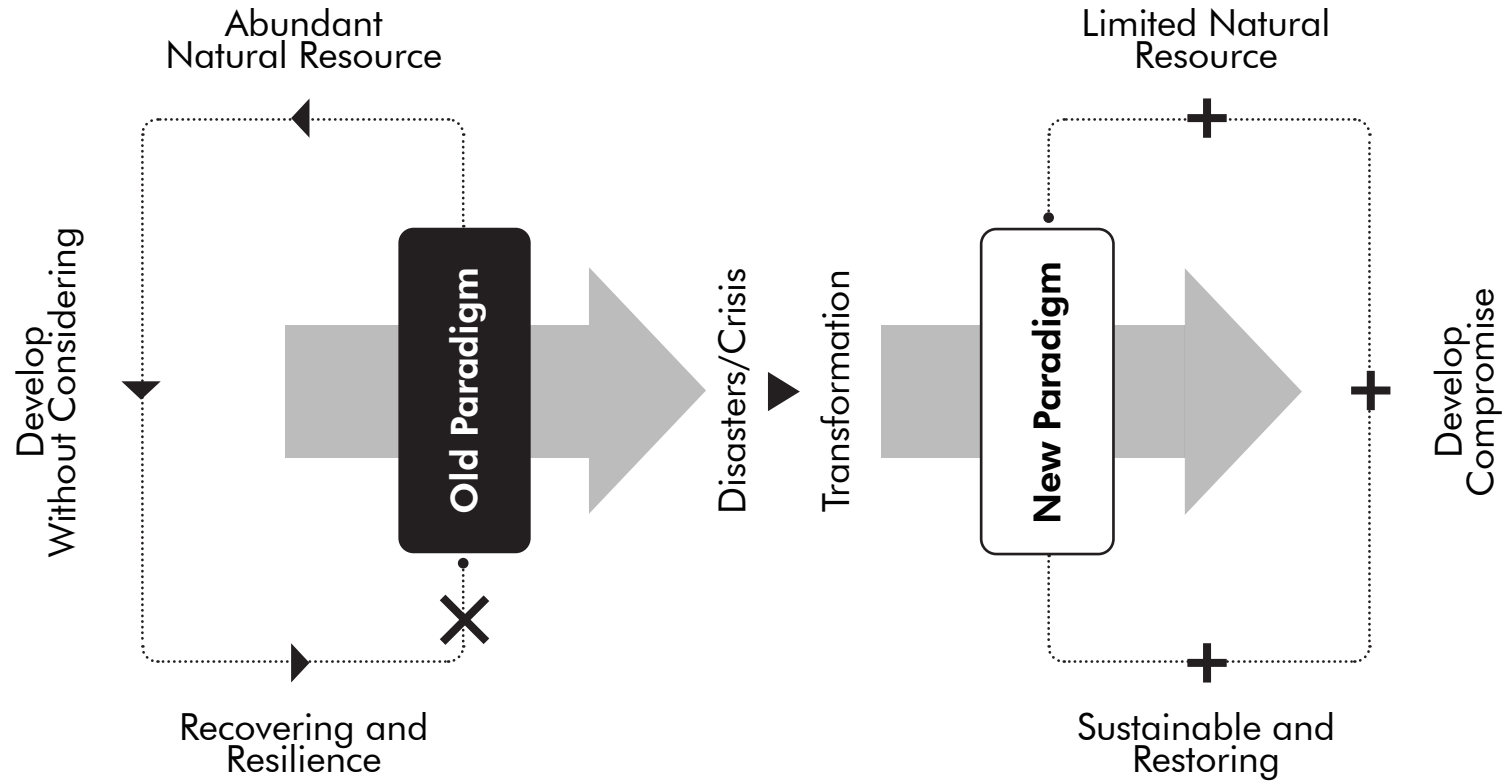


Source: CBS 2021, CML 2021 and EcolInvent 3.4; adaptation by PBL



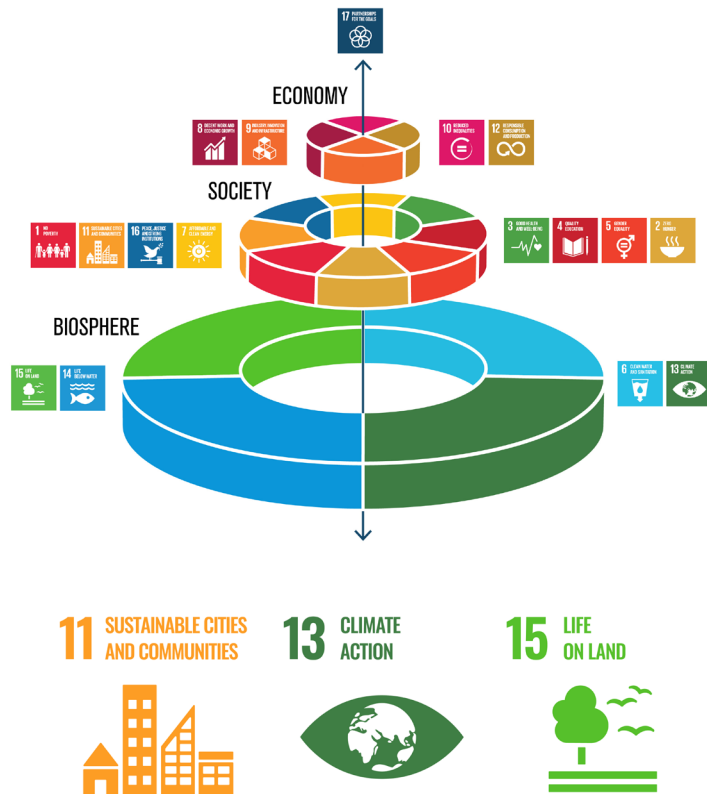
Graphic by Author/Data from KNMI

PROBLEM STATEMENT





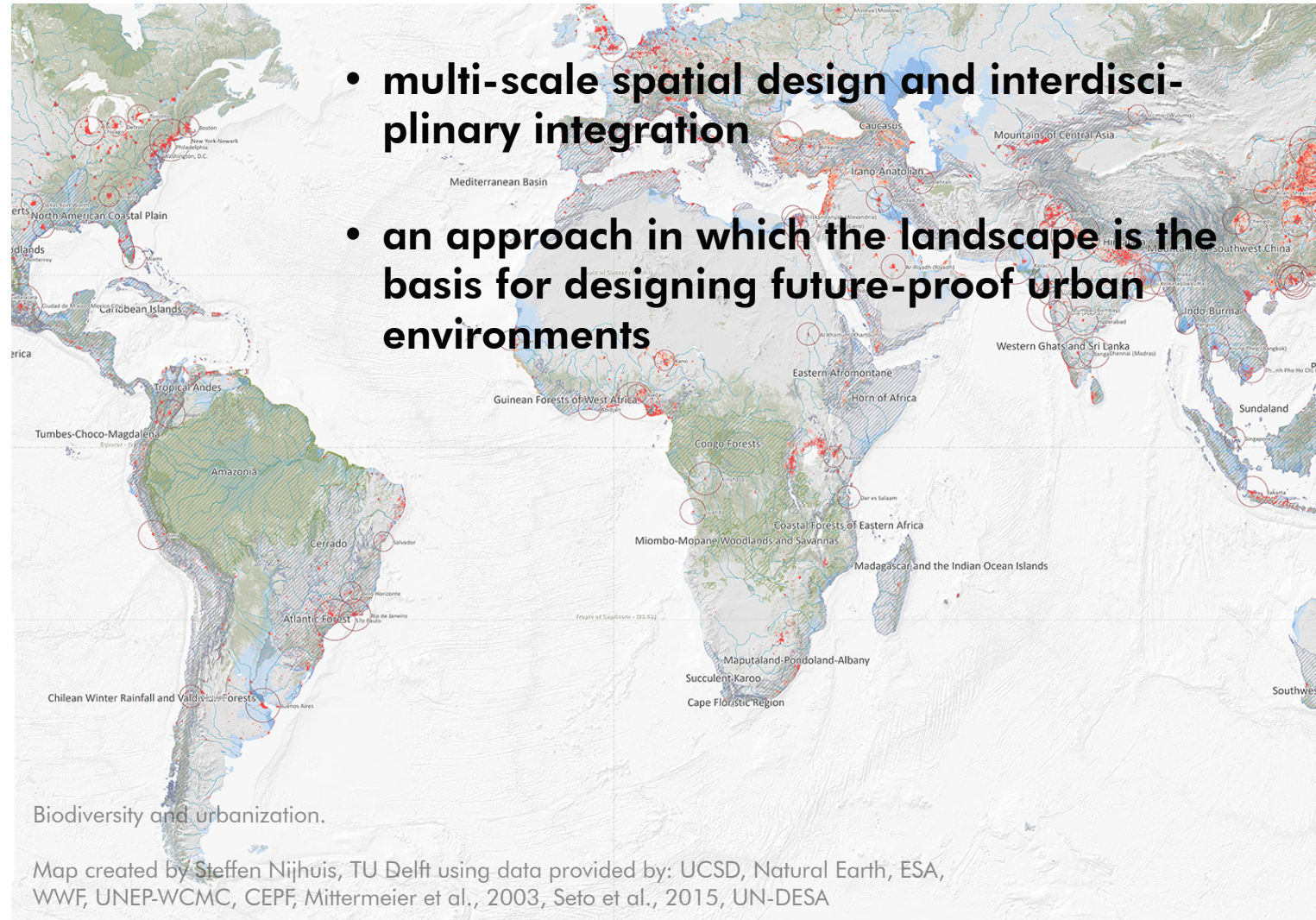
Recovering old landscape...
Or
Create and Embrace
new landscape ?



Landscape as the basis for social and economic development.

Image: © Stockholm Resilience Centre

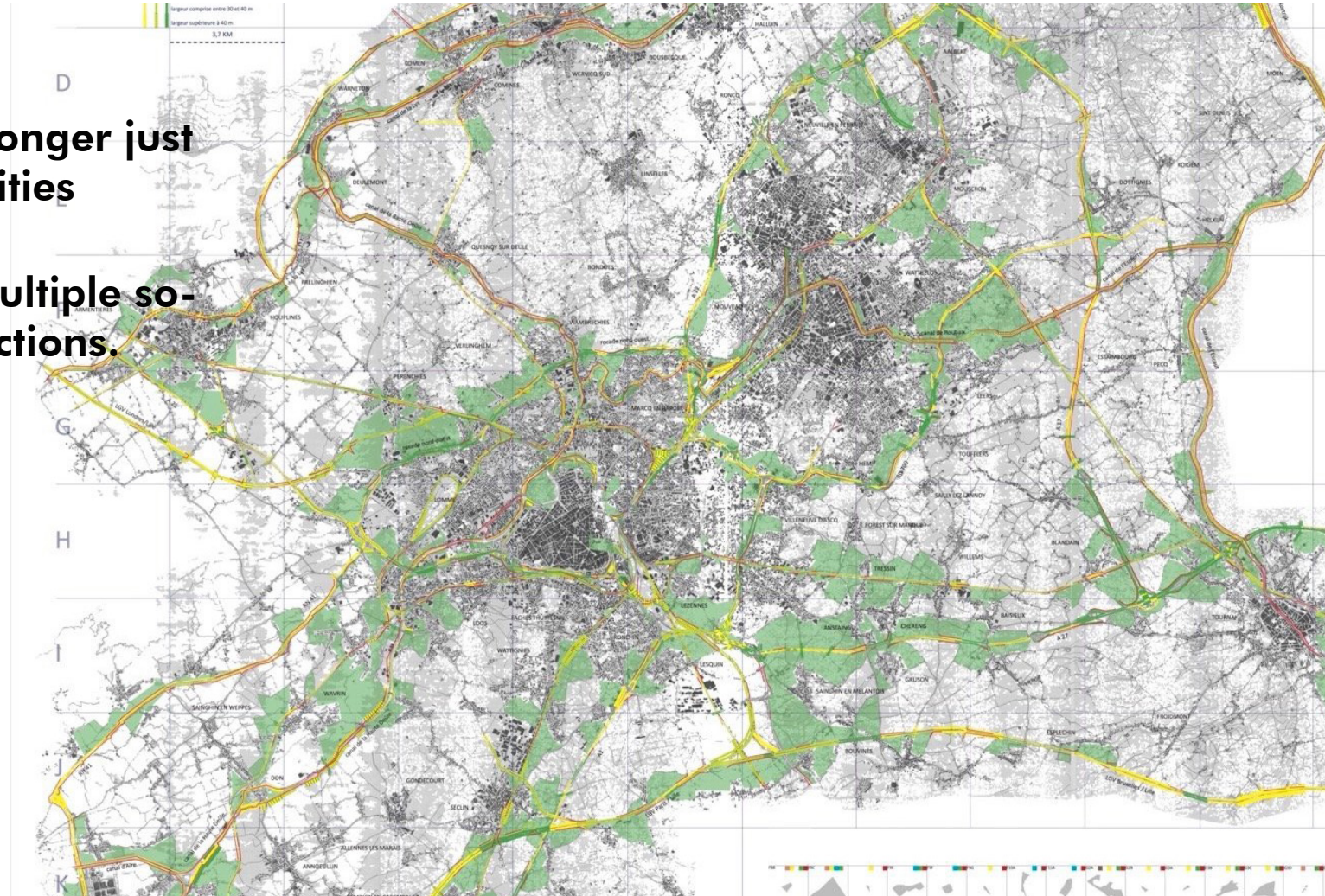
- **multi-scale spatial design and interdisciplinary integration**
- **an approach in which the landscape is the basis for designing future-proof urban environments**



- Landscape Infrastructure is no longer just a collection of engineering facilities
- A “design structure” carrying multiple social, ecological and cultural functions.



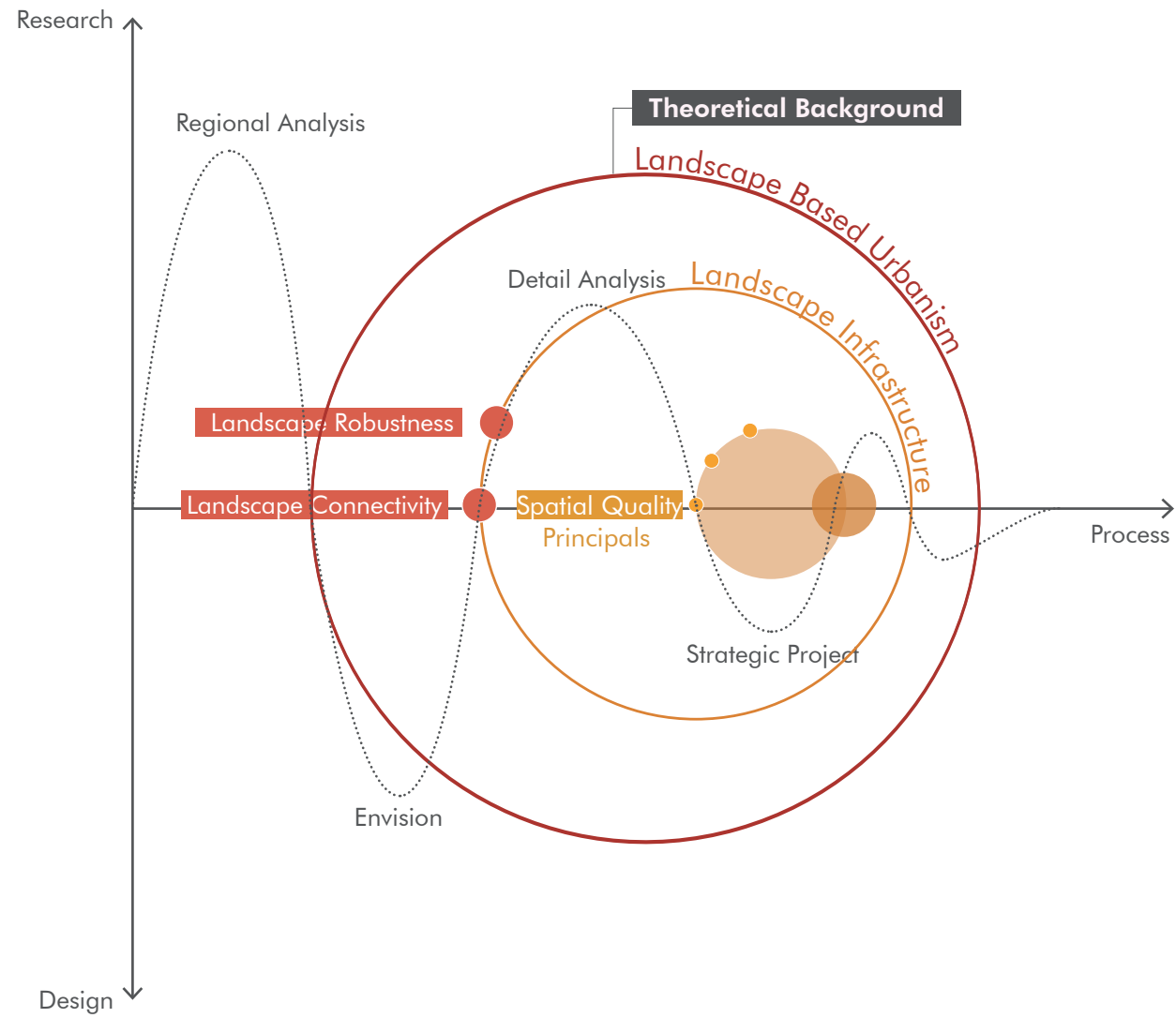
Source: Buffalo Bayou Park and Promenade designed by SWA Group



