



Lilly Petter

P5

Accepting the current(s)

A porous approach for the revitalisation of a former port area in
the Rhine-Meuse Delta

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FASCINATION



Figure 1: Hamburg's fishmarket under water in 2020 / Alinea

HIGH PRESSURE ON DUTCH CITIES

Growth without space

- Dike
- Urban area
- Densification area
- Planned transformation of industrial area

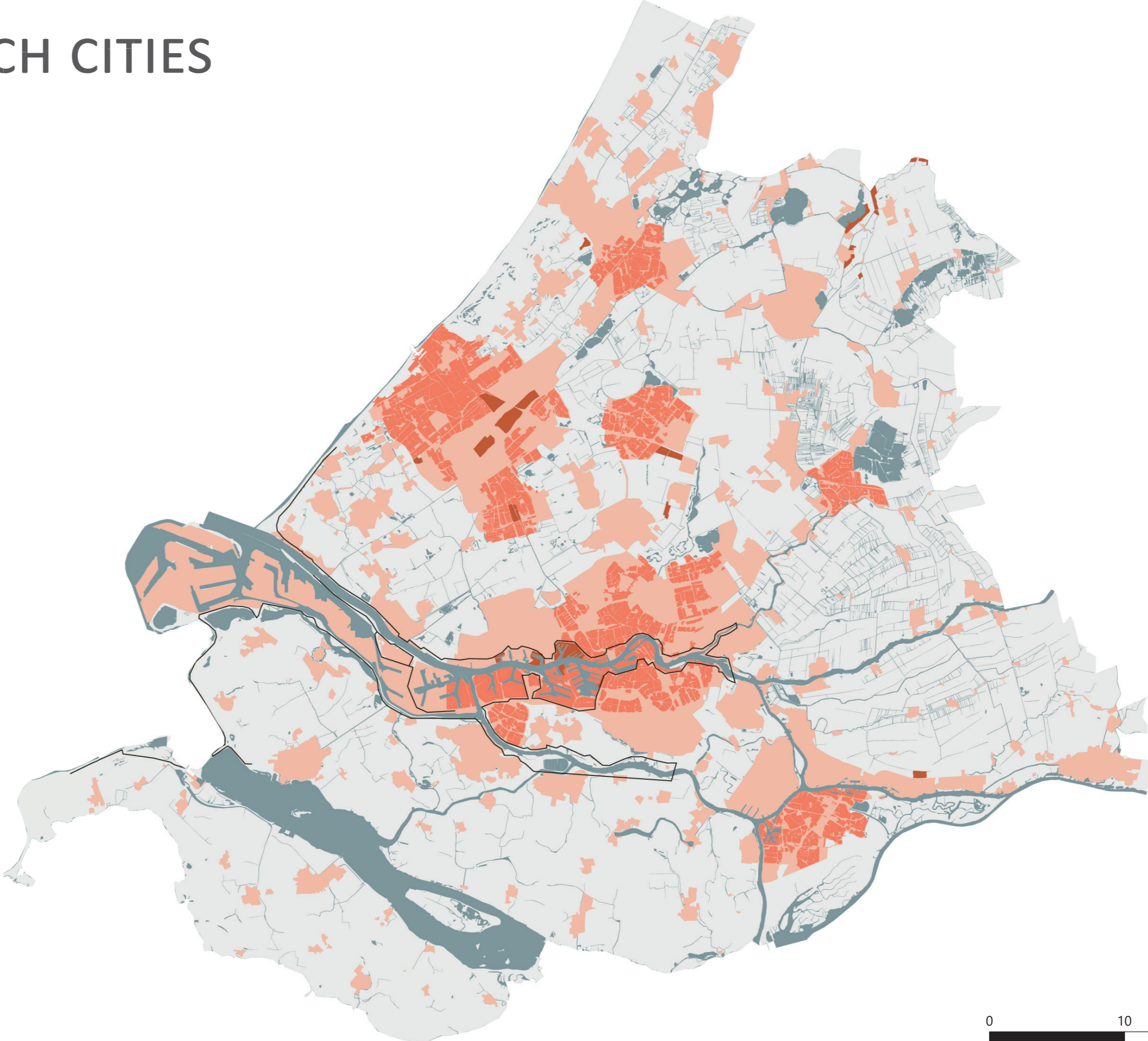


Figure 2: Densification areas in South Holland / Author

How can **post-industrial port areas** be **transformed** and used as a catalyst for **sustainable development** to become **resilient to flood risk** and part of an **adaptive delta system**?

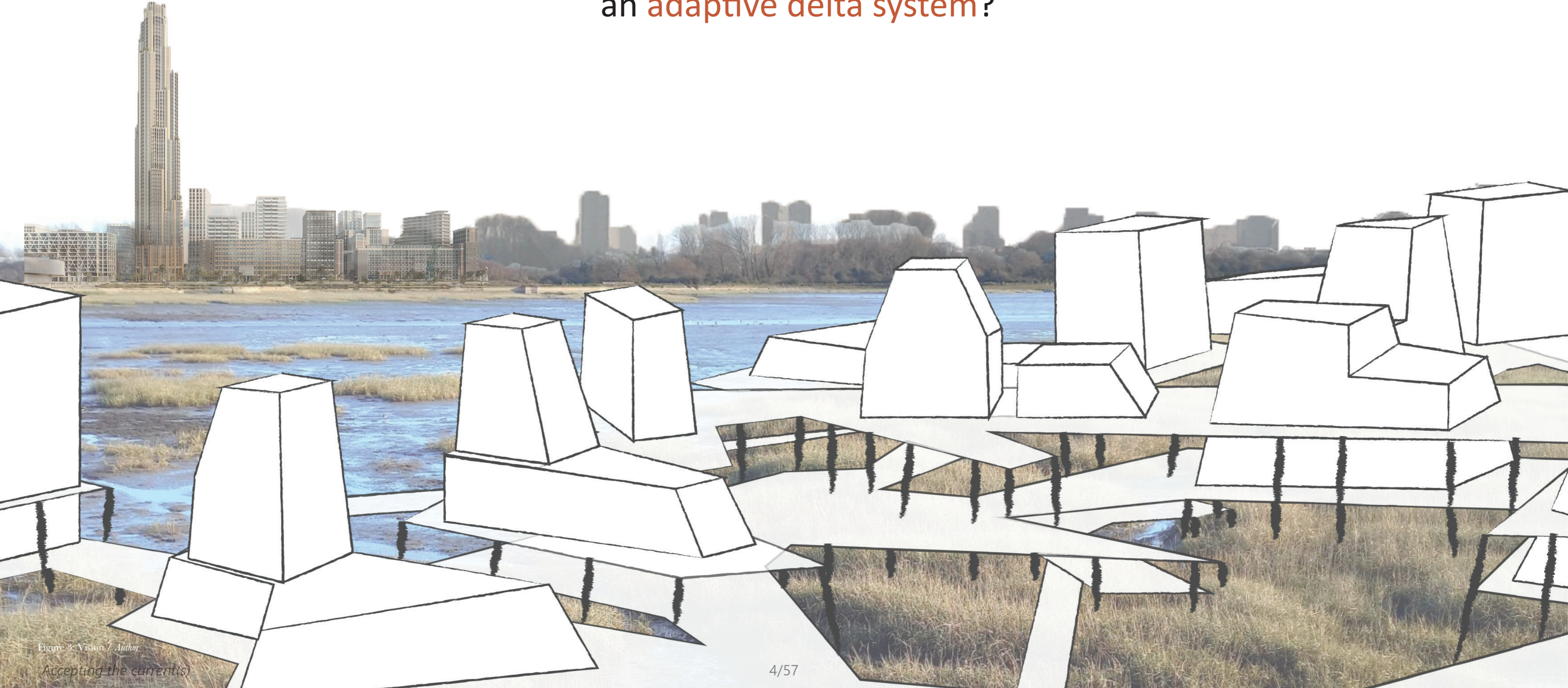







Figure 3: Vision / Author
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CLIMATE CHANGE

and its effects on the Netherlands

-  Change of wind speeds
-  Rising temperatures
-  Increased heavy rain events
-  Rising sea level
-  More solar radiation

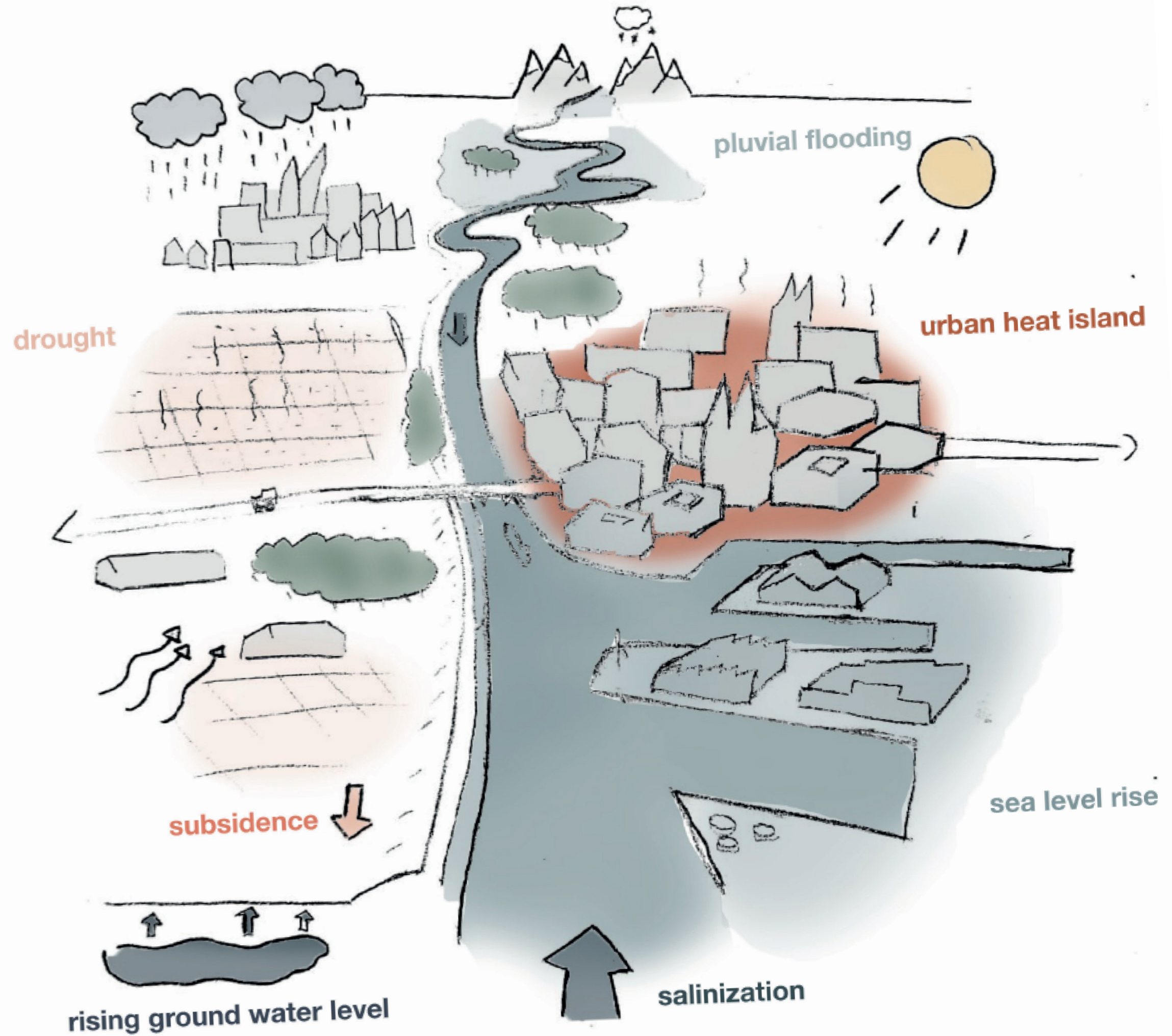


Figure 4: Effects of climate change in the Netherlands / Author

FLOOD RISK IN THE NETHERLANDS

A highly vulnerable country

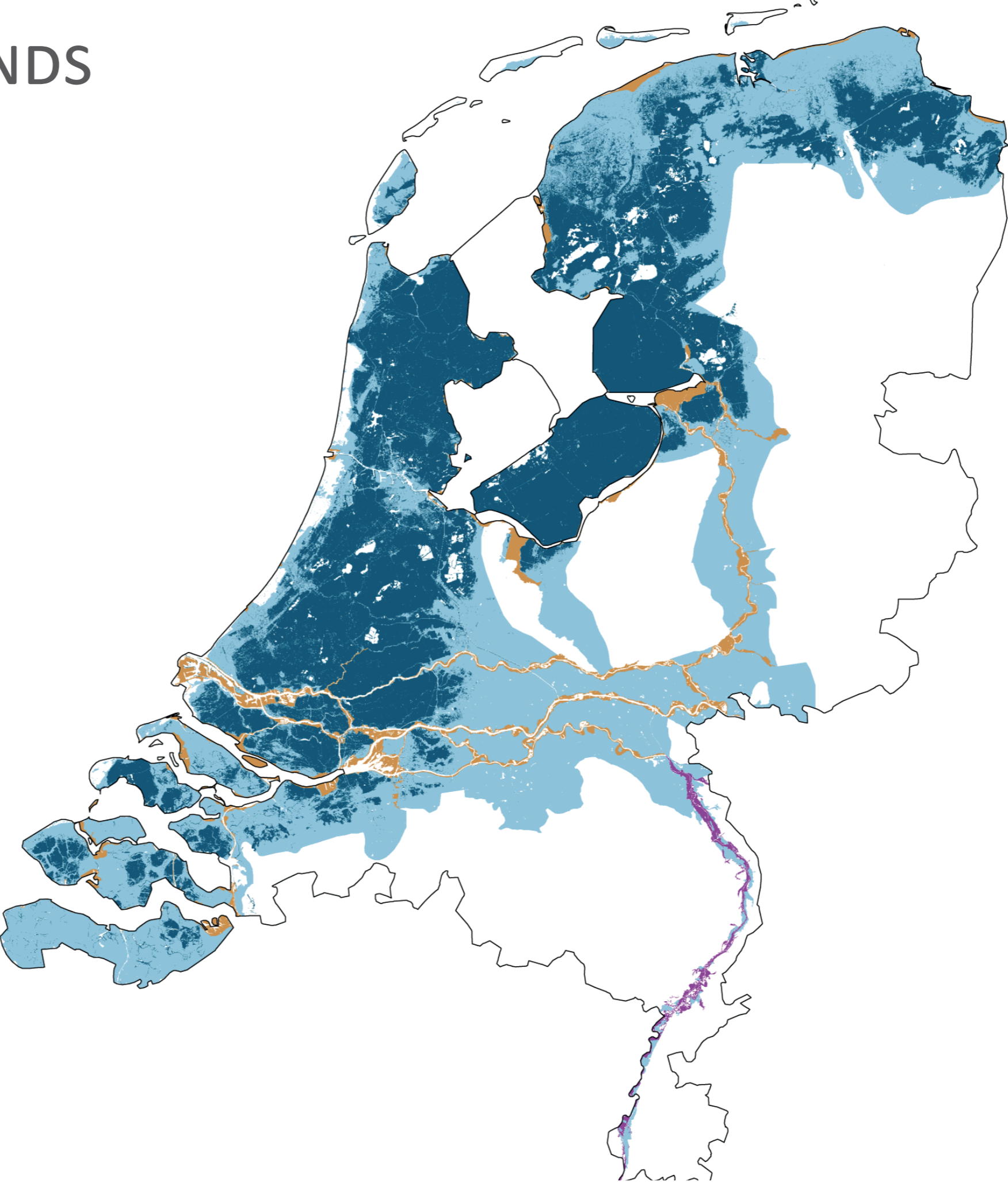
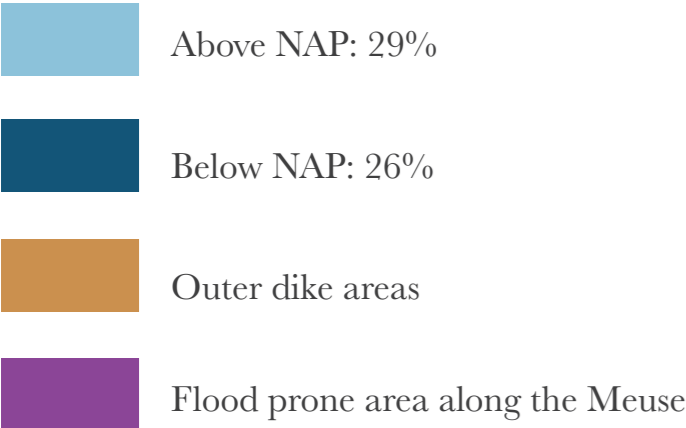


Figure 5: Flood risk in the Netherlands / Pbl, 2007

CURRENT CHALLENGES OF DELTA SYSTEM

Gradual expansion of the port towards the sea

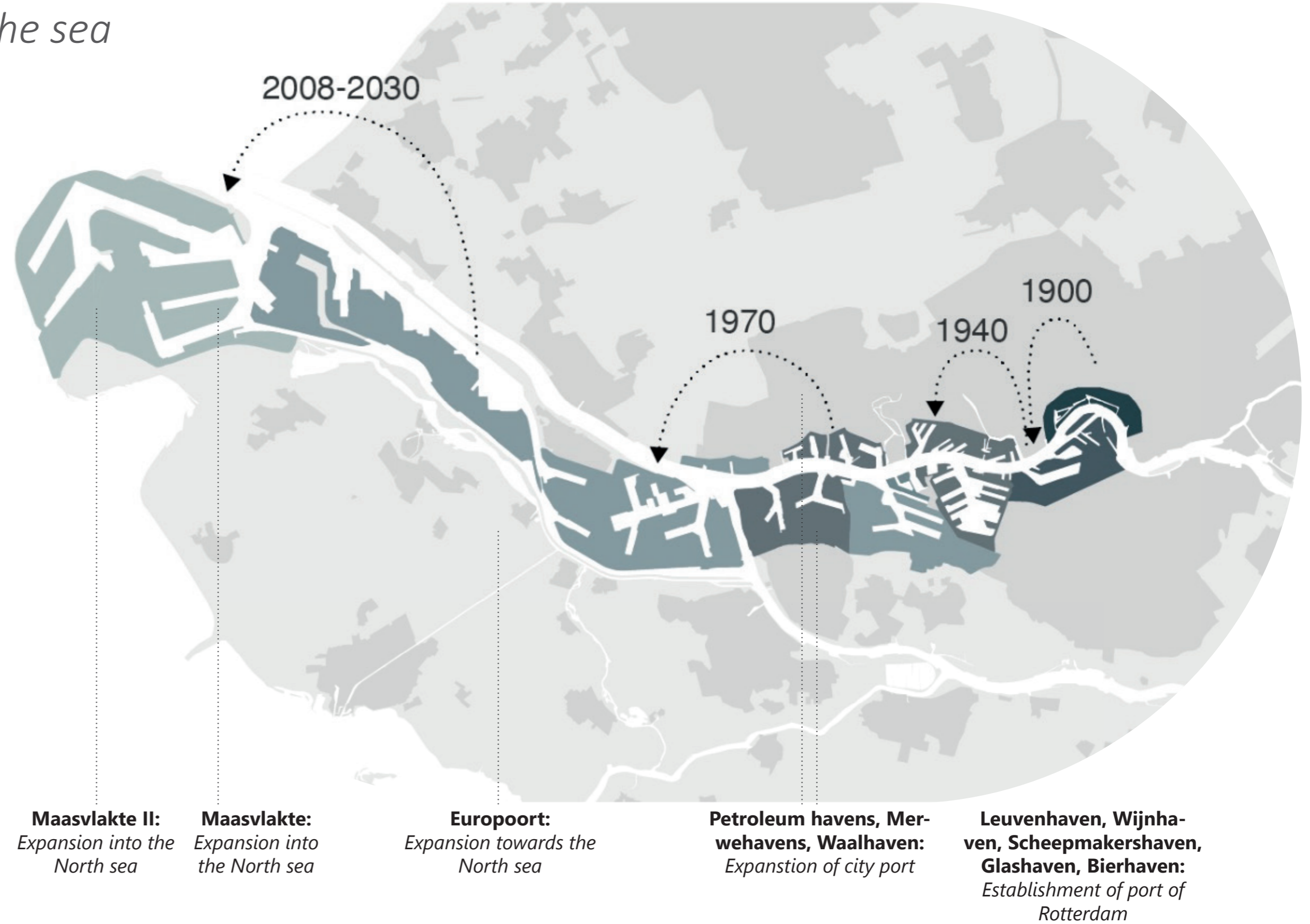


Figure 6: Port development / Author

MANIPULATION OF THE DELTA

Human interventions to the Meuse



Figure 7: Alteration of delta stream over time / Author

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DESTRUCTION OF THE BIOTOPE

Biodiversity crisis in South Holland

- Natura 2000
- Urban area
- Forest
- Grass land
- Dunes
- Wetland
- Blue-green network
- water

