

Edges in transition

Spatial strategies for a regeneration
of socio-ecological systems
along the Vistula River



Kinga Murawska

mentors | dr.ir. Taneha Kuzniecowa Bacchin | dr. Daniele Cannatella
TU Delft | MSc Architecture, Urbanism and Building Sciences
Transitional Territories Graduation Studio

P5 presentation | 02.07.2021

Where?

Why?

How?

What?

When?

location

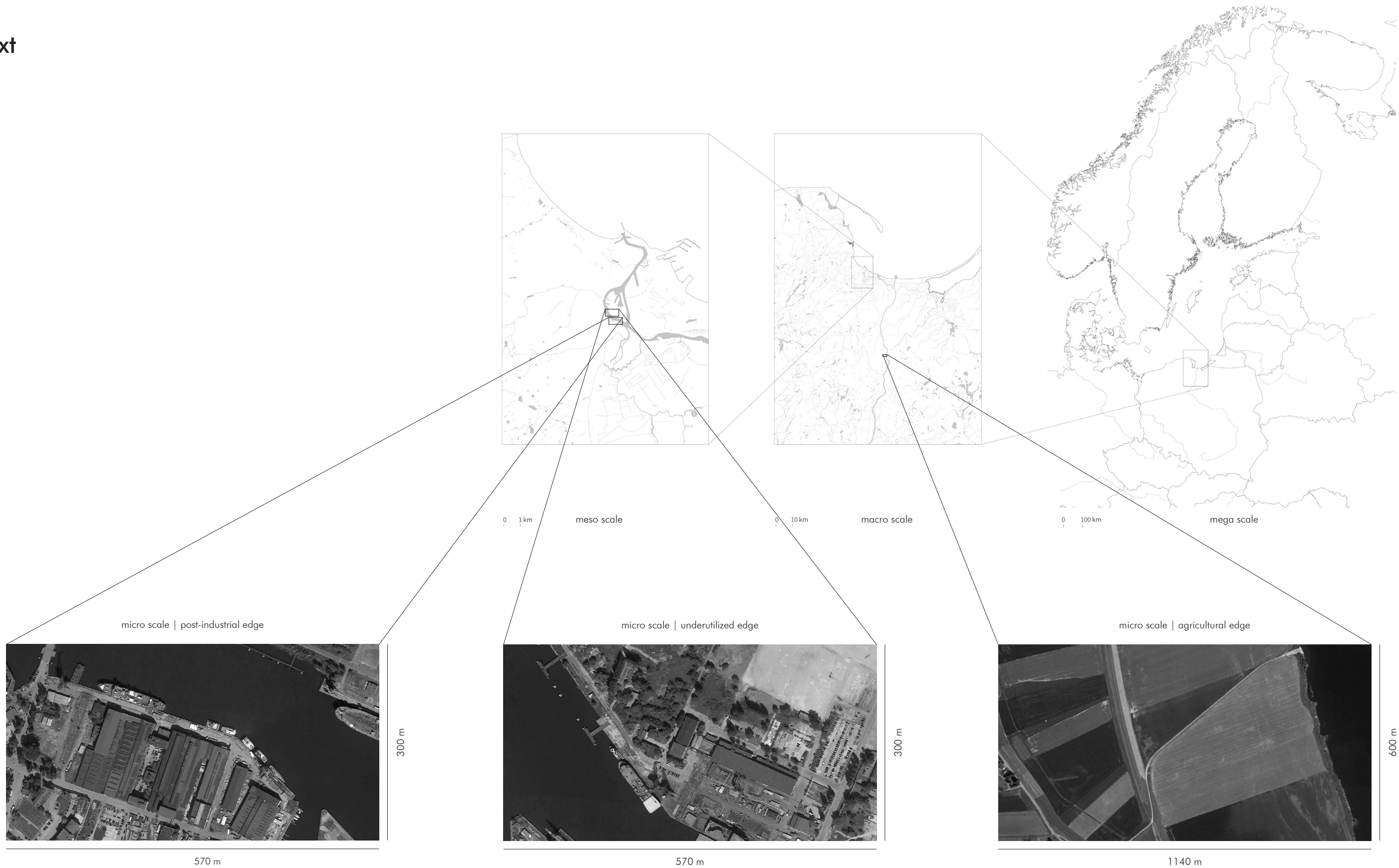
problem analysis

theoretical framework
methodological framework

design proposal

possible implementation
conclusions

Context

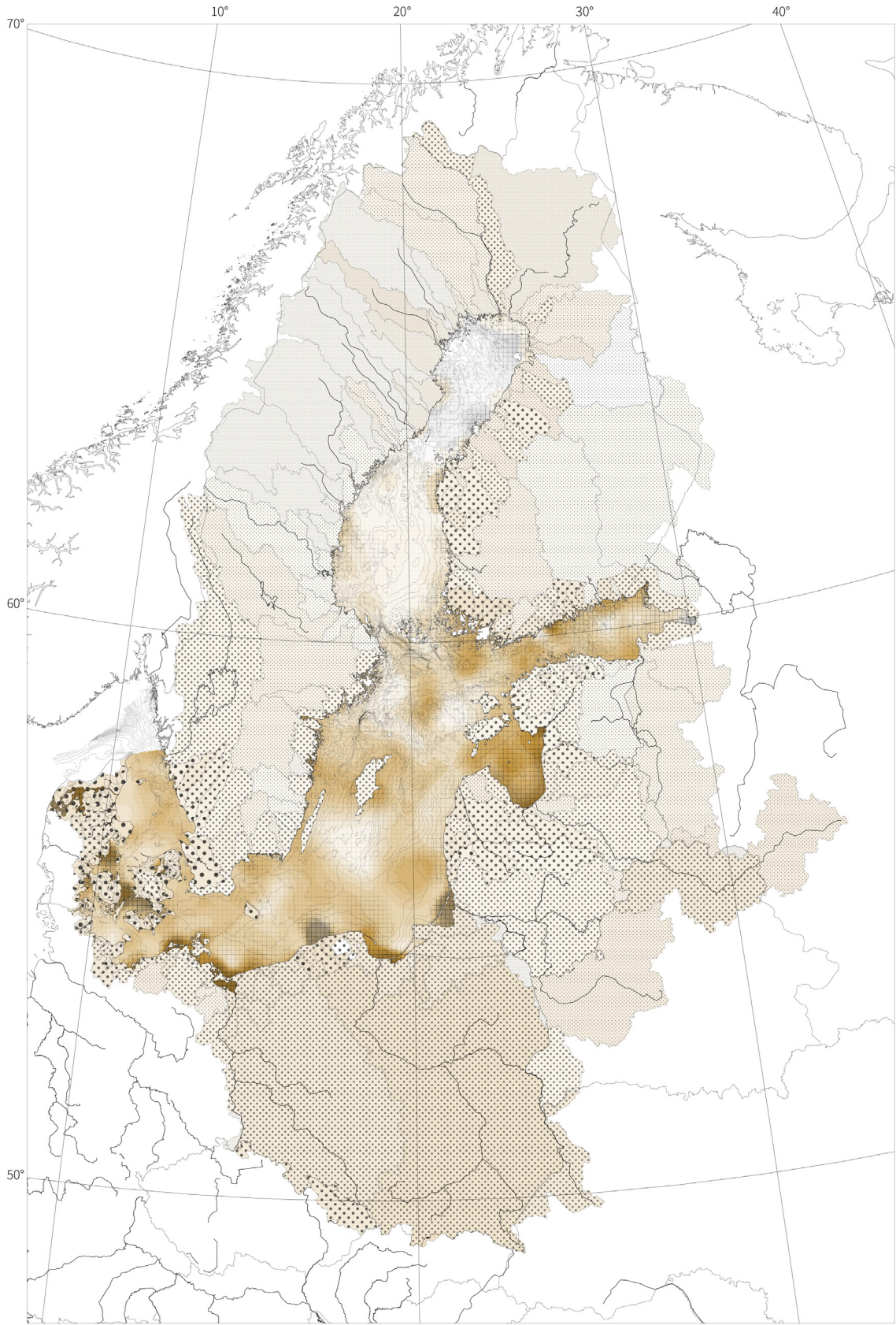


Issue in the territorial (mega) scale



A colourful summer marine phytoplankton bloom fills much of the Baltic Sea
Image captured by Envisat's MERIS on 13 July 2005

Pollution from the catchment areas



Pollution by phosphorus and nitrogen

The map illustrates the relative distribution of phosphorus and nitrogen concentration in the Baltic Sea water. It also presents the load of both nutrients in the sub-catchment areas.

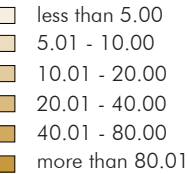
Relative distribution of phosphorus concentration in the seawater



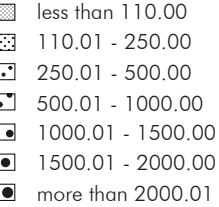
Relative distribution of nitrogen concentration in the seawater



Load of phosphorus from sub-catchments (kg/km²)



Load of nitrogen from sub-catchments (kg/km²)