LIKOTO Eurometropolis Mapping the Spontaneous Green Web

Le gouvernement de la plaine / Plain's government / Likoto's urban plains as a landscape (meta) project: Les plaines urbaines de Likoto comme (méta)projet de paysage

LOGIC BEHIND THEORIES



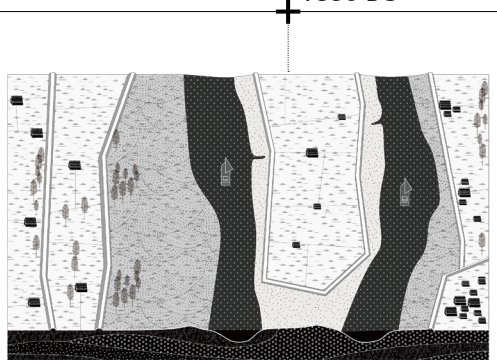
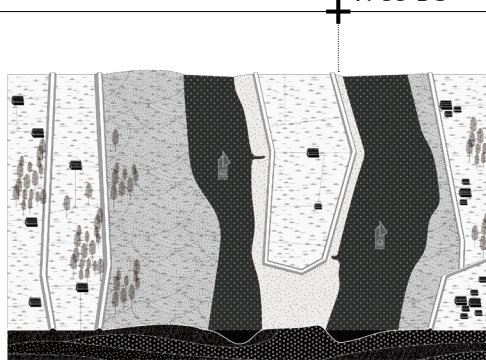
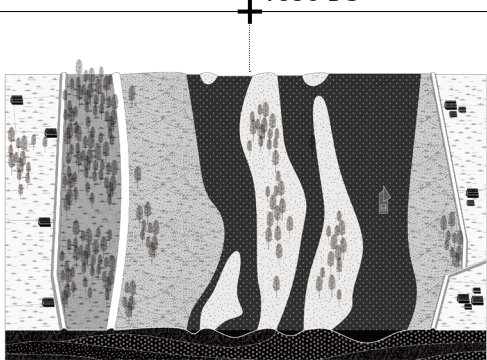
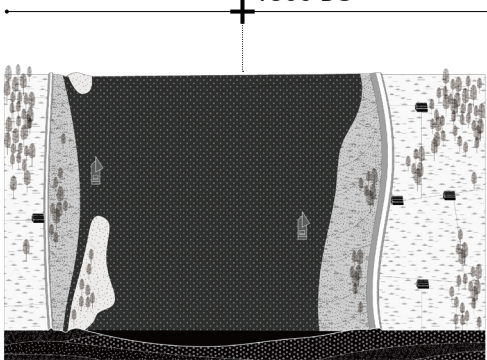
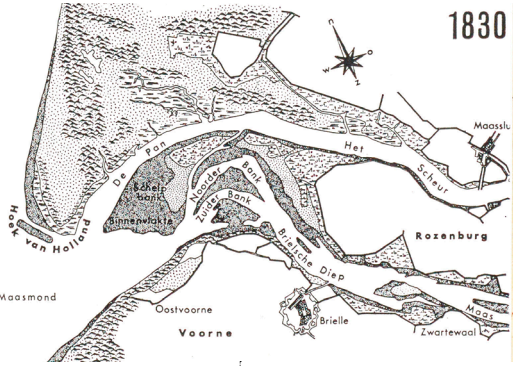
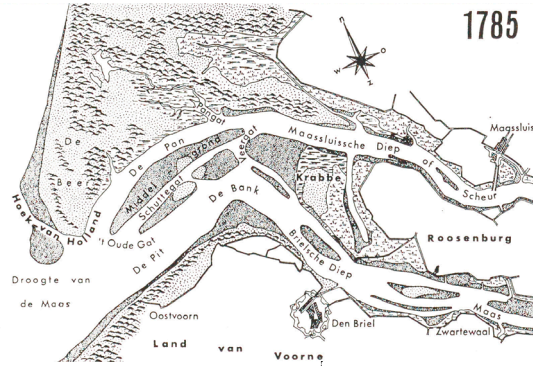
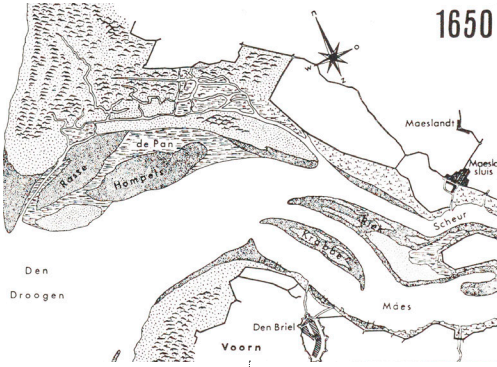
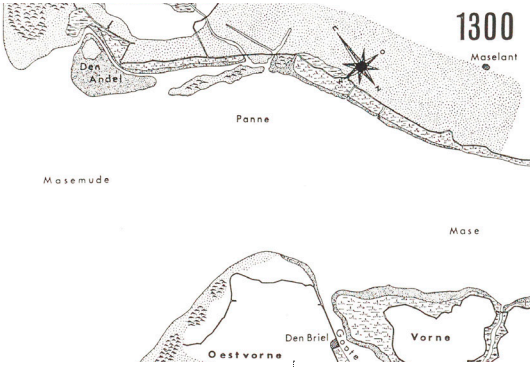
General Research Question

How to design for a landscape infrastructure framework that connects Voorne-Putten and the Port of Rotterdam and regenerates a robust nature, water and productive network ?

Understanding/Problem

-What are the key spatial, ecological and functional characteristics of the regional landscape system, as well as the challenges and opportunities for designing a connecting green-blue infrastructure ?

PALIMPSEST OF OLD PARADIGM



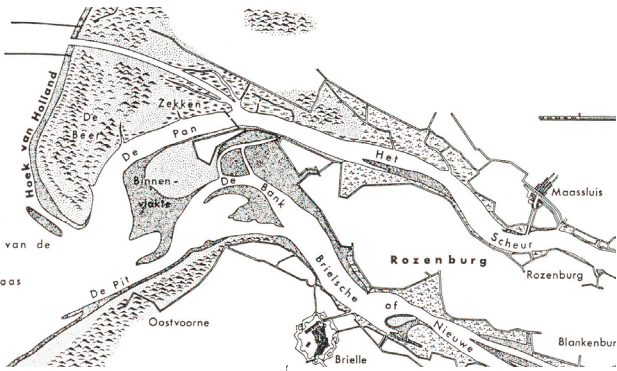
Water Dynamic

Natural Diversity

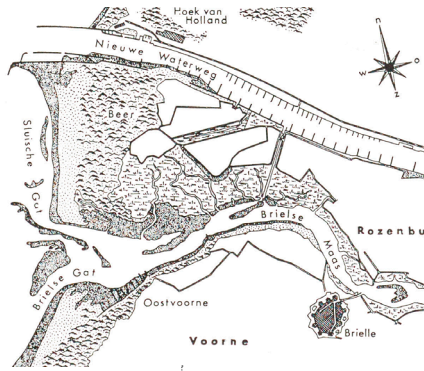
Urbanization

Graphic by Author/Data from Zuid Holland GIS Portal

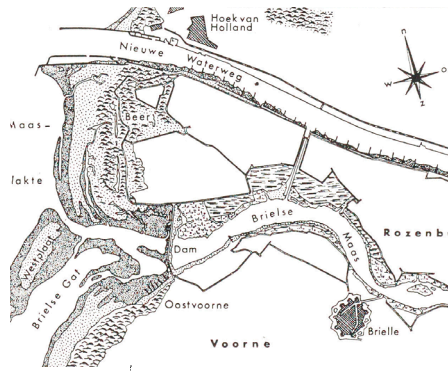
PALIMPSEST OF OLD PARADIGM



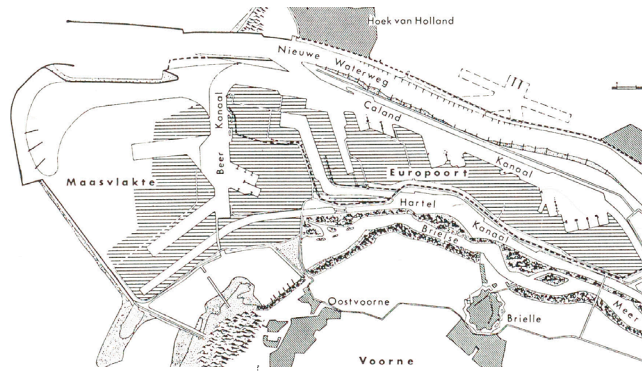
1875 BC



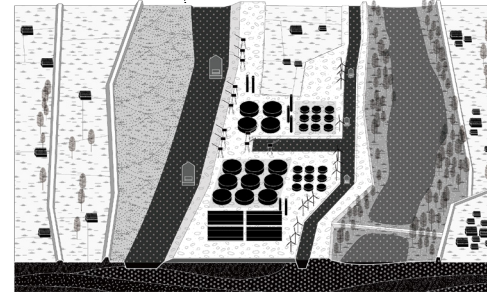
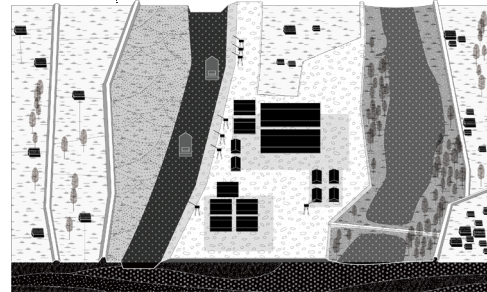
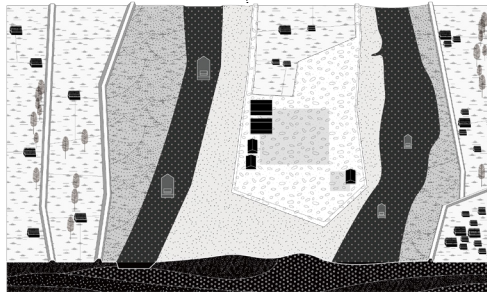
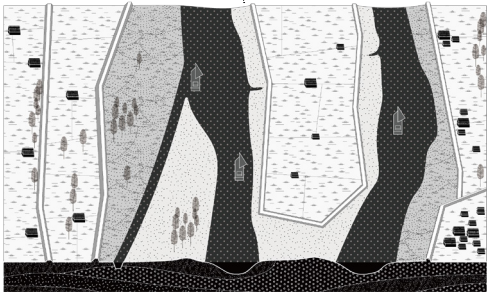
1930 BC



1955 BC



1970 BC



Urbanization

Water Dynamic

Natural Diversity

1st Ecological Disasters

WW II. Parts of Voorne-Putten were inundated with seawater

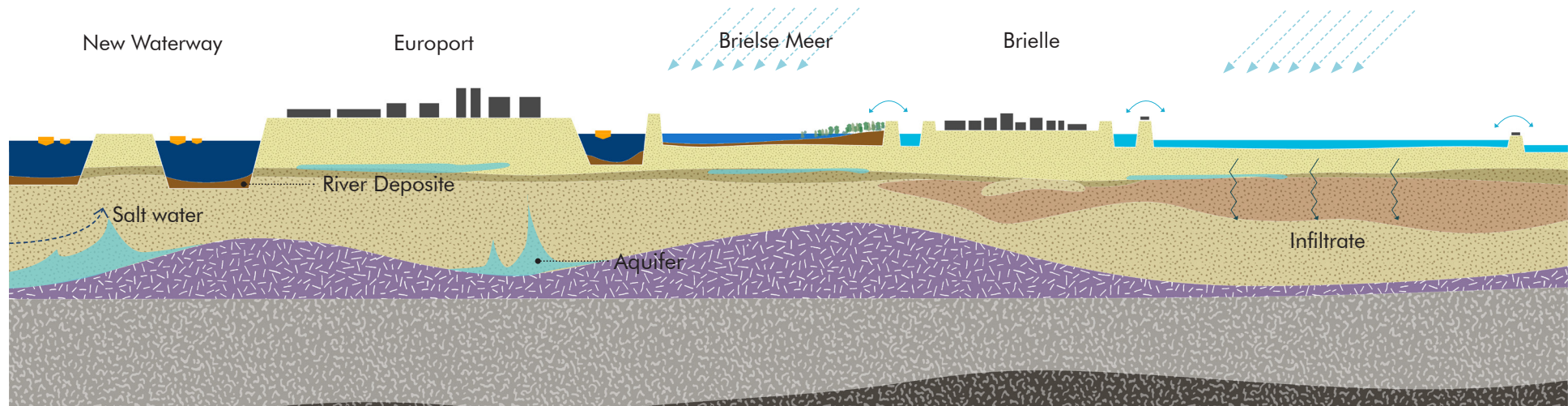
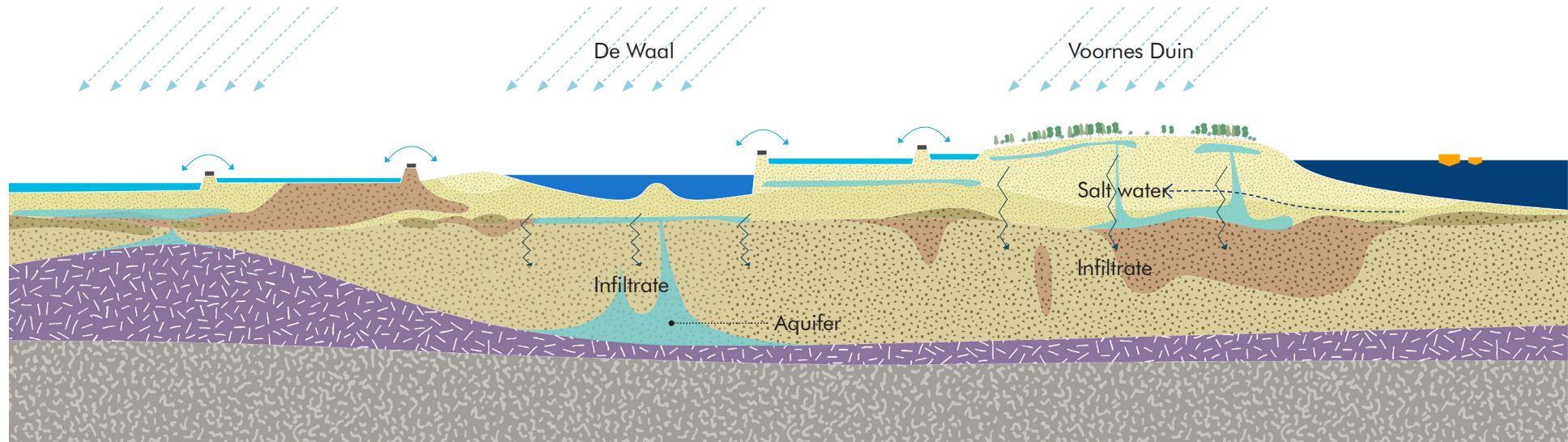
2nd Ecological Disasters

Flood in 1953, agricultural area was flooded with salt water

3rd-4th Ecological Disasters

Intensive agriculture Delta Work...

WATER AND SOIL BINDING TOGETHER



DIVERSE LANDSCAPE TYPOLOGIES...

- The hydrological and geological systems are intertwined, creating a diverse landscape

Industry and Harbor Landscape

- Developed Industrial Area
- Expanding Reclaiming Area

Dune and Forest Landscape

- Sand Dune
- Dune Forest
- Dune Lake
- Estate and Farmhouse

Urban/Village Landscape

- Creek Village (Clay)
- Polder Village (Peat)
- Coastal Village (Sand)
- Urban (Clay)
- Urban Green Space

Marine Polder Landscape

- Polder/Ditches
- Water
- Tree Structure
- Green Houses

DUNE LANDSCAPE



Sand Dune / Dune Lake / Dune Forest
/ Estate

POLDER LANDSCAPE



Clay Polder / Canals / Tree Line /
Farmhouse

URBAN LANDSCAPE



Village / Larger City / Traffic System /
Public Space

INDUSTRIAL LANDSCAPE



Containers / Wind Power / Ports /
Pipeline

WHAT CONNECTS THOSE LANDSCAPE MOSAICS?