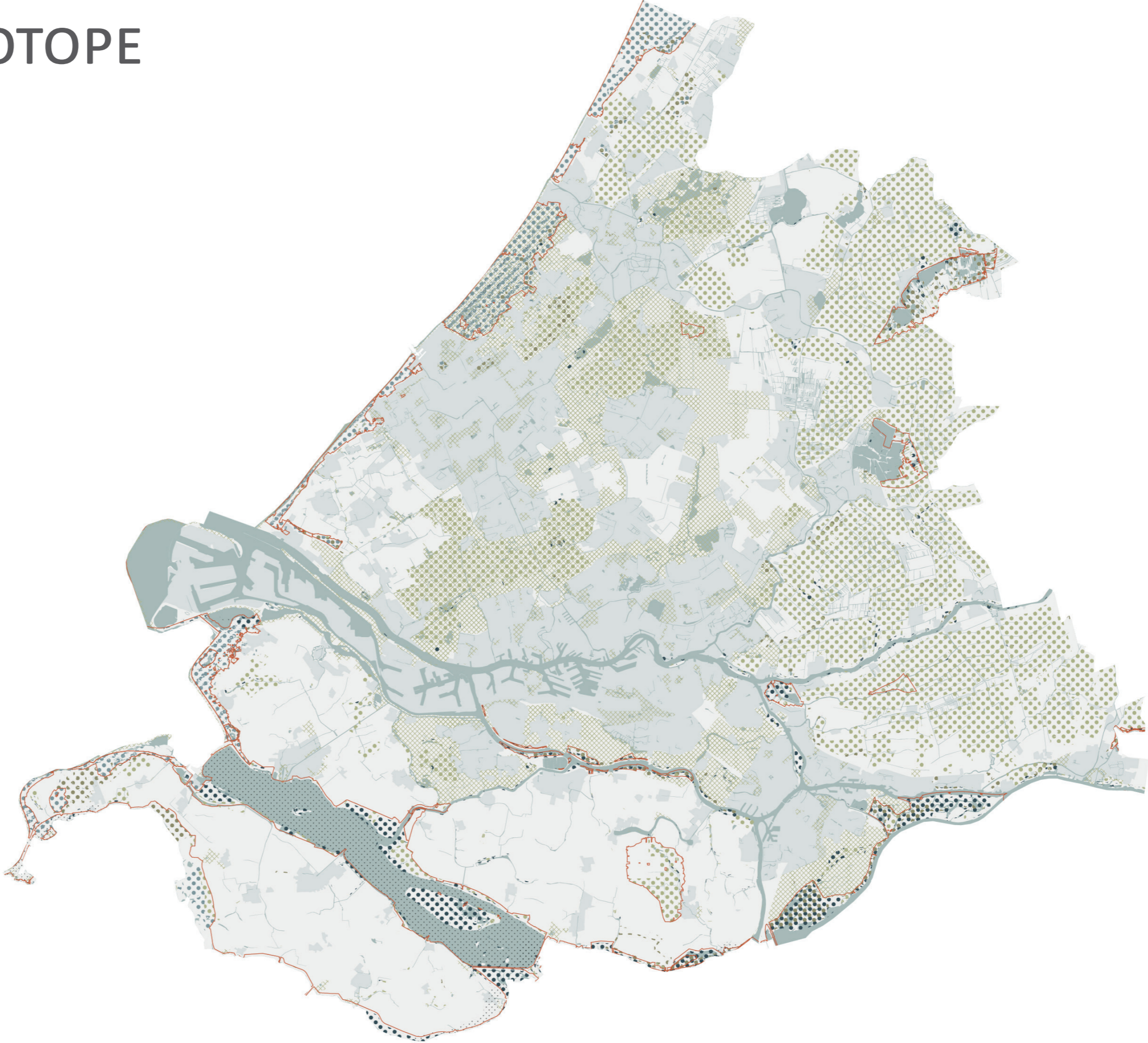


Figure 8: Current landuse in South Holland / Author

TIDAL BIOTOP

Uniqueness and potential of the original landscape of the Netherlands

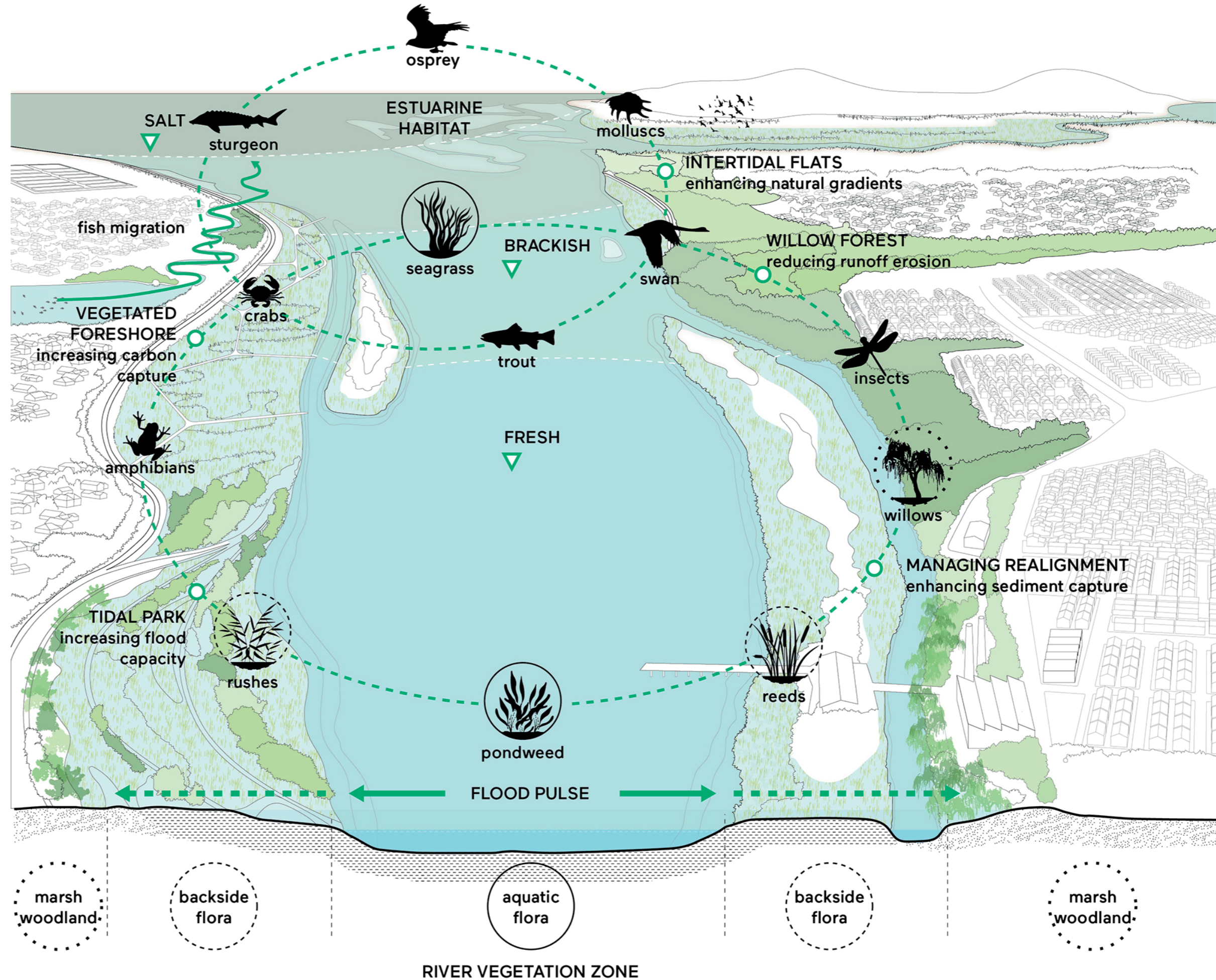
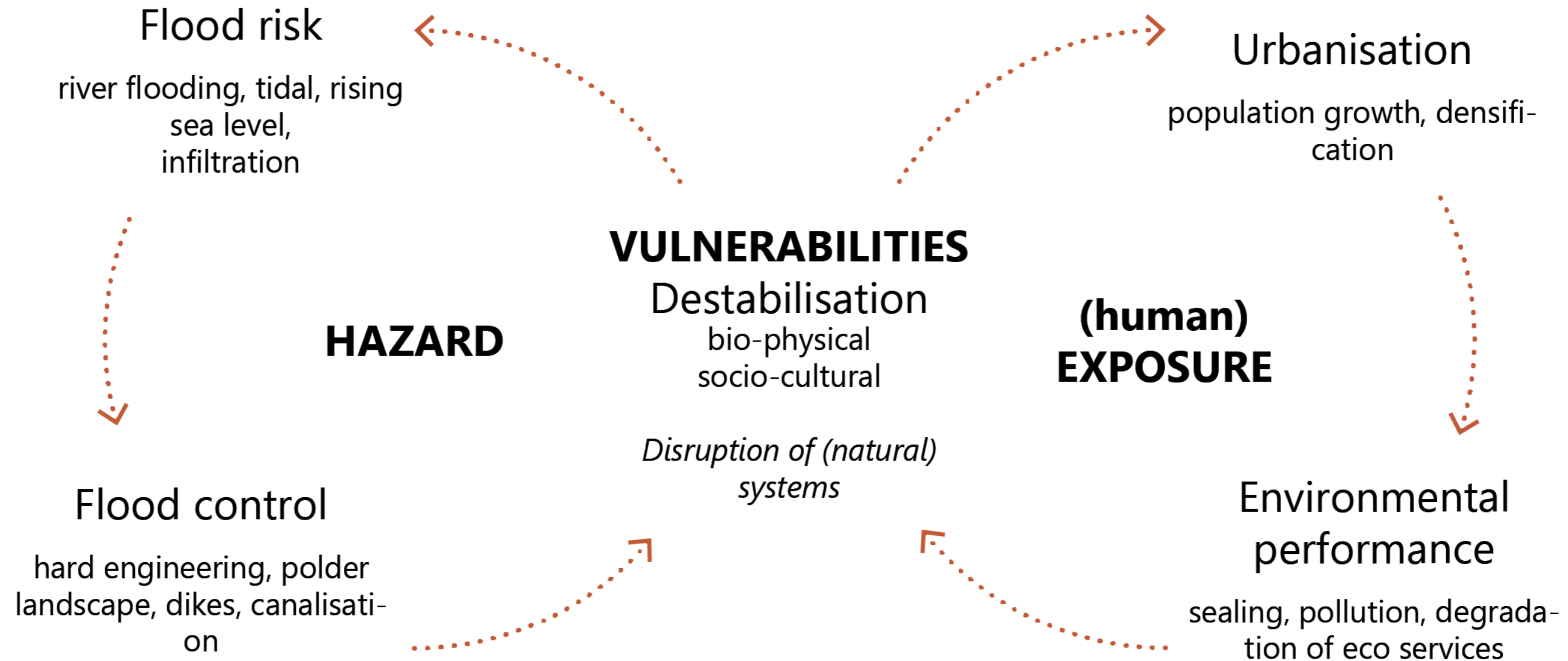


Figure 9: Delta ecosystem / EcoShape

CURRENT SYSTEM IN DISTRESS

Problemstatement



HUMANE SOLUTIONS FOR MAN MADE PROBLEMS

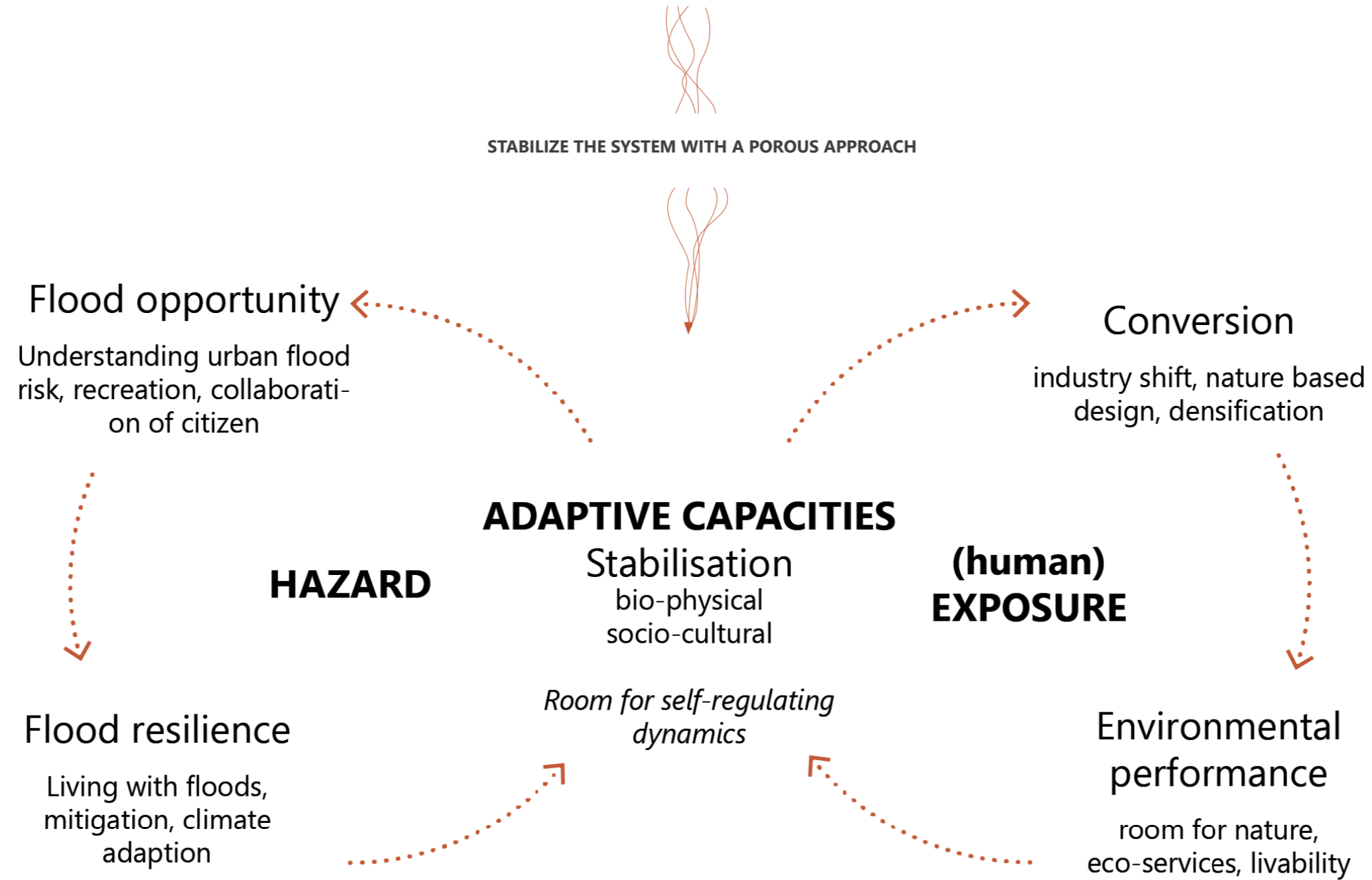


Figure 11: Project aim / Author

TOWARDS A SOLUTION

Paradigm change

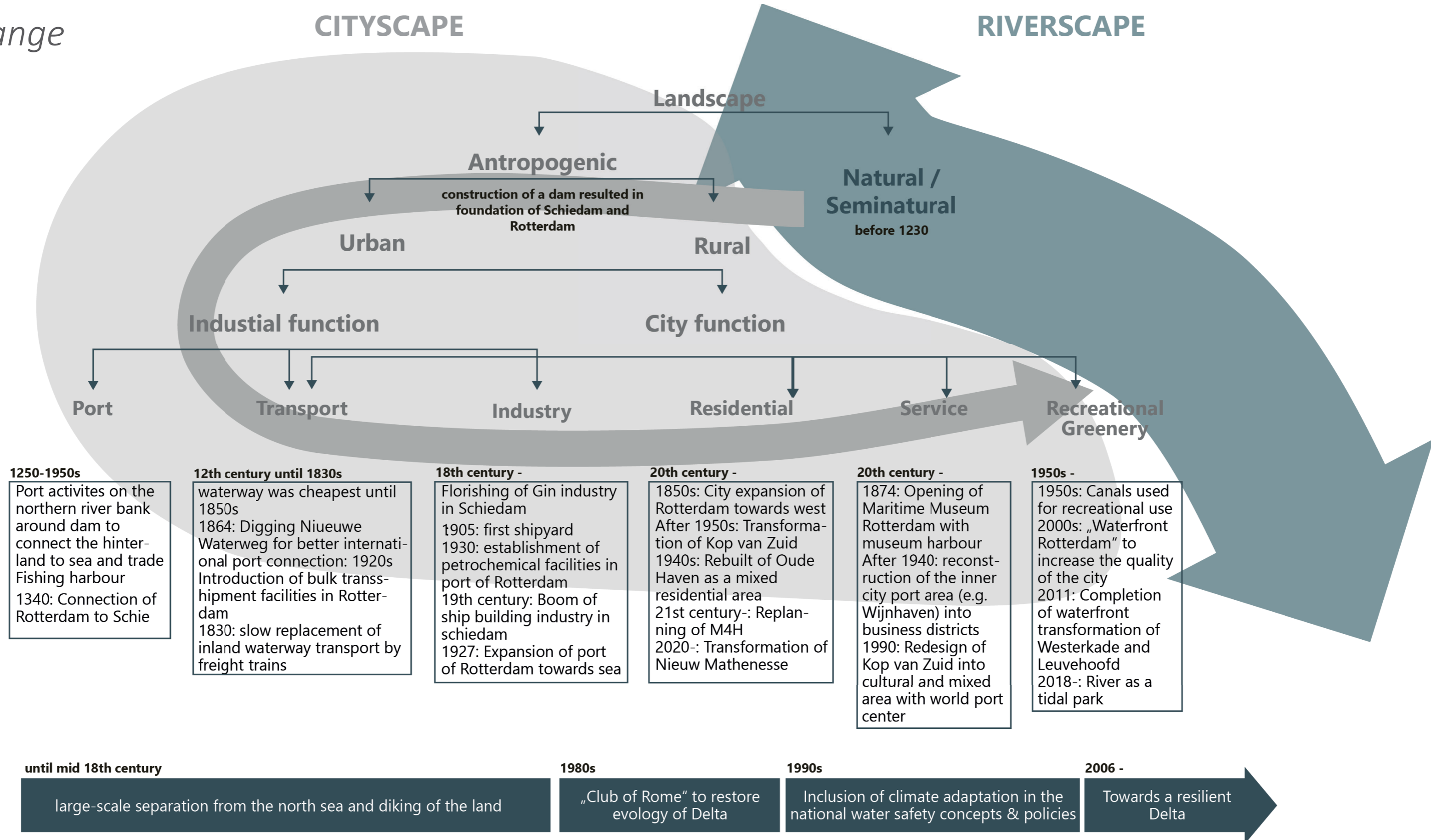
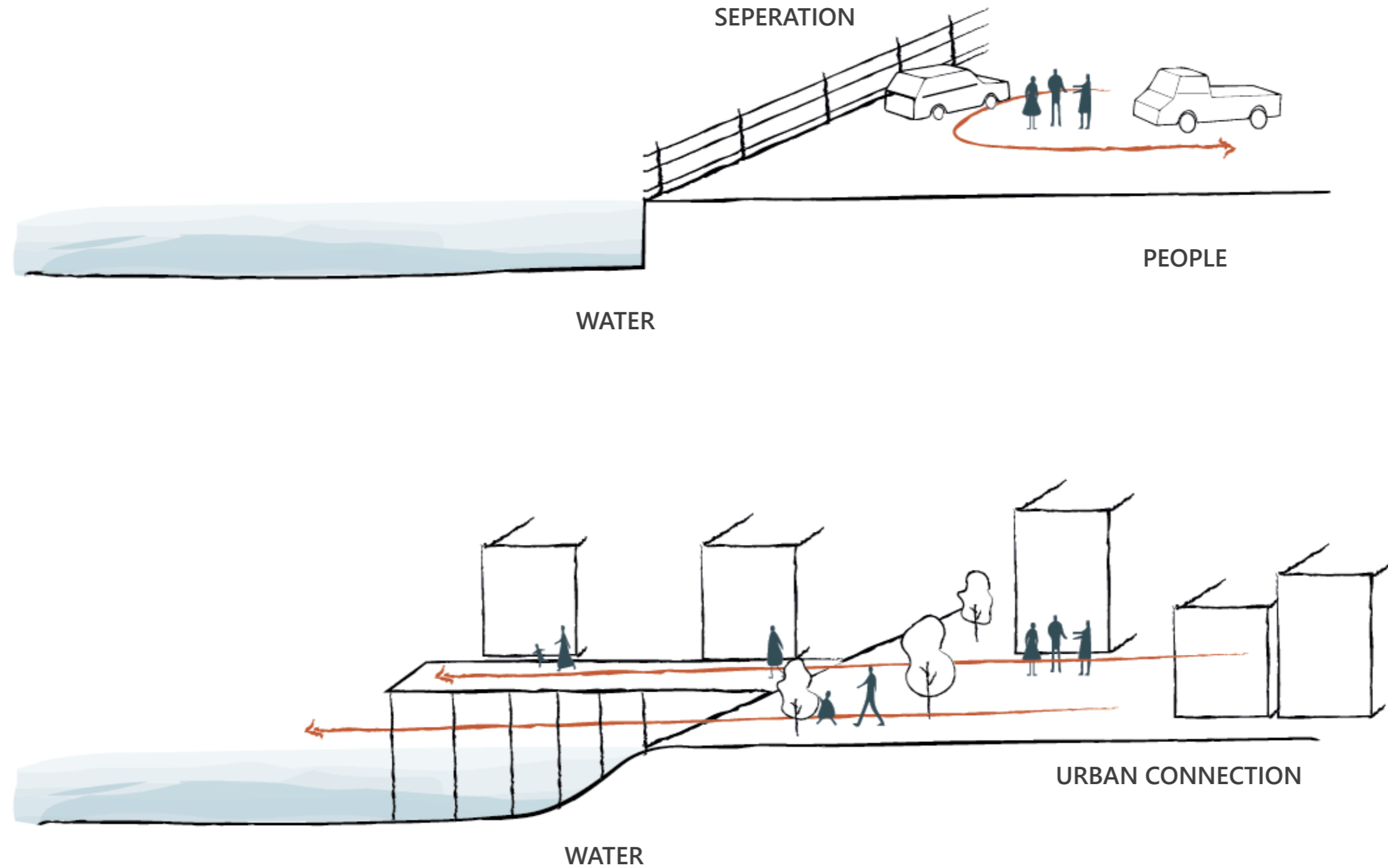


Figure 12: Water related urban planning strategies over time / Based on Breš & Krosnicka, 2021

A POROUS WATERFRONT

Reconnecting the city with the river



SITE LOCATION

Regional context

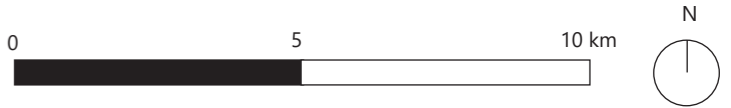


Figure 14: Location of Merwe-Vierhavens in the regional primary dike protection system / Author

MERWE VIERHAVENS

urban context

- Port Transformation Area
- Within Urban Context
- Connected to Urban Infrastructure



Figure 15: Context of study area / Author

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SPATIAL LAYOUT

Historic trade area behind fences

(maritime) businesses and stores

Logistics and trade

heavy (harbour) industry

grass land

waste land

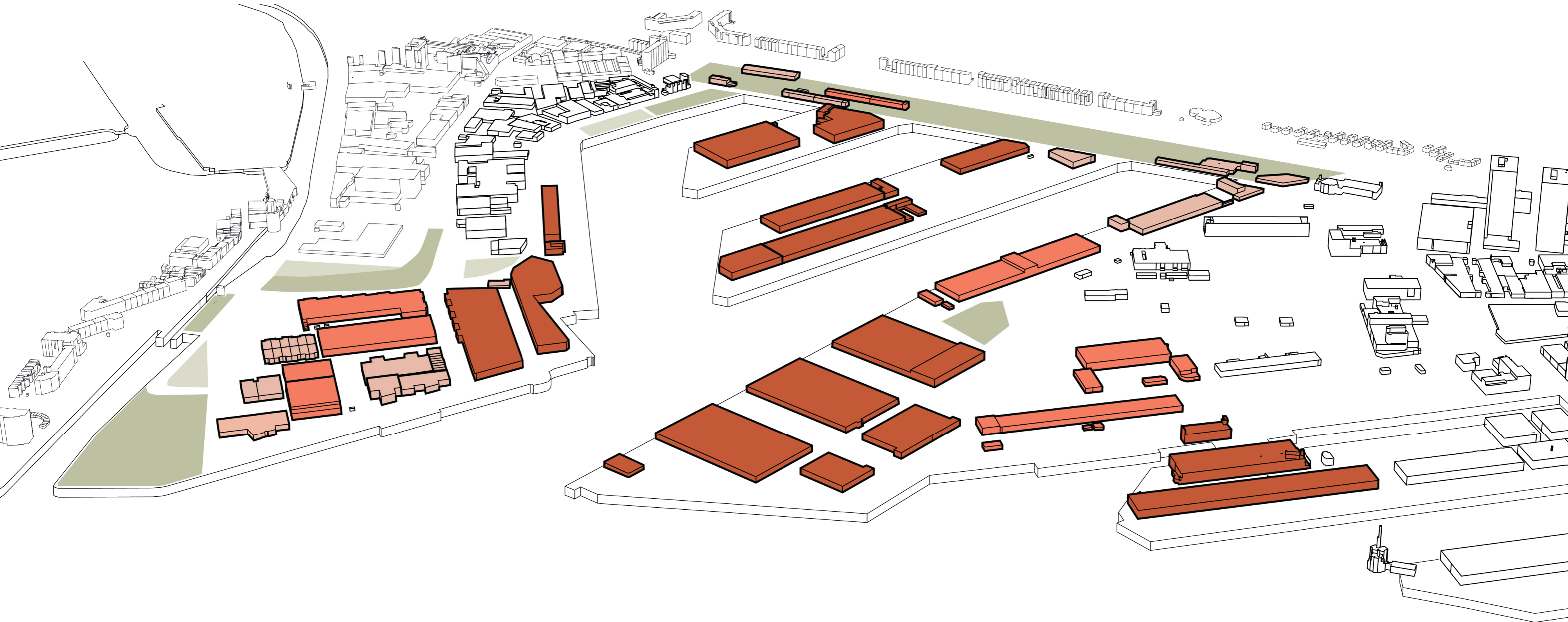


Figure 16: Location of the different commercial uses at water front of the M4H area / Author

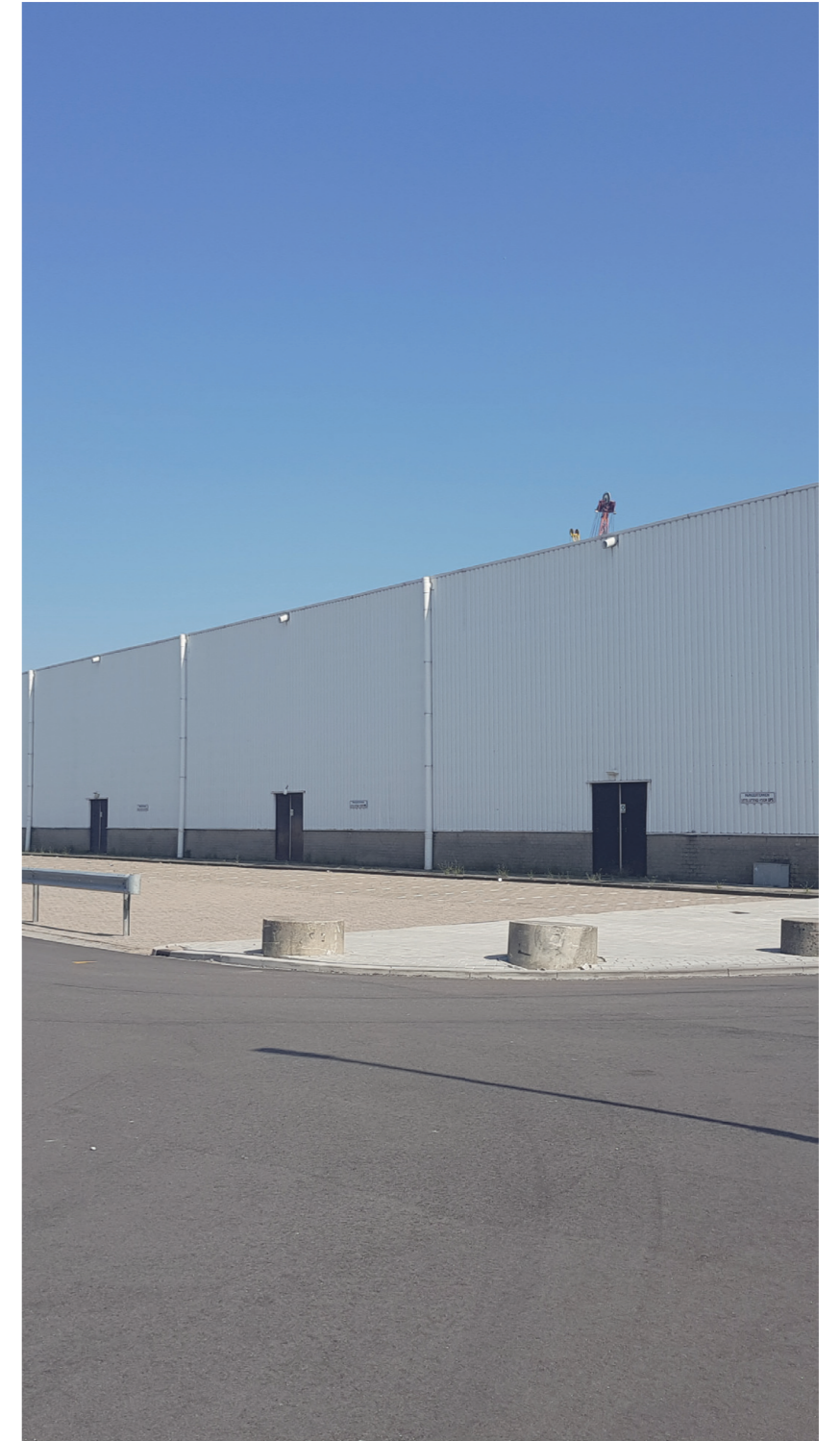
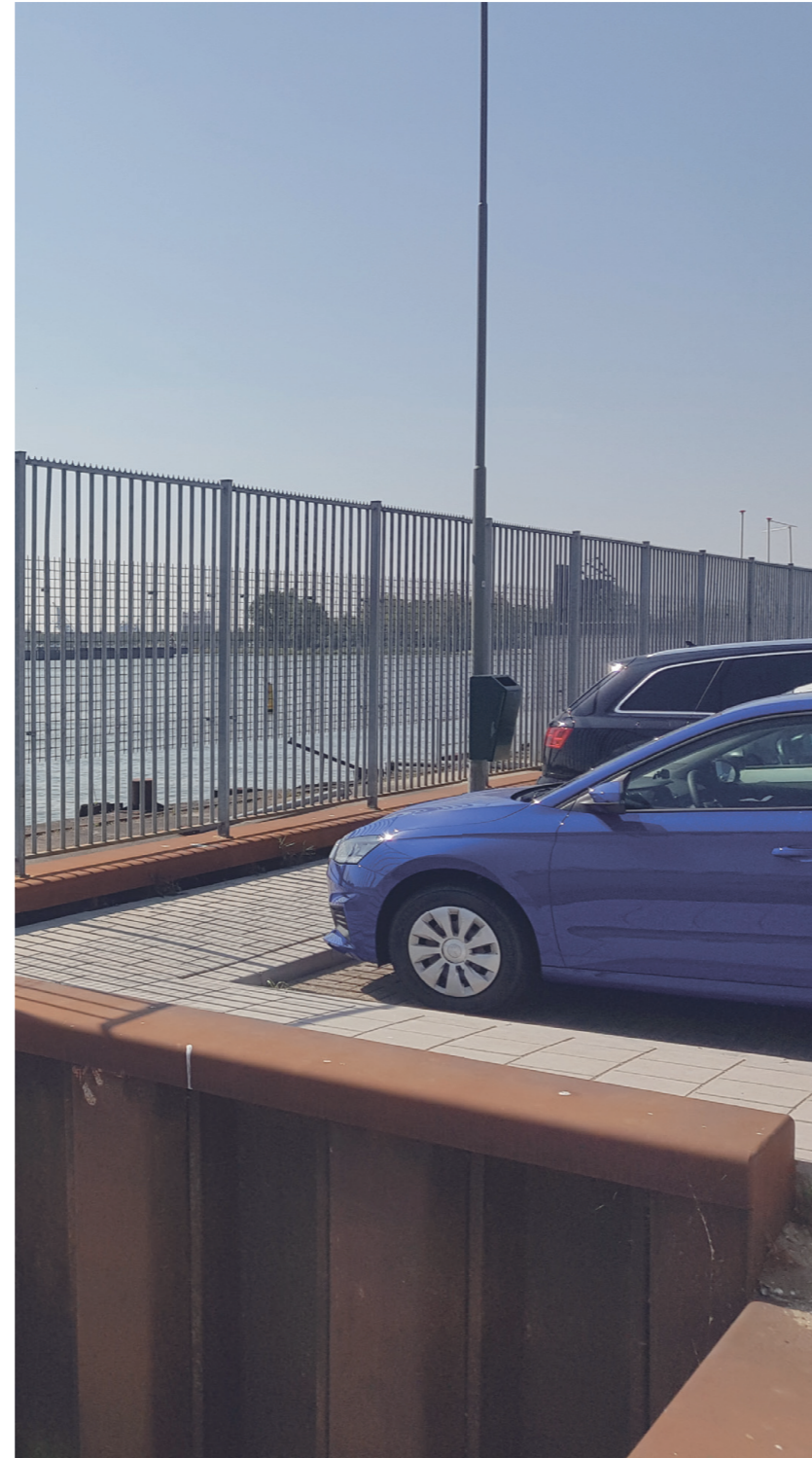