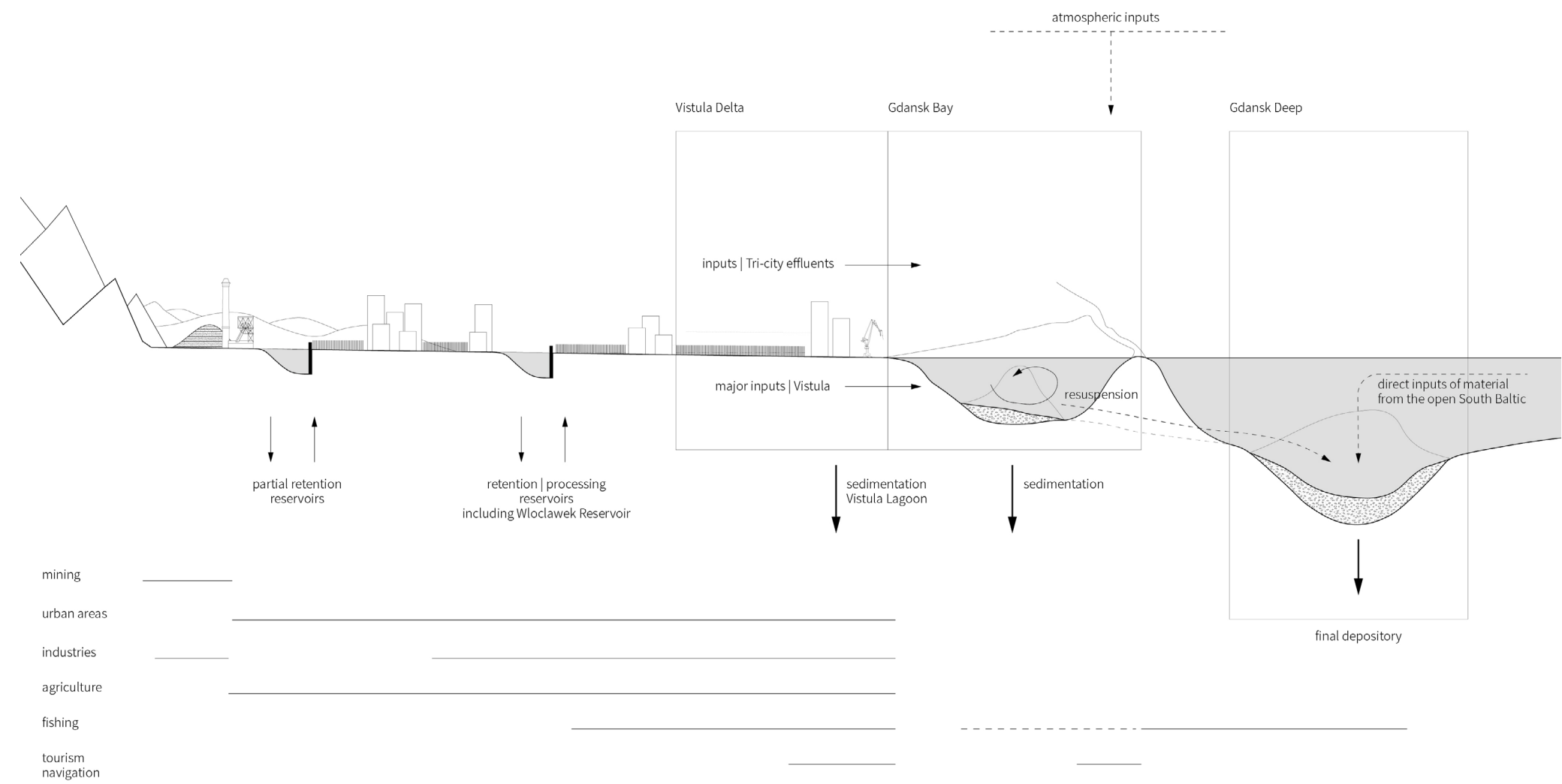


Edges



Agricultural and post-industrial edges of the Vistula River

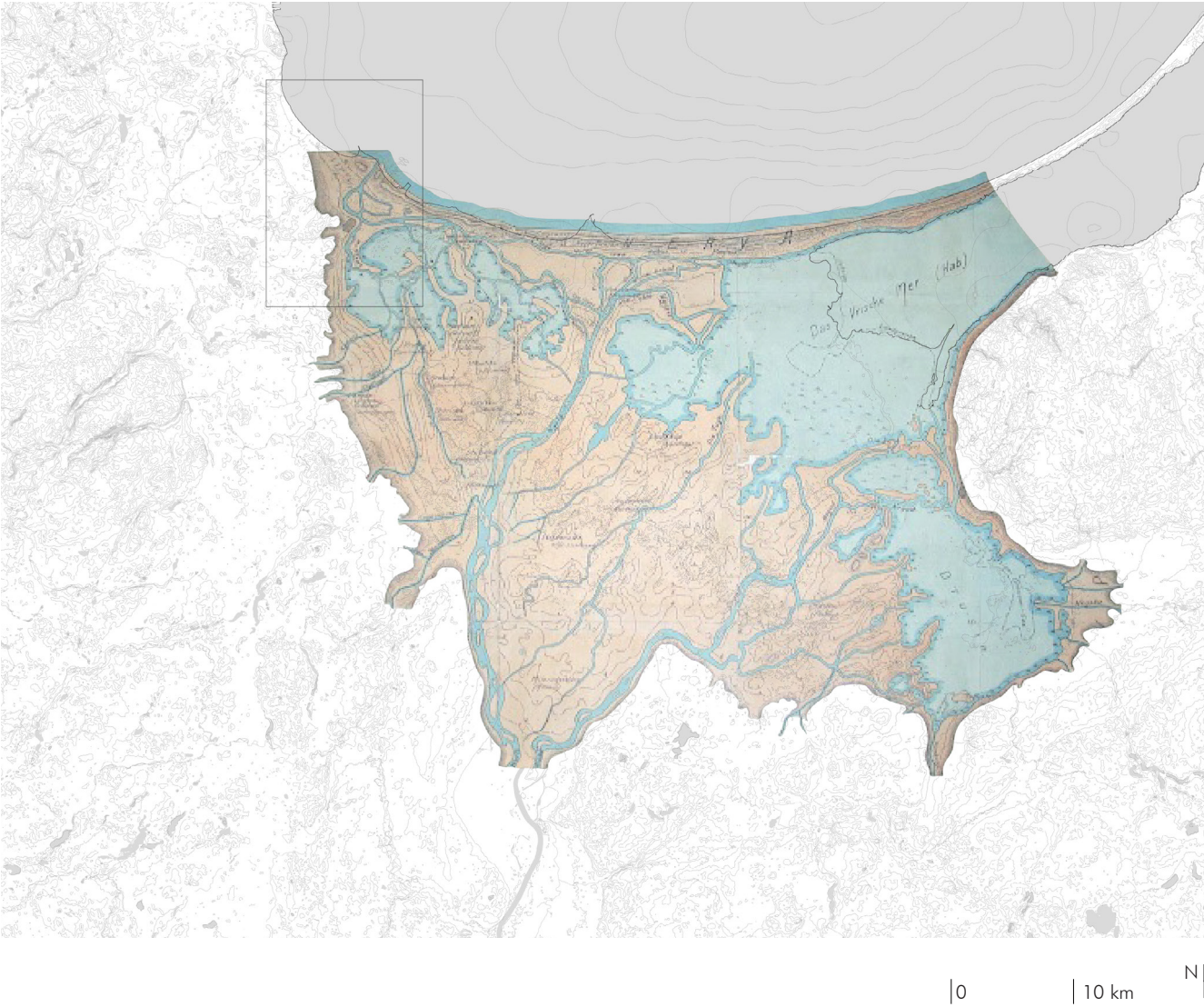
Anthropogenic pressure on the edges of the Vistula River



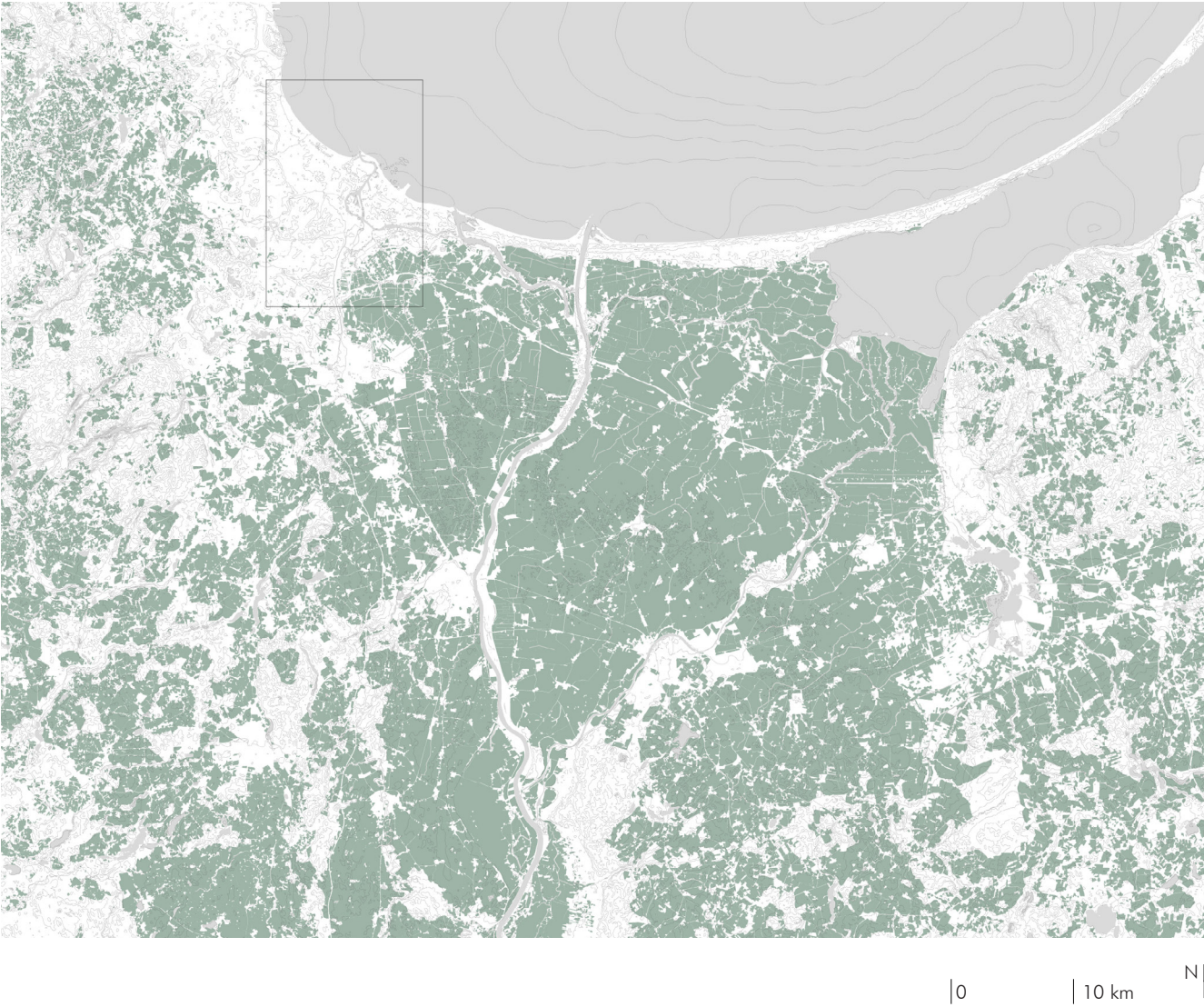
Schematic fluxes and connexions between the Vistula catchment and the coastal zone

source | adapted from Kannen et al. (2004)