- This connectivity not only meets the basic needs of urban development, but also plays a deeper role in spatial quality

Water landscape infrastructure

- Canal/Ditch/Stream
- Lake
- Sewage System
- Pipes and Pump

Productive Landscape Infrastructure

- Agricultural Landscape Infrastructure-Polder/Green House
- Industrial Landscape Infrastructure-Tank/Mills/Pipe/Powerline

Recreational Landscape Infrastructure

- Transportation Landscape Infrastructure-Road/Railway/Junction/Parking
- Social Landscape Infrastructure-Parks/Hiking/Cycle

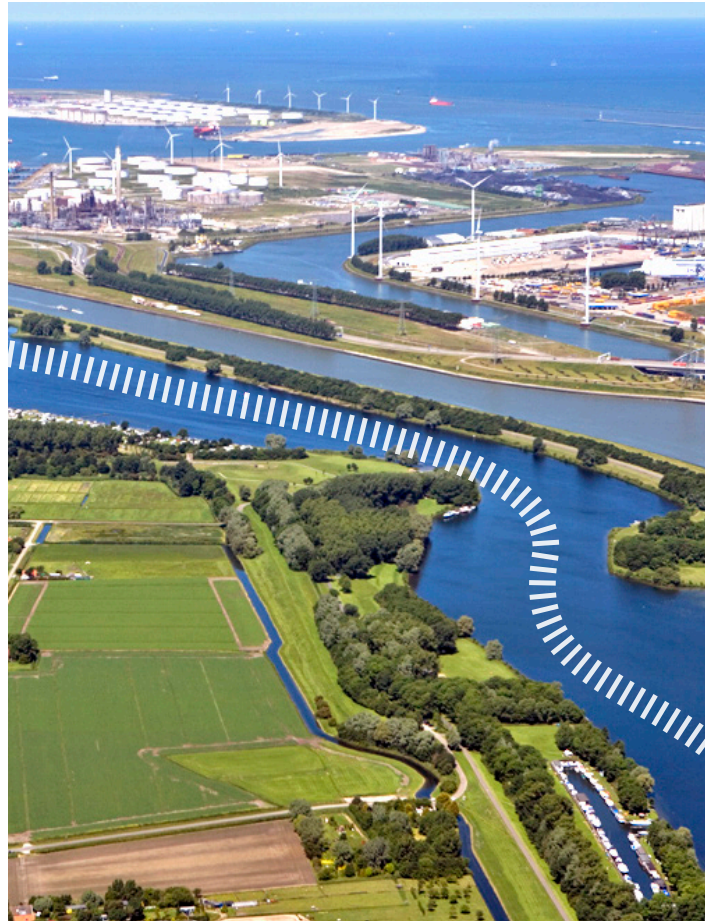
WHAT CONNECTS THOSE LANDSCAPE MOSAICS?

RECREATIONAL



Hiking and Cycle Route / Nature /
Sports / Road System

WATER



Lake / Canals / Wadi System / Dikes

PRODUCTIVE



Railways / Fields / Powerlines / Pipeline

OVERLAY WITH LANDSCAPE TYPOLOGIES-LANDSCAPE INFRASTRUCTURE SYSTEM

WATER LANDSCAPE INFRASTRUCTURE



RECREATIONAL LANDSCAPE INFRASTRUCTURE



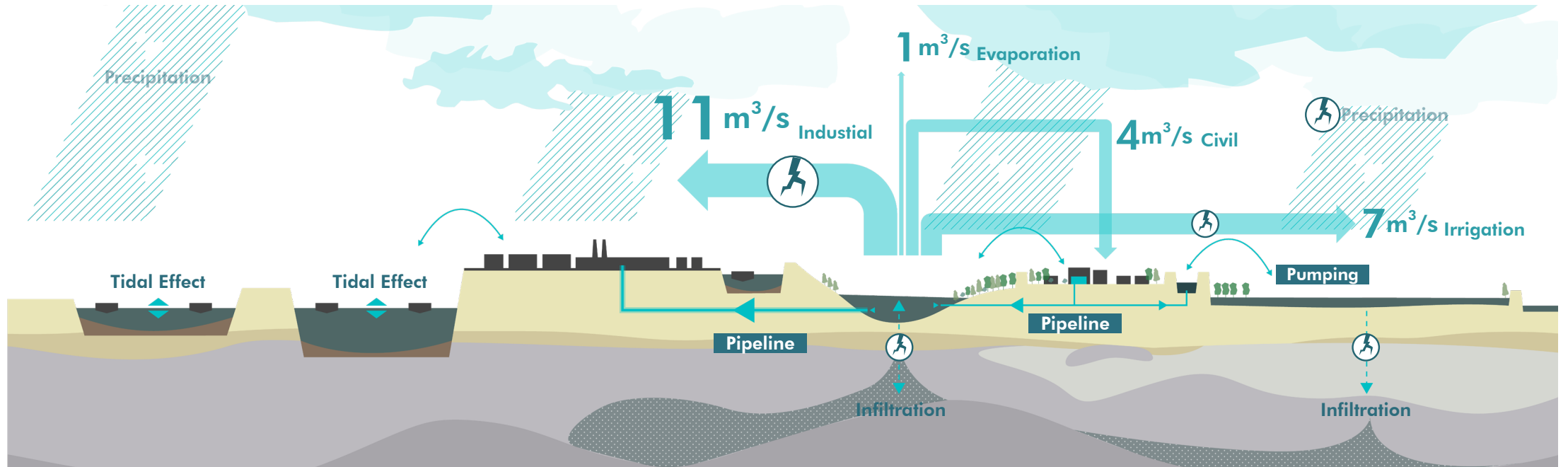
PRODUCTIVE LANDSCAPE INFRASTRUCTURE



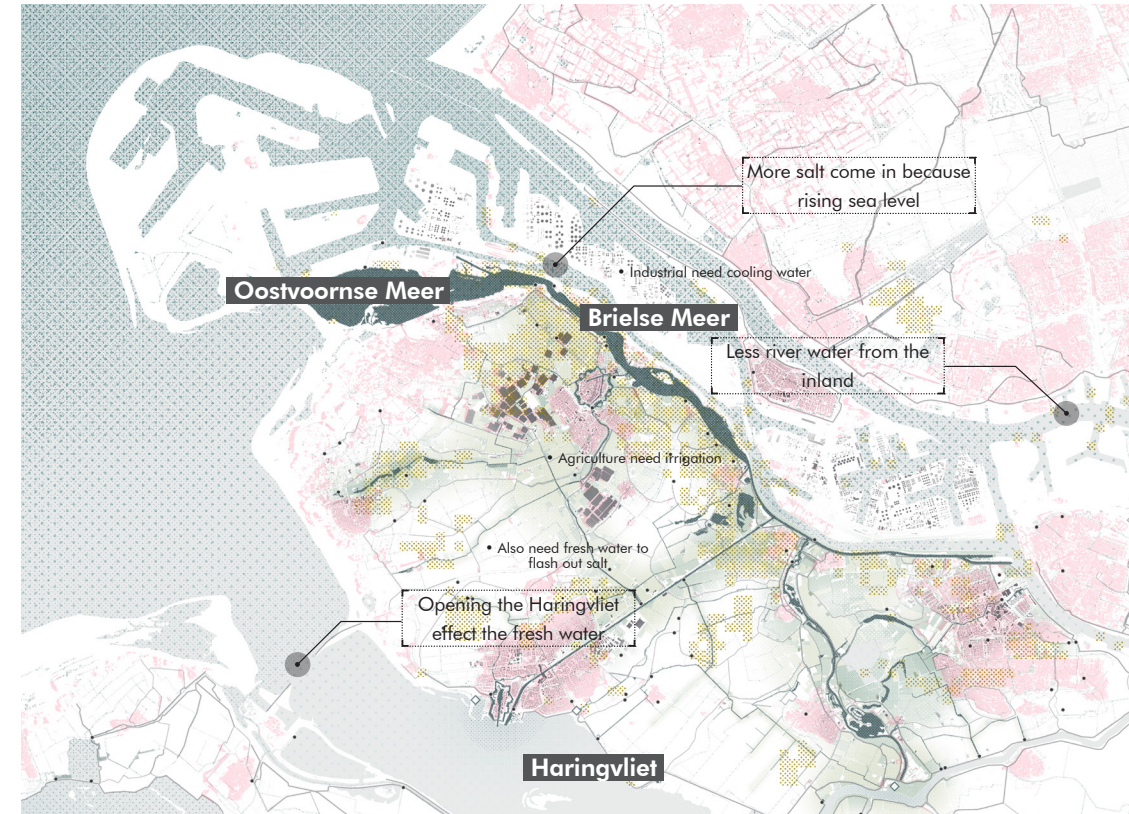
CHALLENGE REFLECTED ON LANDSCAPE INFRASTRUCTURE SYSTEM

Water Supplied by the lake belt...

Single source without dynamic....lead to vulnerability 

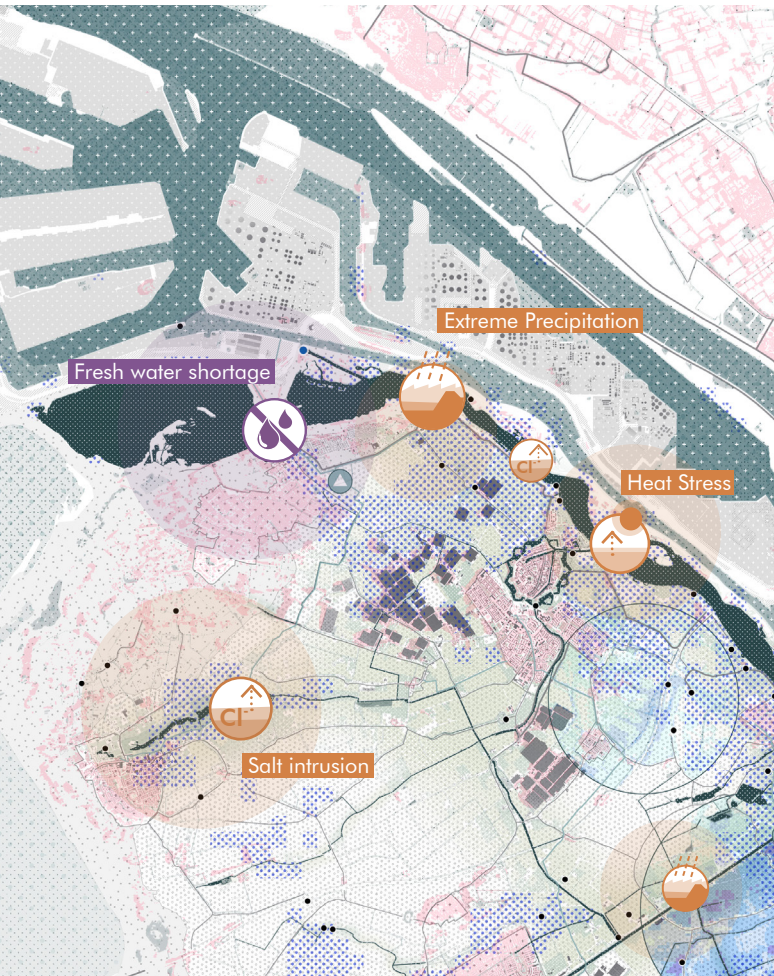


CHALLENGE REFLECTED ON LANDSCAPE INFRASTRUCTURE SYSTEM



CHALLENGE REFLECTED ON LANDSCAPE INFRASTRUCTURE SYSTEM

WATER LANDSCAPE INFRASTRUCTURE



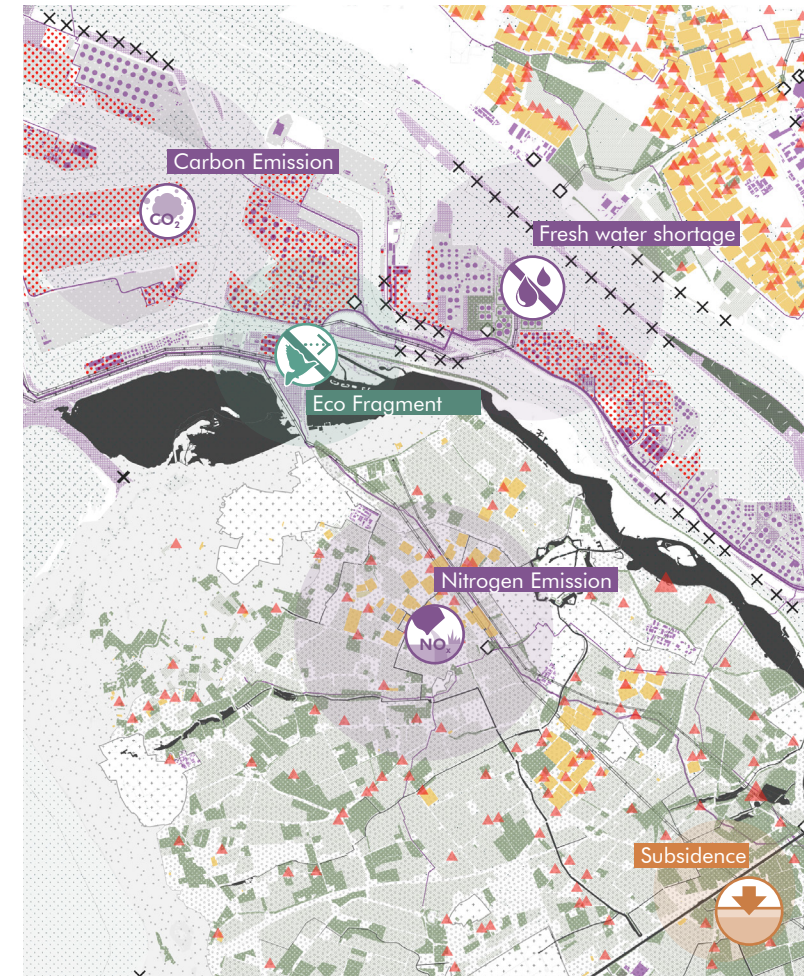
MORE WATER DYNAMIC

RECREATIONAL LANDSCAPE INFRASTRUCTURE



MORE CONNECTED LANDSCAPE

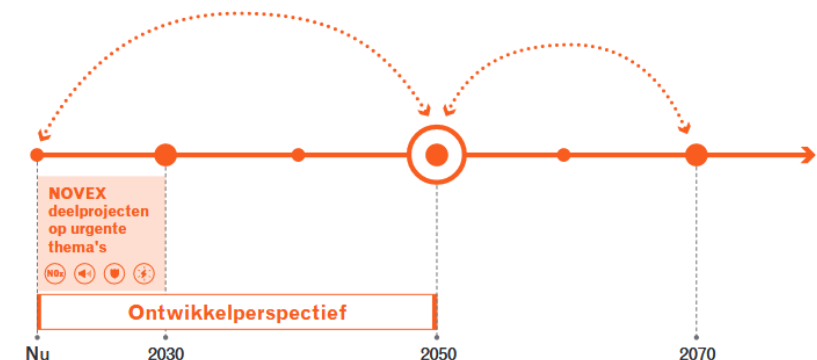
PRODUCTIVE LANDSCAPE INFRASTRUCTURE



MORE NATURAL INCLUSIVE/SUSTAINABLE



- The specific expression of spatial quality and broader well-being varies depending on the unique characteristics of each region. Therefore, by enhancing spatial quality, we are also reinforcing the distinctive regional identity of the Port of Rotterdam and its surrounding areas.