Figure 17: Impressions of Nieuw Mathenesse / Author

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GREEN PUBLIC SPACE

Lack of recreational and ecological value



Figure 18: Green structures of in the regional context / Author

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WATER NETWORK

Two rivers coming together



- Outer dike area
- Flooding area
- Urban area
- Erosion area
- Sedimentation area
- Municipality border
- Lock

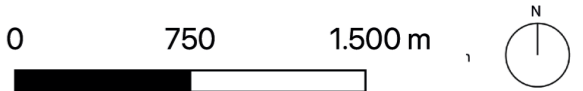


Figure 19: Water network in Rotterdam region / Author

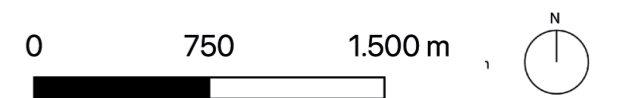
RELATION BETWEEN WATER AND LAND

Loss of relationship between residents and river



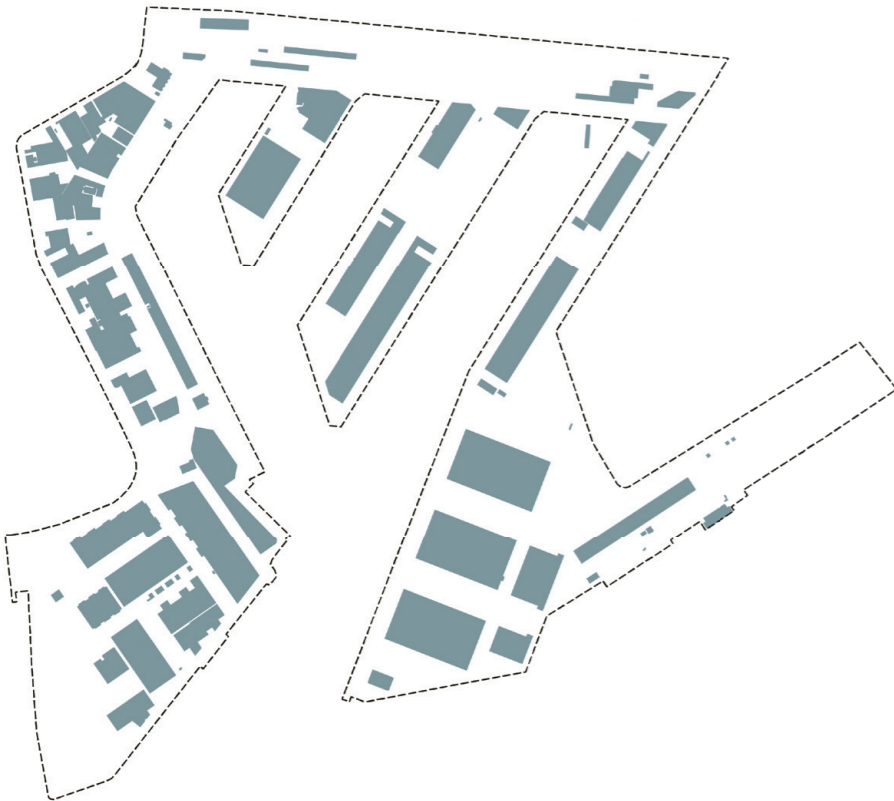
Figure 20: Accessibility of waterfront in the area / *Author*

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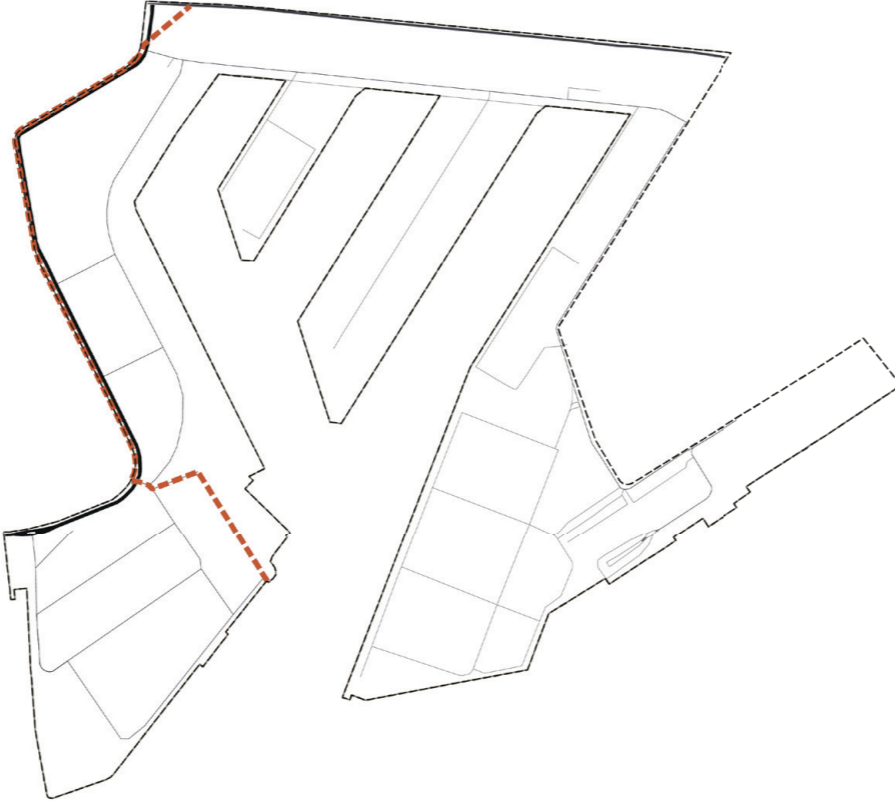


MAIN CHALLENGES

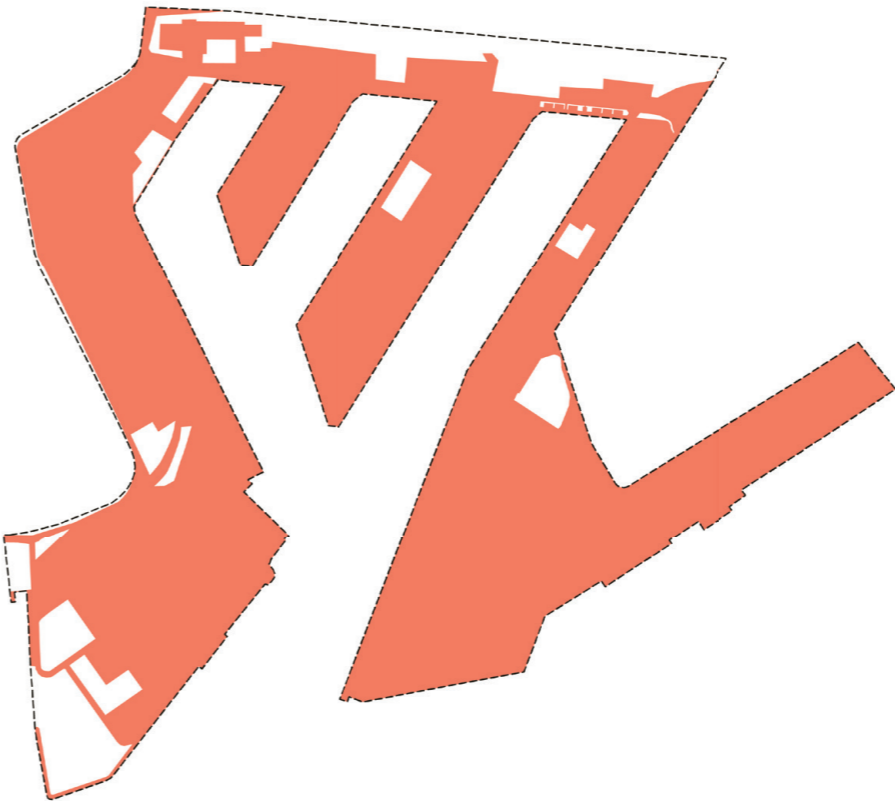
In Merwe-Vierhavens



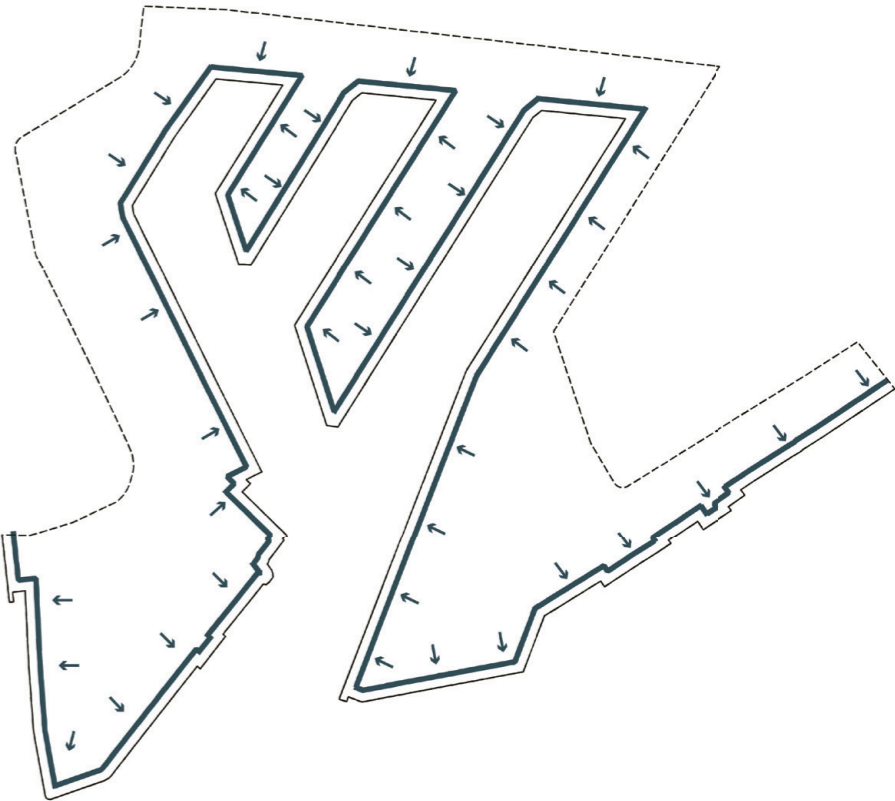
monofunctional



disconnected



petrified



separated

TURNING VULNERABILITIES INTO OPPORTUNITIES

Creating a Design Framework

- Flood risk
- Distorted delta ecosystem
- Polluted environment
- Disconnected neighborhoods
- Monofunctional use

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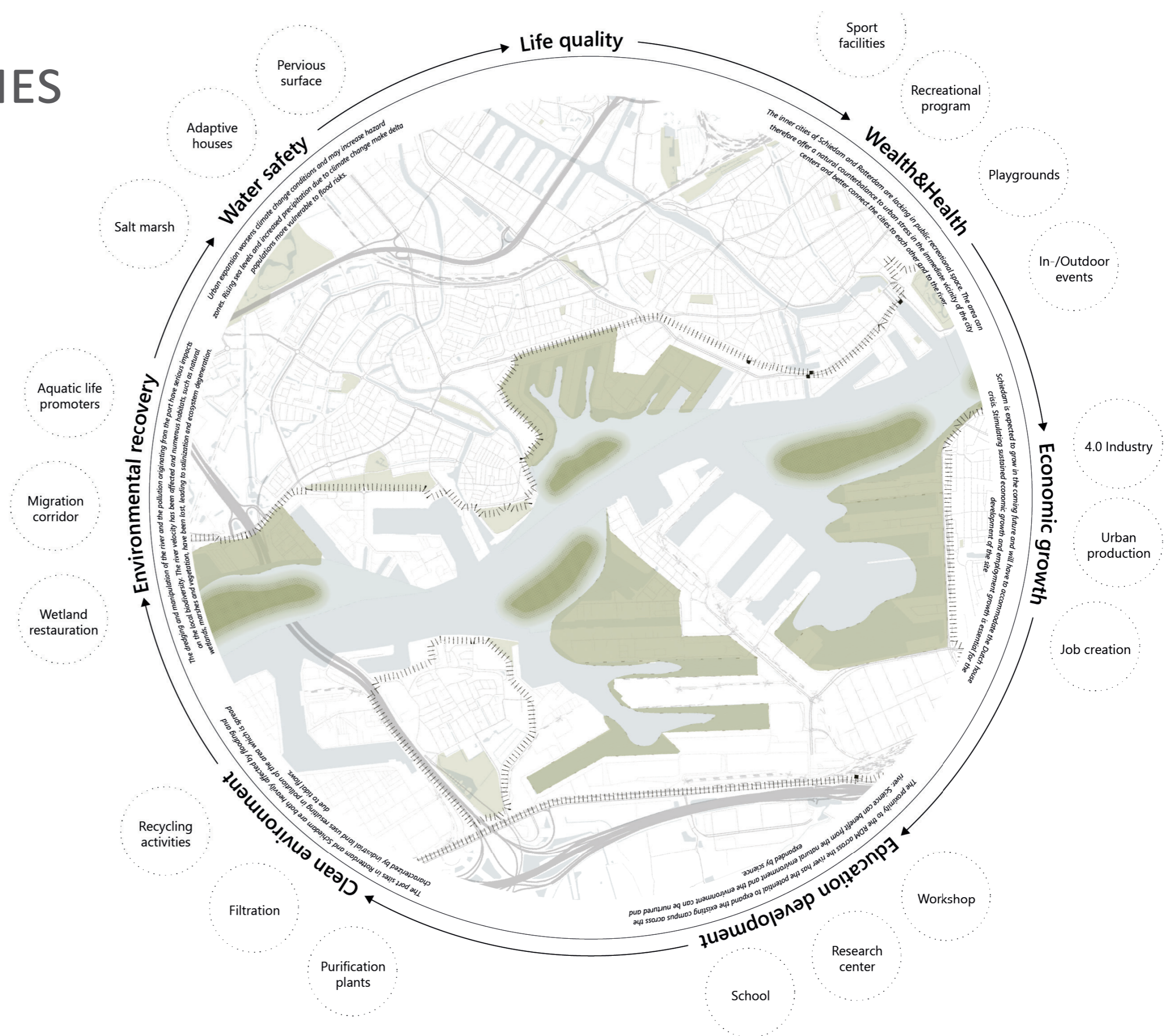


Figure 23: Main challenges of the M4H area / Author

Implication

EMBRACING THE NATURAL GRADIENT

By creating a semi natural environment

- Mimicing Natural Process
- Creation of Hybrid Delta Park
- Combine Urban and Natural Transformation Processes
- Dynamic Landscape
- Profit of Eco Services



Figure 24: Vision map / Author

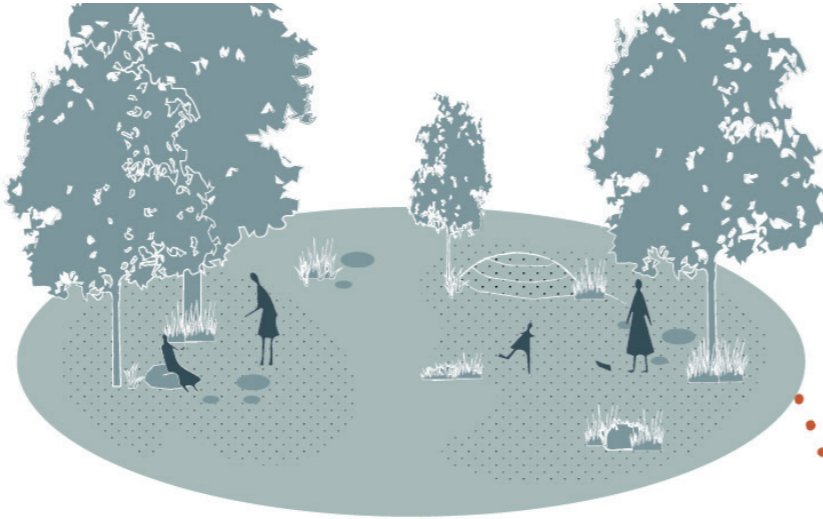
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DEVELOPMENT PHASING

Enabeling a landscape transition

Habitation

Creating the possibility of co-existence and migration of both human and natural entities and processes



Preperation

Shape and prepare area and community for the new form of use and the increased risk of flooding



Expansion

Creation of large scale corridors and connections for the most effective outcome

Figure 25: Project phases / Author
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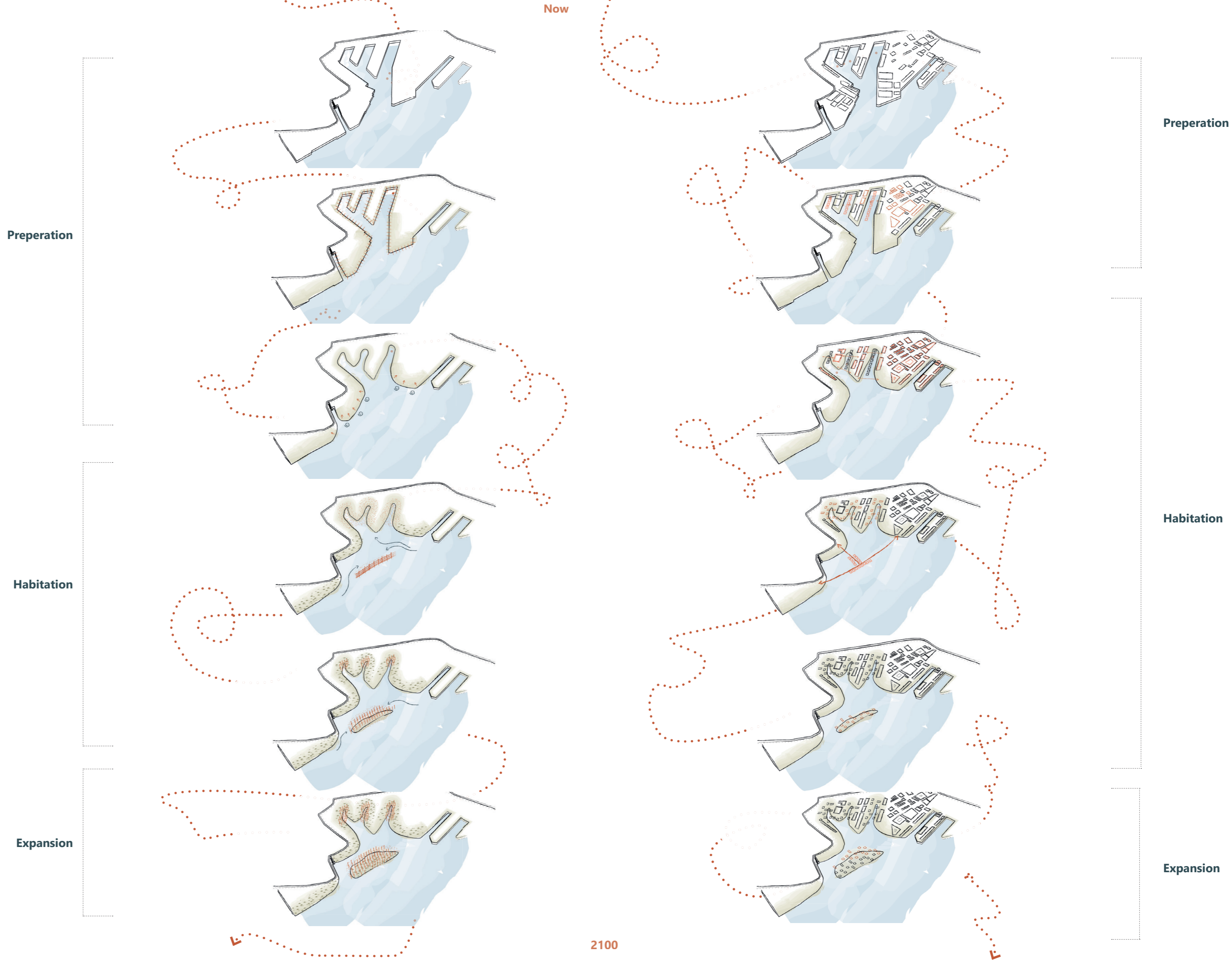


Figure 26: Settlement & Terrain restoration concept plan / Author

MUD BECOMES HABITAT

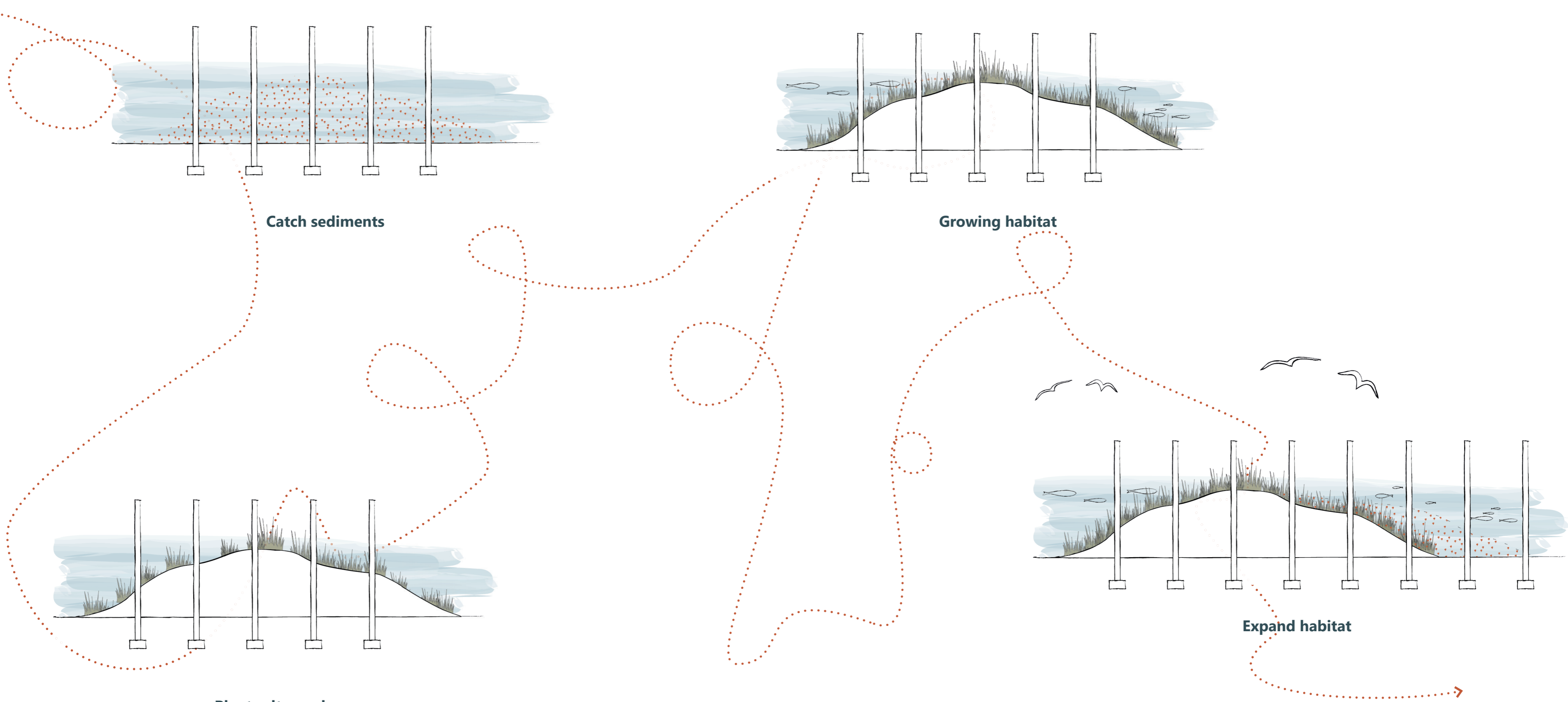
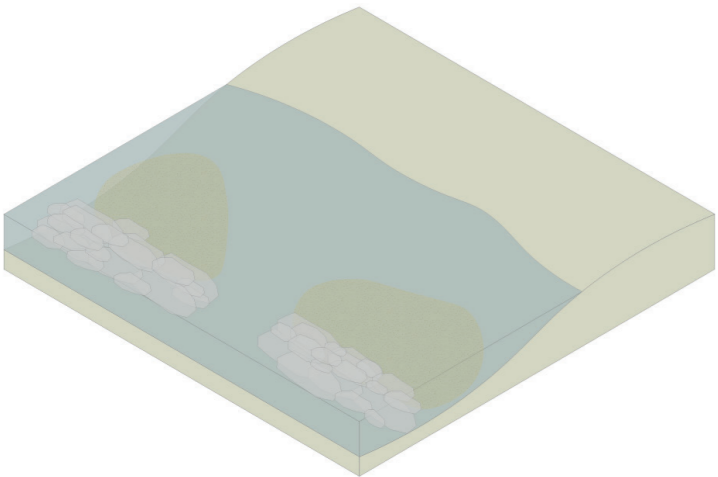


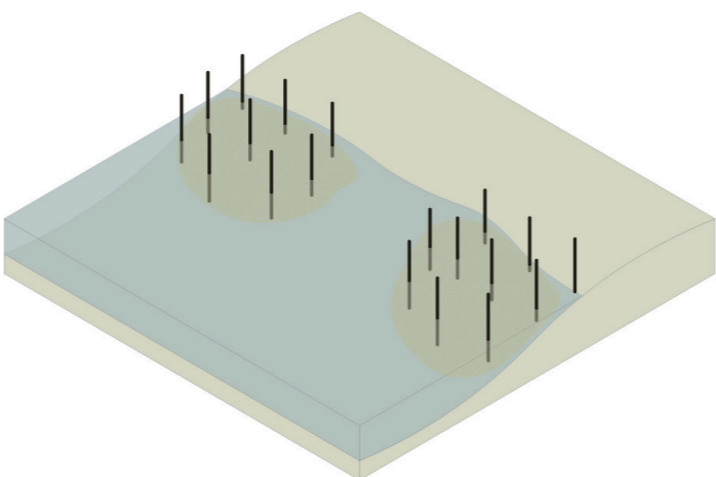
Figure 27: Creation of salt marsh habitat / Author