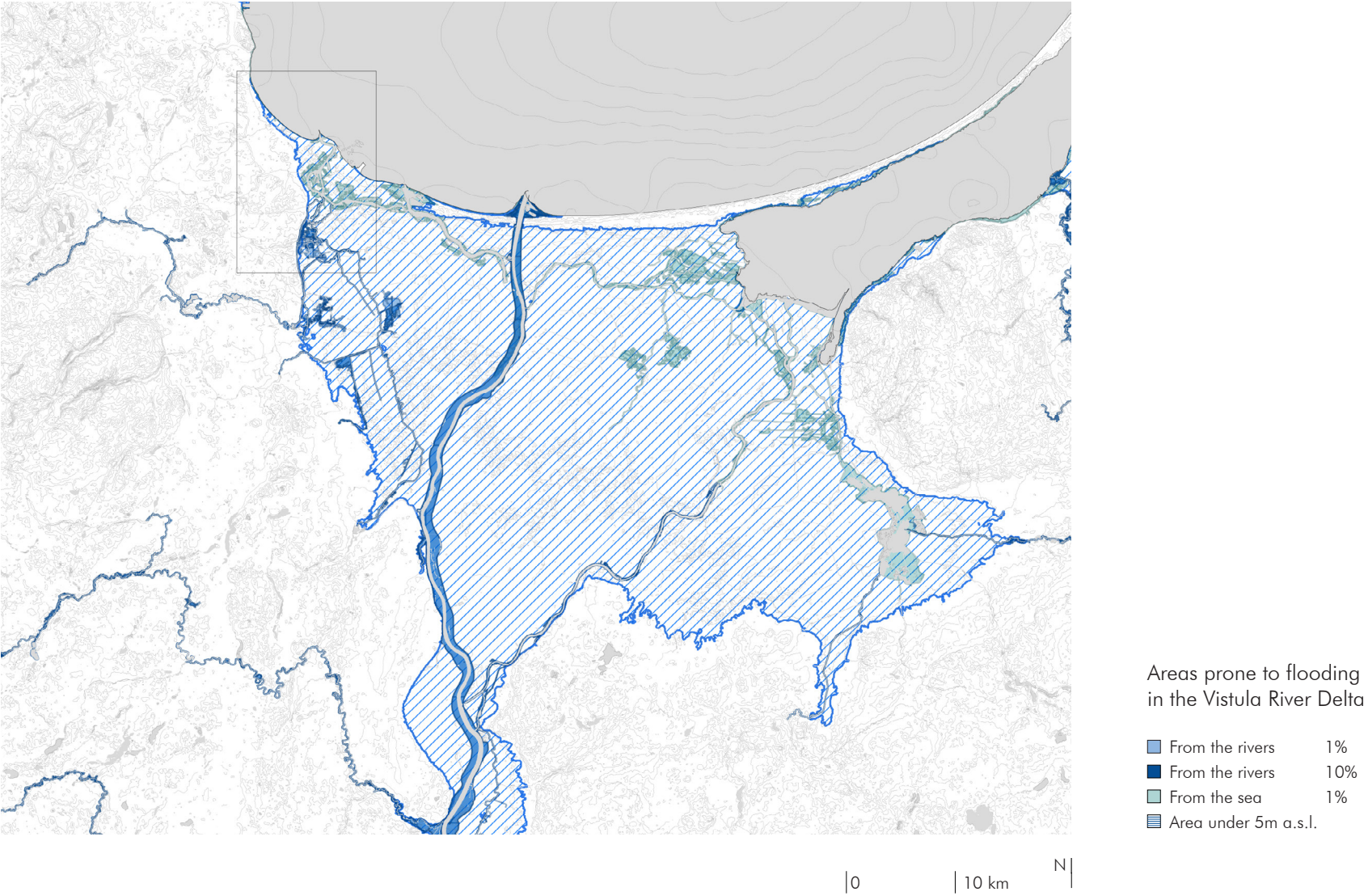
Pristine landscape



Reclaimed land



Issue of flooding



Extreme weather events

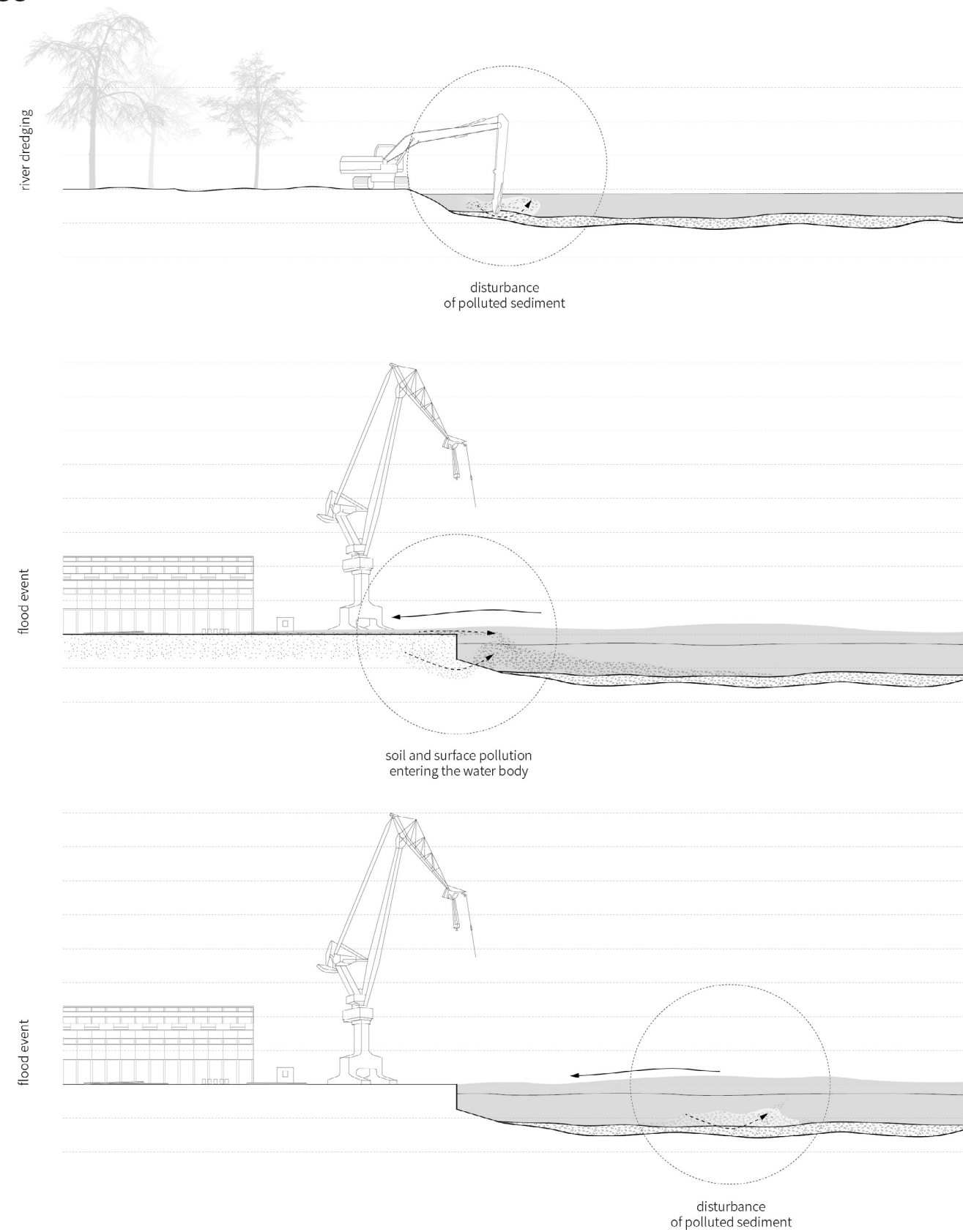


Flood event | the Vistula River in Warsaw
May 2019

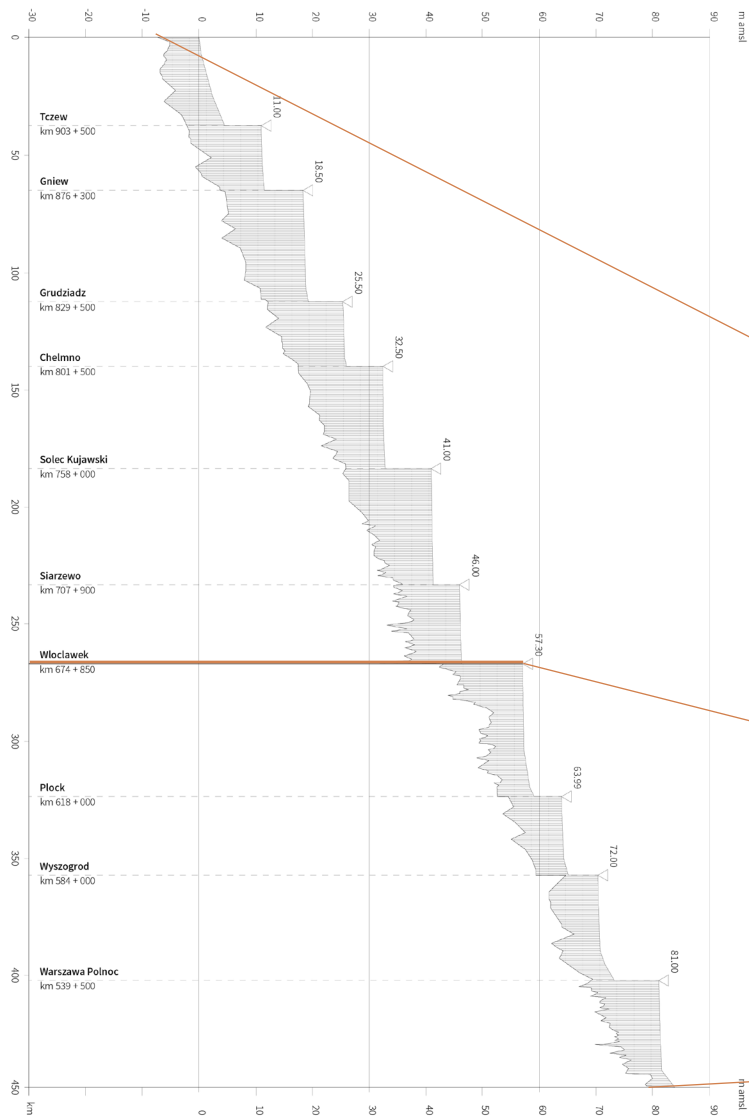


Drought of the Vistula River | Warsaw
April 2020

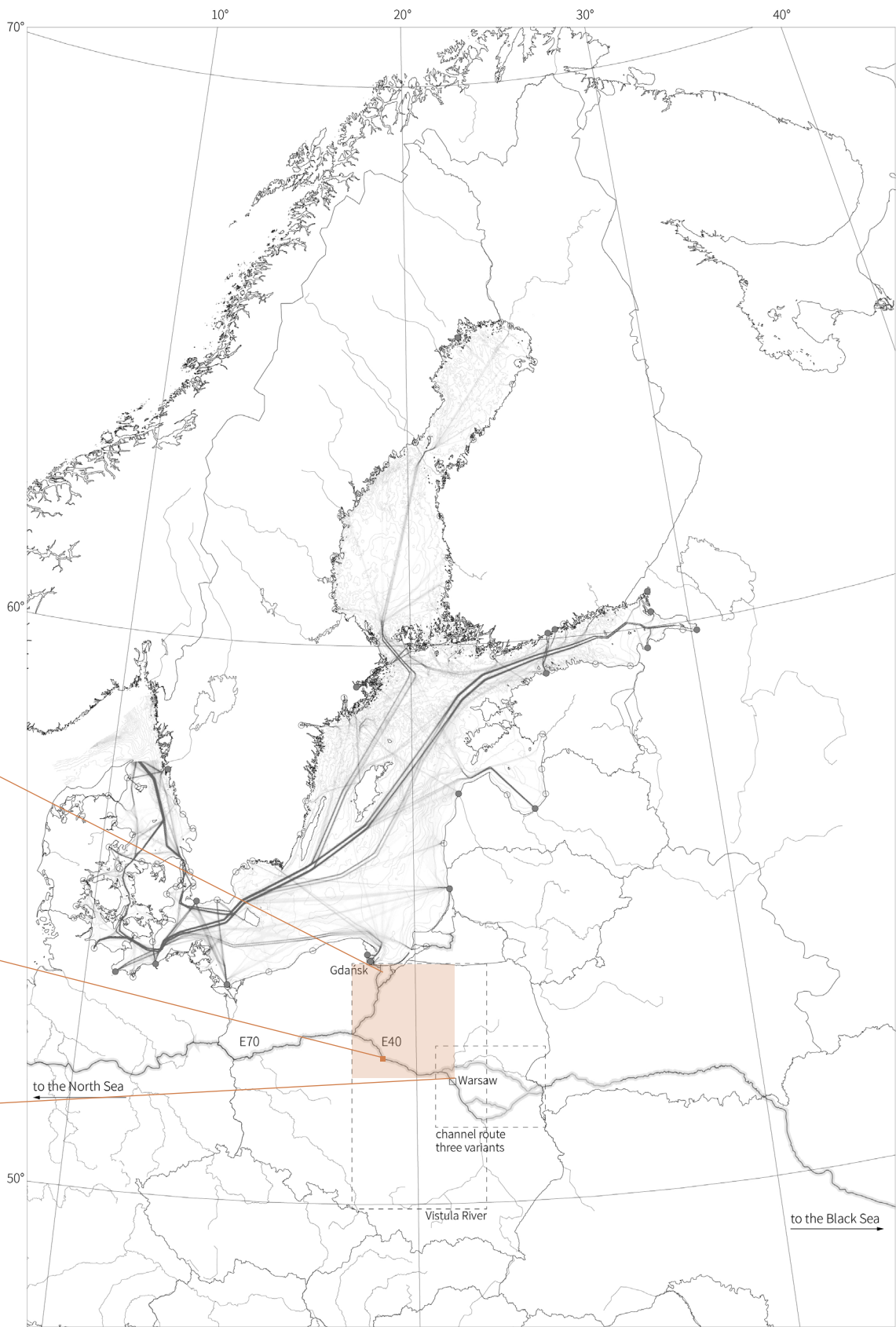
Flooding and pollution at the riverine edges



Concept of regulation of the Lower Vistula River



One of the proposed variants of the Lower Vistula Cascade



Current and proposed shipping routes

The map illustrates the shipping density in the Baltic Sea in the years 2011-2015 as well as possible use of the Vistula River as a part of E70 and E40 waterways connecting the Baltic Sea with respectively the North Sea and the Black Sea.