The port and the region face three urgent challenges in the coming years: the economic transition, the social transition and increasing the appeal of the region

Source: PORTVISION ROTTERDAM

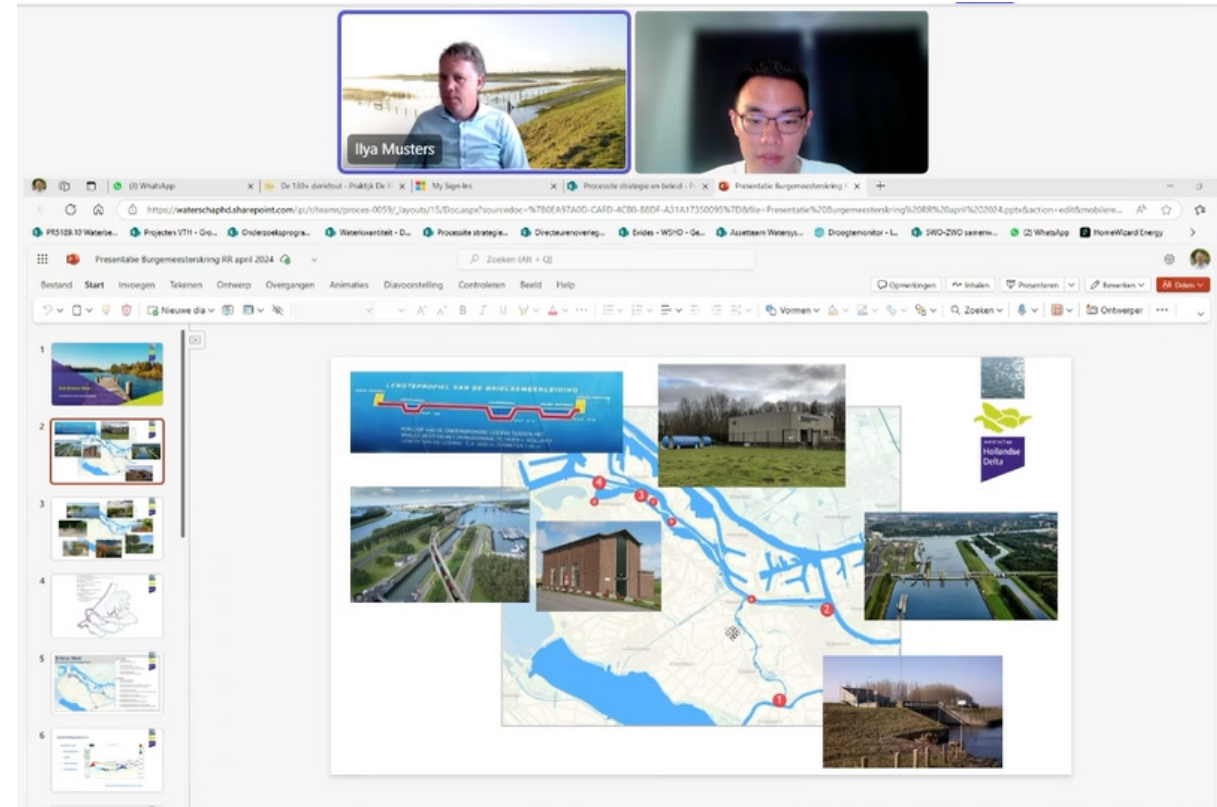
Source: SAMENWERKEN AAN DE TOEKOMST VAN HET ROTTERDAMSE HAVENGEBIED

- Nature is already giving too much and we need to feed-back...
- Ecosystem Services-Wellbeing and Resources



Piet Mout with his native species garden, Piet is a retired ecology teacher now working in KNNV and ecological consultant of Voorne De Zee Municipality

Photo by Author



Ilya Musters is giving a presentation about the proposal and explanation of water management in Brielse Meer. Ilya is a Strategisch adviseur waterbeheer of Waterschap Hollandse Delta

Photo by Author

[illegible]

POTENTIAL MAP-CONNECT AND CREATE NEW NATURE

Main Corridor

Dune Corridor

Port Corridor

Hoek van Holland Beach

Rewilding and water potential in Nieuwe Waterweg

Open space and Infrastructure

Middeland

Maassluis

Bio-Ditches

Oostvoorne Dune

Nature 2000 Area in North Sea

Westduinen

Hellevoetsluis

Nature 2000 Area Outer dike

0 10 km

POTENTIAL MAP-CONNECT AND CREATE NEW NATURE

Main Corridor

Dune Corridor

Port Corridor

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• Oostvoorne Dune

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Nature 2000 Area in North Sea

Nature 2000 Area Outer dike

28

POTENTIAL MAP-CONNECT AND CREATE NEW NATURE

• Hoek van Holland Beach

Rewilding and water potential in Nieuwe Waterweg

Open space and Infrastructure

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Rewilding and water potential in Nieuwe Waterweg

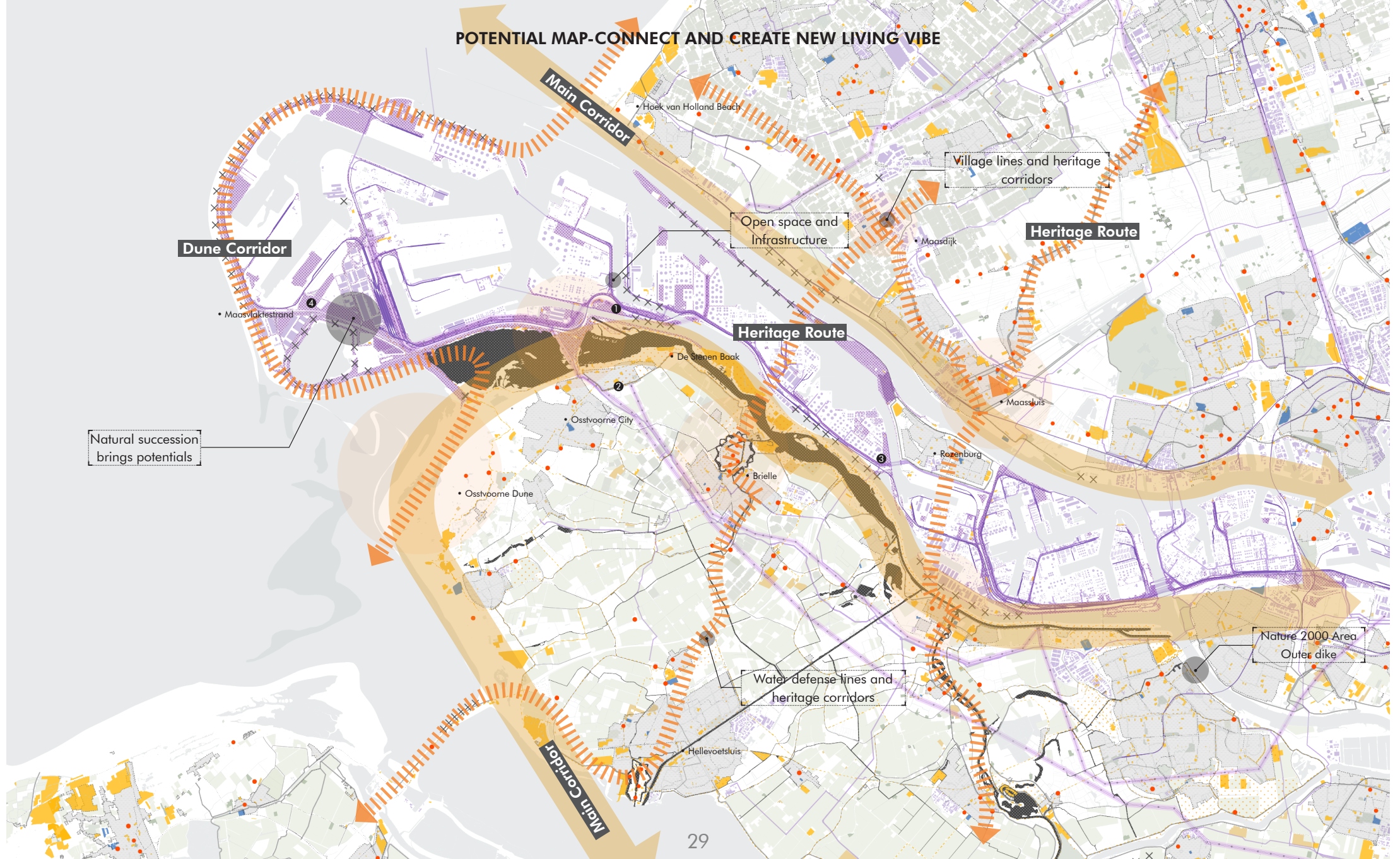
Open space and Infrastructure

Nature 2000 Area in North Sea

Nature 2000 Area Outer dike

28

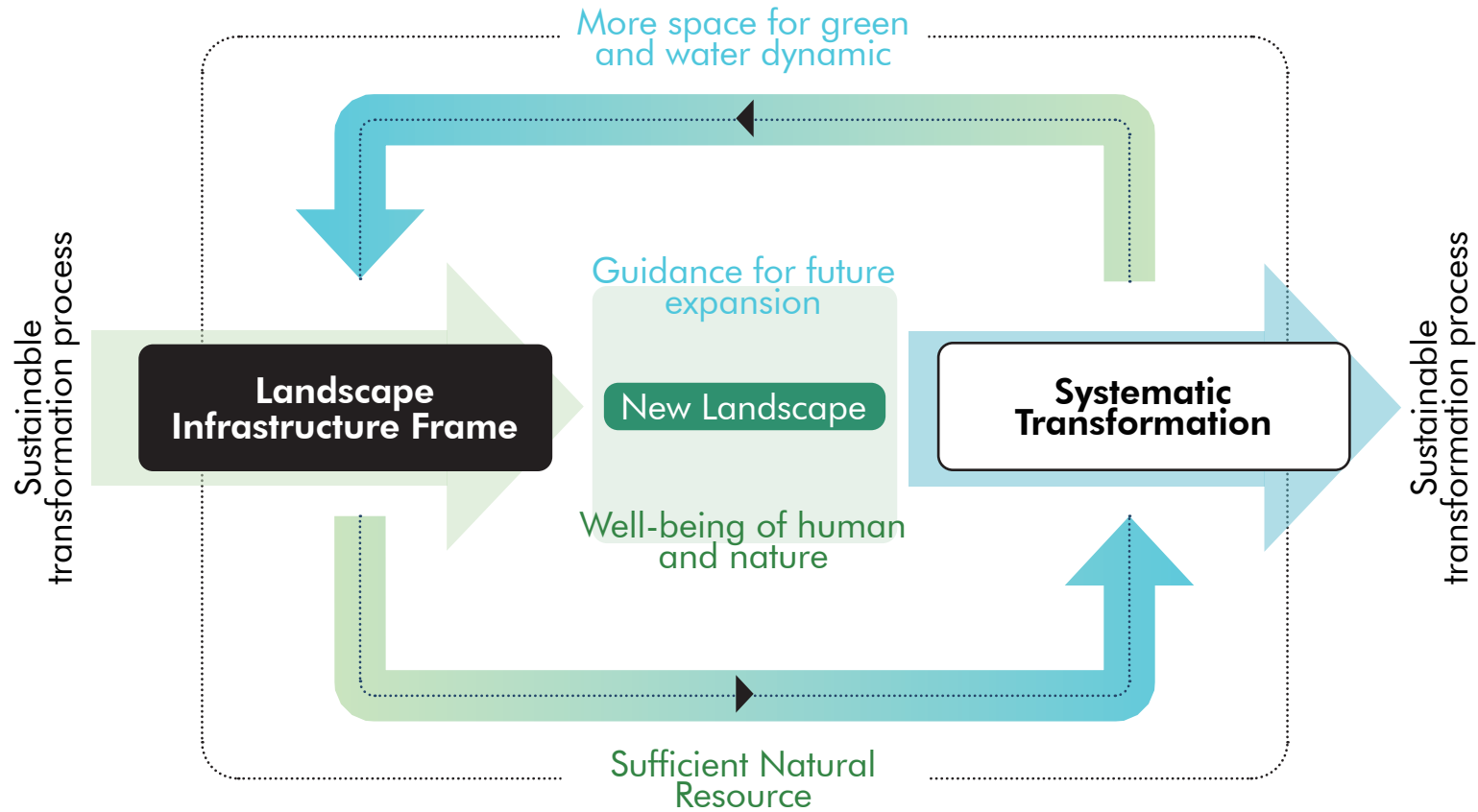
POTENTIAL MAP-CONNECT AND CREATE NEW LIVING VIBE



Strategy/Principal

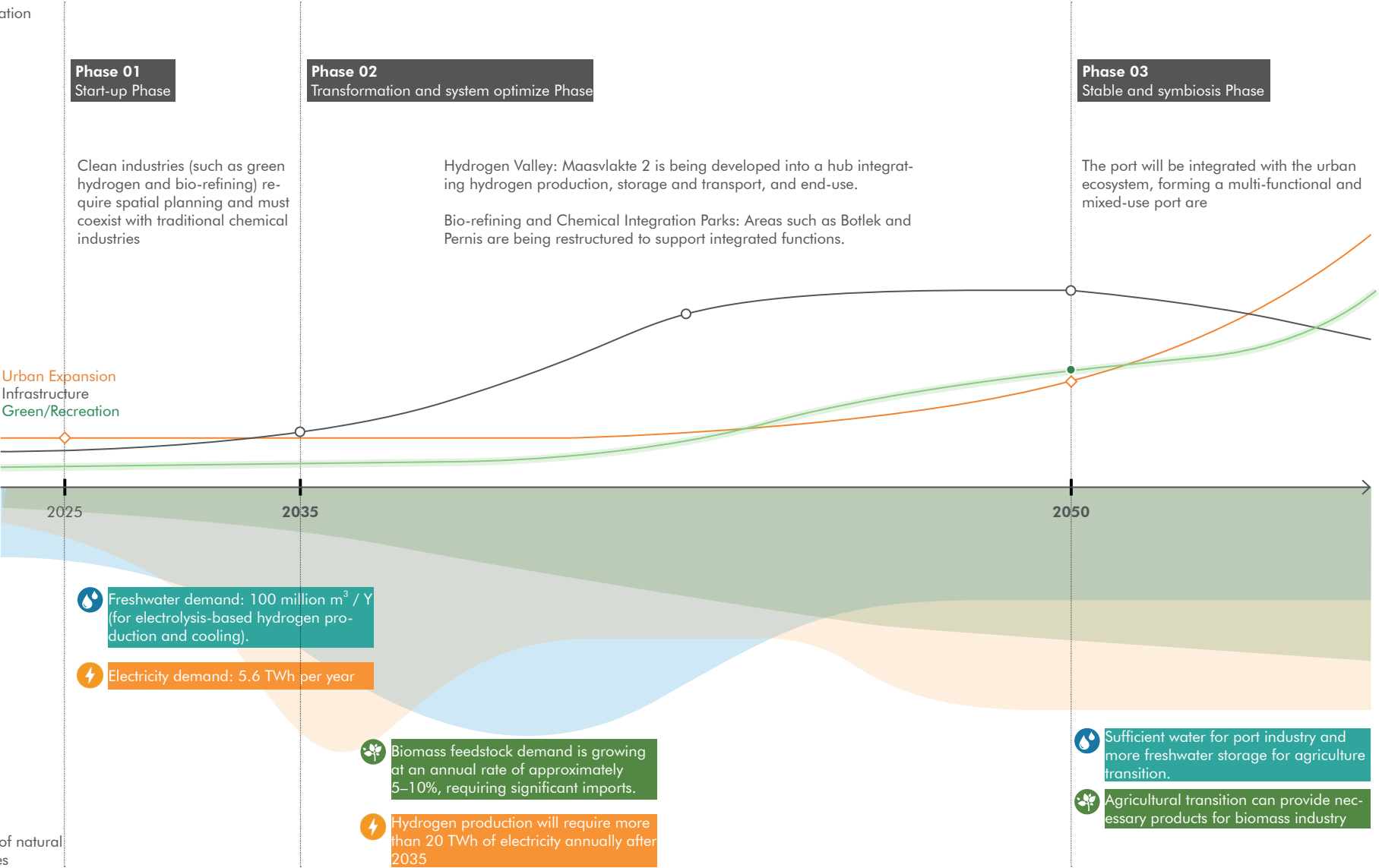
-What landscape-based design strategies and principles can be employed to create a well connected, coherent and robust landscape infrastructure network?