TECHNIQUES TO CREATE A SALT MARSH

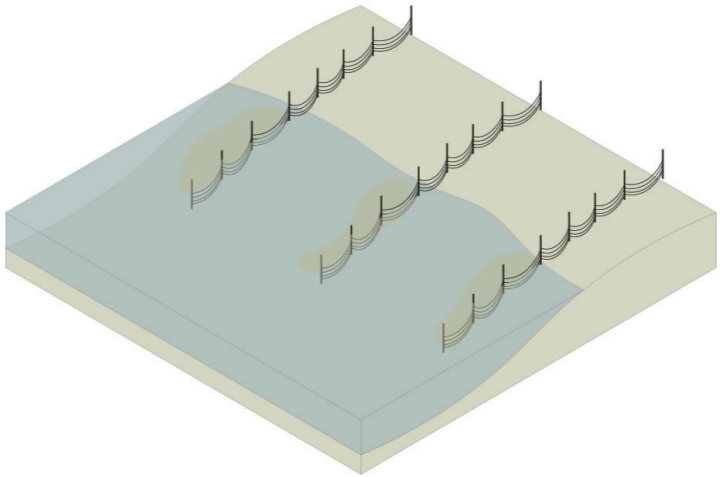
Possible infrastructures that facilitate the natural processes



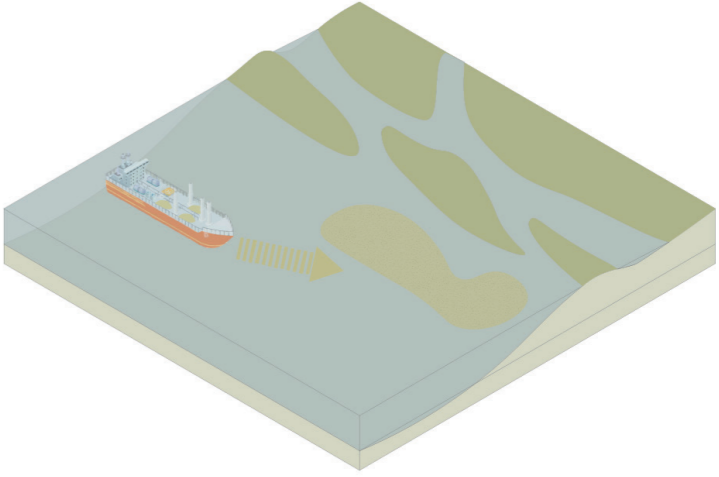
Living Breakwater



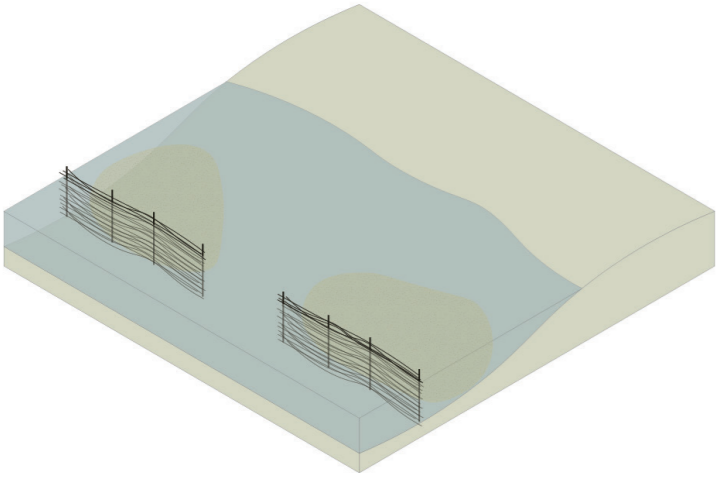
Poles



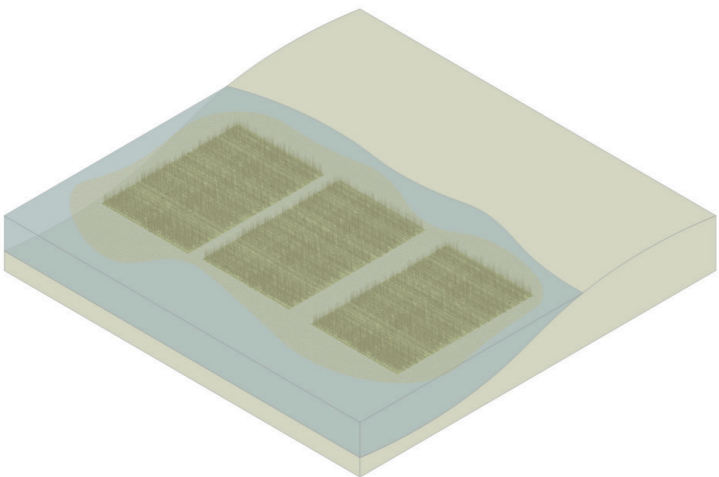
Sand Net



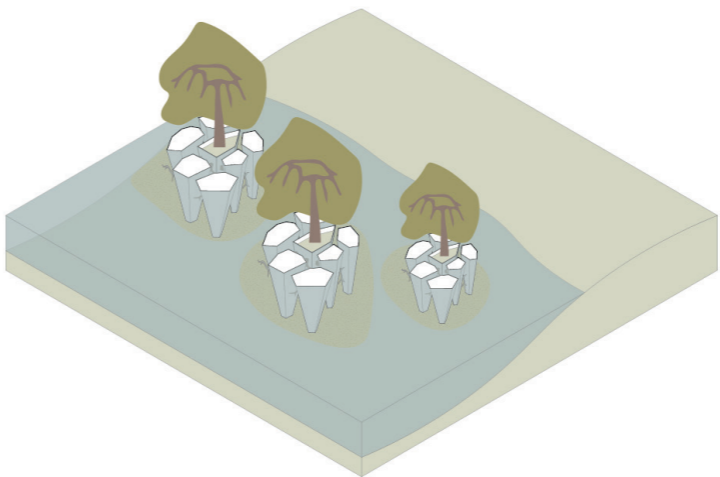
Mud Motor



Permeable Dike














Planting Mats



Rizolith Island

PROPOSED STRATEGIES

to achieve the design proposal

-  Creation of Tidal park
-  Important connections
-  Recreational hotspot
-  Sediment trapping and wetland park
-  Dike to reduce erosion and stimulate sedimentation
-  Removal of quaywall for a soft waterfront and enabling erosion
-  Redevelopment in reallion to Nieuw Mathenesse
-  Redevelopment in reallion to M4H
-  Climate adaptive redevelopment reallied to new M4H development
-  Green dike
-  Dike park transitioning urban context to tidal landscape

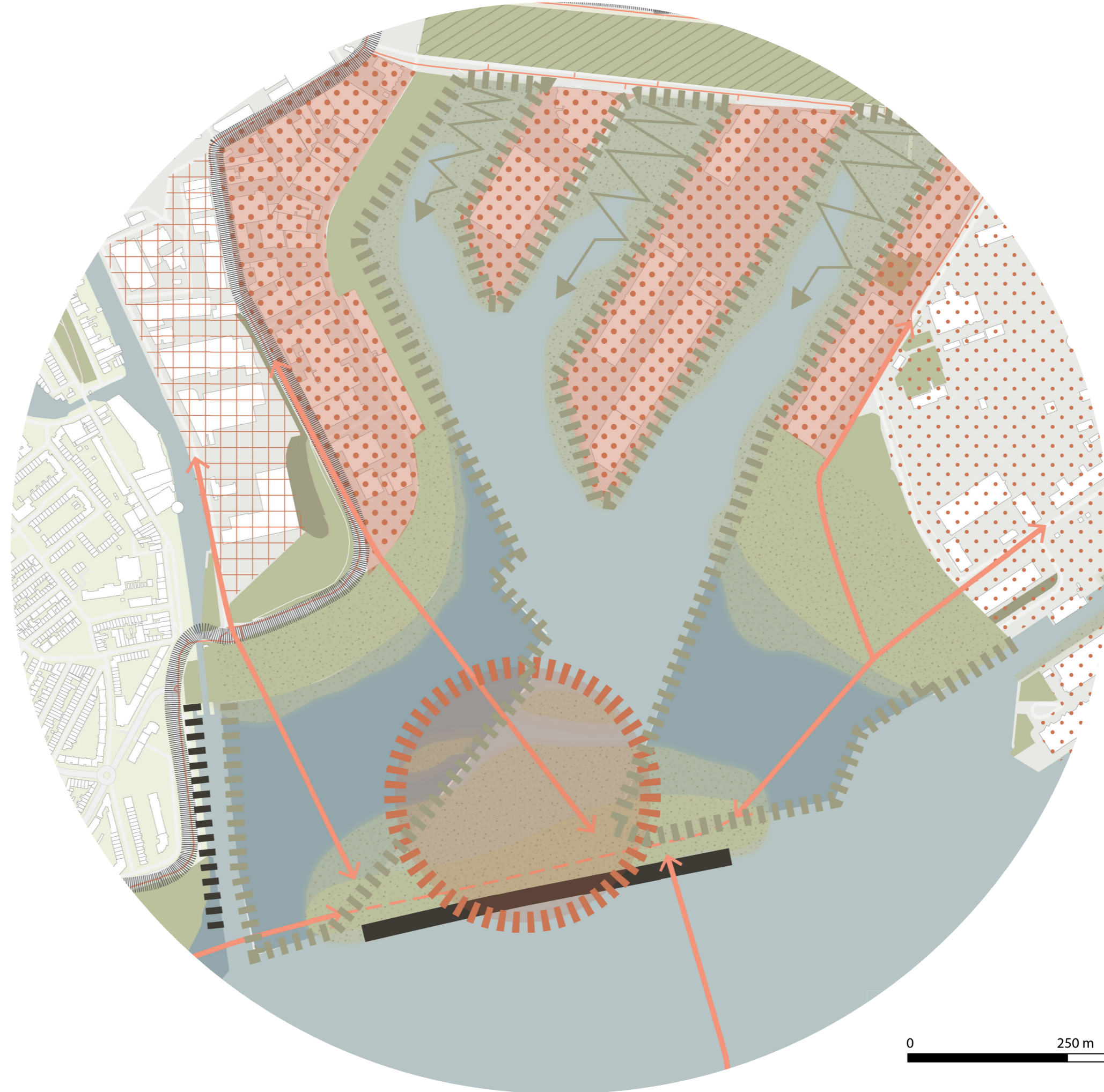
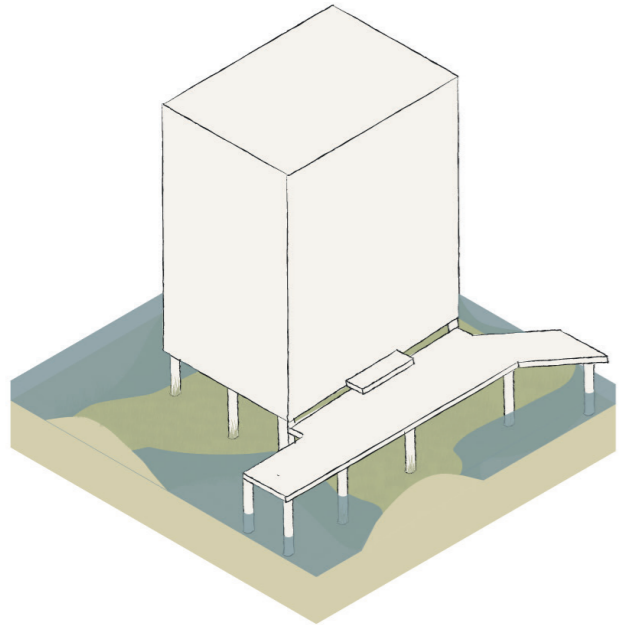


Figure 28: Conceptual plan / Author

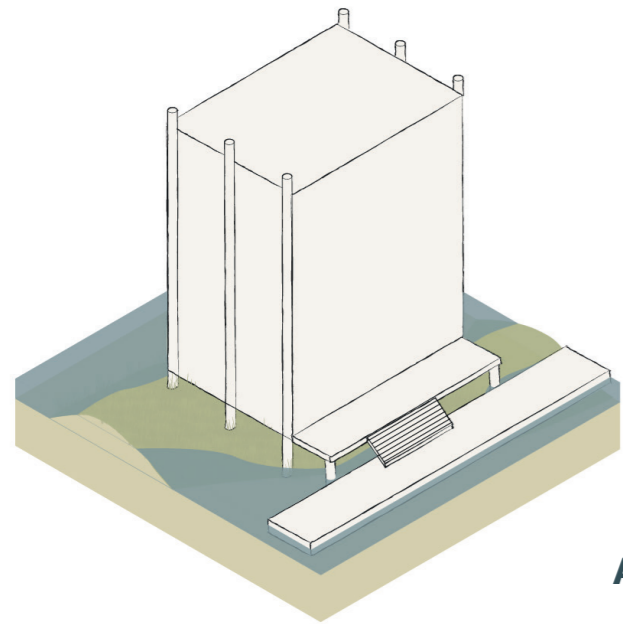
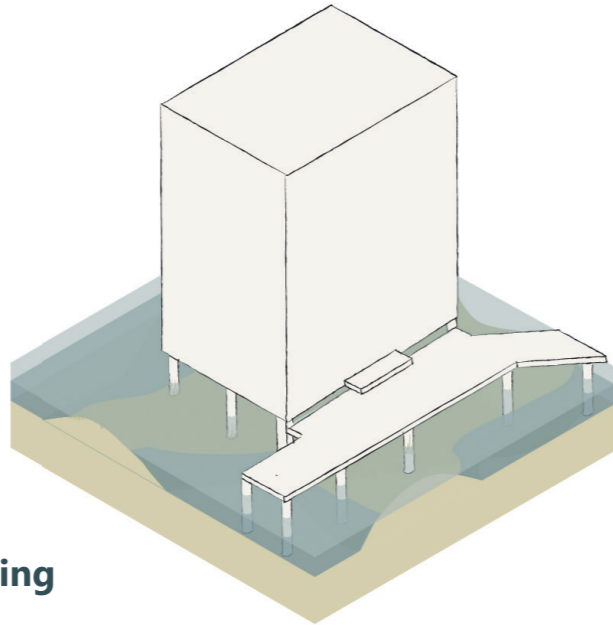
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ADAPTIVE BUILDING TYPOLOGIES

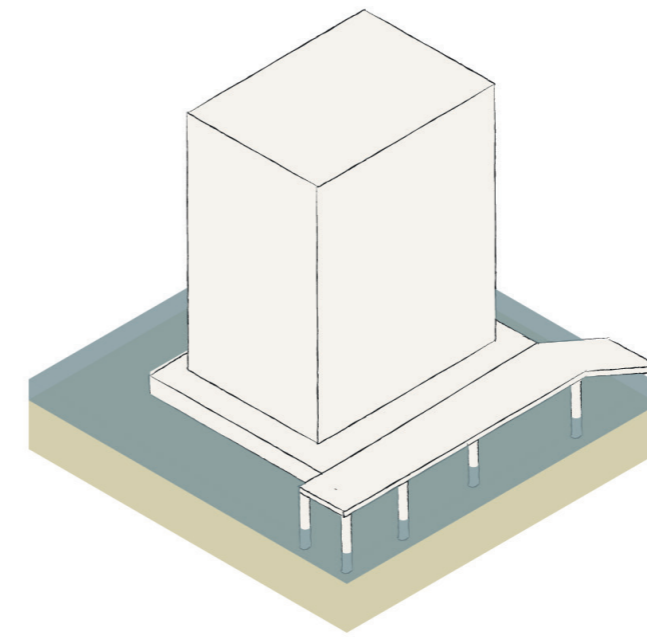
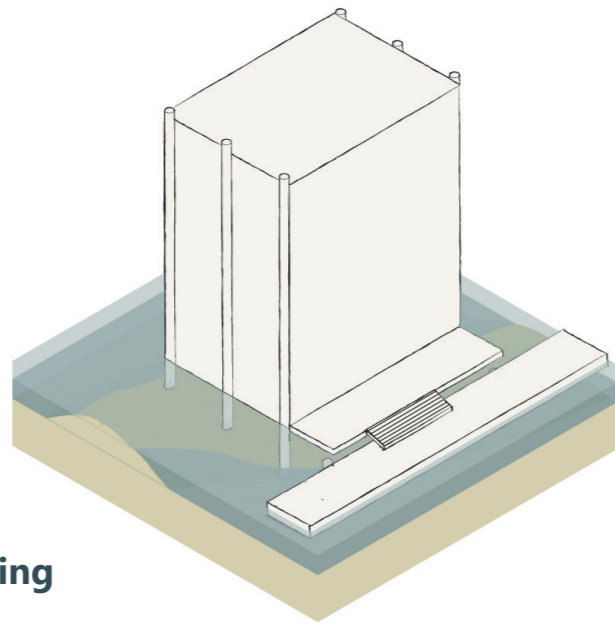
Marine architecture to live with water



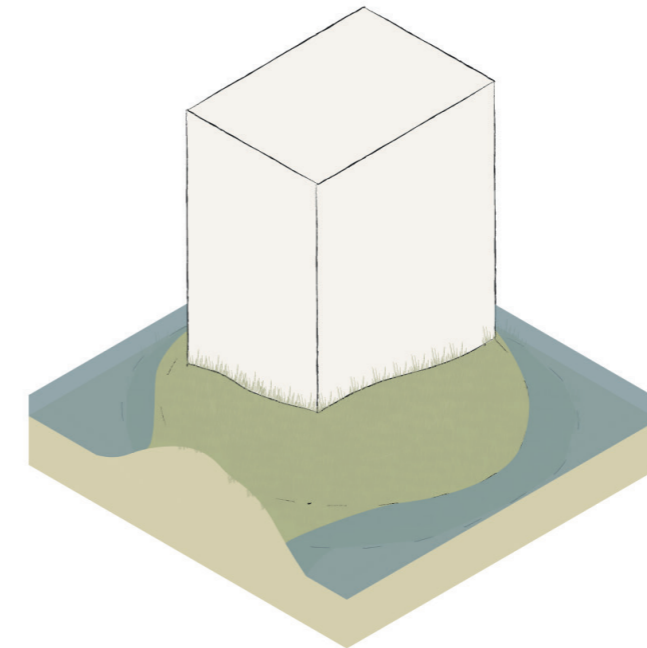
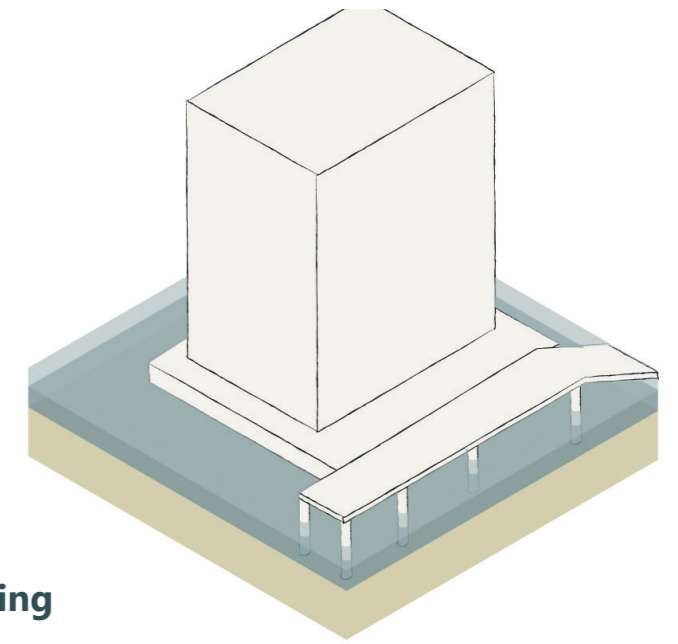
Stilt/Pile Building



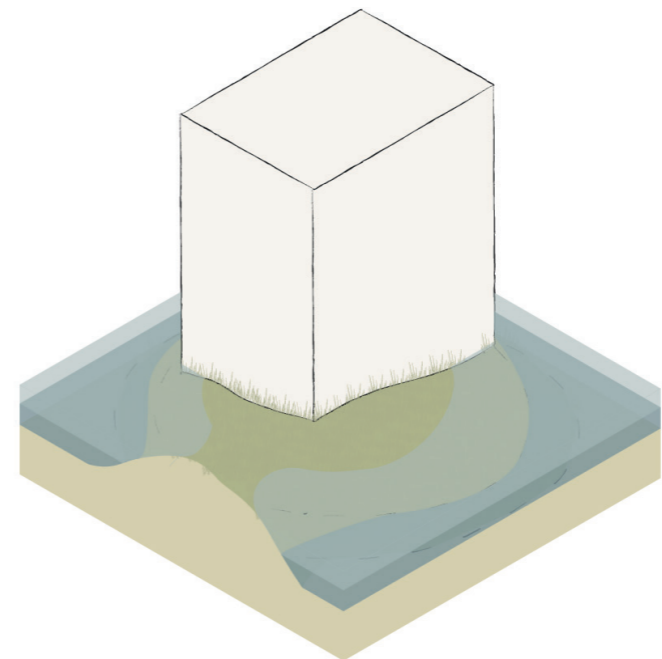
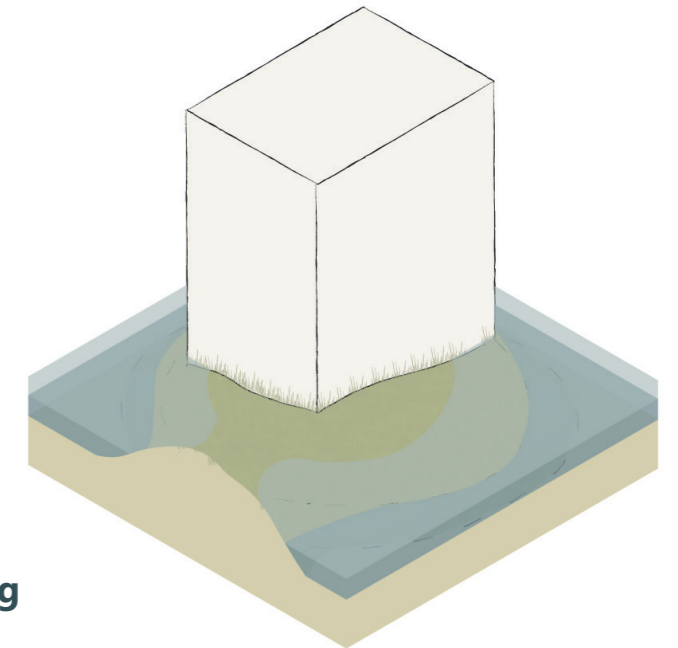
Amphibic Building