- Port
- Planned waterway
- Shipping density
 - low
 - high

Anthropogenic alterations of the edges in the urban areas

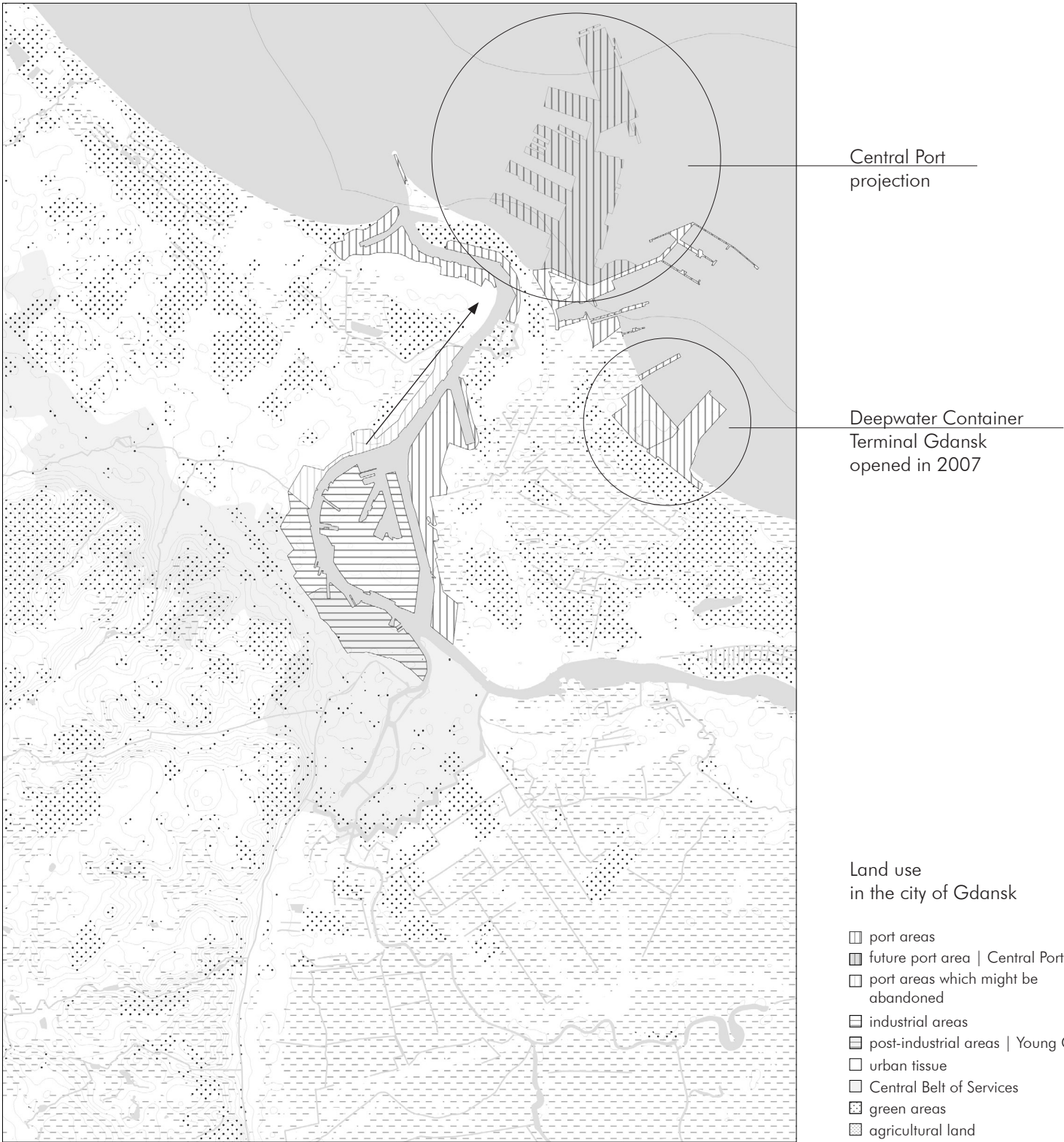


Post-industrial edges of the Dead Vistula River, Gdansk

Seaward movement of the port



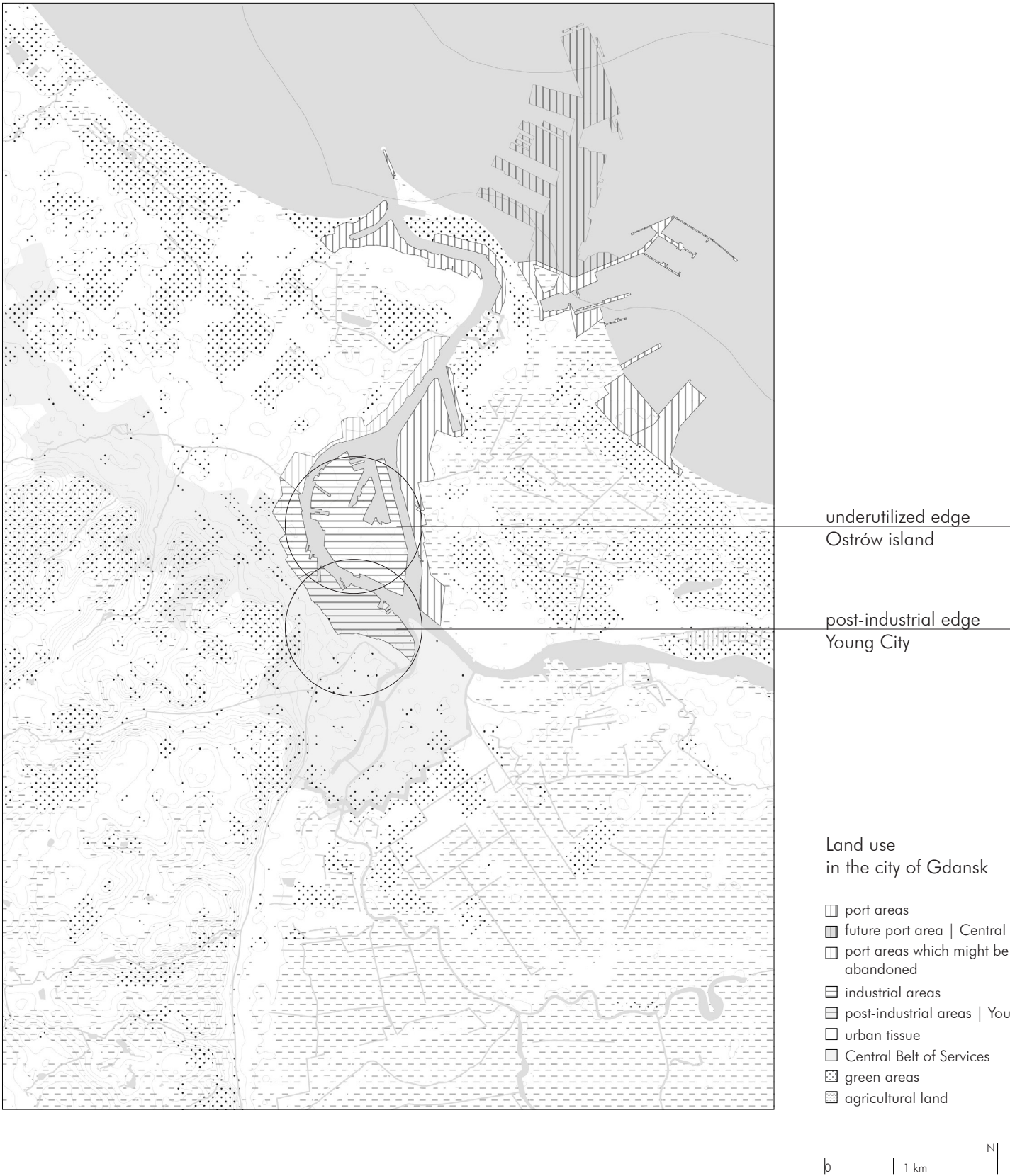
land reclamation
Central Port
visualisation



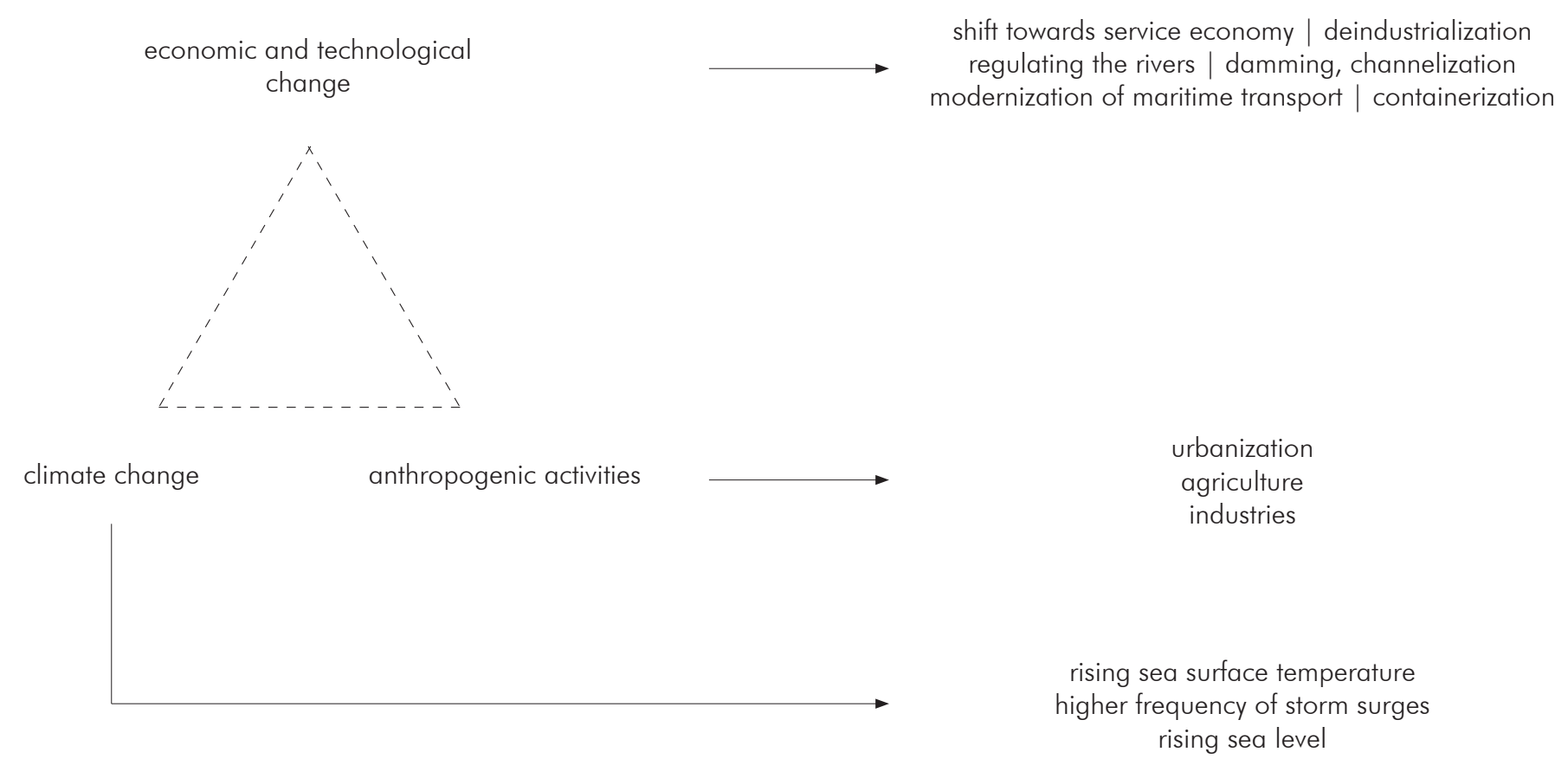
Emergence of post-industrial edges



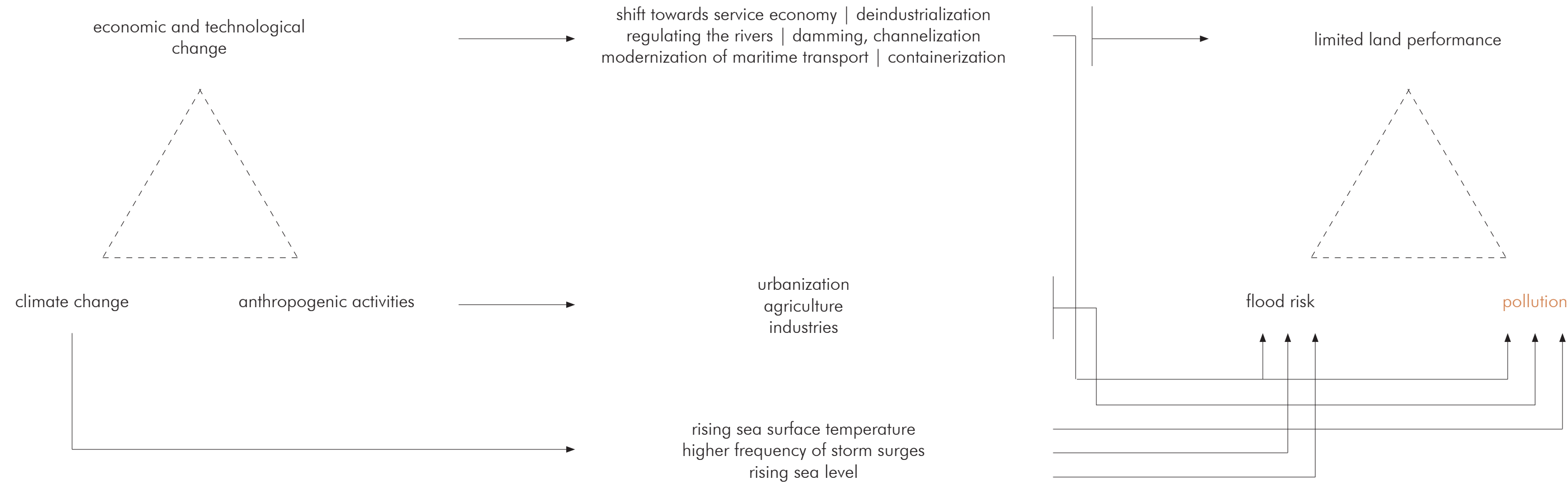
post-industrial edges in the Young City
and
underutilized edges of the Ostrów Island



Drivers of transition



Problem statement



Landscape as a medium



Shanghai MOMA Museum Waterfront Park
Shanghai, China
by YIYU design



Weiliu Wetland Park
Xianyang, China
by Yifang Ecoscape



De Ceuvél
Amsterdam, The Netherlands
by DELVA

Research question

Can landscape be used as a medium to cope with socio-ecological and spatial urgencies along the edges of the Vistula River through a regenerative design?

Research question and sub-research questions

Can landscape be used as a medium to cope with socio-ecological and spatial urgencies along the edges of the Vistula River through a regenerative design?

sub-research question 2

sub-research question 1

sub-research question 3

sub-research question 4

sub-research question 1

What are the urgencies in the social and ecological systems along the Vistula River, what do they originate from and how are they interrelated?

sub-research question 2

What are the potentialities of using landscape as a medium for regeneration?