CONCEPT OF LANDSCAPE-CONCEPTUAL FRAME

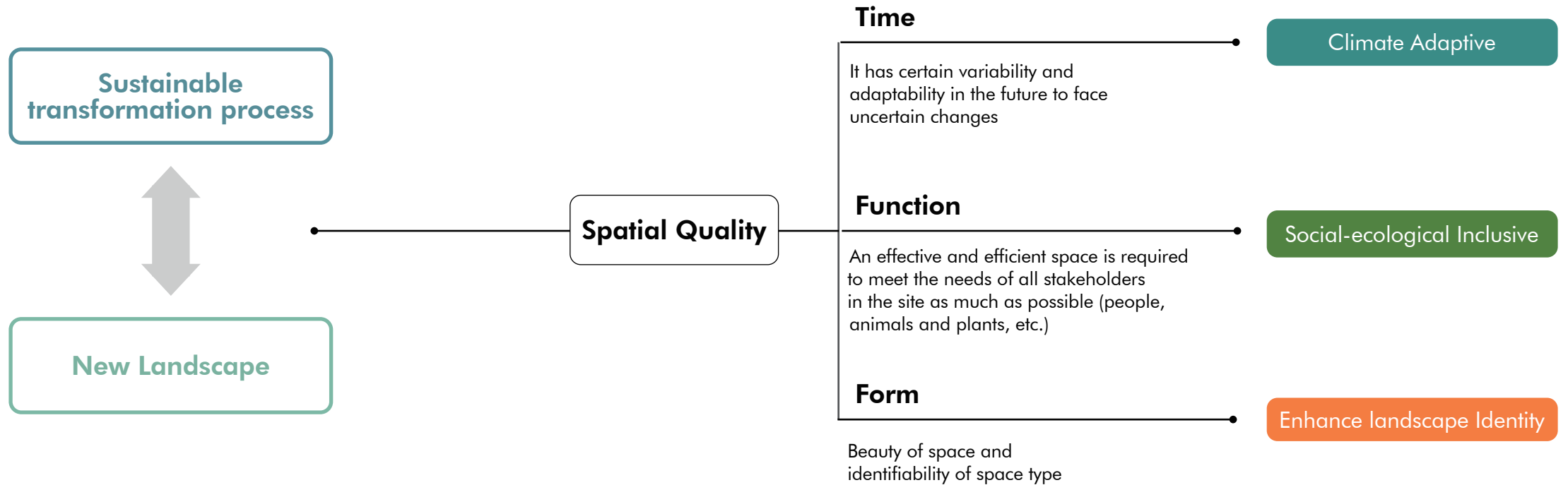


DESIGN TROUGHG TRANSFORMATION-DEMAND FOR MORE RESOURCE

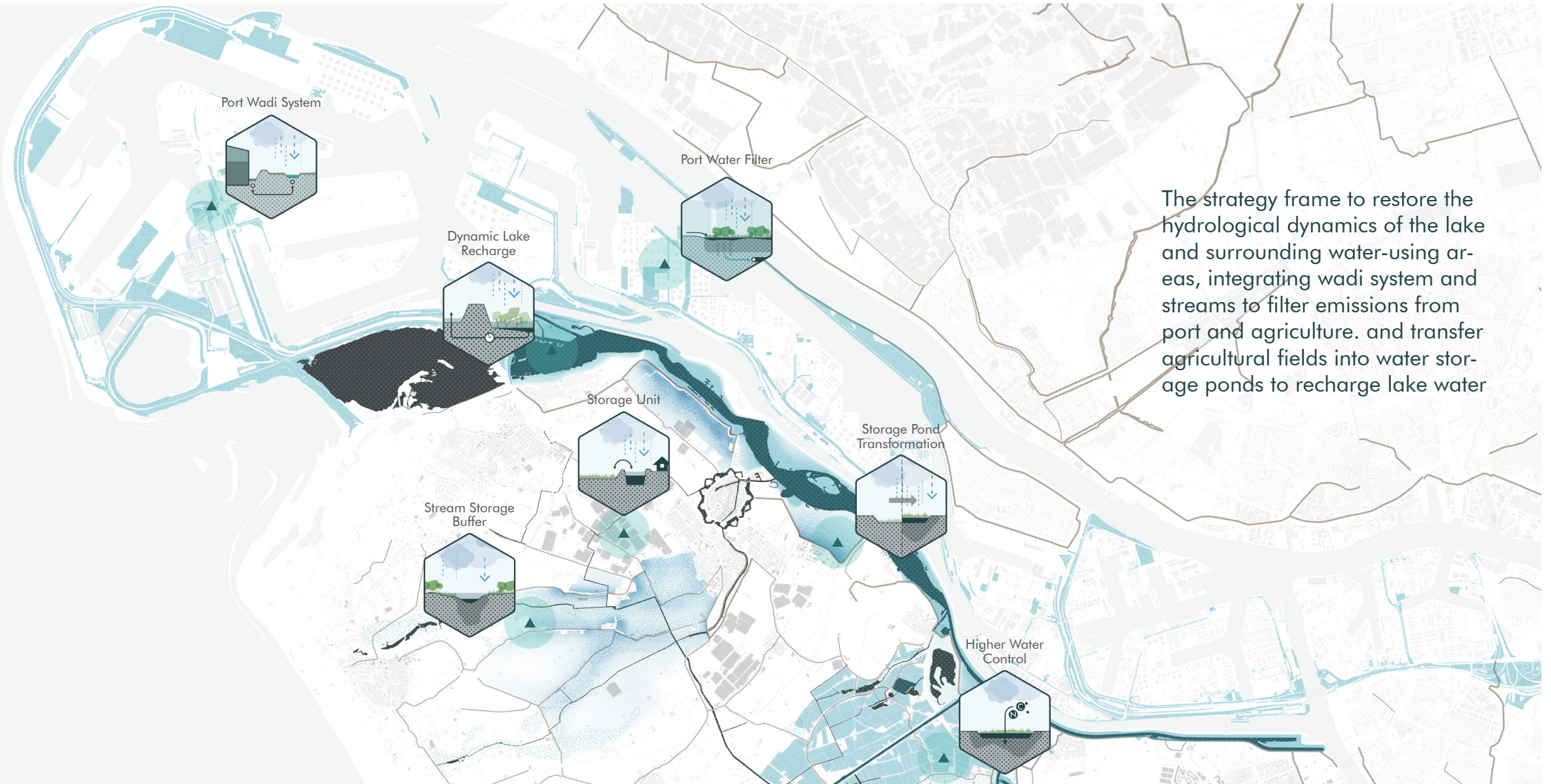
• Transformation Process

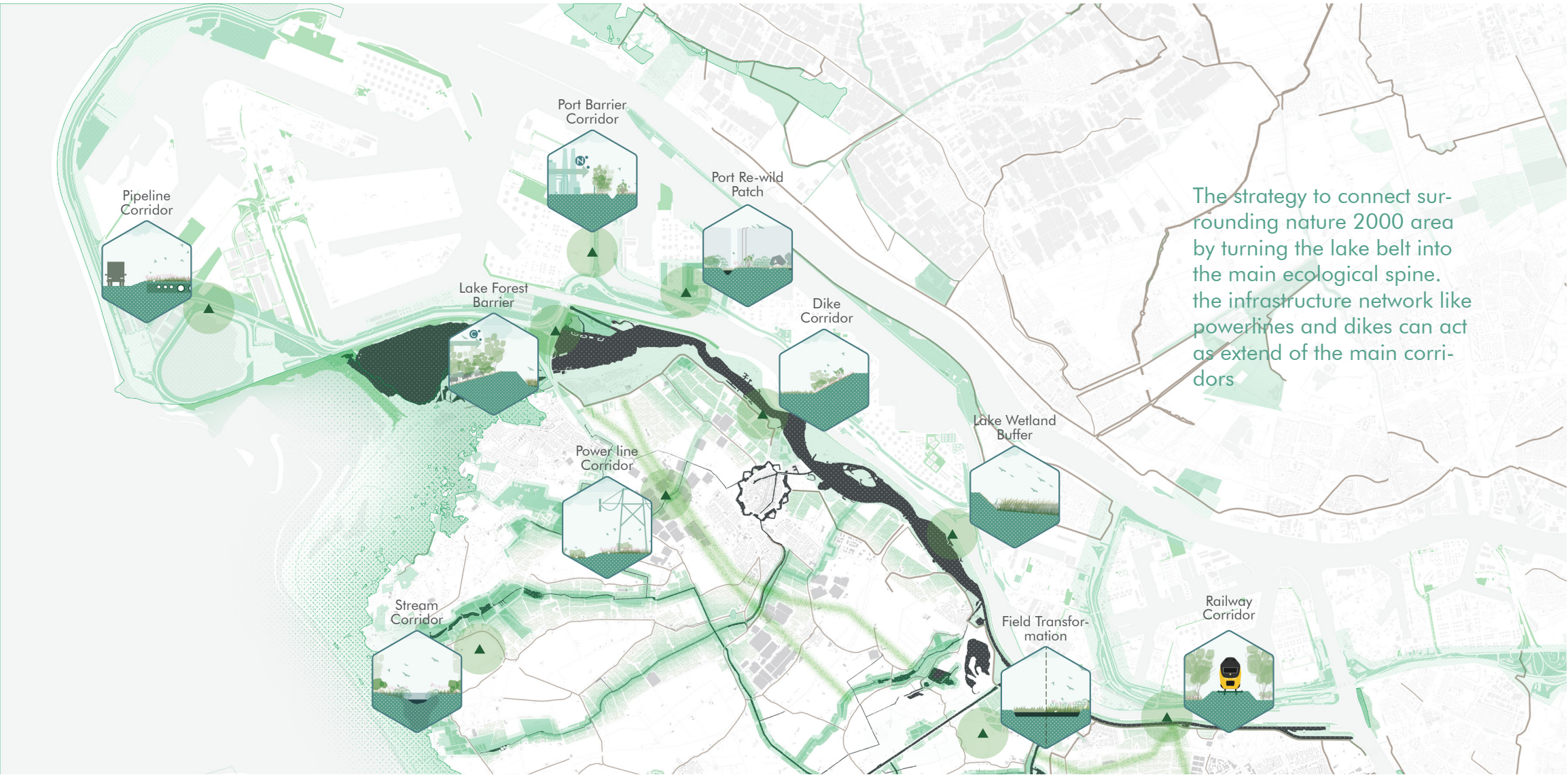


• Demand of natural resources

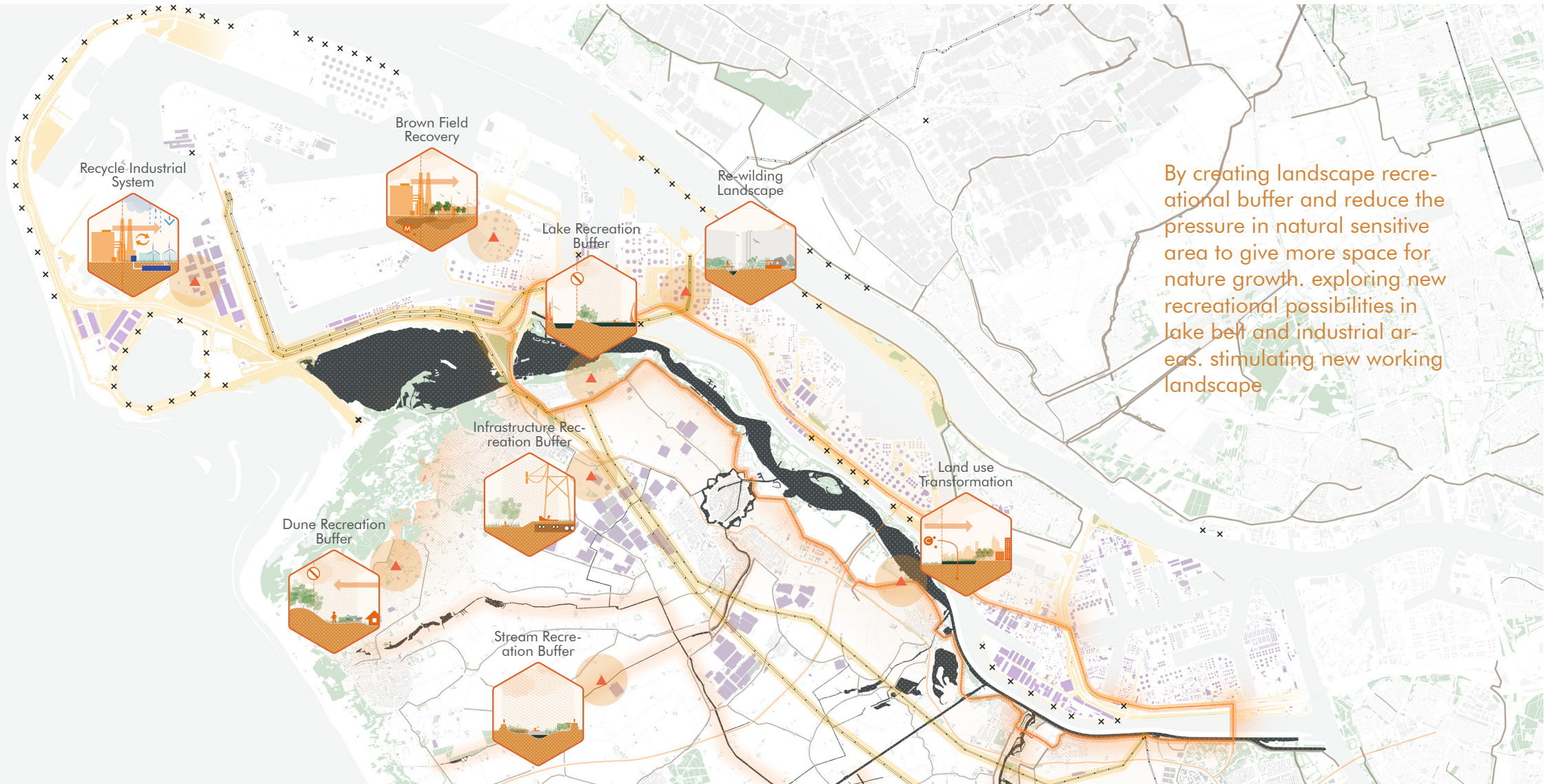


REGIONAL STRATEGY FRAME-CLIMATE ADAPTIVE

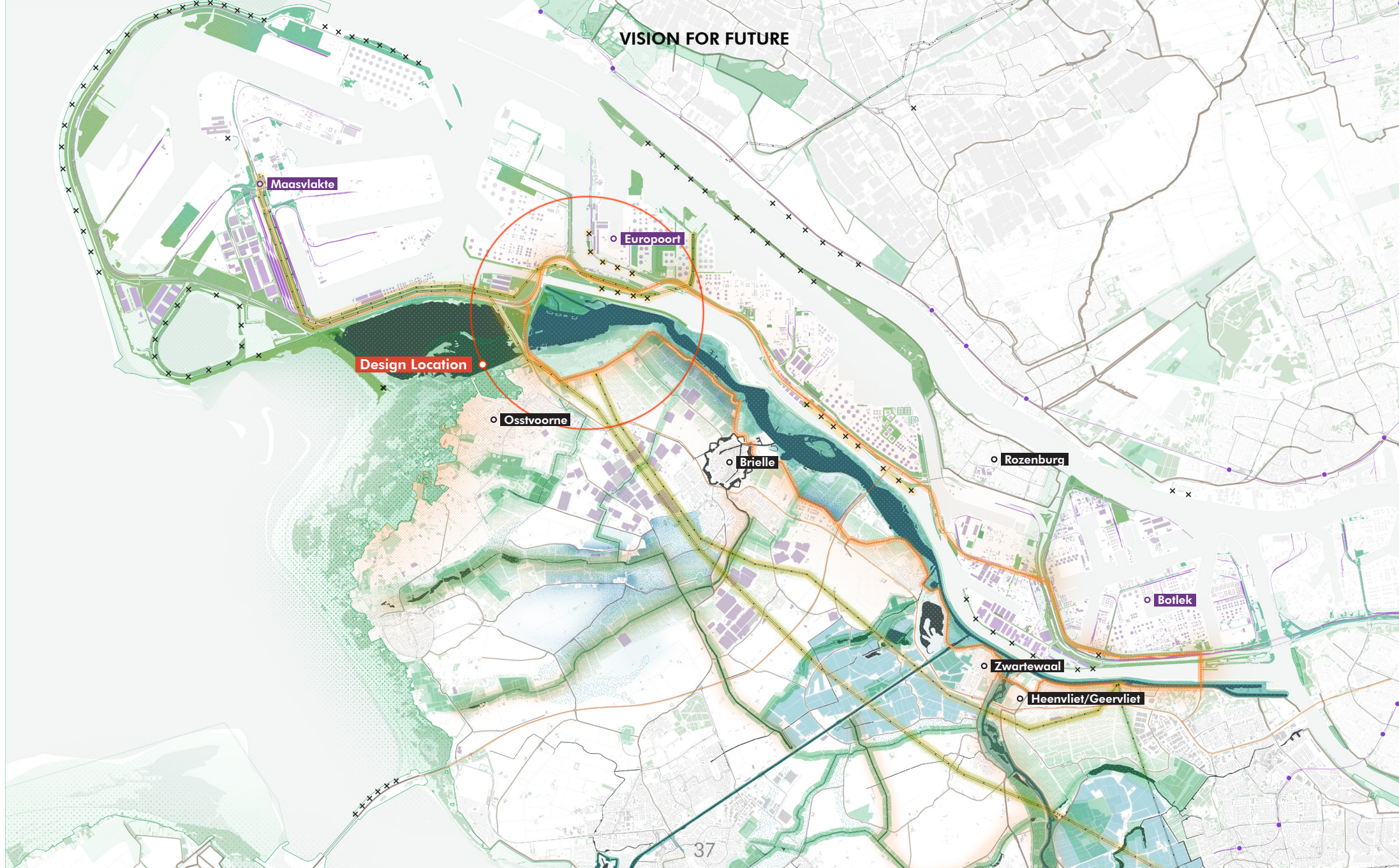




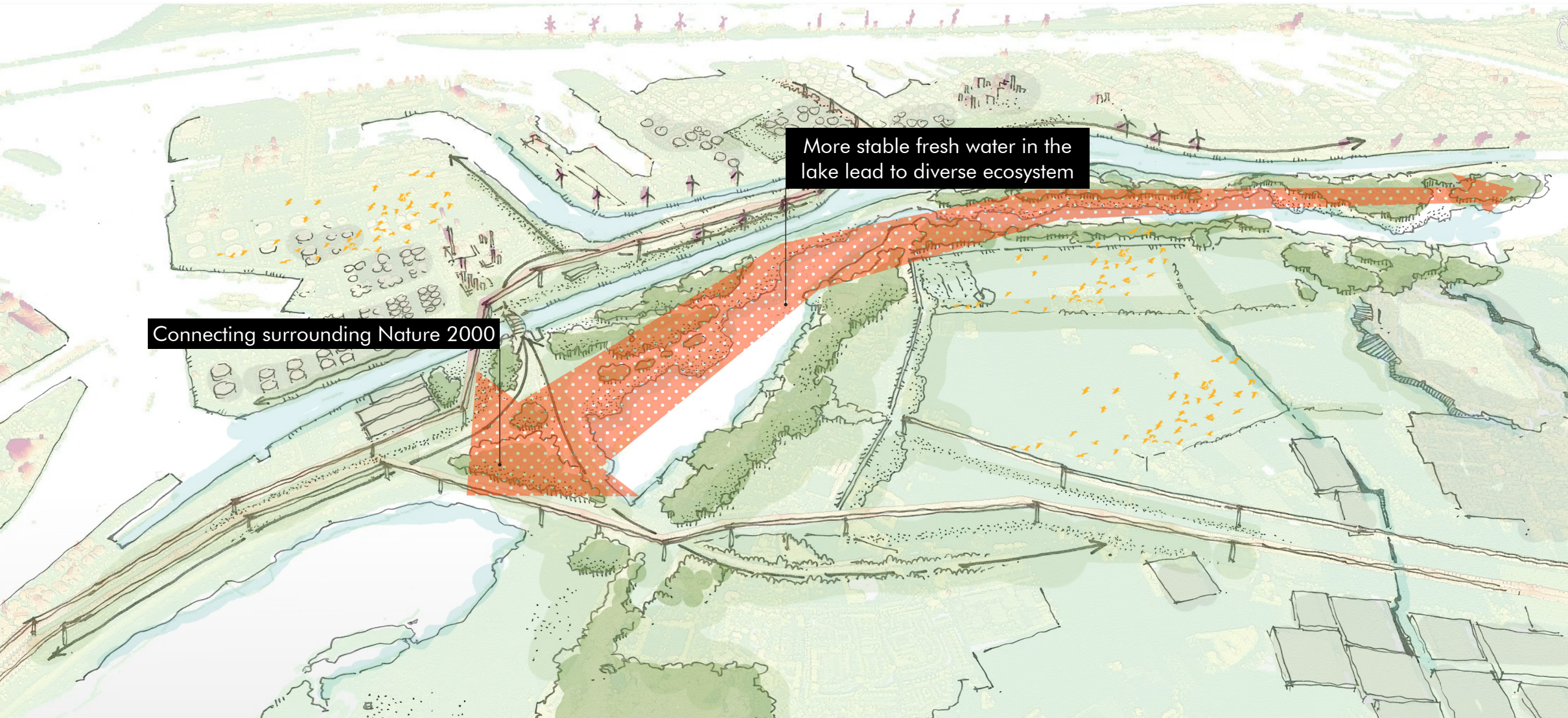