Floating Building



Terp Building



Waterproof Building

STRUCTURAL COMPOSITION

Different construction methods for diverse surfaces

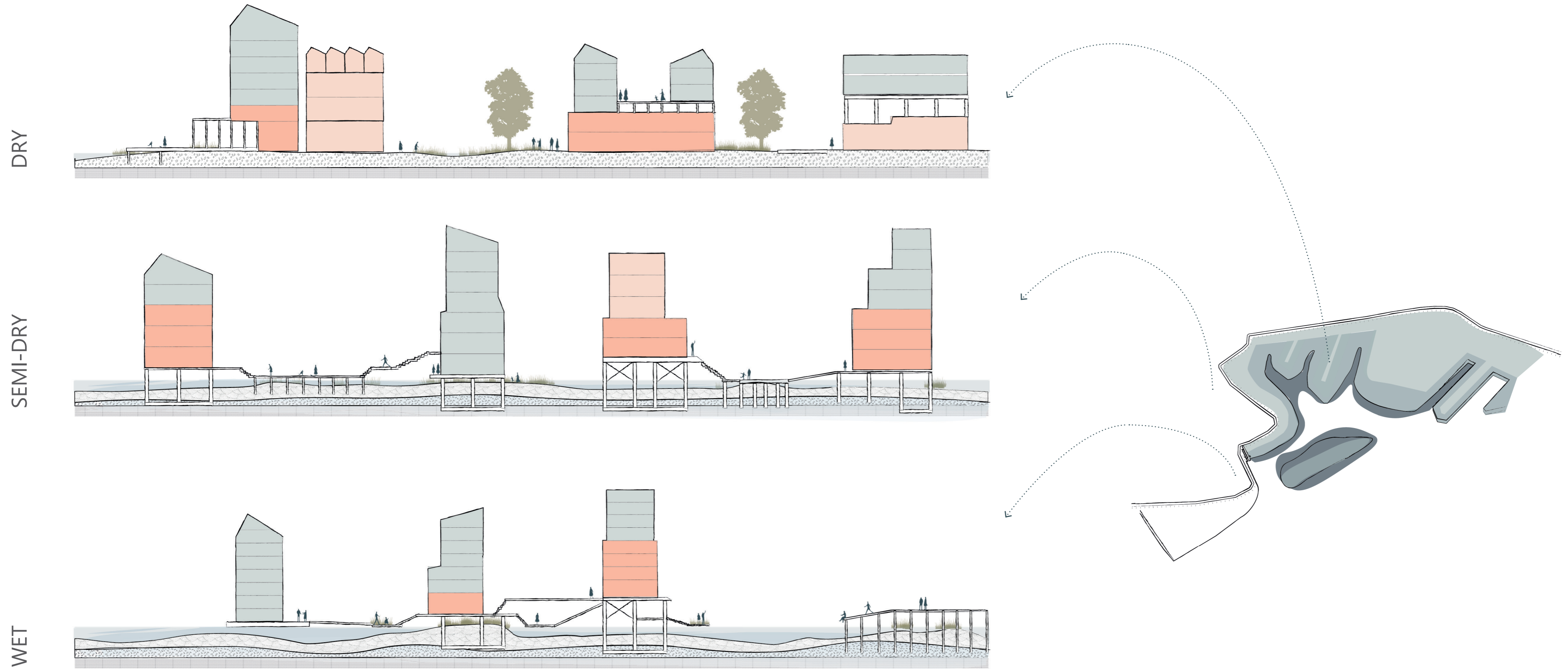


Figure 30: Different typologies for different landscape conditions / Author

ZONING OF AREA

Possible distribution of functions

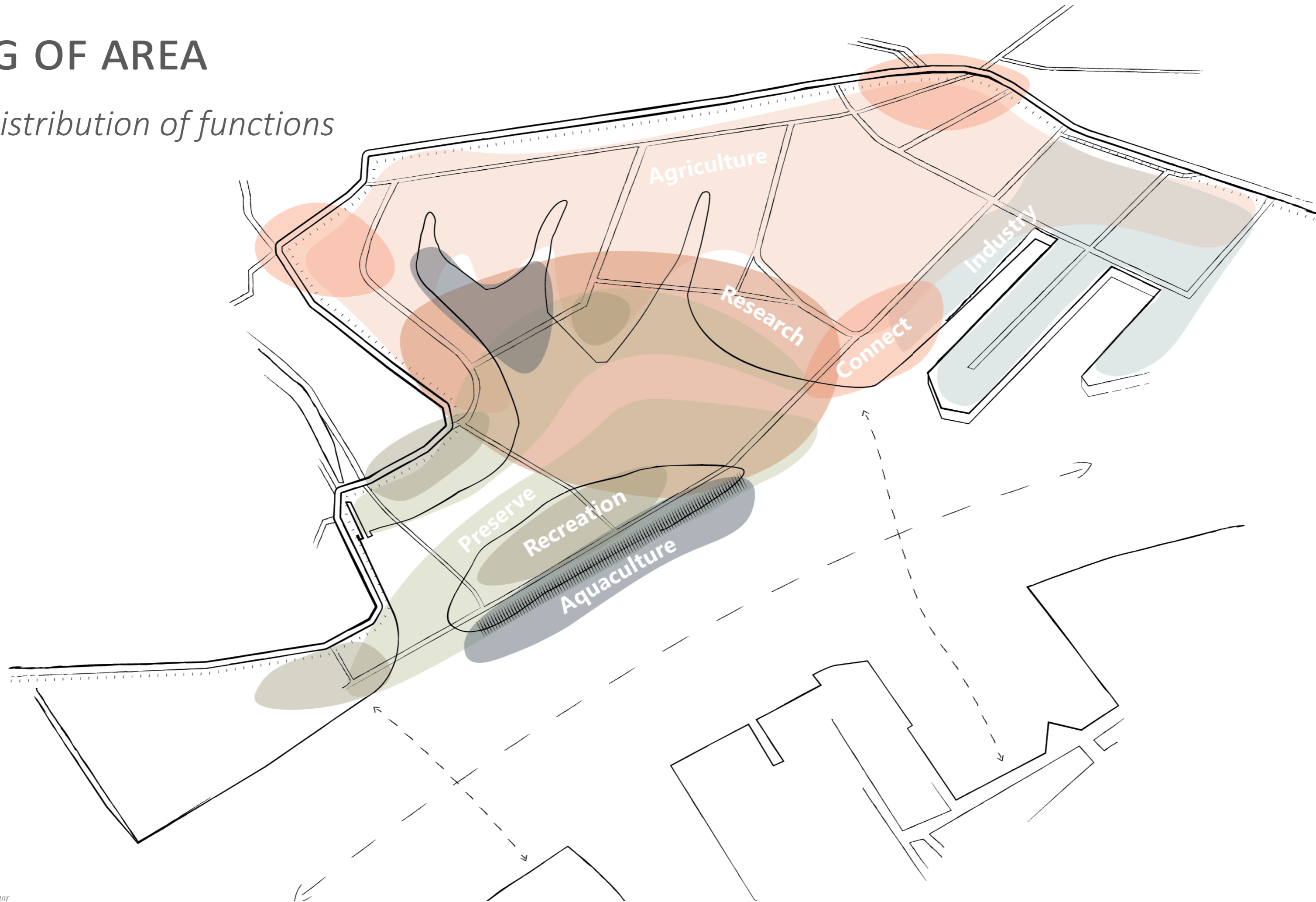


Figure 31: Porous zoning / Author

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DEVELOPMENT FOCUS AREA

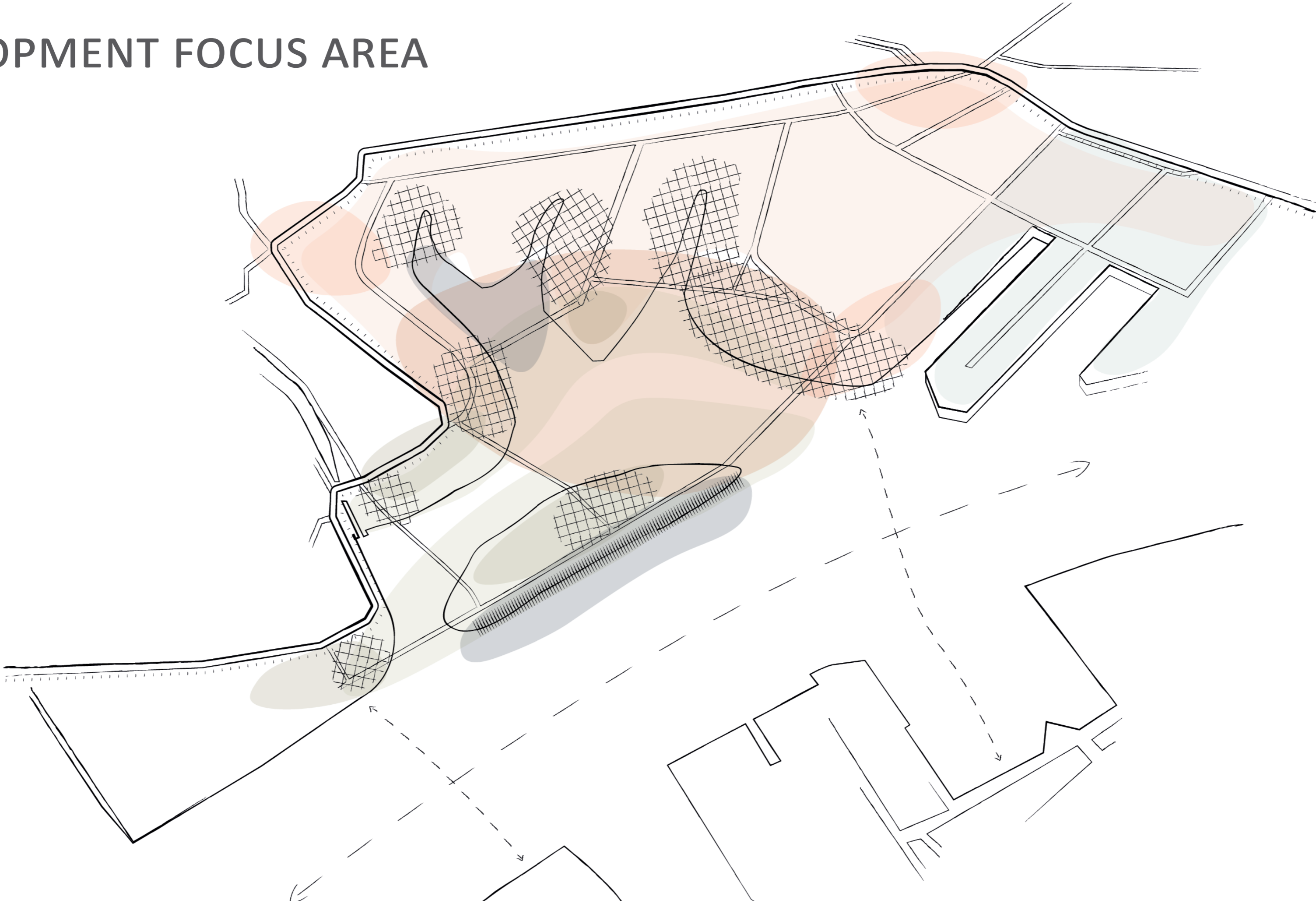


Figure 32: Focus areas / Author

CULTURAL DRIVERS

Creating local and regional connections

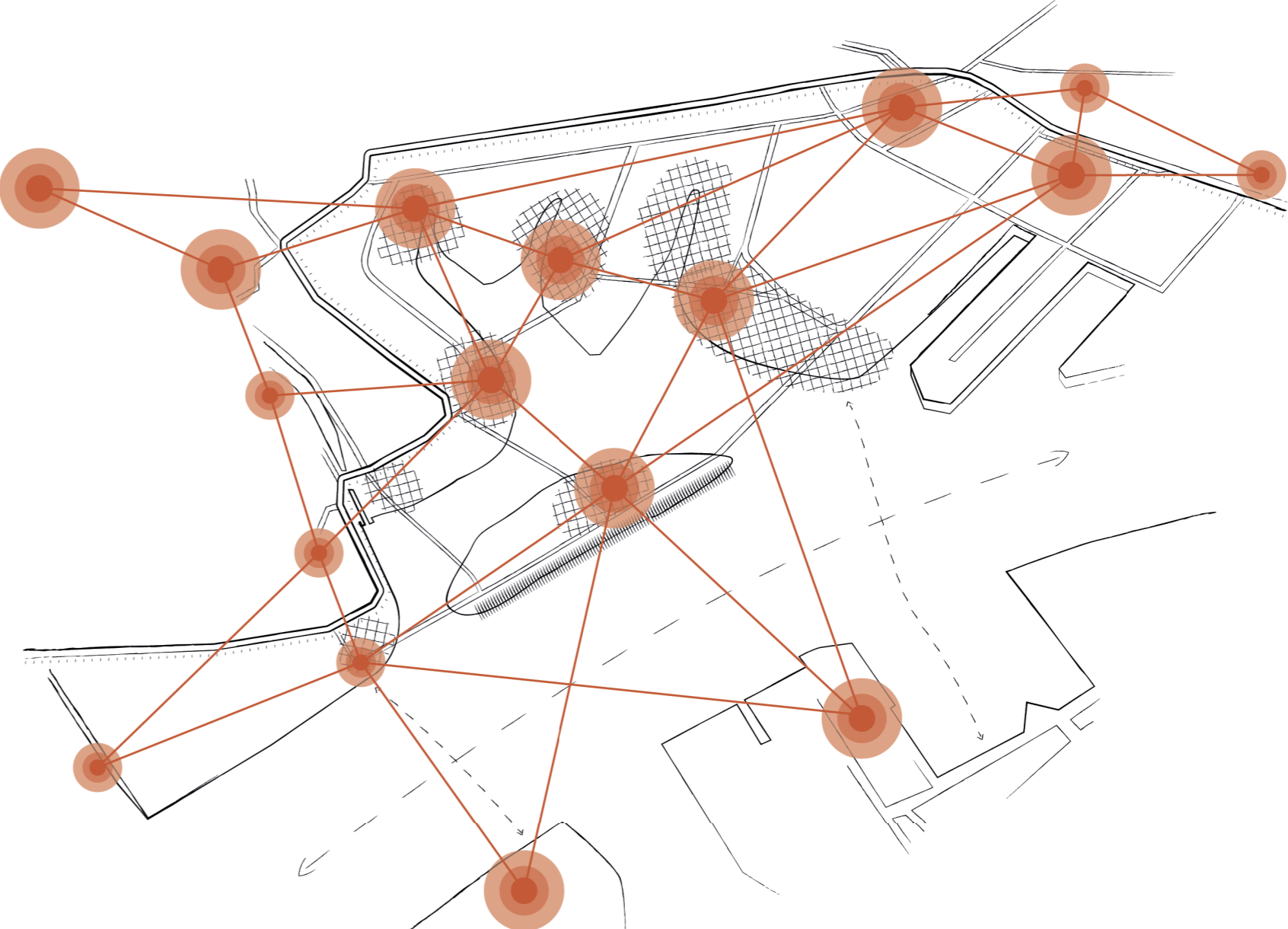
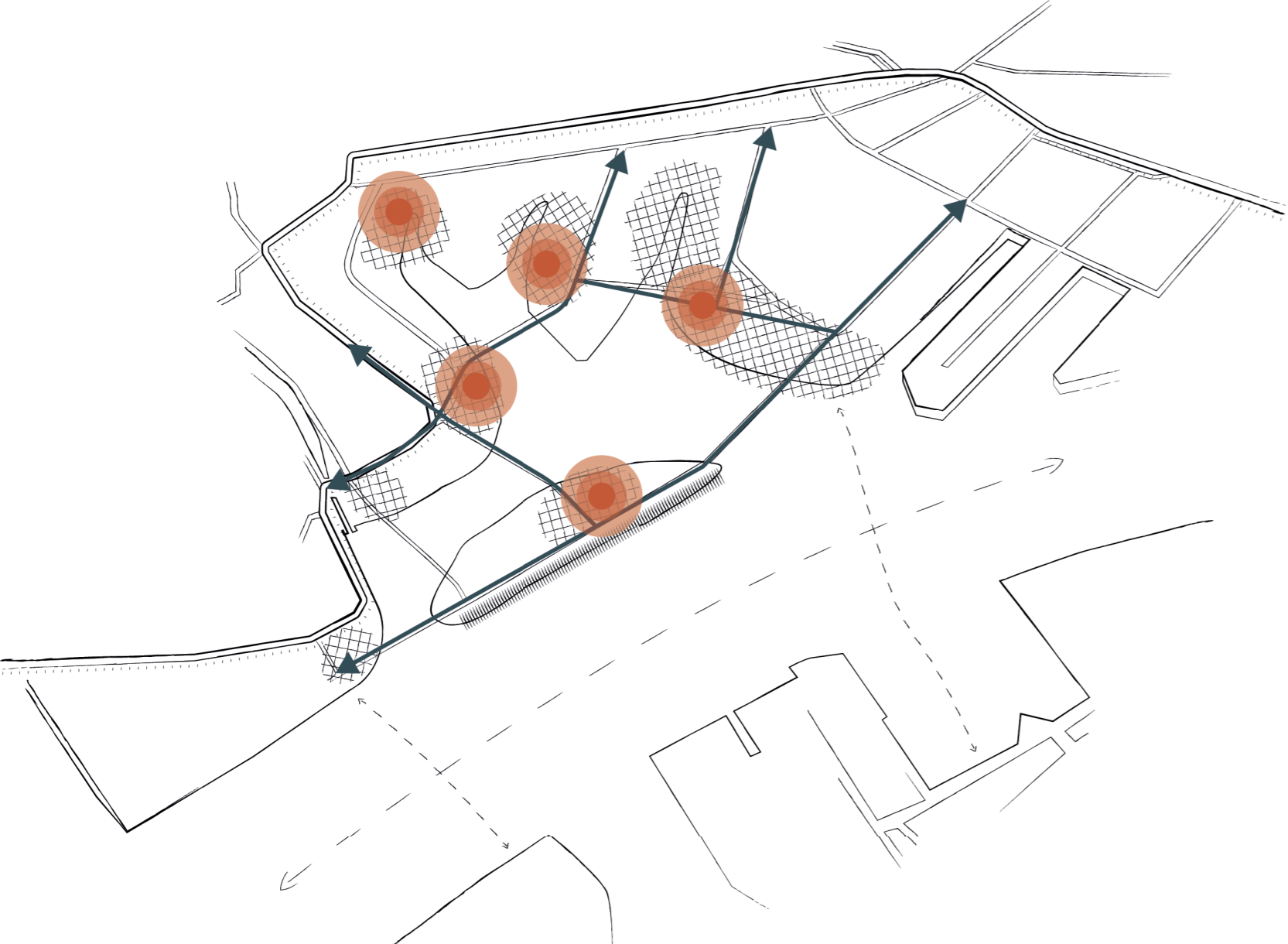
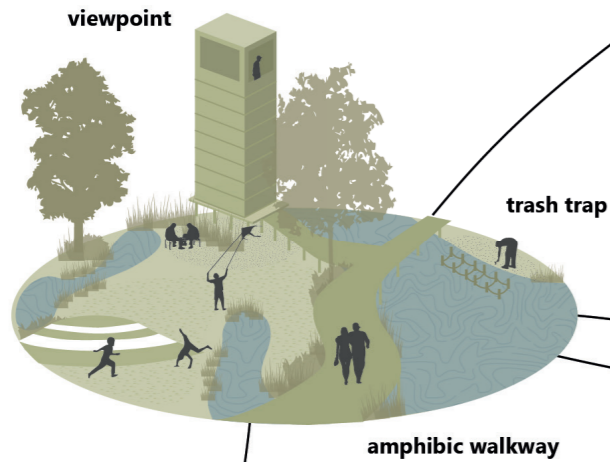


Figure 33: Location of cultural drivers / Author

CULTURAL CATALYSTS

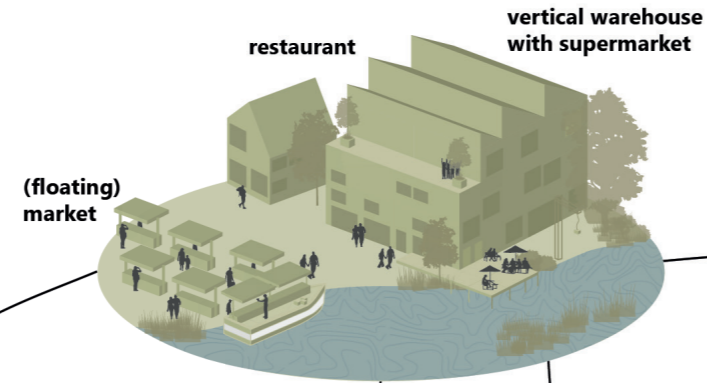
Catalyst for wildlife

nature playground, combined scout hut, field house, nature centre, beehives, bird tower, shelters, hiking trails, insect hotels, trash traps, viewing tower, bee hotel, bird sanctuary



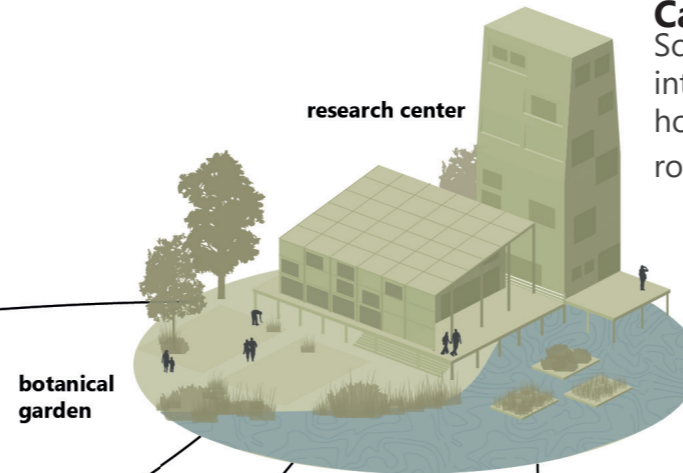
Catalyst for trade and local food

Supermarket, bank, gas station, market-place for local food sales, restaurants, bar, cafe, port, vertical warehouse



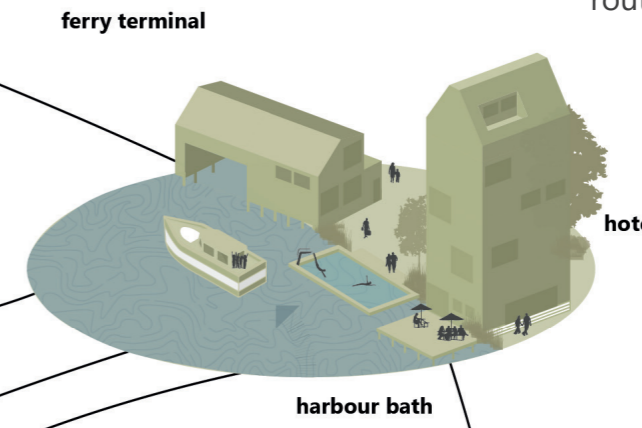
Catalyst for knowledge

School, Educational center, museum, interactive environment, playgrounds, art house, water treatment place, meeting room, green urban space



Catalyst for tourism

Boat tours, market space, hotel, ferry terminal, viewpoints, event space, educational center, aquatic architecture, hiking route, port, harbour baths



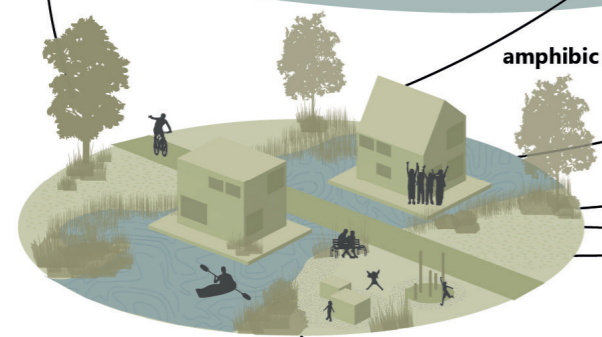
Catalyst for creativity and active life

art center, pop up exhibitions, educational center, cafe, interactive environment, playgrounds, water sports, swimming, event space, multi purpose halls, urban garden, market area, mixed use, test and maker-space, green urban space



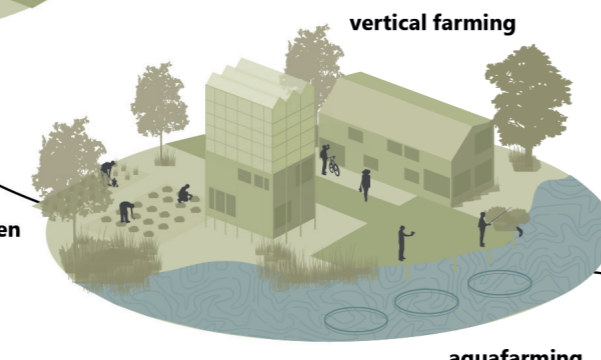
Catalyst for life in salt marsh

Nature experiences in the salt marsh, floating houses, observation tower, picnic, circus and event site, amphibious walkways, river beach, senior center, playscape



Catalyst for cultivation and healthy food culture

Greenhouses on roof, vertical farming, communal hall for machinery, market place, farm hall, school/community garden, supermarket, startup premises, urban fish farming



Catalyst for health

community spaces, activities, wellness, restaurants, Sport center, outdoor fitness, water sports, activity playground, sharing facilities, rehabilitation center, natural swimming pool, water access, playscapes

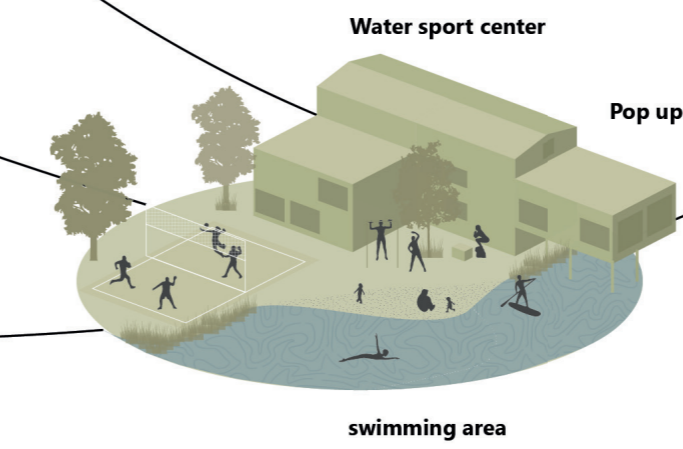


Figure 34: Possible catalysts to achieve an activation of the outer dike area / Author

LOCAL FLOWS

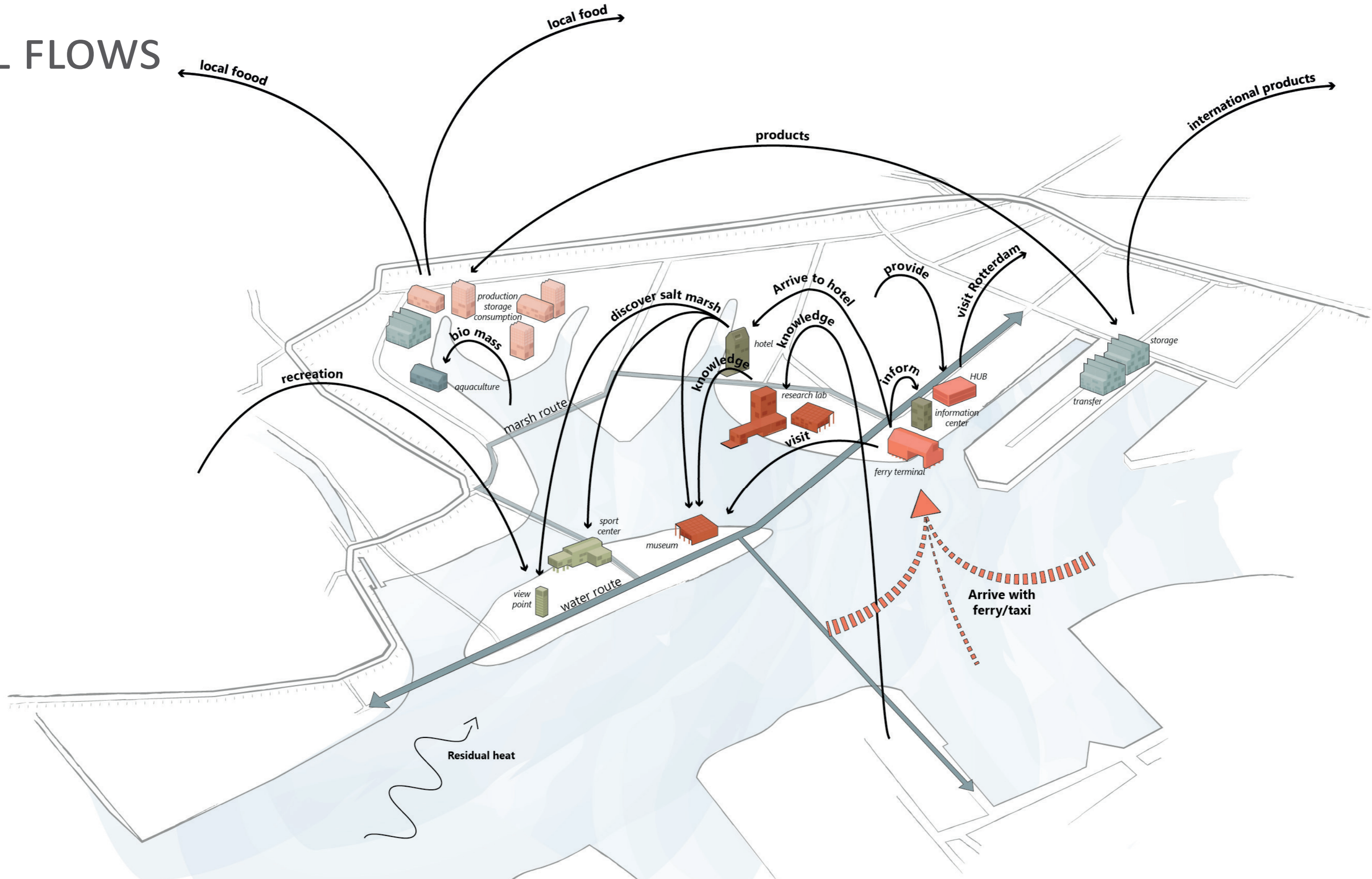
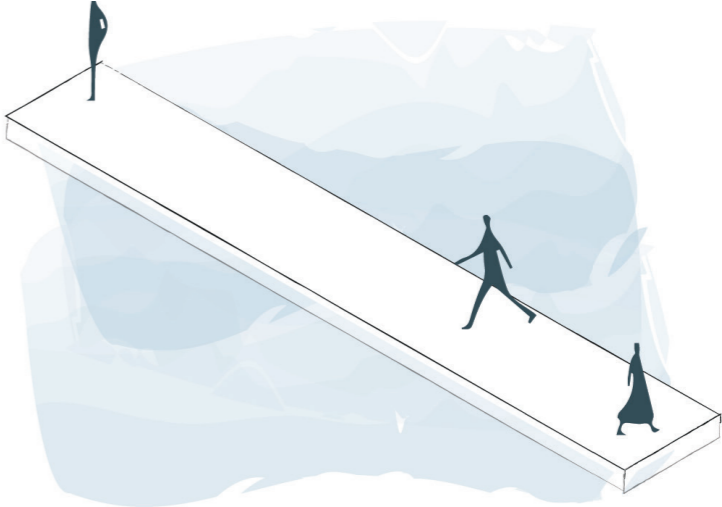
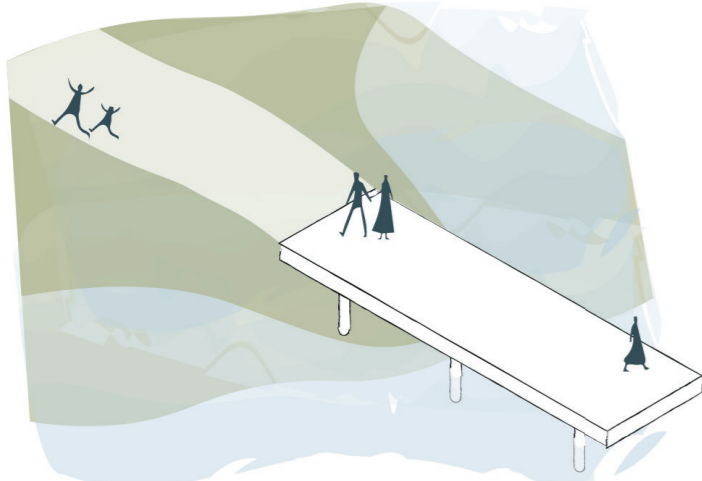