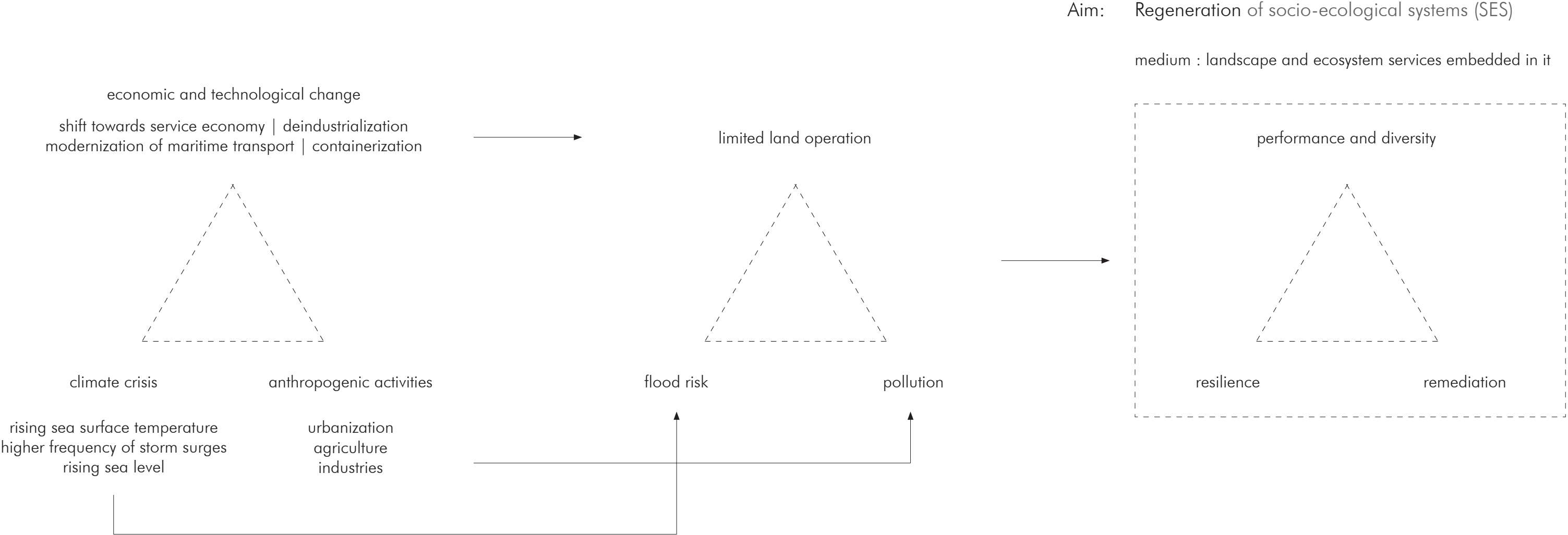
sub-research question 3

Can the presence of spatial urgencies along the edges become a potential to respond to environmental issues of a larger territory?

sub-research question 4

What stakeholders could drive the transition towards regenerative practices?

Aim



Aim: Regeneration of socio-ecological systems (SES)

medium : landscape and ecosystem services embedded in it

Theoretical underpinning

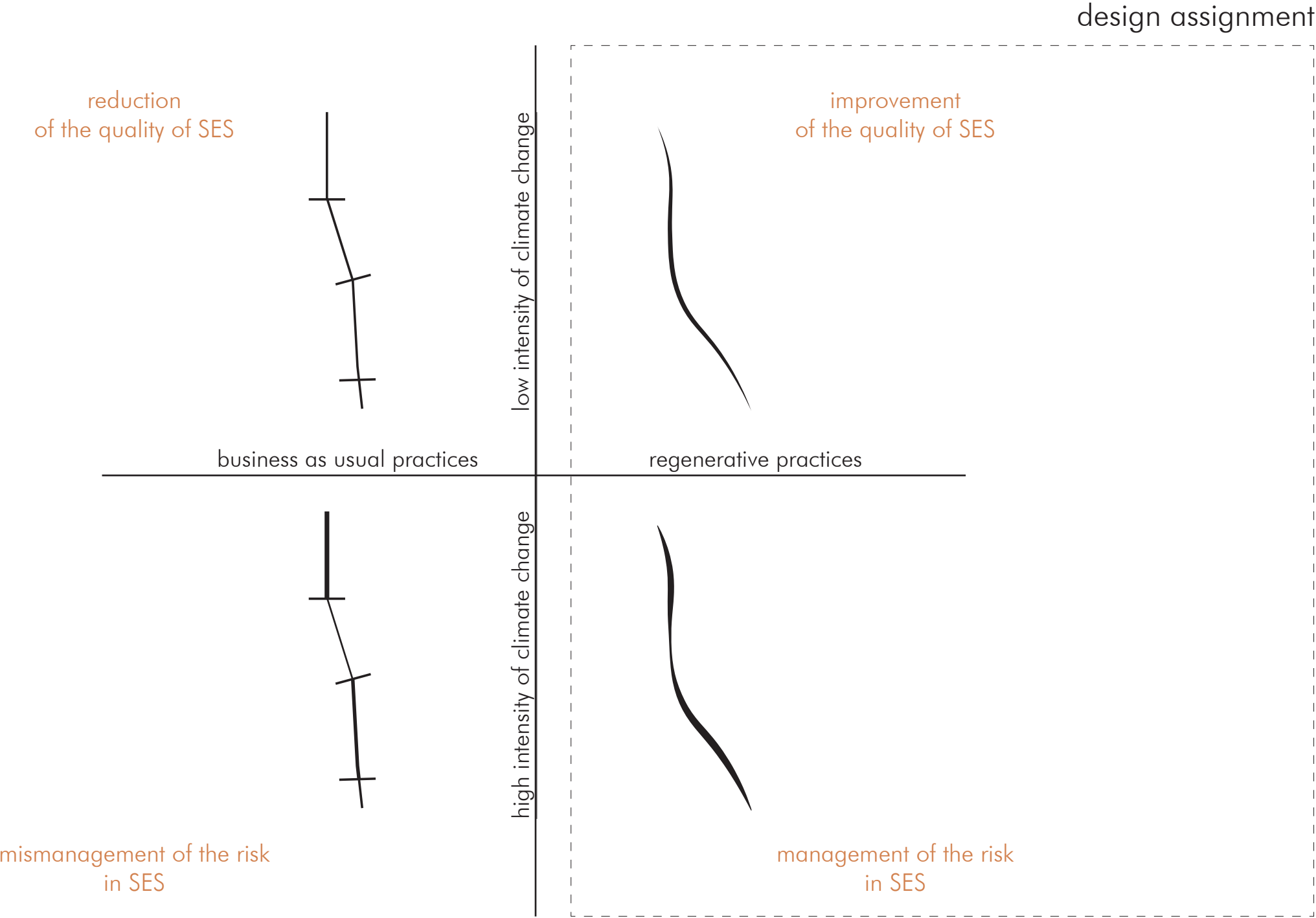
Resilience of socio-ecological systems (SES)