REGIONAL STRATEGY FRAME-ENHANCE LANDSCAPE EXPERIENCE AND IDENTITY



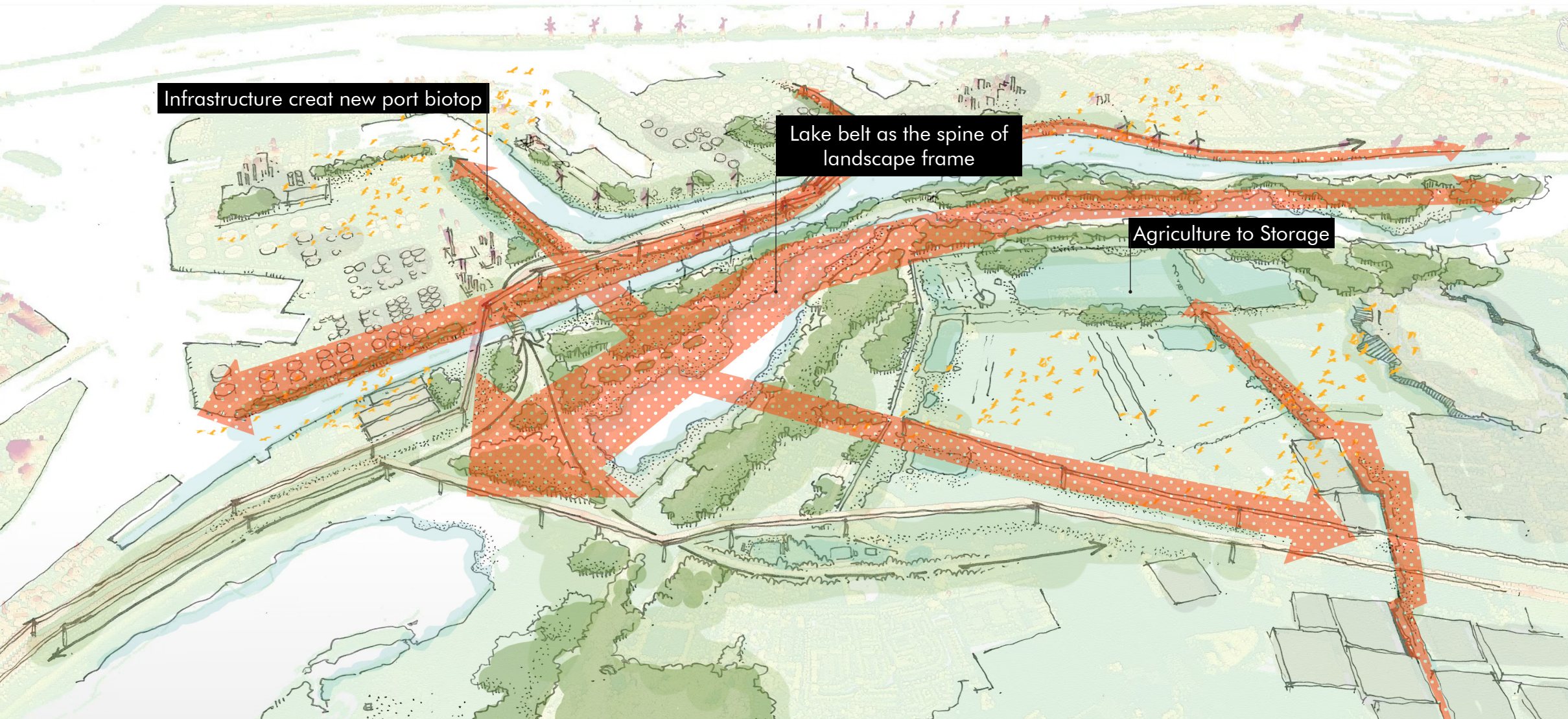
VISION FOR FUTURE



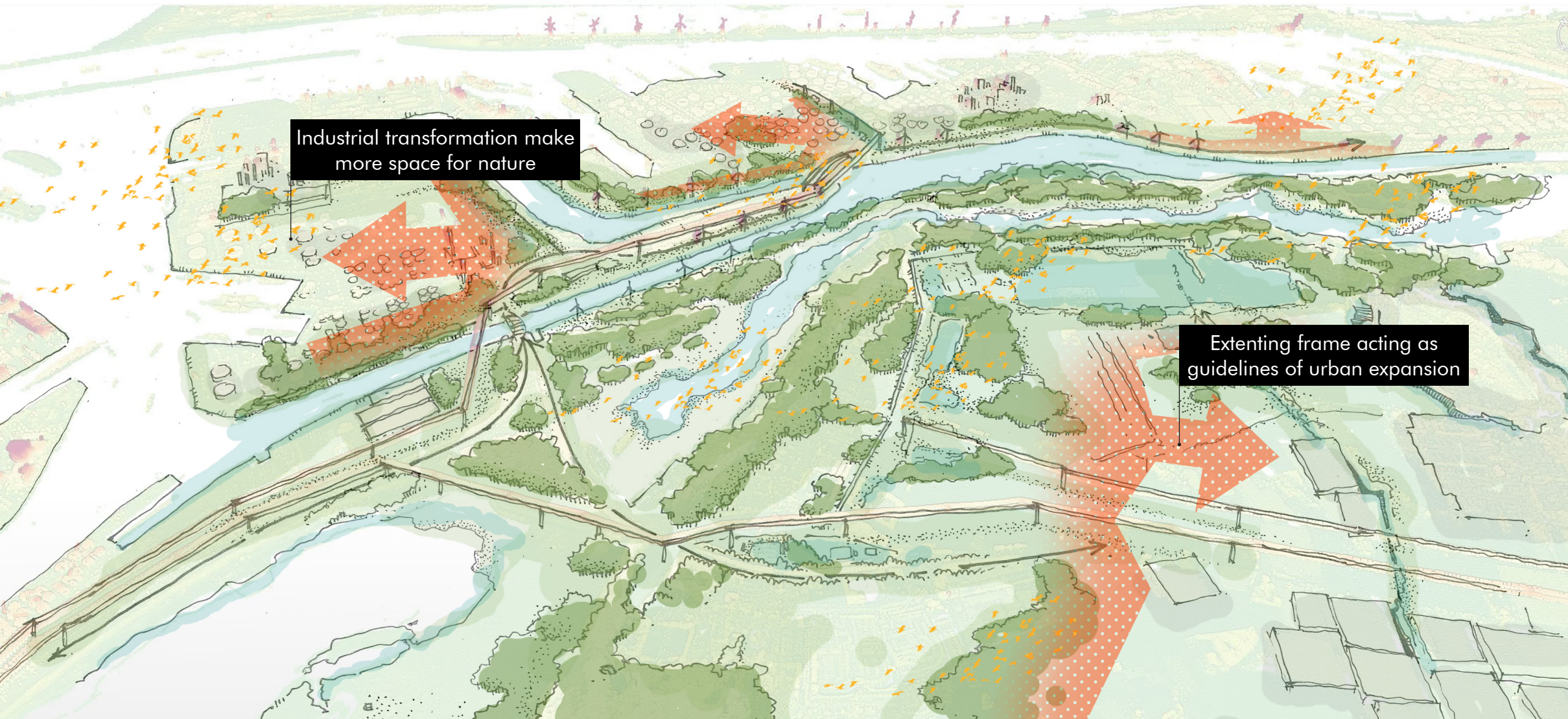
SCENARIO OF 2025-2035



SCENARIO OF 2035-2050



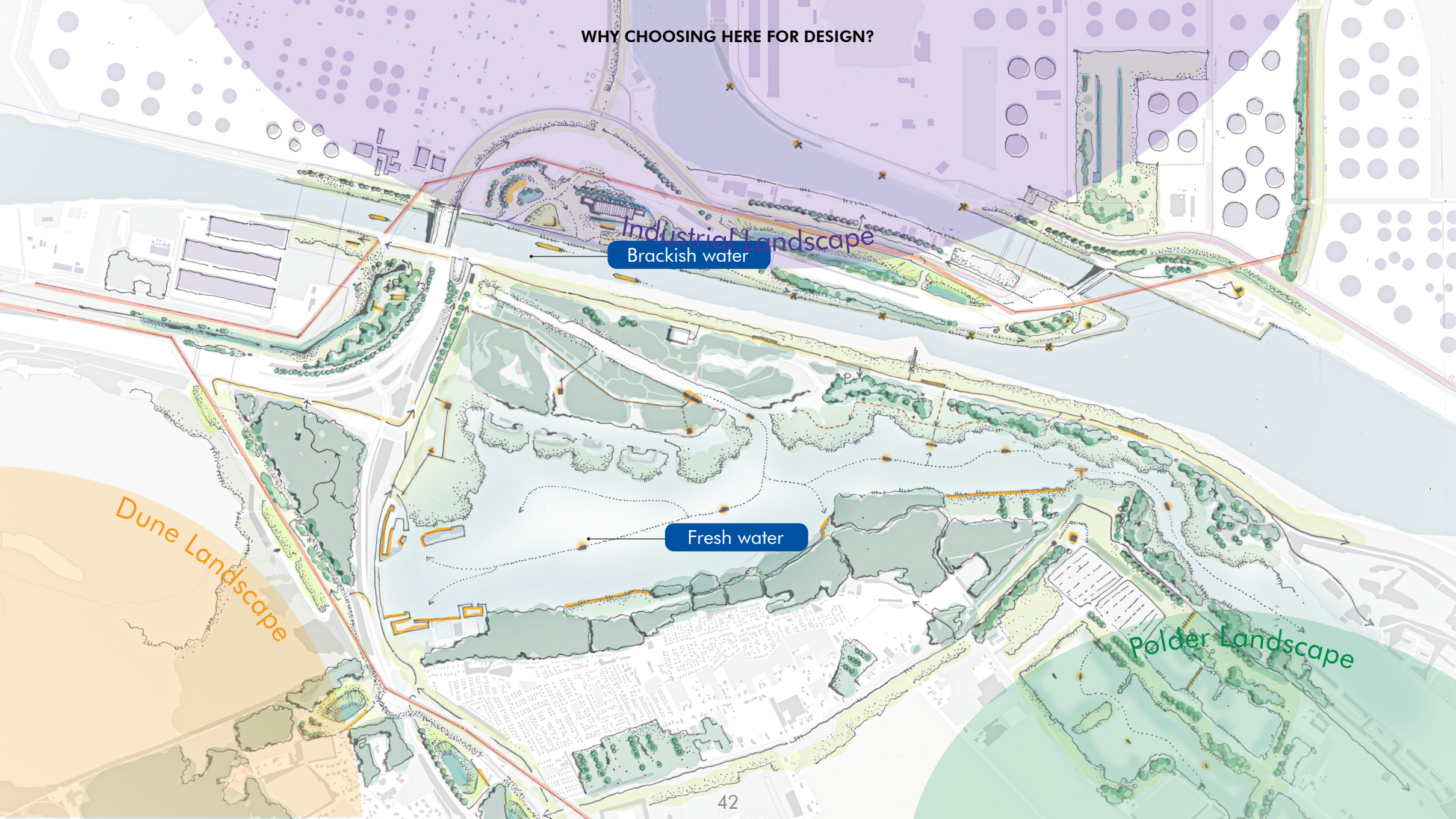
SCENARIO OF 2050-20XX



Application

-How to apply design strategies and principles across scales and what's the connection between landscape infrastructure design in regional and detail scale ?