Figure 35: Different flows in area / Author

ADAPTIVE CONNECTIONS



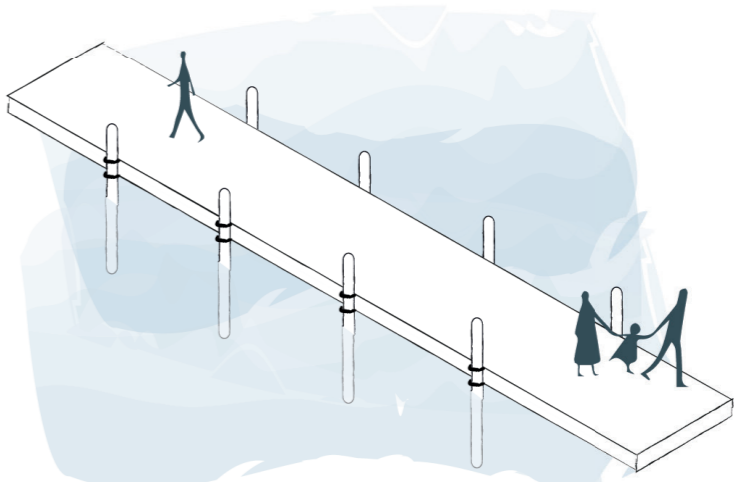
Floating path



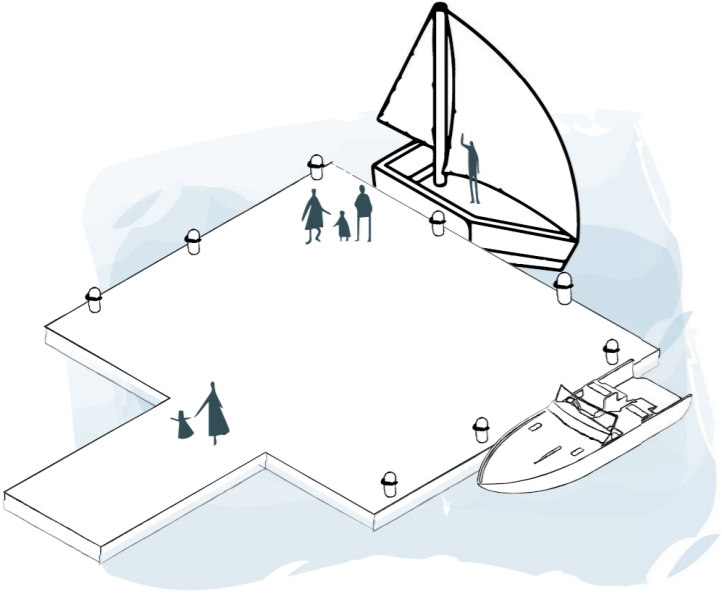
Floodable path



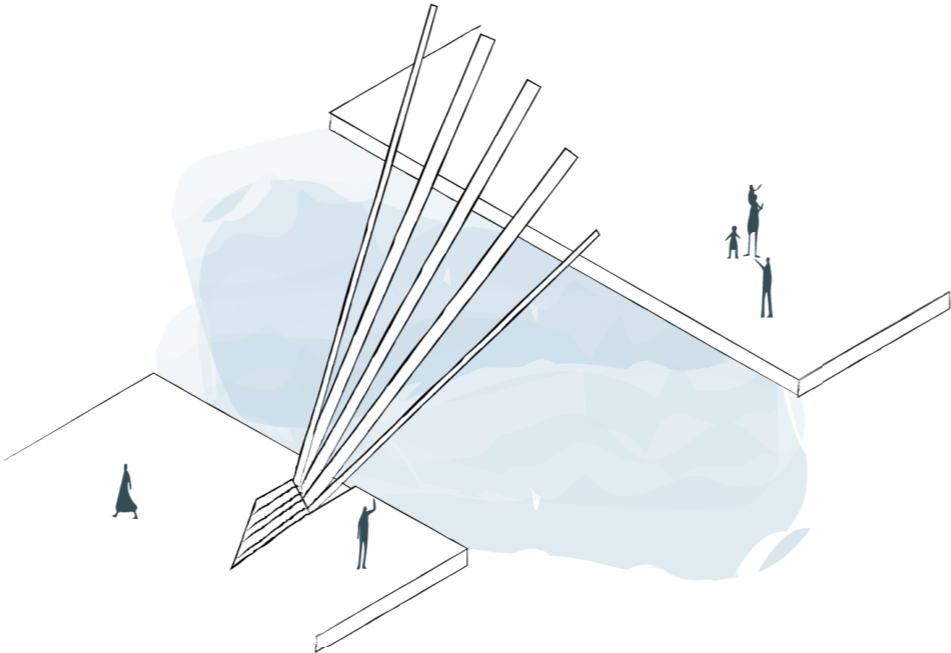
Movable / floating bridge



Amphibic walkway



Boat landing stage

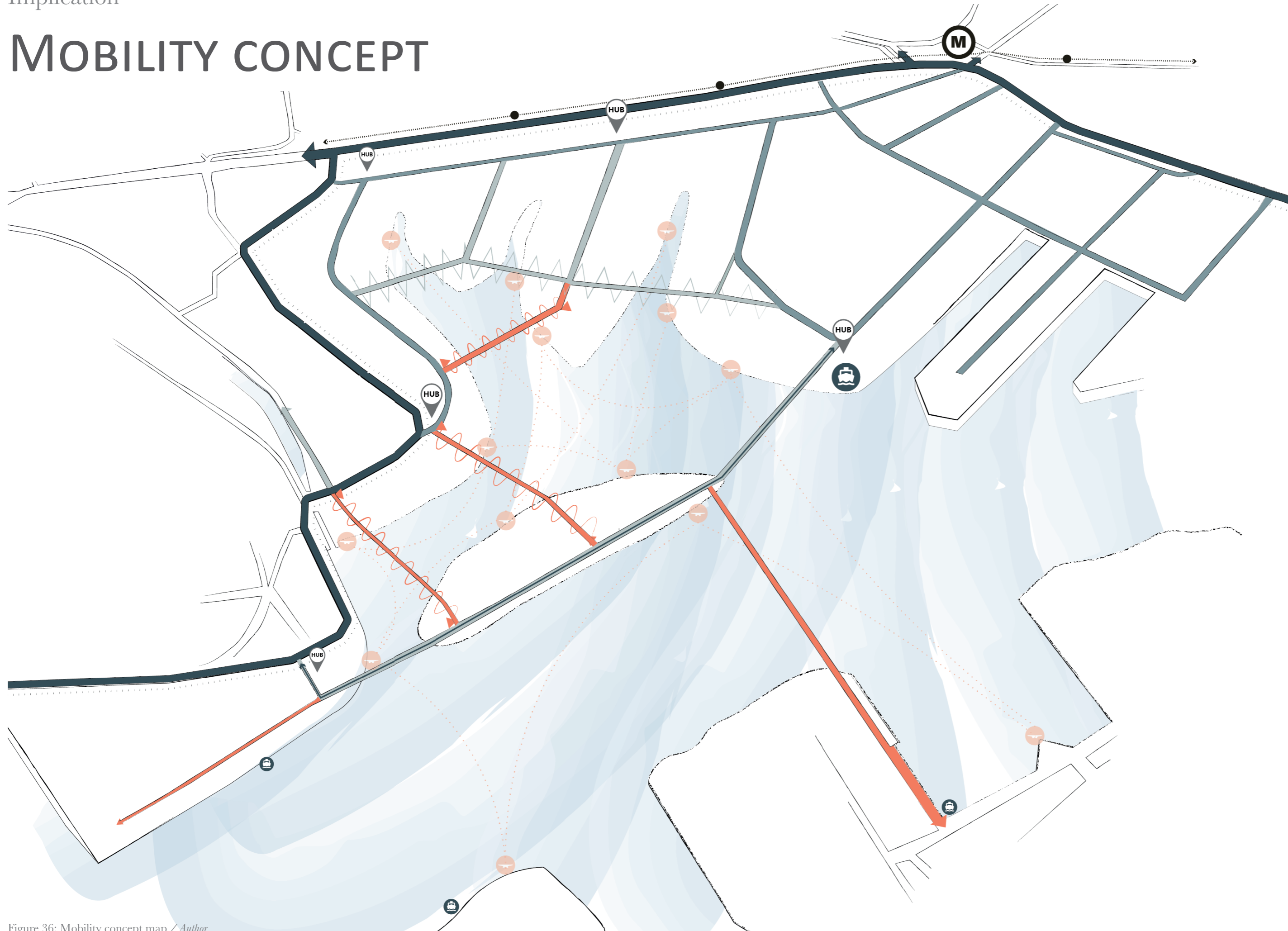


Foldable bridge



Lifted street

MOBILITY CONCEPT





















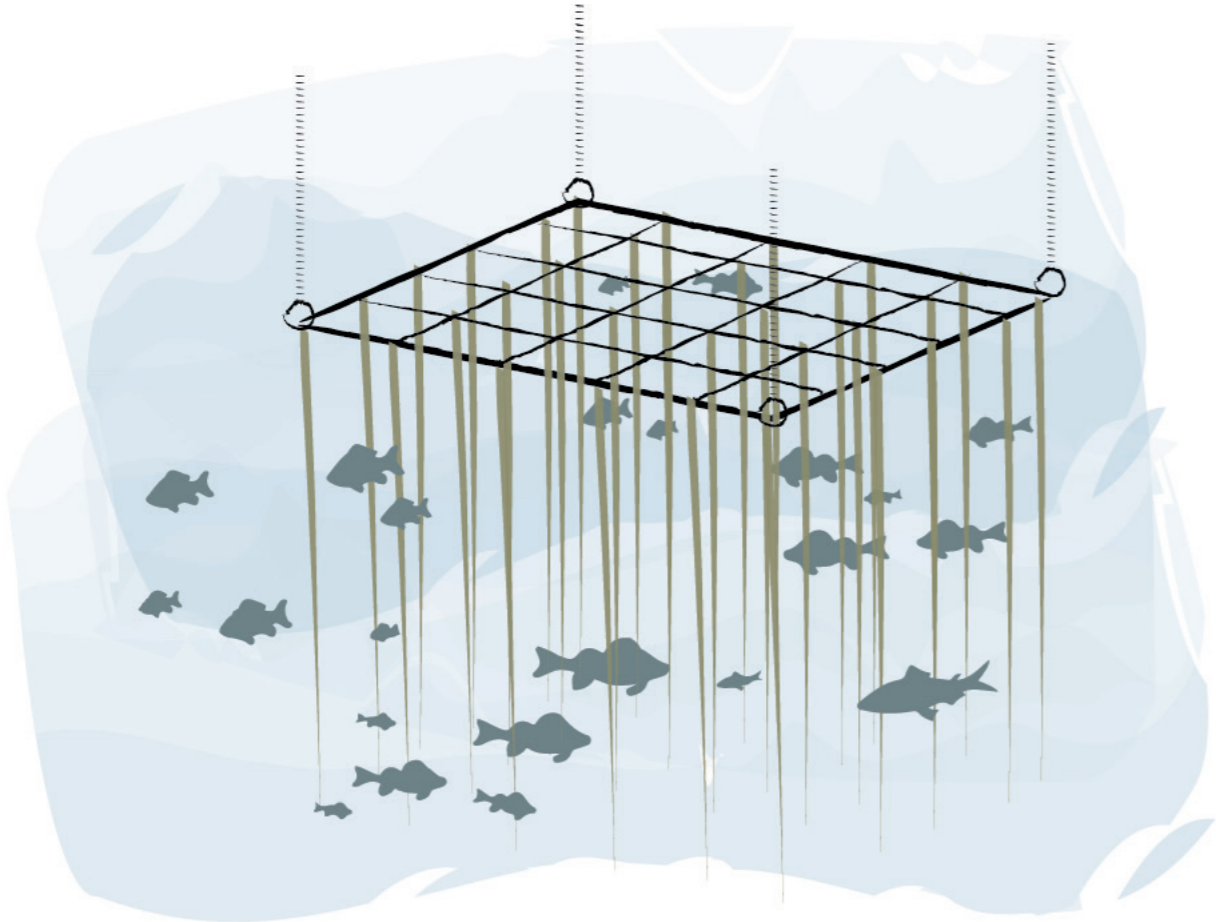
- Fast traffic connection 
- Slowed down traffic connection 
- Dynamic lane configuration* 
- Shared space connection 
- Electric autonomous vehicles and micro-mobility 
- Slow traffic connection 
- Residential route 
- folding bridges during flood* 
- Recreational route 
- floating and amphibic bridges* 
- Fast route 
- Suggestive water mobility routes 
- Ferry and water bus landing 
- Multi-modal interchange HUB 
- shuttle drivers on comand* 
- Public mooring for water mobility 
- Tram connection 
- medium speed* 
- Underground transport
- high speed*
- Underground transport
- low speed*

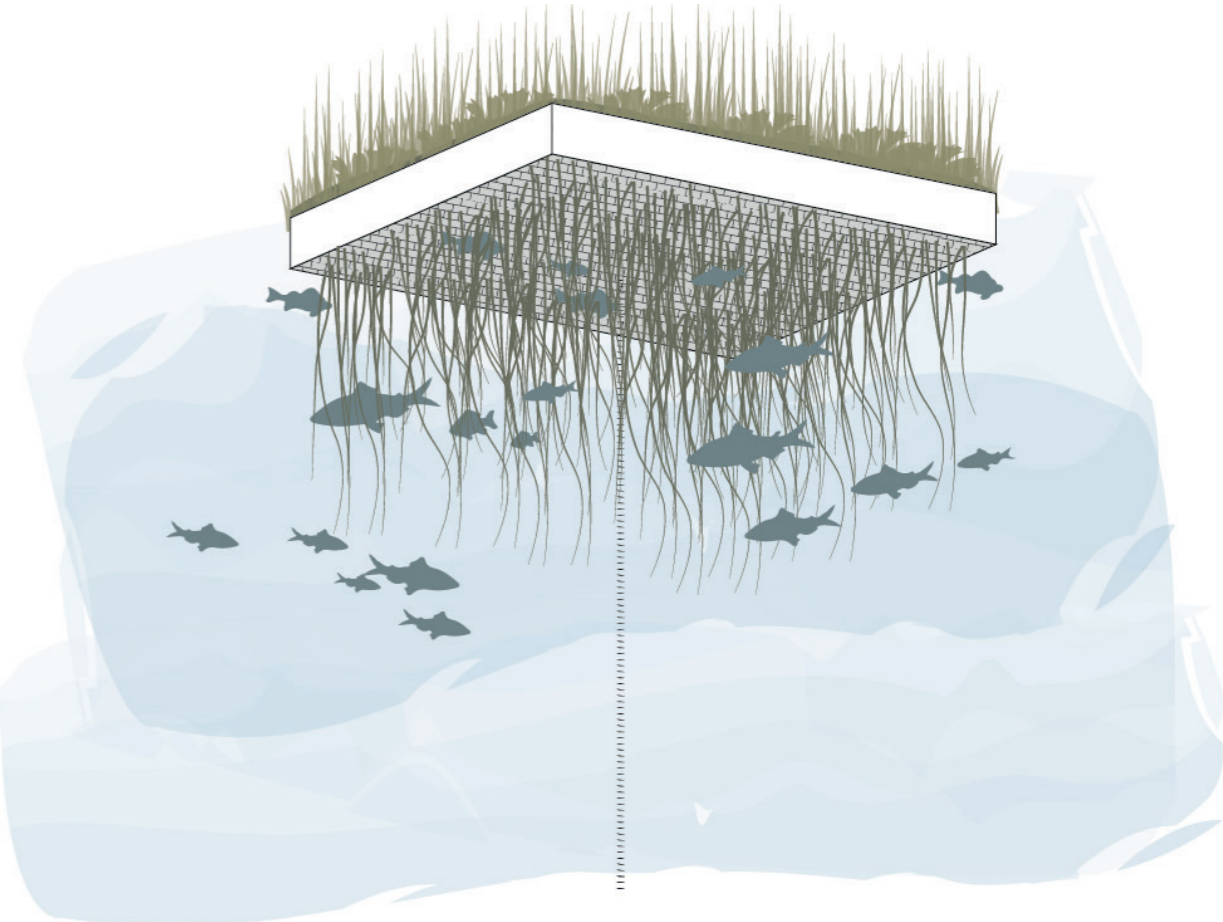
Figure 36: Mobility concept map / Author

MARITIME LIFE PROMOTERS

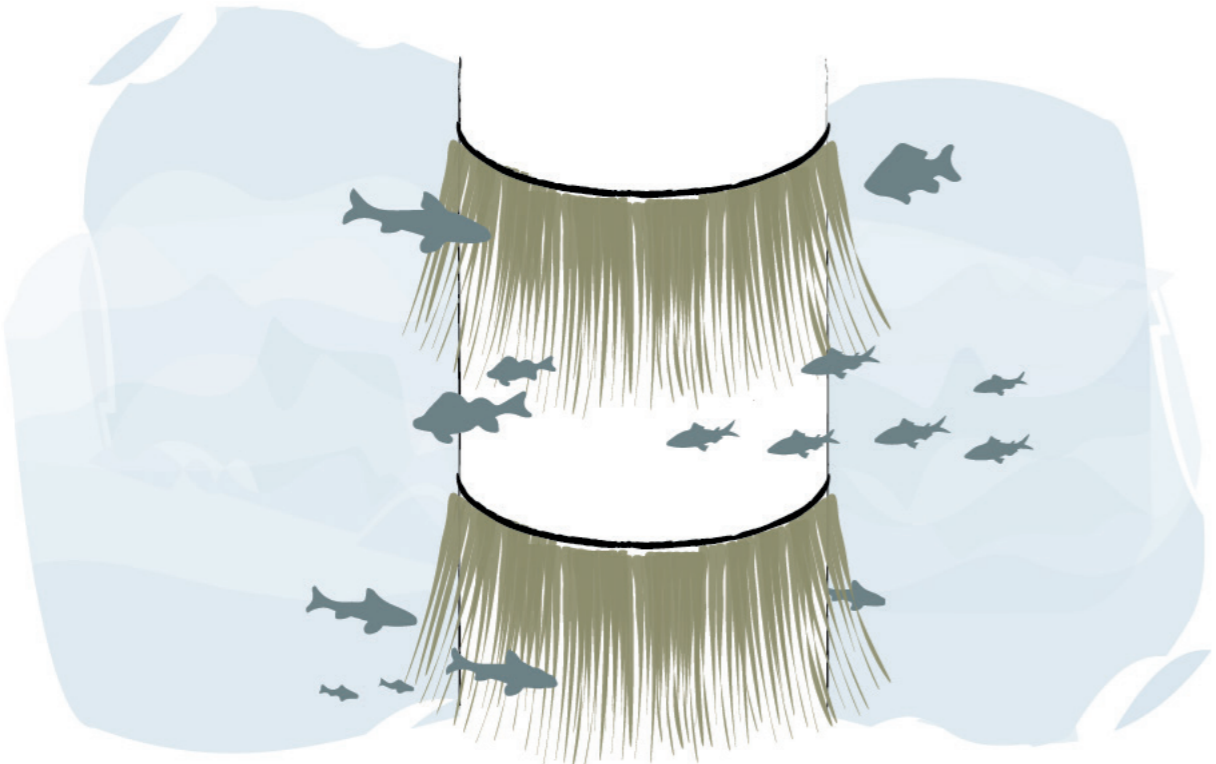
Limnetic curtain



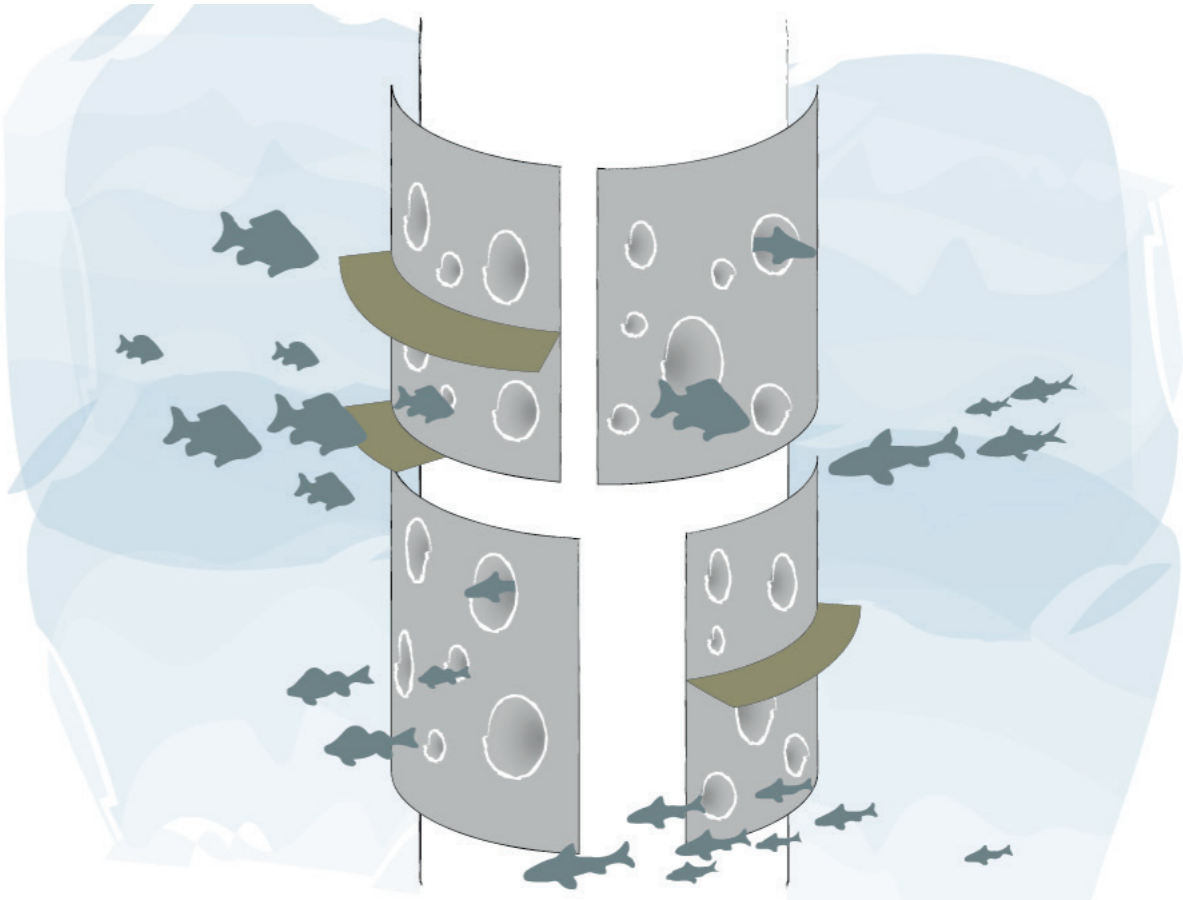
Floating wetland/forest








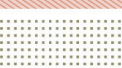








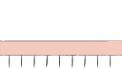



Pole hula



Lunker



Implication

-  Nature driven densification strategies
-  Urban hotspot
-  Nature based urban production landscape *communal*
-  Recreational salt marsh *public*
-  Flood adaptive urban development *private*
-  Dense adaptive building development
-  Wetland park
-  Punctual adaptive urban development
-  Transportational (*light*) and recreational (*dark*) use of river
-  cultural driver location
-  Densification
-  primary dike protection
-  Permeable dike under primary infrastructure connection *fixed infrastructure required for design*
-  Attainable infrastructure *desired infrastructure for success of the design*
-  Possible infrastructure *infrastructure that might be possible but is not essential to the achievement of the project*
-  Water connections
-  Porous and dynamic water front
-  Transportation HUB to supply the car-free area