Landscape urbanism

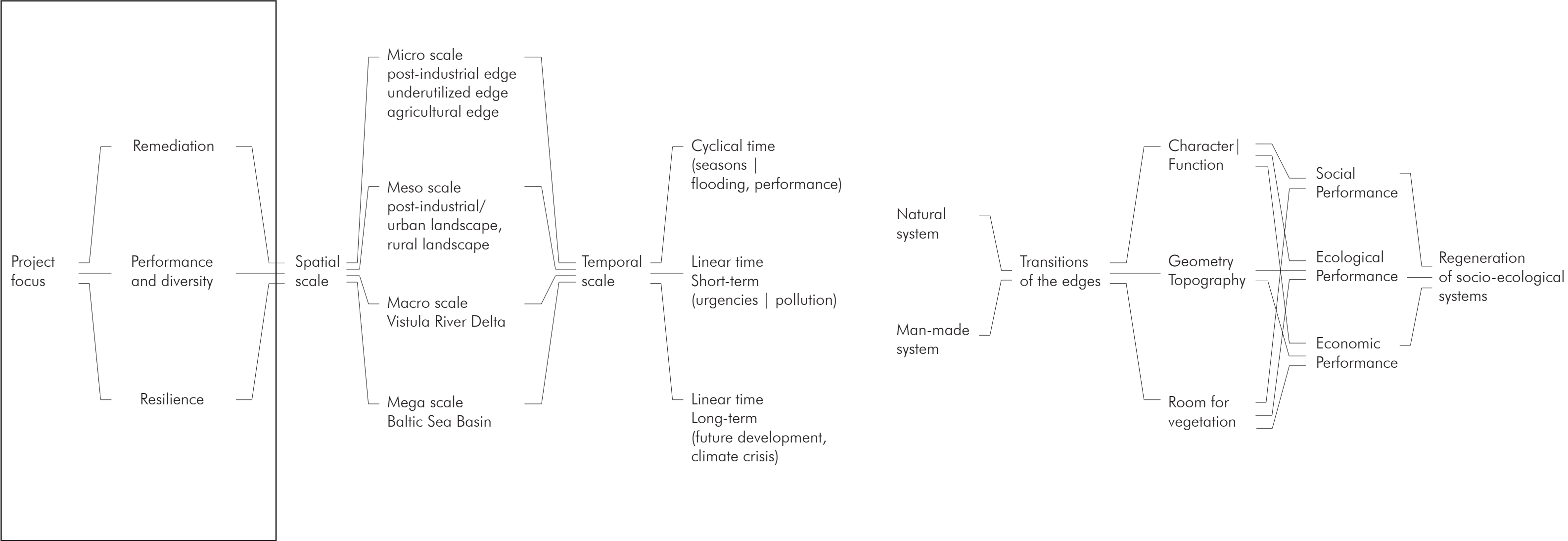
Regenerative design

Landscape ecology

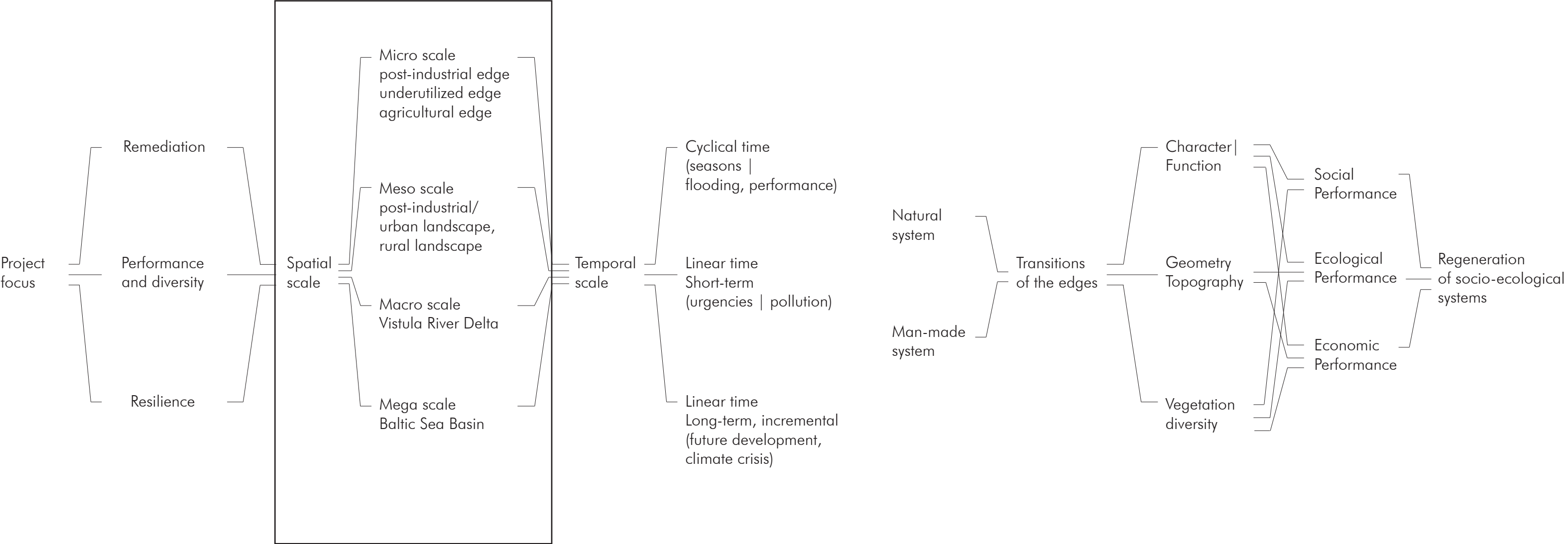
Expected research outcomes
Possible future transitions | matrix of scenarios