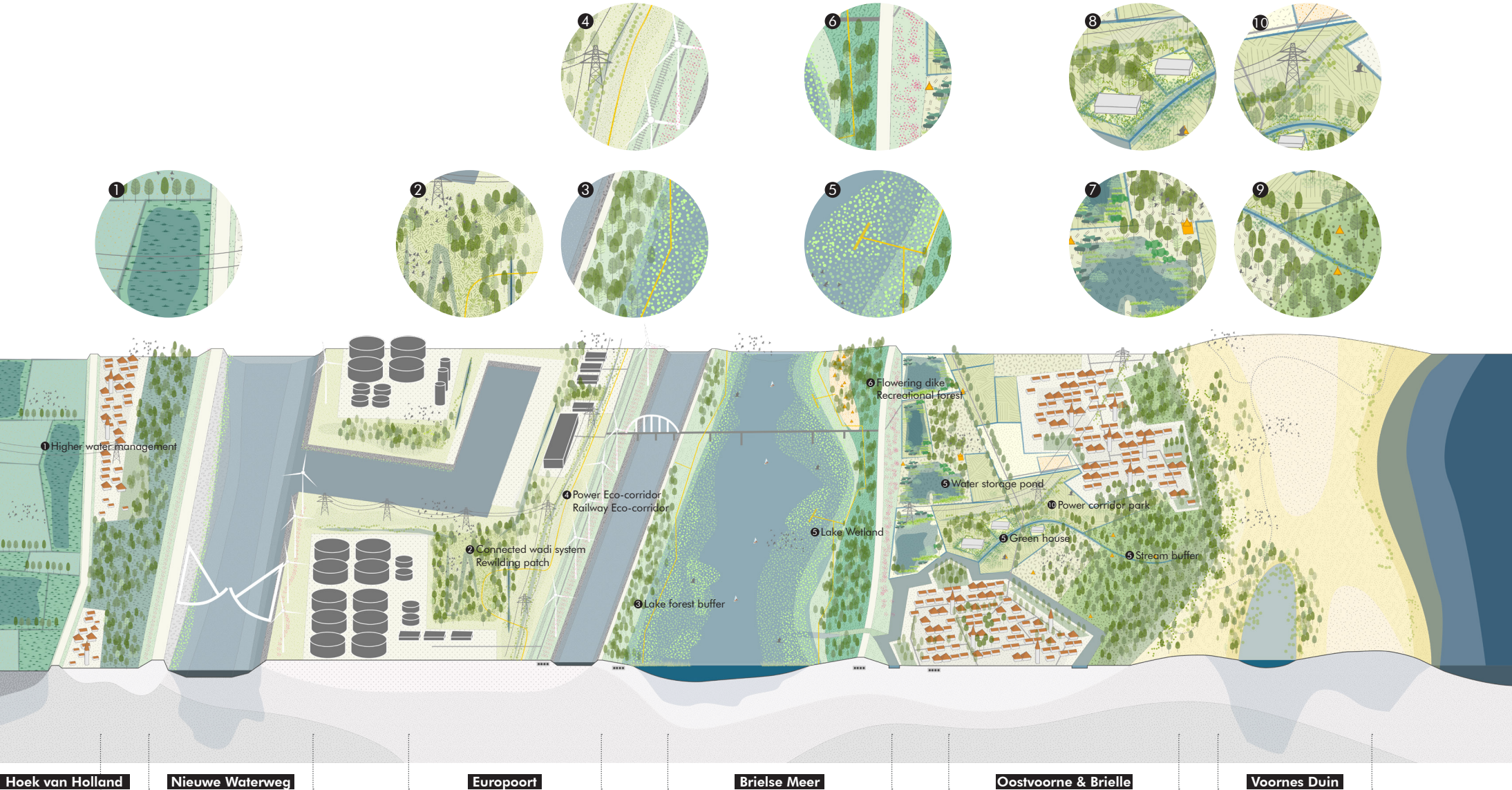
WHY CHOOSING HERE FOR DESIGN?



FLOWSCAPE-OPERATIVE LANDSCAPE STRUCTURES ALONE INFRASTRUCTURE



FLOWSCAPE-DETIAL SPATIAL STRATEGIES-SOFTEN BOUNDARIES



TRANSITIONAL ZONE-MASTER PLAN

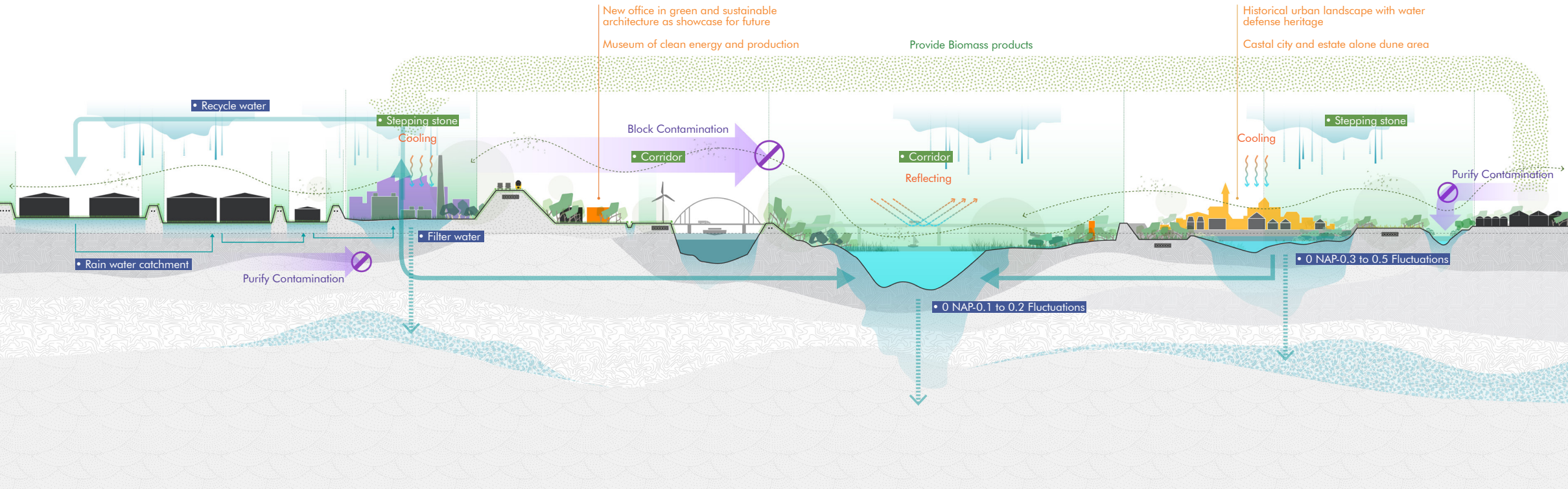


Legend

- ① Climate parks
- ② Flower meadow along Powerline
- ③ Exploration garden assemble
- ④ Water ditches along powerline
- ⑤ New Porthos station with garden
- ⑥ Tempary habitat
- ⑦ Green extension between tanks
- ⑧ Water ditches along pipeline
- ⑩ Lighthouse-De Stenen Baak
- ⑪ Flower meadow and woods along dike
- ⑫ Buffer forest/tree line
- ⑬ Water terrace/Tidal park
- ⑭ Lake wetland and plank road



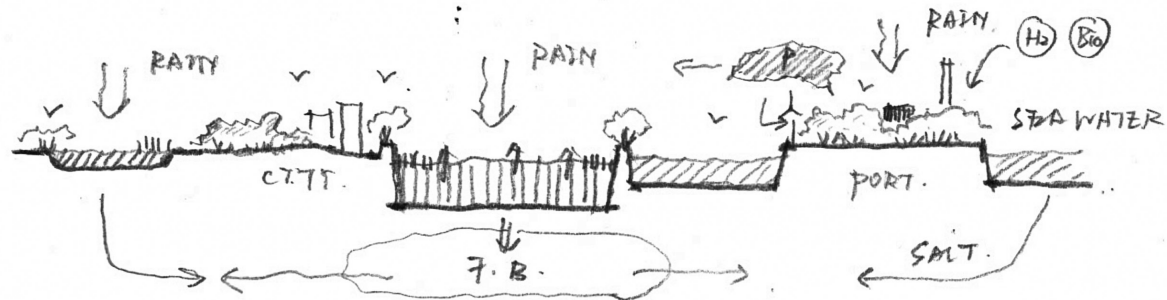
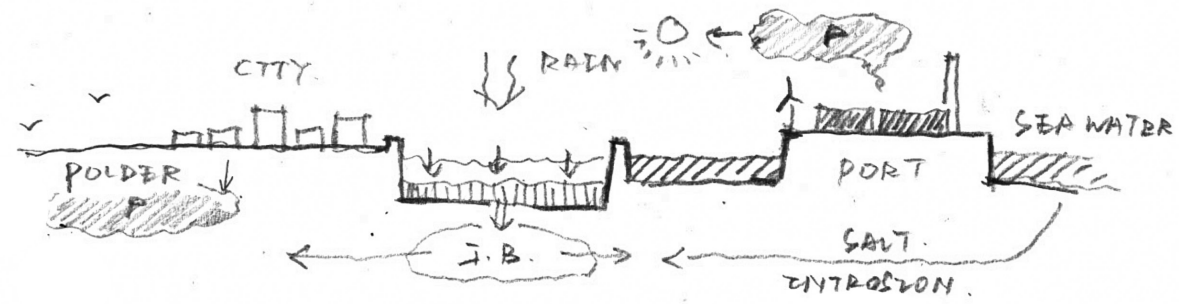
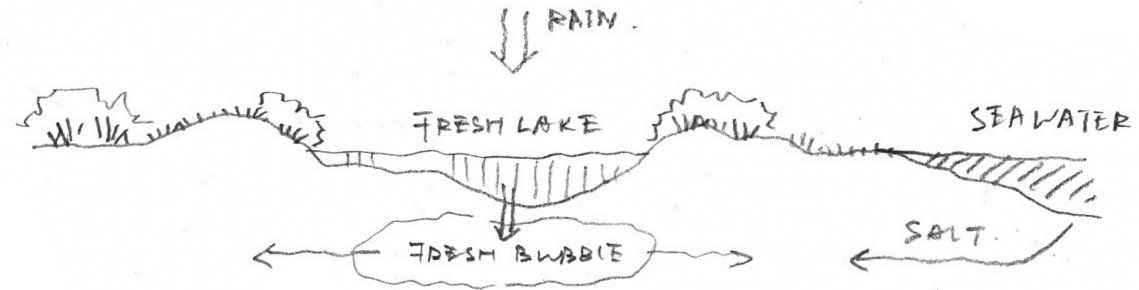
MASTERPLAN SECTION-SYNERGETIC LANDSCAPE INFRASTRUCTURE FRAME



DETAIL DESIGN LOCATION-HARTELKANAAL



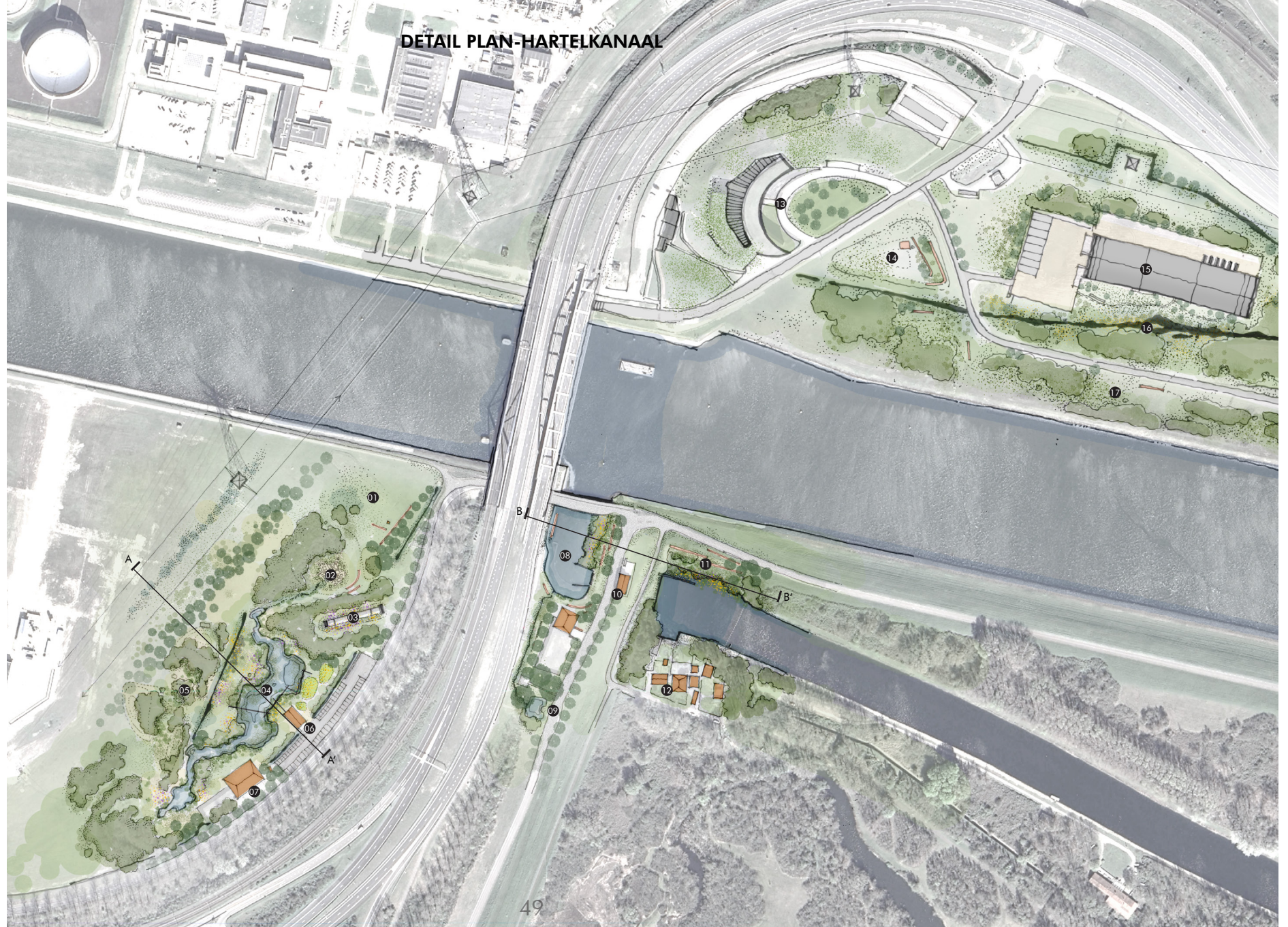
DESIGN CONCEPT-REINTRODUCE PROCESS



DETAIL PLAN-HARTELKANAAL

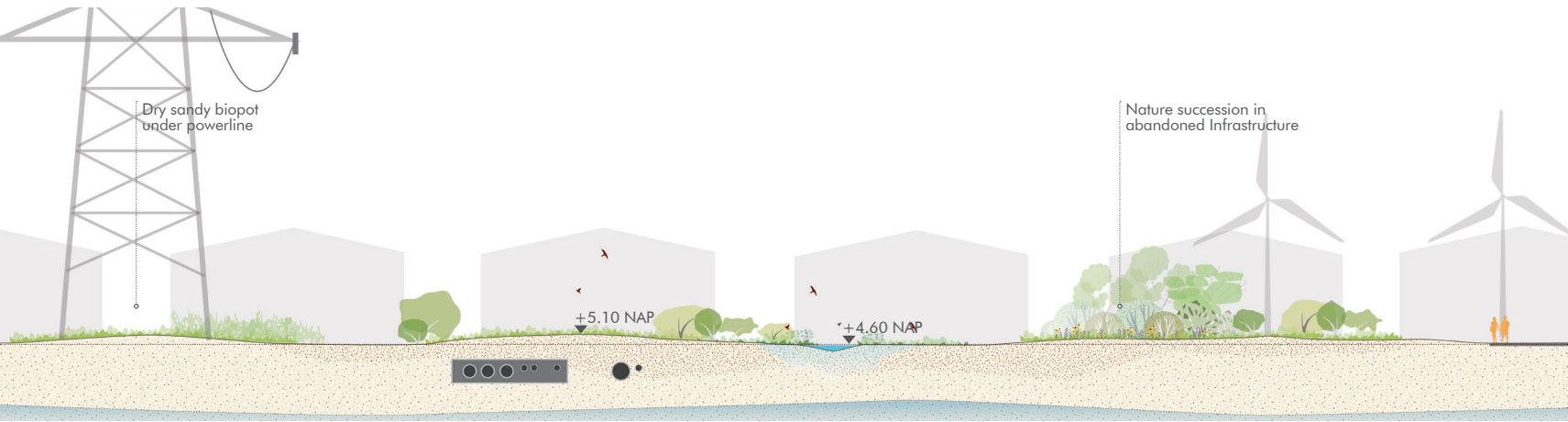


- 01 Open Meadow
- 02 Water Detention Garden
- 03 Industrial Heritage Garden
- 04 Wetland Educational Garden
- 05 Dune Garden
- 06 Tourist Center
- 07 Cafe
- 08 Tidal Park
- 09 Rain Garden
- 10 Sluis Rozenburg
- 11 Wetland Terrace
- 12 Camping Complex
- 13 BP Rotterdam
- 14 Grass Slope
- 15 Porthor Station
- 16 Open Ditch
- 17 Path with Benches