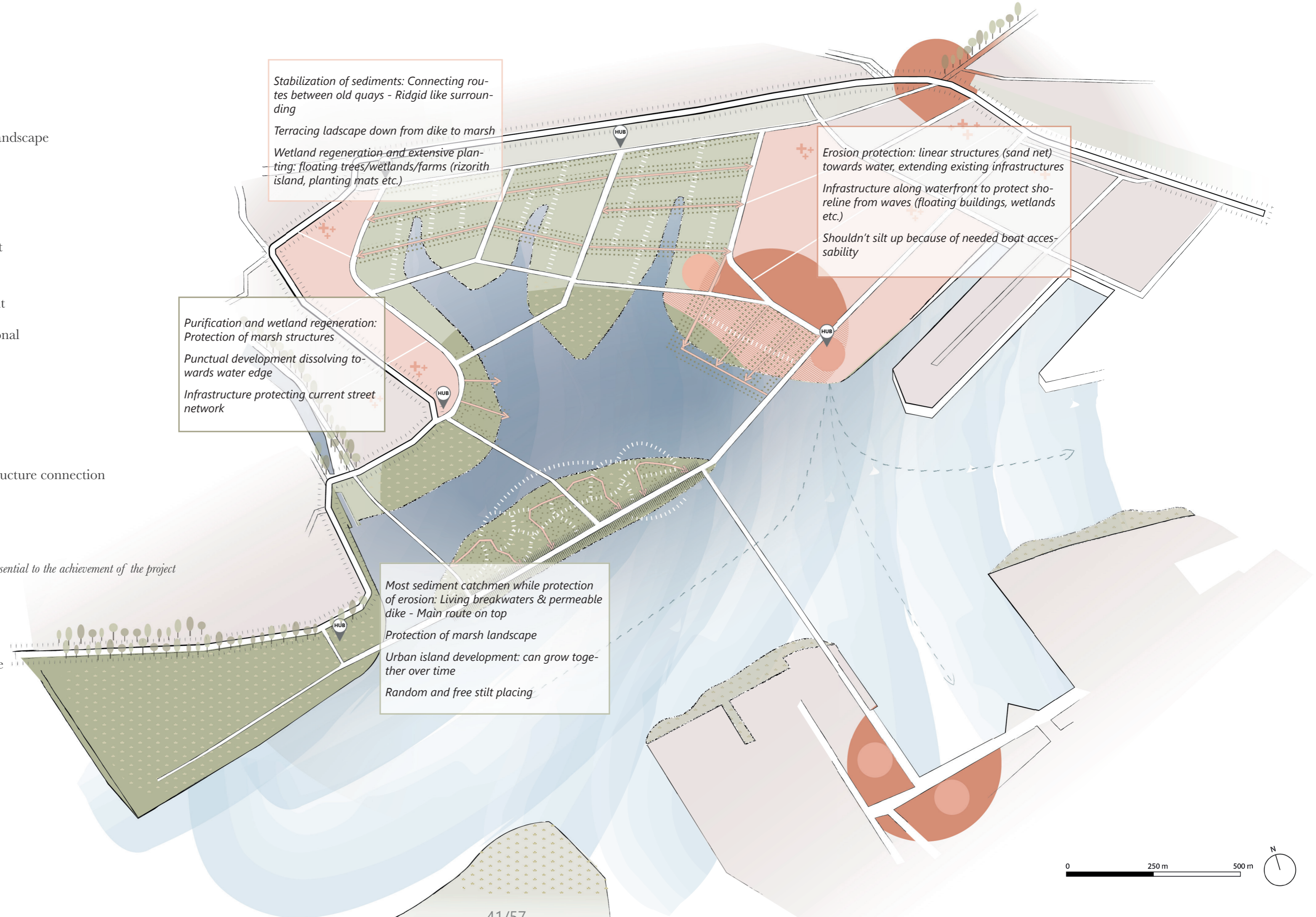
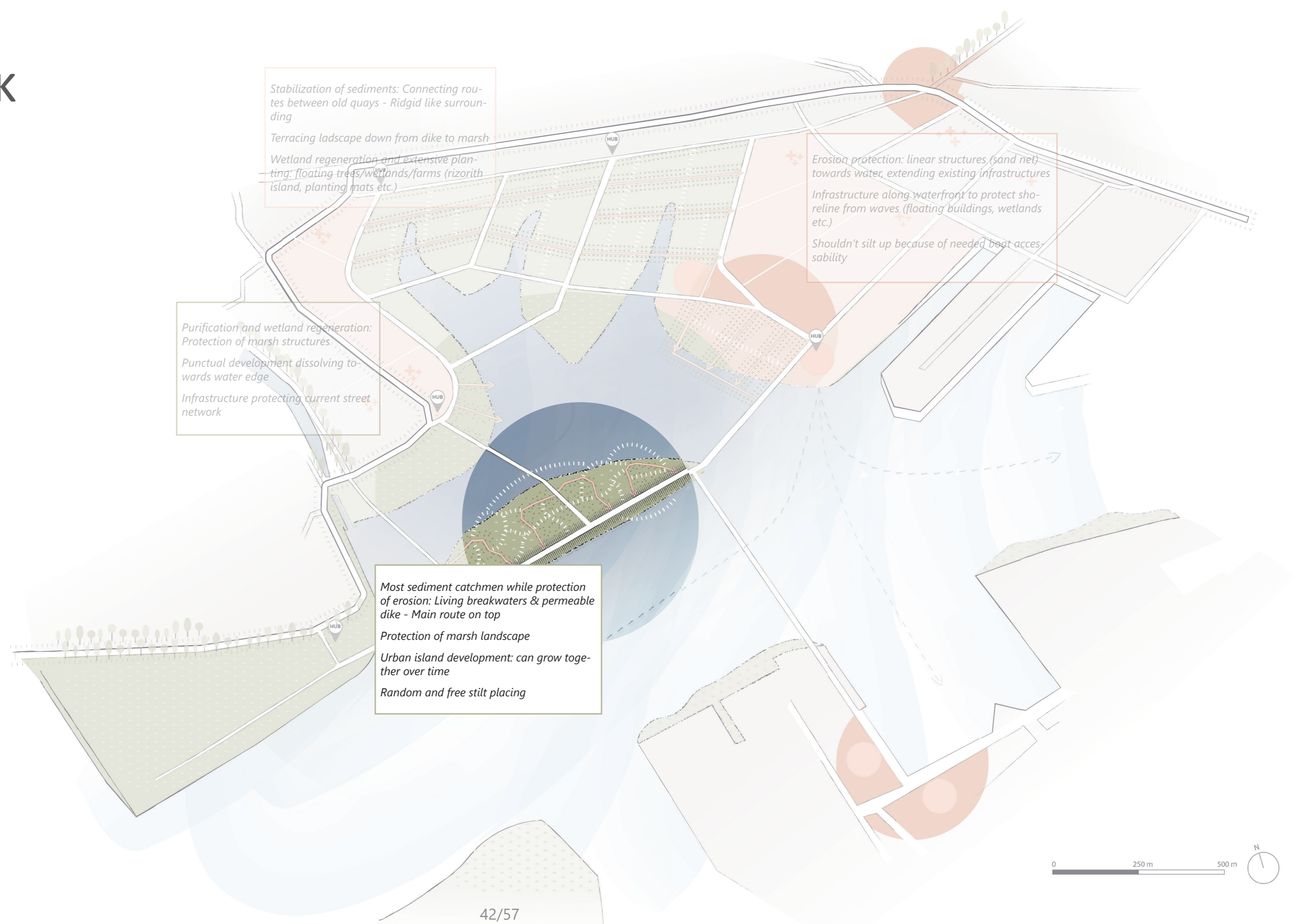


Figure 37: Structure plan/ Author

Accepting the current(s)

WETLAND PARK



Stabilization of sediments: Connecting routes between old quays - Rigid like surrounding

Terracing landscape down from dike to marsh

Wetland regeneration and extensive planting: floating trees/wetlands/farms (rizorith island, planting mats etc.)

Erosion protection: linear structures (sand net) towards water, extending existing infrastructures

Infrastructure along waterfront to protect shoreline from waves (floating buildings, wetlands etc.)

Shouldn't silt up because of needed boat accessibility

Purification and wetland regeneration: Protection of marsh structures

Punctual development dissolving towards water edge

Infrastructure protecting current street network

Most sediment catchmen while protection of erosion: Living breakwaters & permeable dike - Main route on top

Protection of marsh landscape

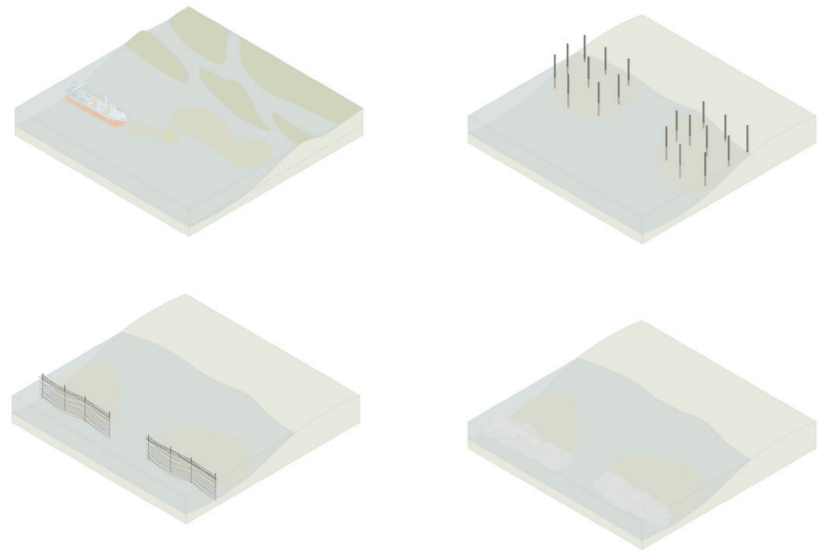
Urban island development: can grow together over time

Random and free stilt placing



Implication

Landscape tools



Building typologies

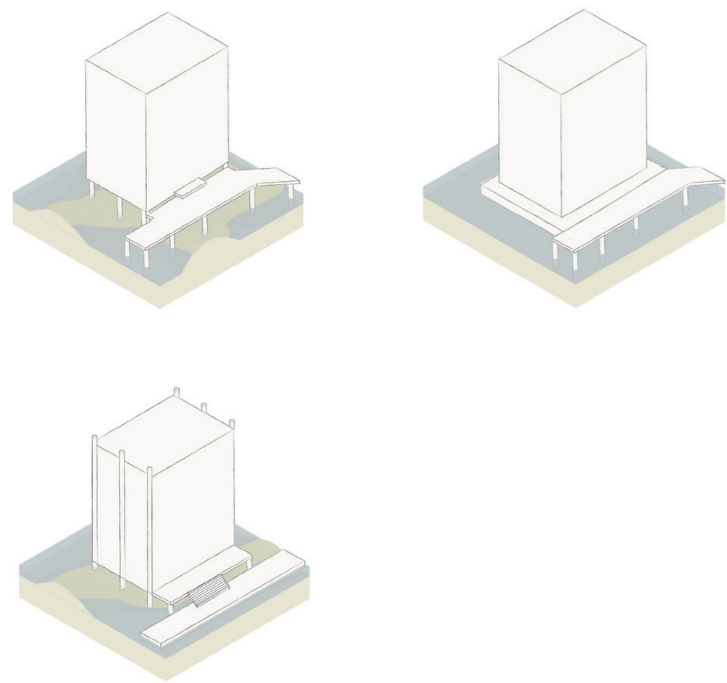
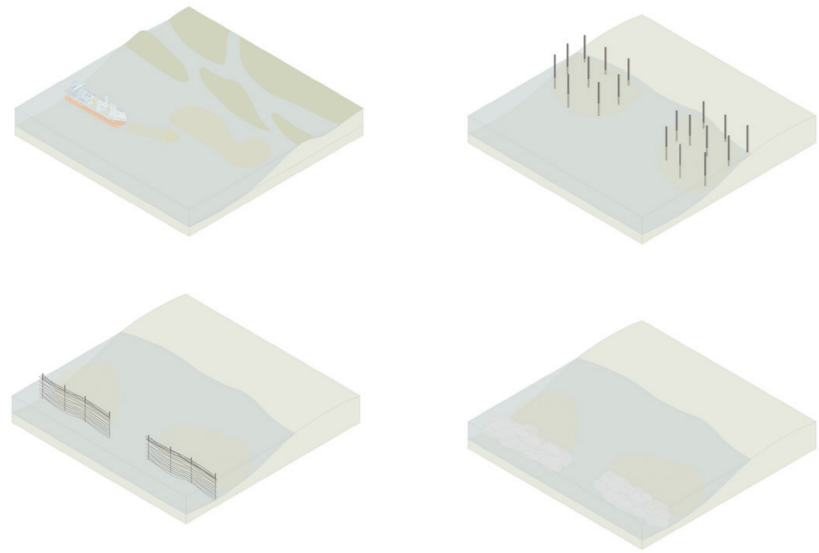


Figure 40: Wetland park / Author
Accepting the current(s)



Implication

Landscape tools



Building typologies

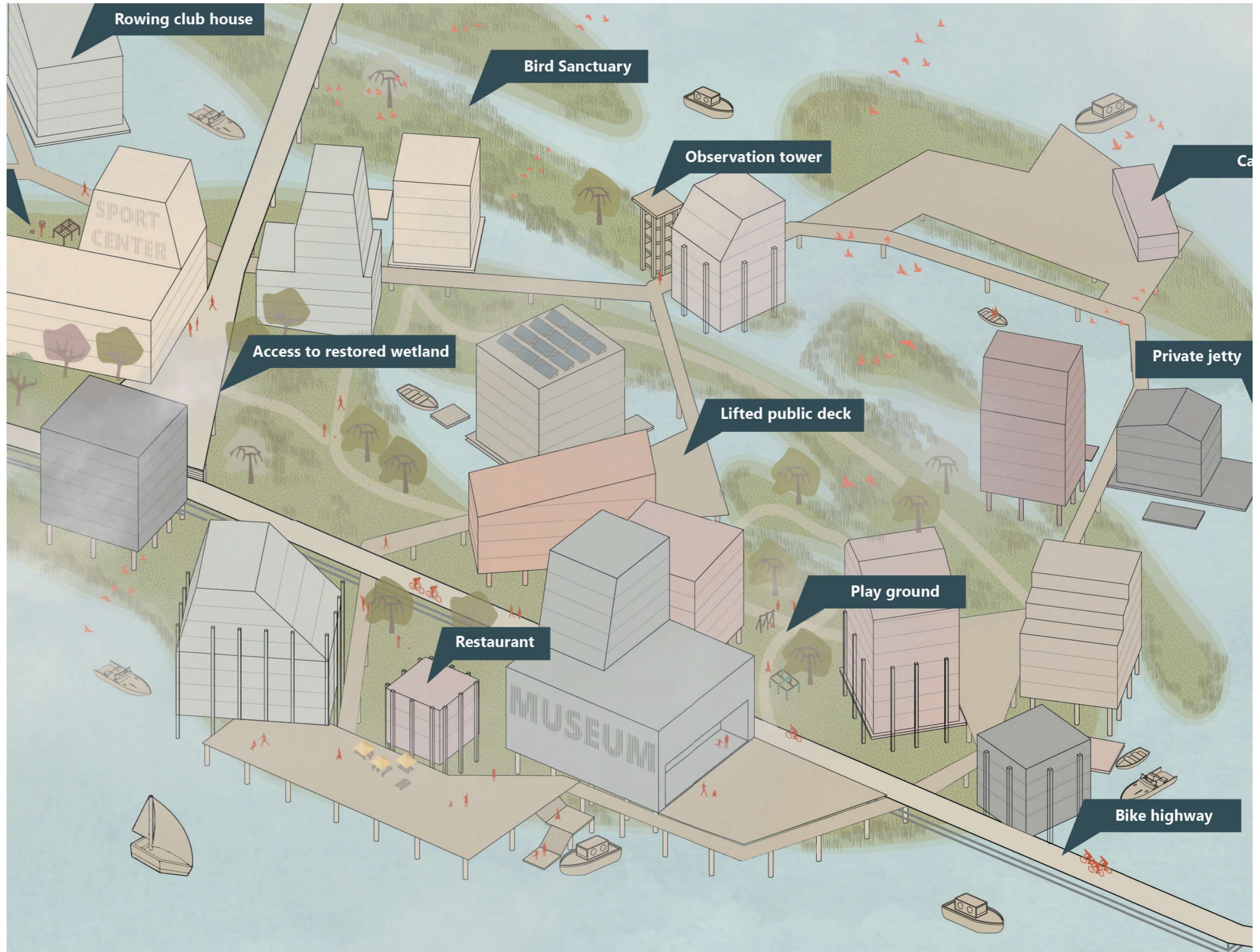
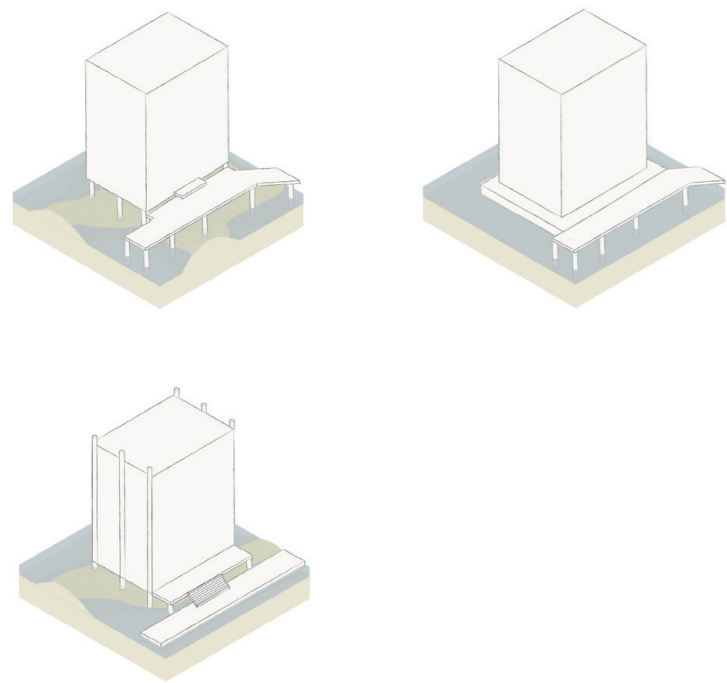
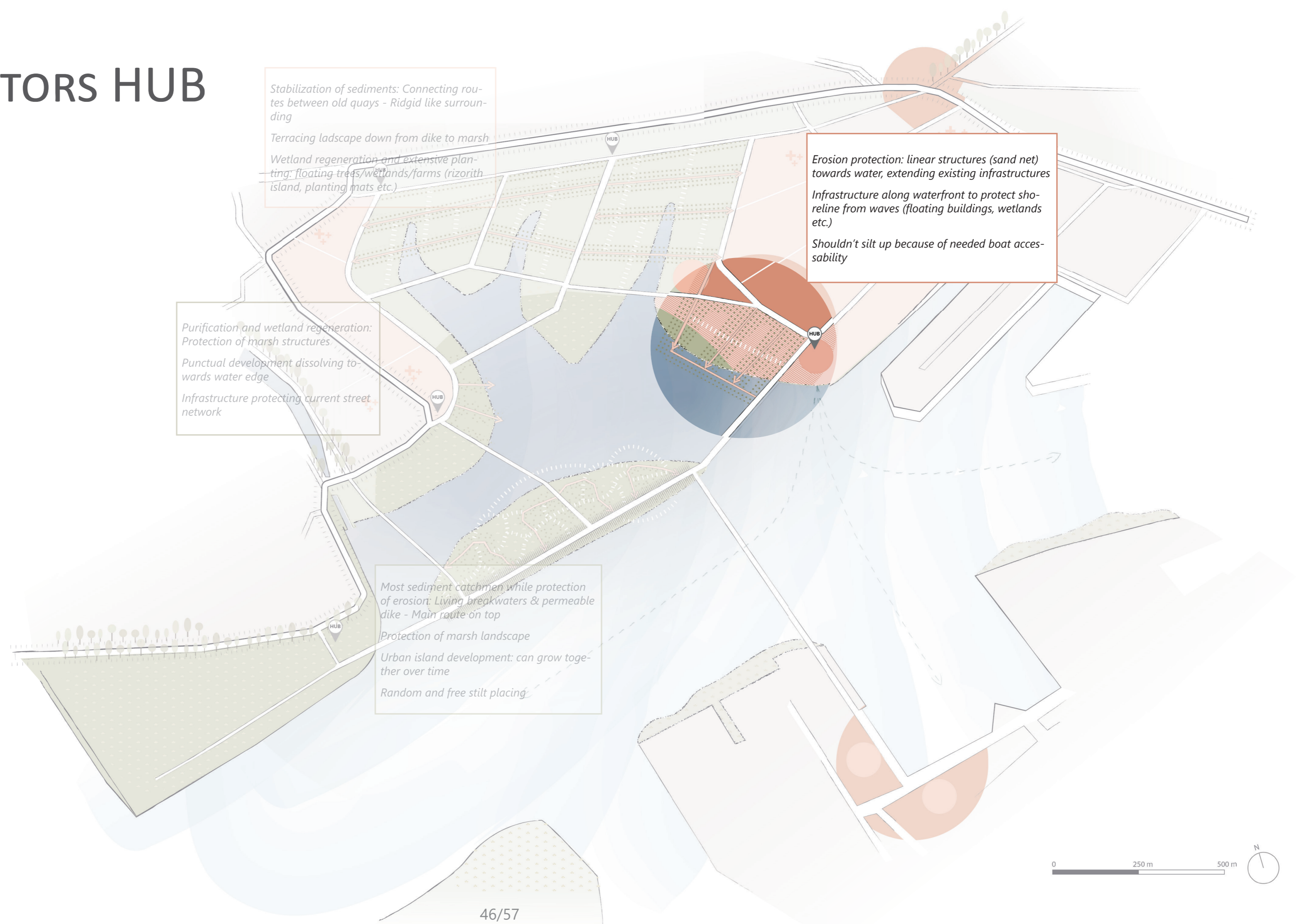


Figure 41: Wetland park / Author
Accepting the current(s)



CULTURAL-VISITORS HUB



Stabilization of sediments: Connecting routes between old quays - Rigid like surrounding

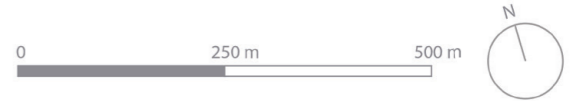
Terracing landscape down from dike to marsh

Wetland regeneration and extensive planting: floating trees/wetlands/farms (rizorith island, planting mats etc.)

Erosion protection: linear structures (sand net) towards water, extending existing infrastructures
Infrastructure along waterfront to protect shoreline from waves (floating buildings, wetlands etc.)
Shouldn't silt up because of needed boat accessibility

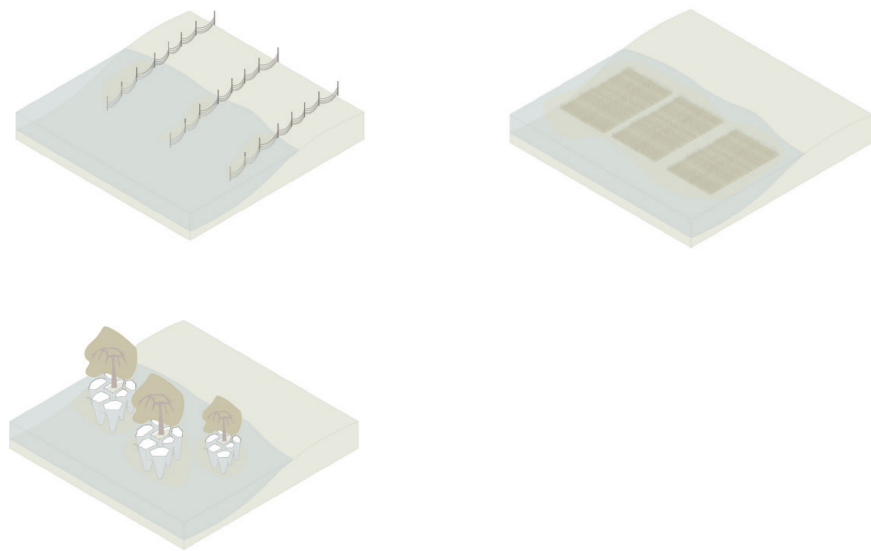
Purification and wetland regeneration: Protection of marsh structures
Punctual development dissolving towards water edge
Infrastructure protecting current street network

Most sediment catchmen while protection of erosion: Living breakwaters & permeable dike - Main route on top
Protection of marsh landscape
Urban island development: can grow together over time
Random and free stilt placing



Implication

Landscape tools



Building typologies

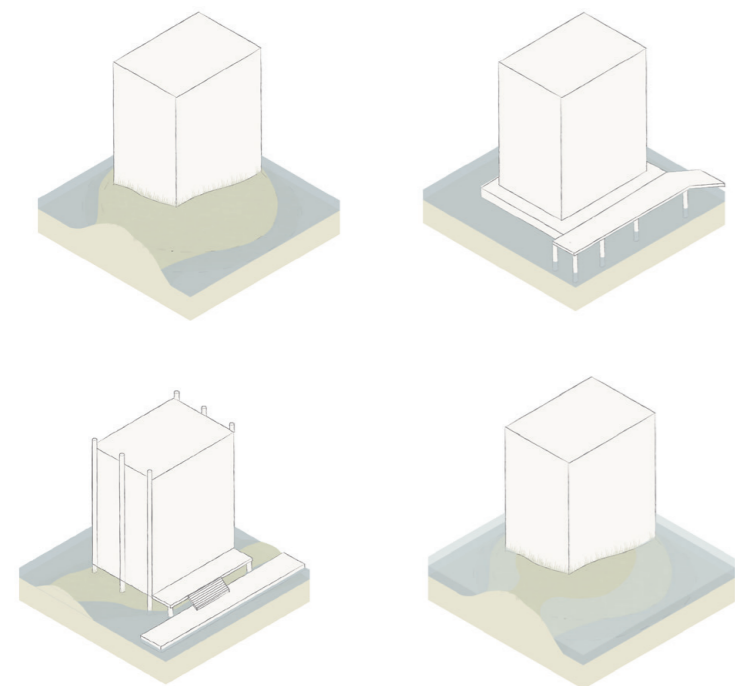
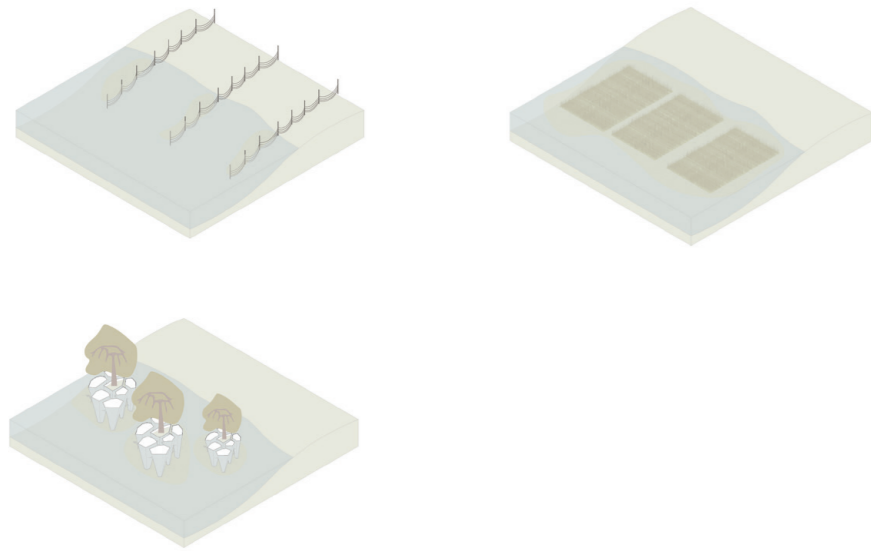