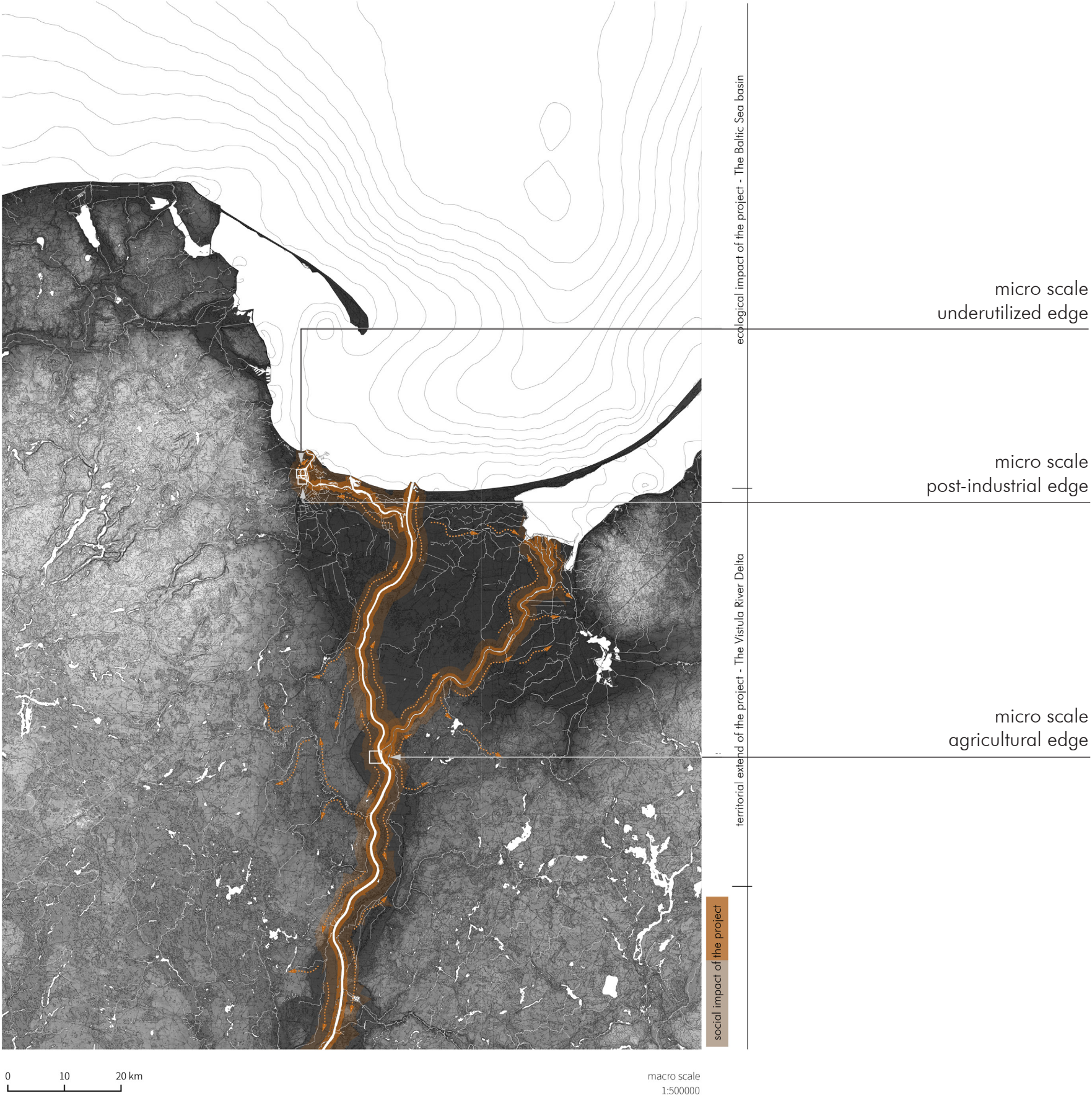
Taxonomy | project focus



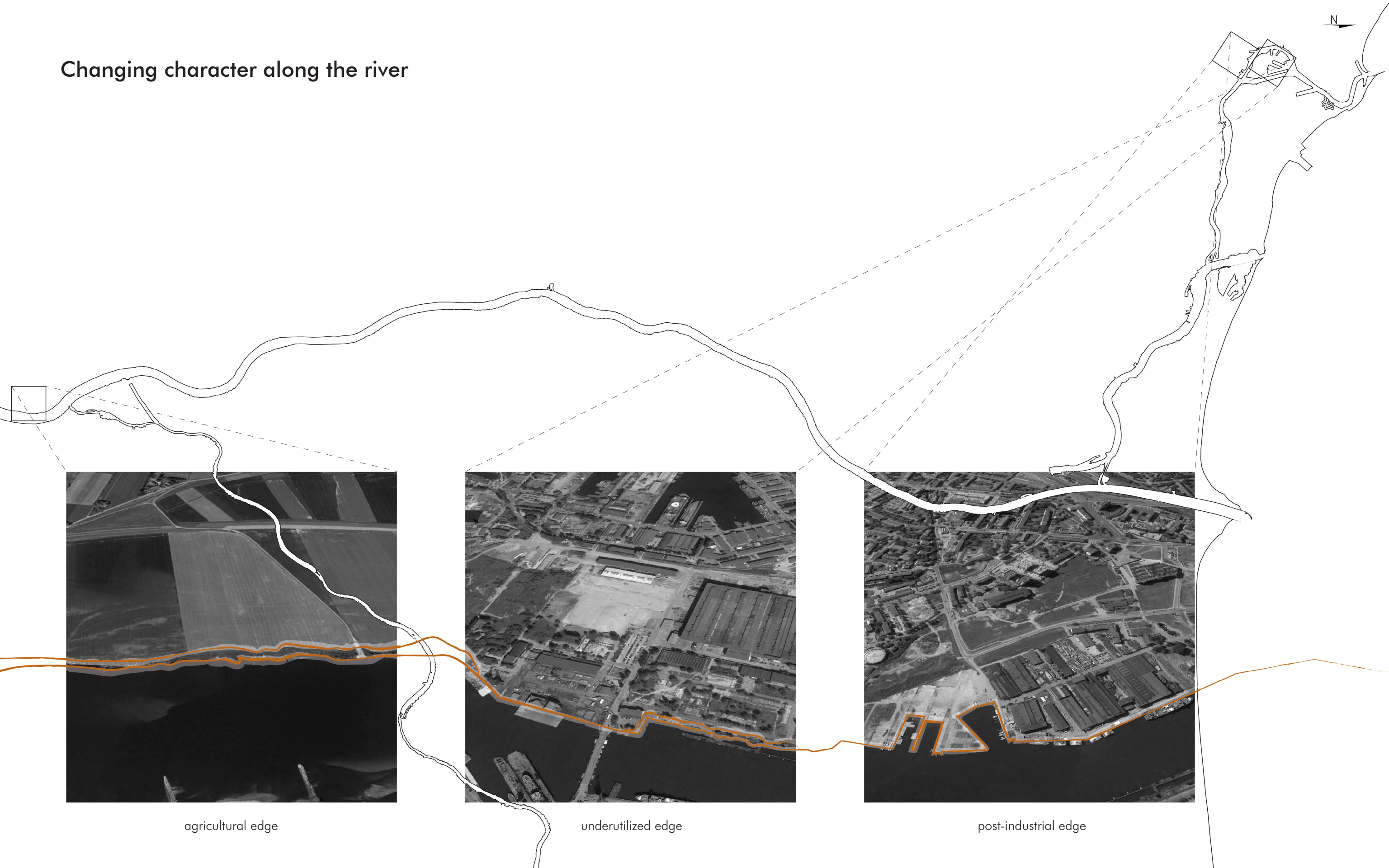
Taxonomy | spatial scale



Scales



Changing character along the river