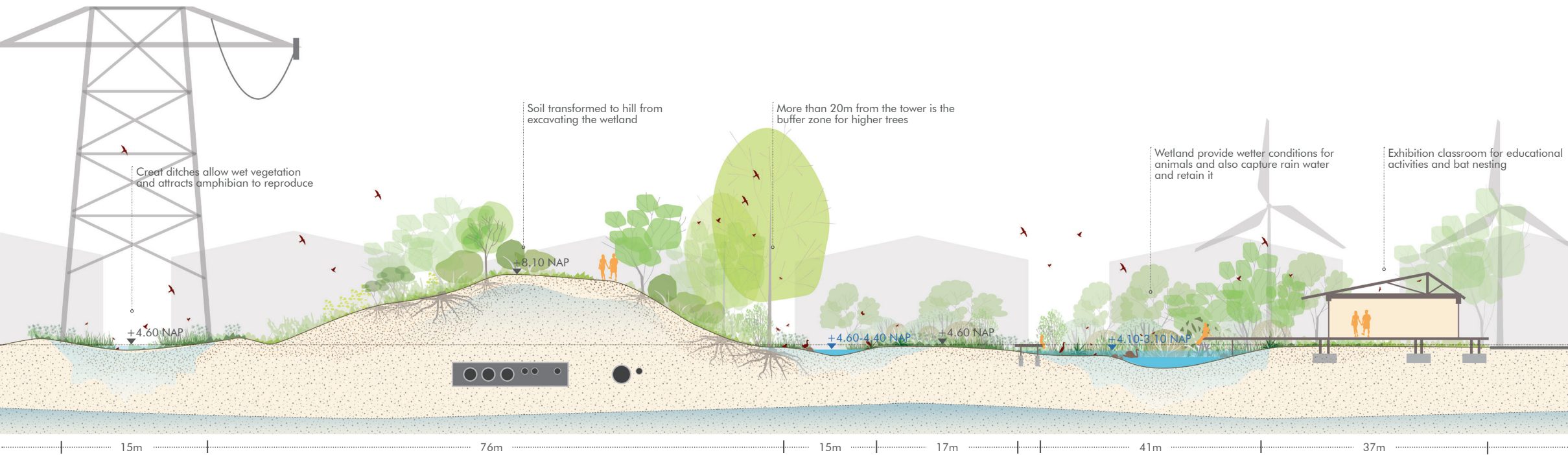


SECTION A-EXPLORATION GARDEN

• Current Situation A-A'



• Designed Phase to 2035 A-A'



PROCESS-EXPLORATION GARDEN

Trees

- *Betula pubescens*
- *Populus tremula*
- *Quercus robur*

Shrubs

- *Salix repens*
- *Hippophae rhamnoides*
- *Juniperus communis*
- *Empetrum nigrum*

Herbaceous Species

- *Ammophila arenaria*
- *Festuca rubra*
- *Carex arenaria*
- *Helichrysum arenarium*
- *Viola curtisii*



VIEW-DRY AND WET DUNE GARDENS

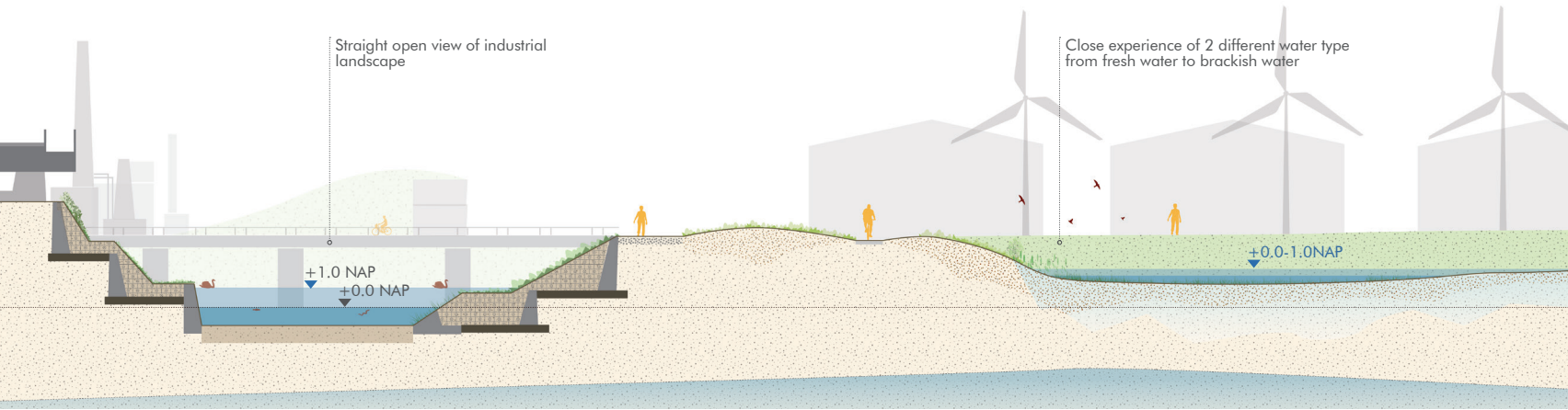


VIEW-A RAIN GARDEN AMONG BUSHES



SECTION B-TIDAL PARK AND TERRANCE

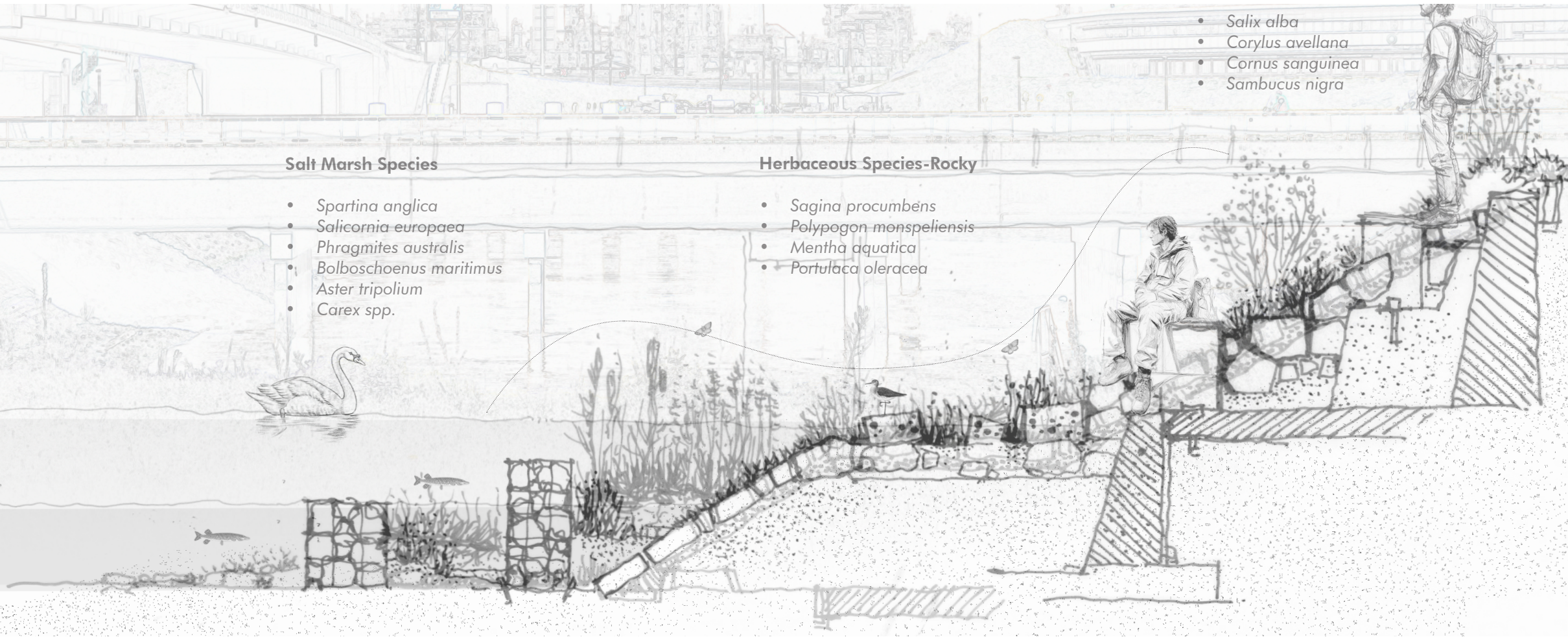
• Current Situation B-B'



• Designed Phase to 2035 B-B'



PROCESS-TIDAL PARK AND TERRANCE



Salt Marsh Species

- *Spartina anglica*
- *Salicornia europaea*
- *Phragmites australis*
- *Bolboschoenus maritimus*
- *Aster tripolium*
- *Carex spp.*

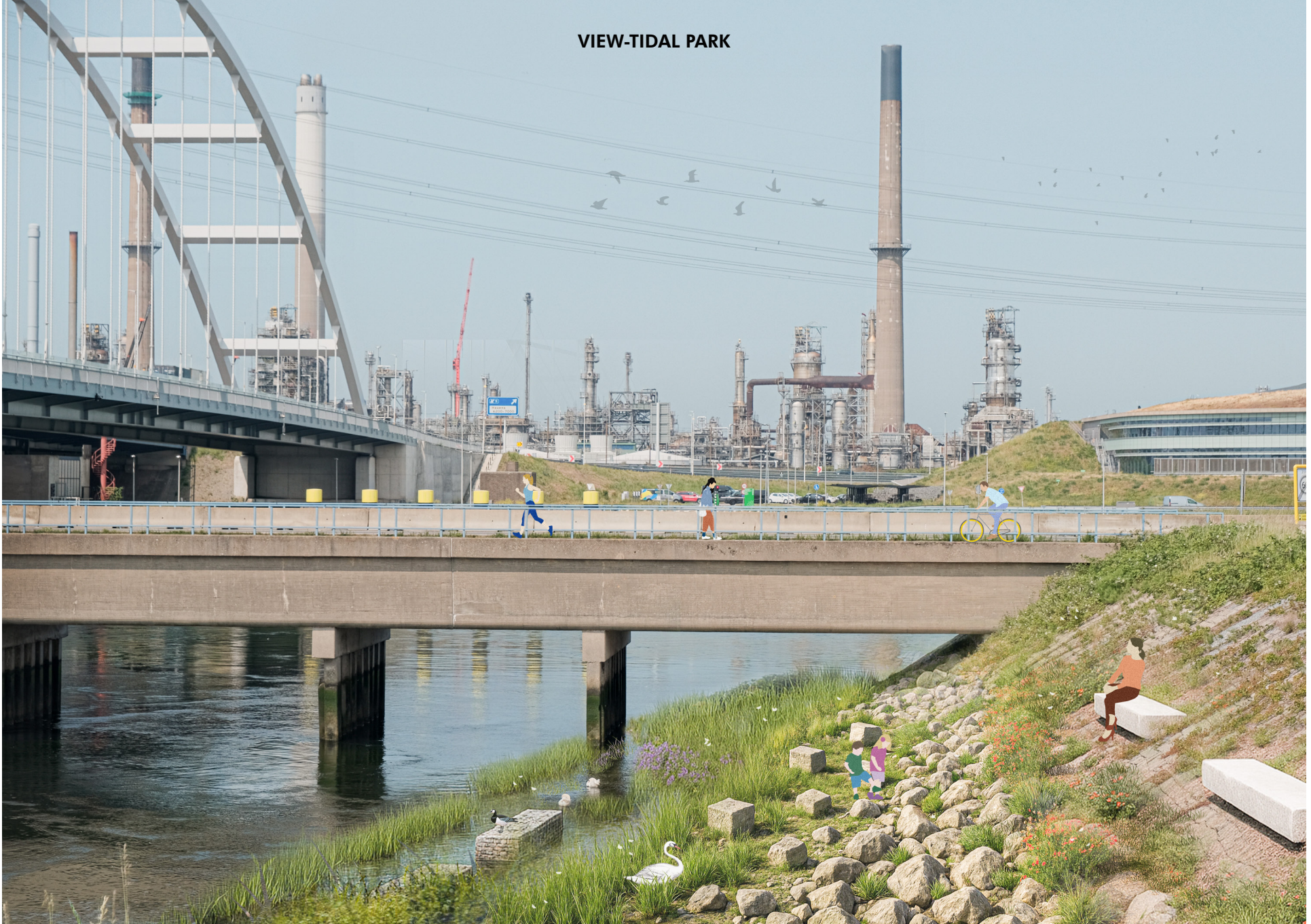
Herbaceous Species-Rocky

- *Sagina procumbens*
- *Polypogon monspeliensis*
- *Mentha aquatica*
- *Portulaca oleracea*

Shrubs

- *Salix alba*
- *Corylus avellana*
- *Cornus sanguinea*
- *Sambucus nigra*

VIEW-TIDAL PARK



VIEW-TERRACE ALONE DIKE OF THE LAKE



Reflection and conclusion

-BACK TO THE RESEARCH OBJECTIVE

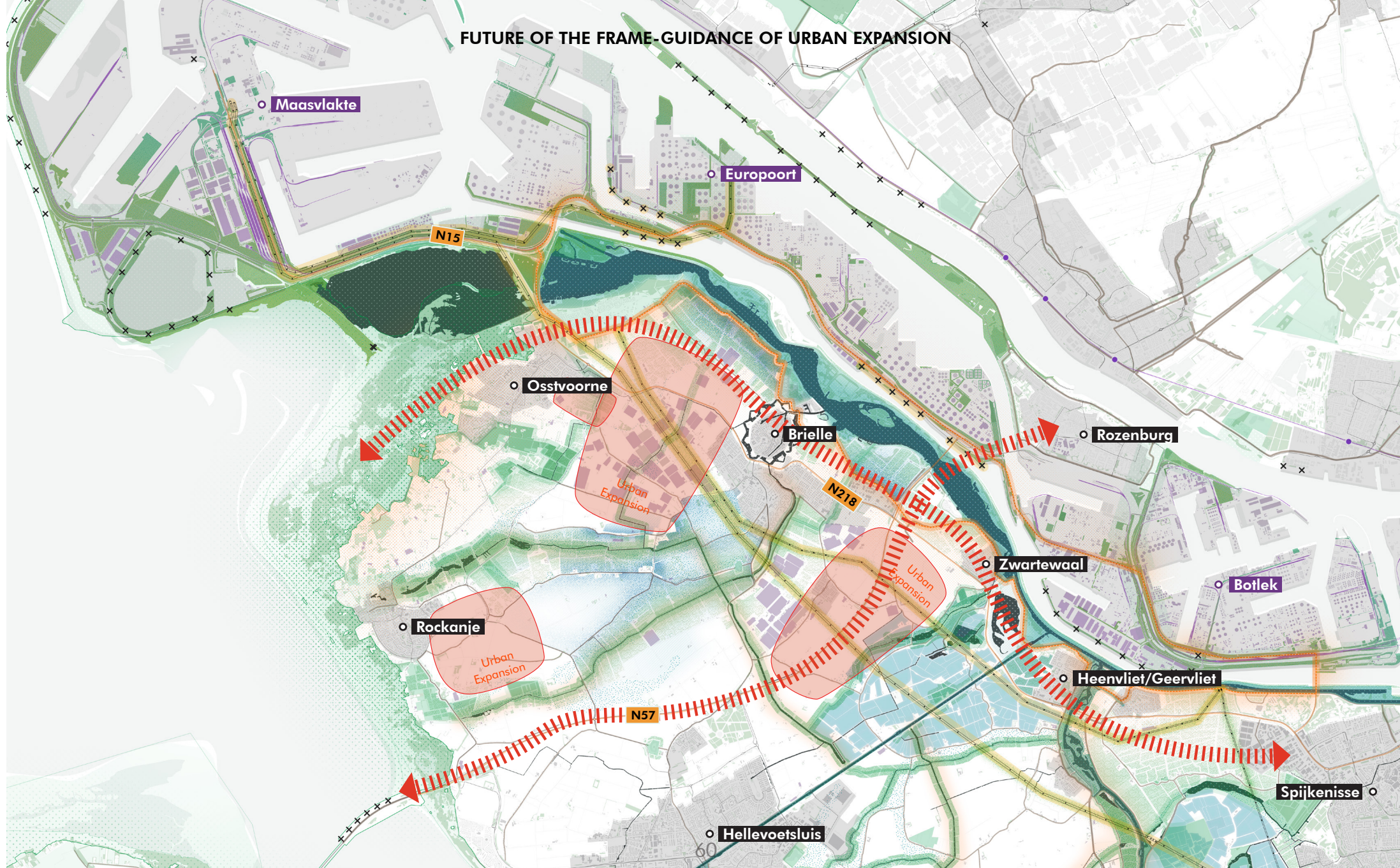
**How does this research help to connects Voorne-Putten
and the Port of Rotterdam and regenerates a robust nature,
water and productive new landscape ?**



CONCLUSION

- **Reconnecting Ecological and Water Systems**
- **Reconstructing a Productive Landscape**
- **Integrating Spatial and Cultural Layers**

FUTURE OF THE FRAME-GUIDANCE OF URBAN EXPANSION



- 
- **Governance mechanisms—exploring how multiple stakeholders can co-manage regionally**
 - **Incorporating more digital tools/monitoring**

" To study the urban landscape as a system of dynamic actions, and as a system of the interaction of space and process, opens up new perspectives of interdisciplinary spatial intervention, more in accordance with a society in perpetual transformation, a society in which the user feels more involved, committed, and in harmony with the environment. "

THANK YOU FOR LISTENING!

NEW PORT-ISLAND CONNECTOR
DESIGNING A LANDSCAPE INFRASTRUCTURE FRAME TO CONNECT VOORNE-PUTTEN ISLAND AND THE PORT OF ROTTERDAM