Figure 42: Cultural-Visitors HUB / Author

Implication

Landscape tools



Building typologies

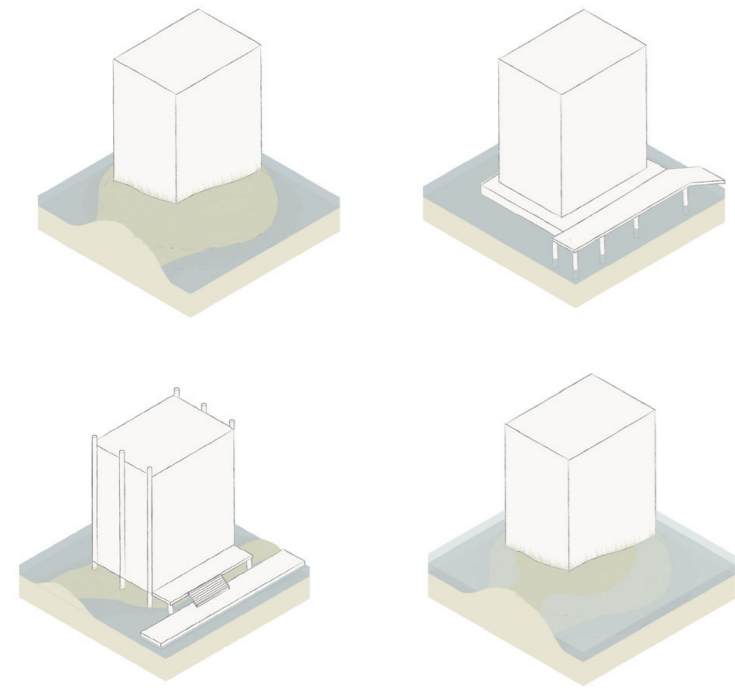
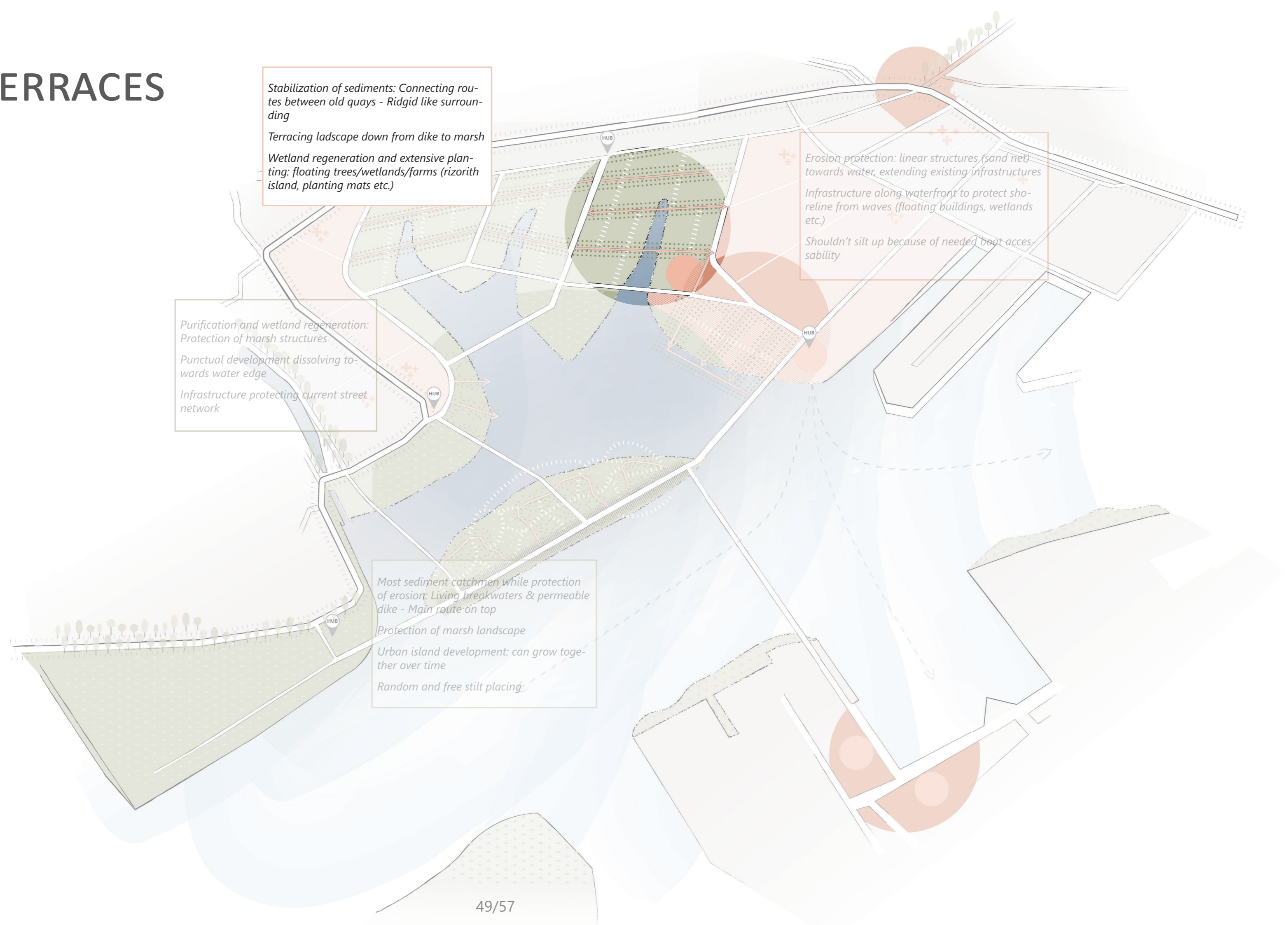


Figure 43: Cultural-Visitors HUB / Author

PRODUCTIVE TERRACES



Stabilization of sediments: Connecting routes between old quays - Rigid like surrounding

Terracing landscape down from dike to marsh

Wetland regeneration and extensive planting: floating trees/wetlands/farms (rizorith island, planting mats etc.)

Erosion protection: linear structures (sand net) towards water, extending existing infrastructures

Infrastructure along waterfront to protect shoreline from waves (floating buildings, wetlands etc.)

Shouldn't silt up because of needed boat accessibility

Purification and wetland regeneration: Protection of marsh structures

Punctual development dissolving towards water edge

Infrastructure protecting current street network

Most sediment catchmen while protection of erosion: Living breakwaters & permeable dike - Main route on top

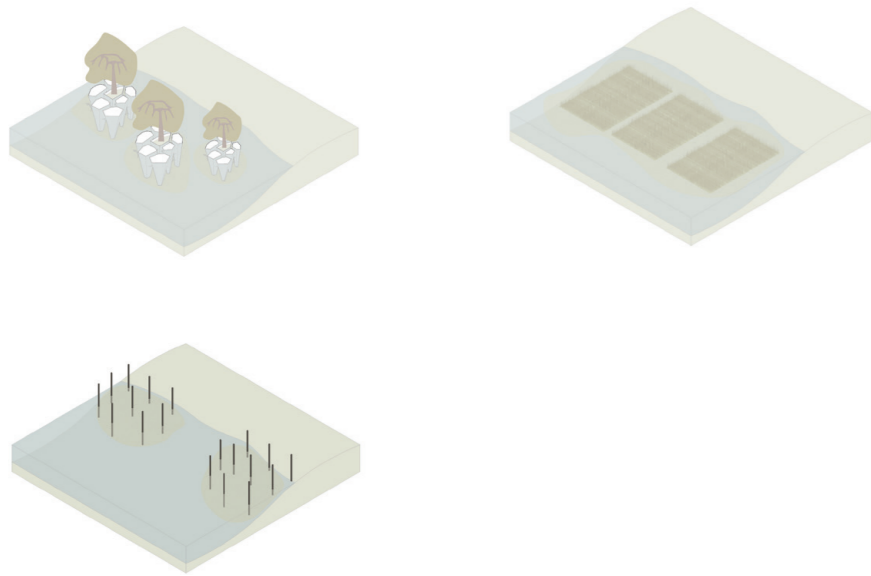
Protection of marsh landscape

Urban island development: can grow together over time

Random and free stilt placing

Implication

Landscape tools



Building typologies

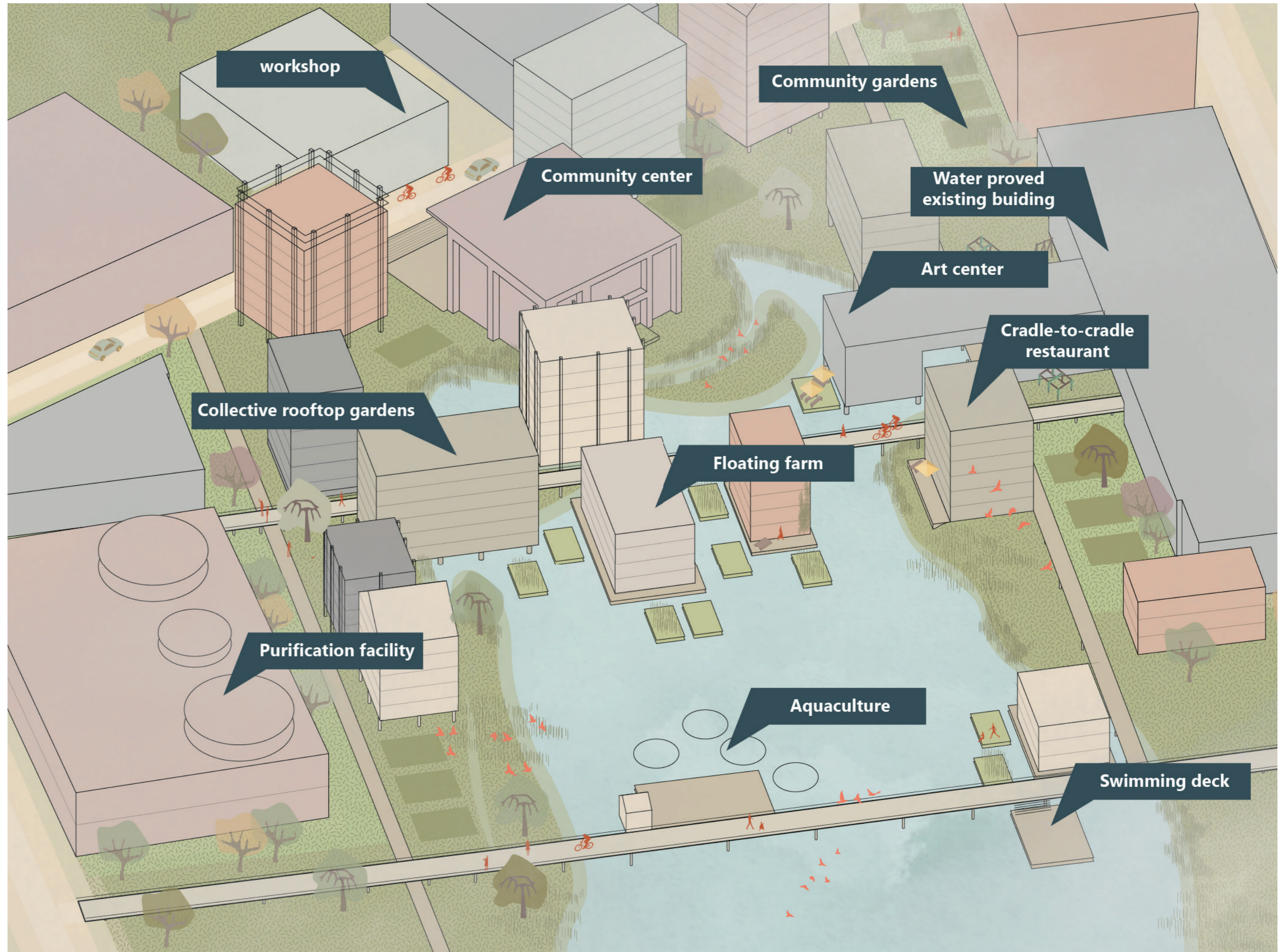
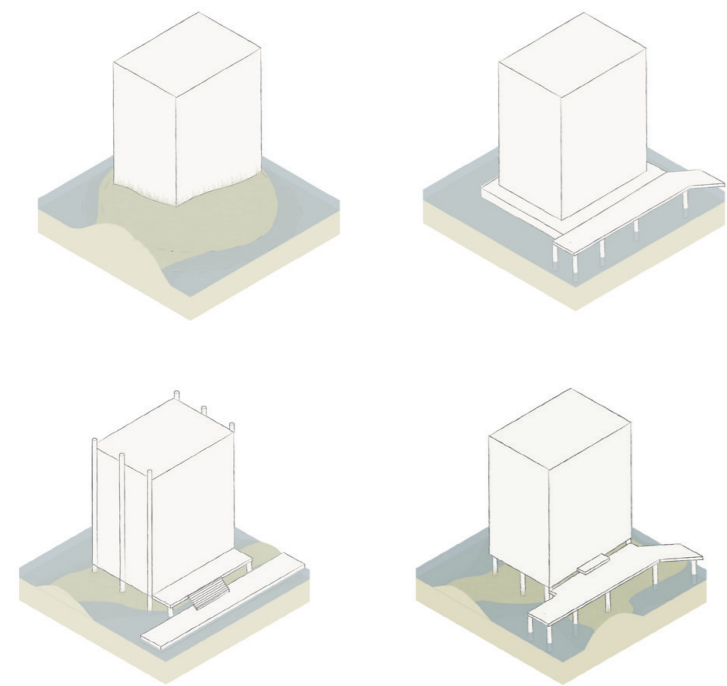
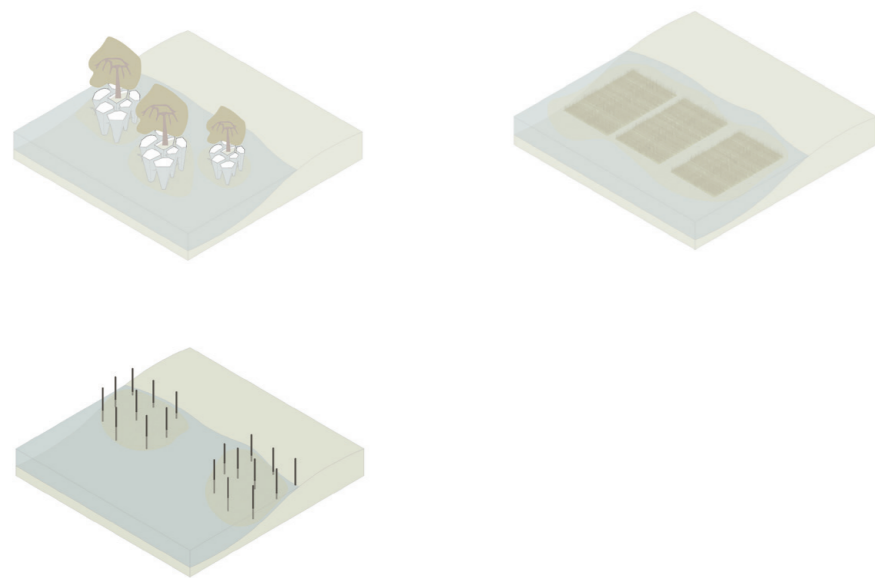


Figure 44: Productive Terraces / Author

Implication

Landscape tools



Building typologies

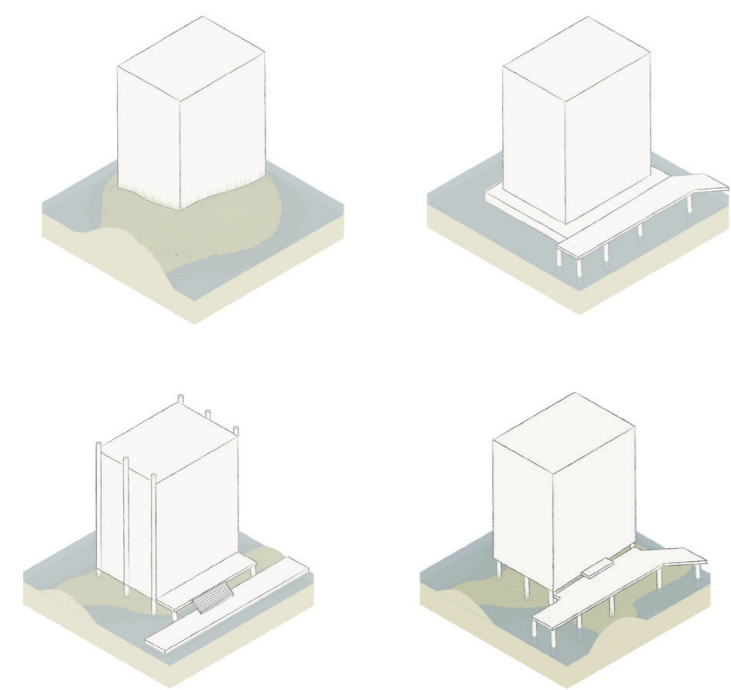


Figure 45: Productive Terraces / Author





Figure 46: Bird view over area / Author

APPLICABLE AREAS

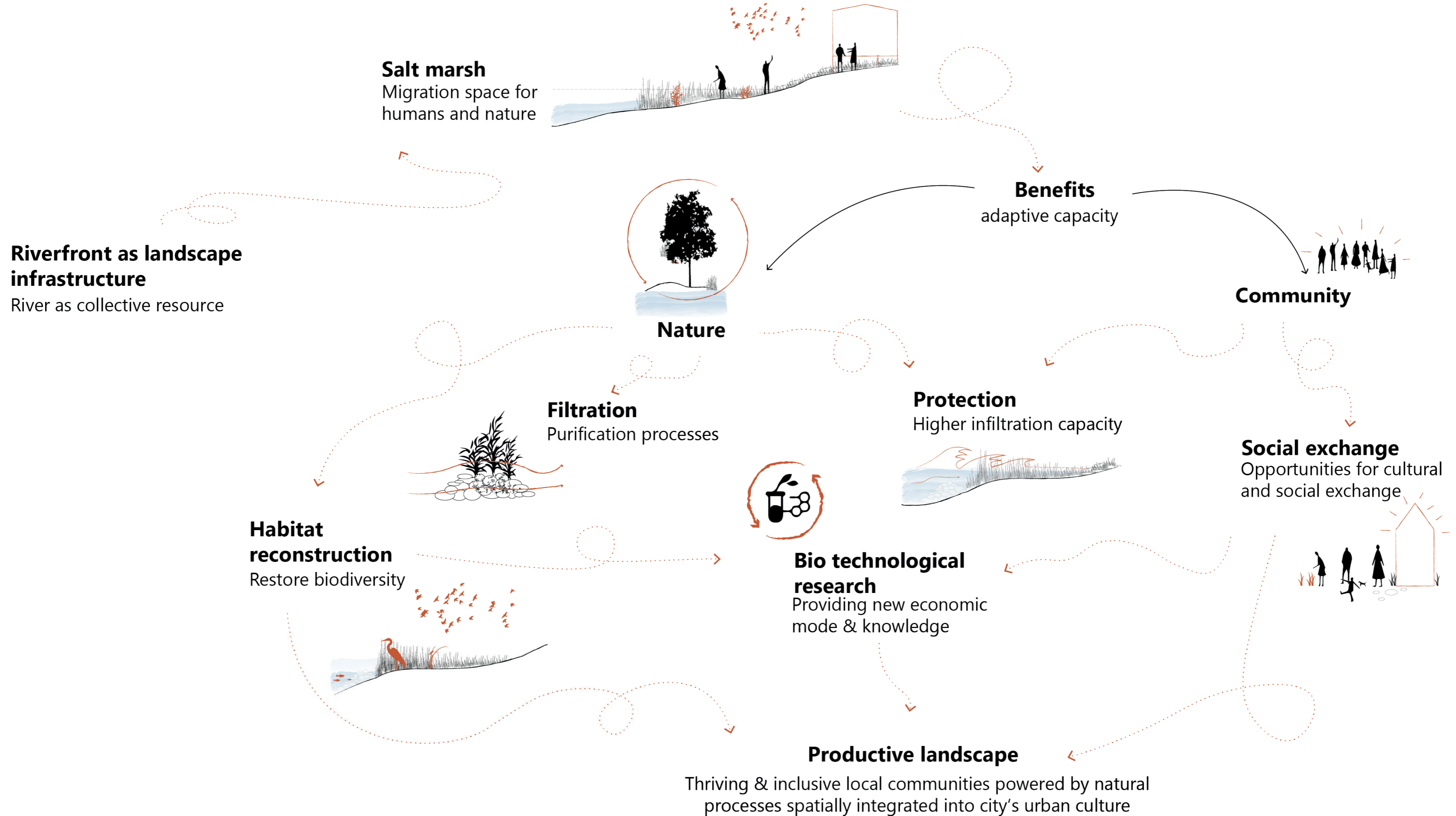
Creation of a transboundary delta landscape

- Wetland park 
- Proposed tidal parks 
- Existing public green structures 
- Dike 
- Viewing deck 
- New industry quay 
- Constructed wetland 
- Swimming access 



Figure 47: Regional application / Author

Accepting the current(s)



Conclusion

Merwer-Vierhavens became a flagship project for wetland urbanity. Researchers are encouraging new productivities by exploring new materialities and strategies related to salt marshes and urban food production.



The Reconstruction strategies integrate the participation of the local population from the very beginning.

2025
Planting marsh vegetation

Water retention

2100
Reformation of salt marsh and restored habitat

Amphibic boardwalks

The river is no longer a border or a barrier, but rather a place of connection. Not only from the natural and human domain, but also from different activities and in the interpersonal sphere.

2030
trash trap

Outdoor classrooms

2042
Living breakwaters

THERE'S ANOTHER NEW SPECIES OF FISH I HAVEN'T SEEN HERE BEFORE!

The marshland programme involves species decontamination and maintenance of both the soil as well as the water, thus promoting human and non-human health.

2038
River access

FINALLY I CAN ACCESS THE MARSH AND SPENT SOME QUALITY TIME WITH MY SON HERE AND TEACH HIM MORE ABOUT OUR ENVIRONMENT.

Purification plants

2035
Marine architecture

I LOVE MY NEW FLAT! I NEVER GET BORED LOOKING OUT BECAUSE THERE IS ALWAYS SOMETHING TO WATCH.

Water mobility

2065
water sports

The ever present relationship between landscape, urbanity and water is key to the atmosphere in Merwe-Vierhavens. This unique atmosphere has been integrated into the architecture of new maritime buildings. The residential buildings with minimal land consumption are surrounded by a wetland park, which is a largely wild landscape.

THIS IS THE BEST PLAYGROUND IN THE WORLD! I LOVE COMING HERE WITH MY CLASS.

2041
marsh species

Figure 48: Accepting the currents / Author

Accepting the current(s)

Merwer-Vierhavens became a flagship project for wetland urbanity. Researchers are encouraging new productivities by exploring new materialities and strategies related to salt marshes and urban food production.



The Reconstruction strategies integrate the participation of the local population from the very beginning.

2025
Planting marsh
vegetation

Water retention

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Reformation of
salt marsh
and restored
habitat

Amphibic boardwalks



The river is no longer a border or a barrier, but rather a place of connection. Not only from the natural and human domain, but also from different activities and in the interpersonal sphere.

2030
trash trap

Outdoor classrooms



THERE'S ANOTHER
NEW SPECIES OF FISH I
HAVEN'T SEEN HERE
BEFORE!

2042
Living breakwaters

Purification plants

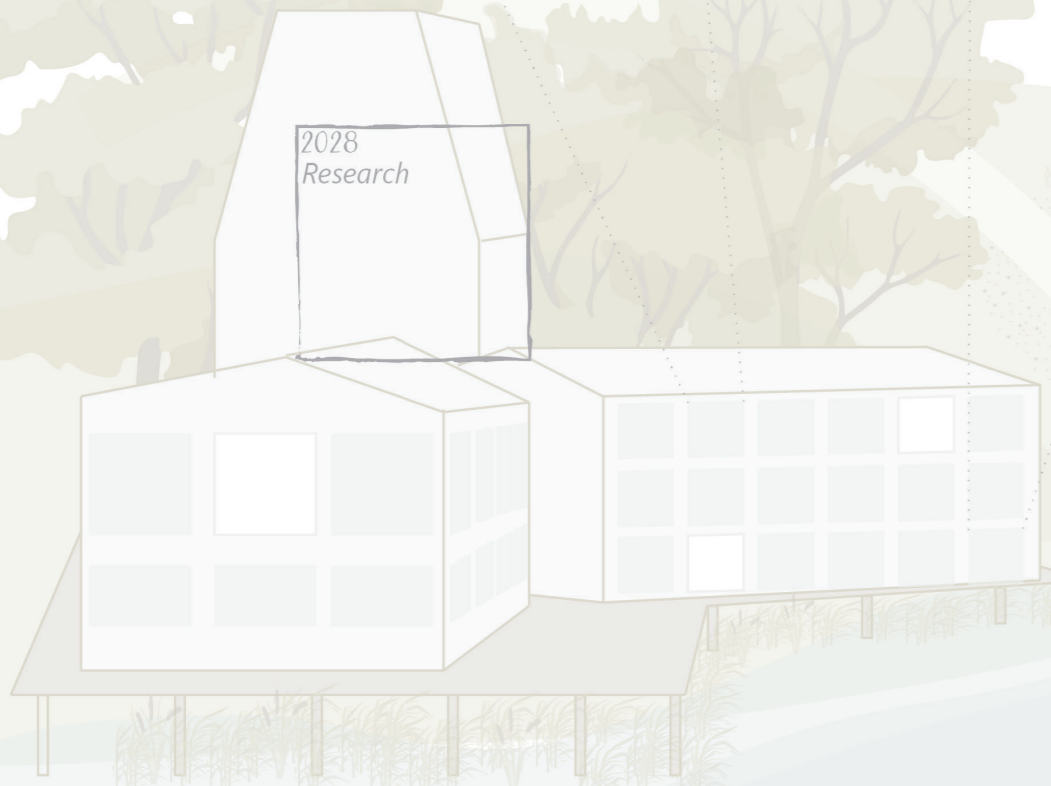
The marshland is a natural species decontamination and maintenance of the water, thus promoting human and non-human health.

THANK YOU FOR LISTENING QUESTIONS!

2038
River access

AND SPENT SOME QUALITY TIME WITH MY SON HERE AND TEACH HIM MORE ABOUT OUR ENVIRONMENT.

2028
Research



Water mobility



2035
Marine
architecture

I LOVE MY NEW FLAT! I NEVER GET BORED LOOKING OUT BECAUSE THERE IS ALWAYS SOMETHING TO WATCH.

2065
water sports

The ever present relationship between landscape, urbanity and water is key to the atmosphere in Merwe-Vierhavens. This unique atmosphere has been integrated into the architecture of new maritime buildings. The residential buildings with minimal land consumption are surrounded by a wetland park, which is a largely wild landscape.

THIS IS THE BEST PLAYGROUND IN THE WORLD! I LOVE COMING HERE WITH MY CLASS.



2041
marsh species

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