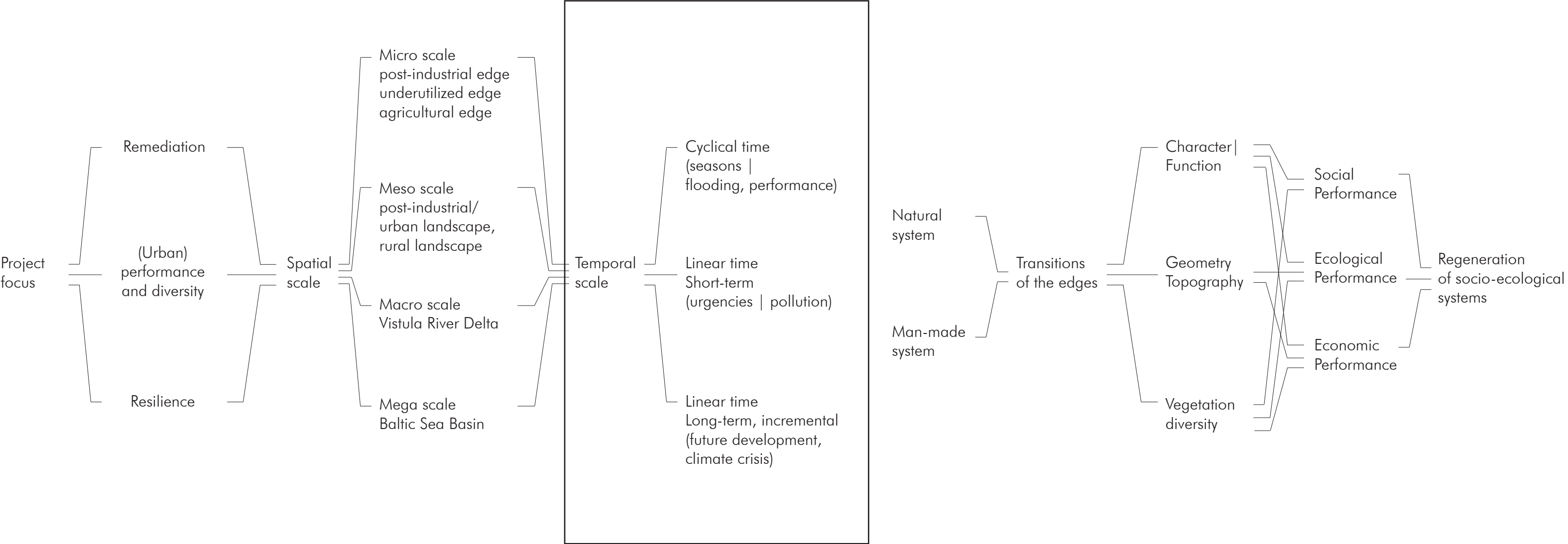


agricultural edge

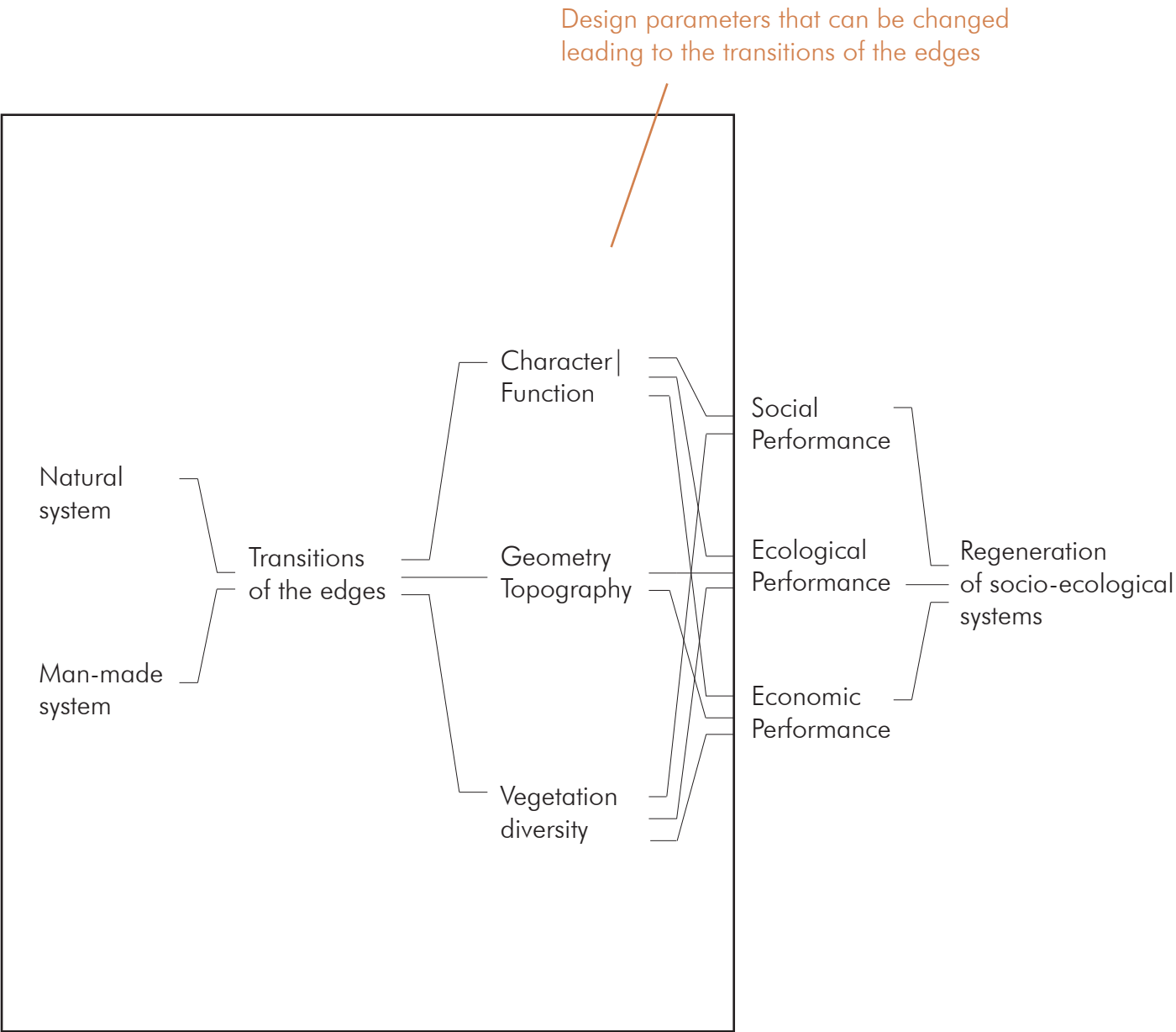
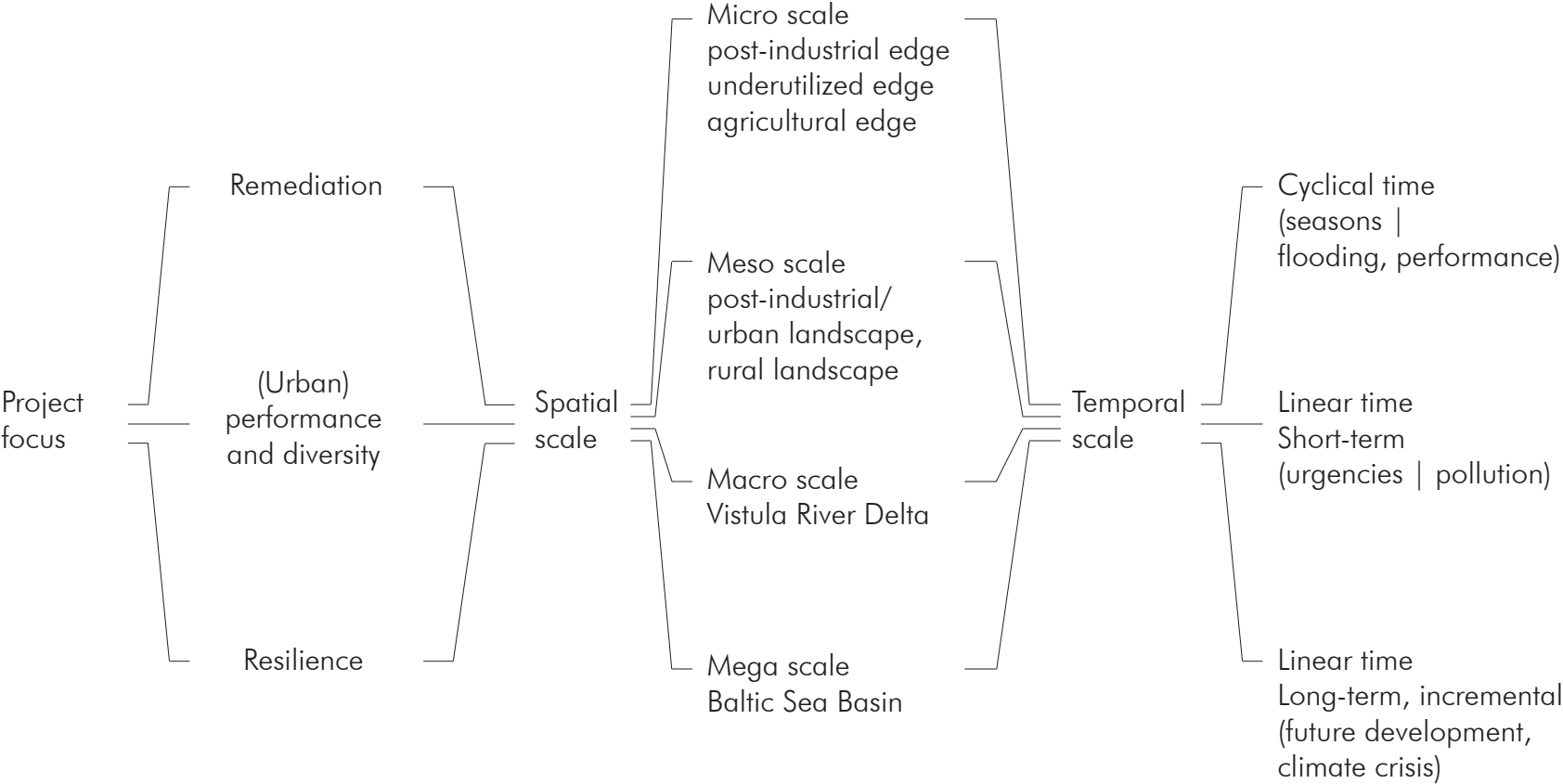
underutilized edge

post-industrial edge

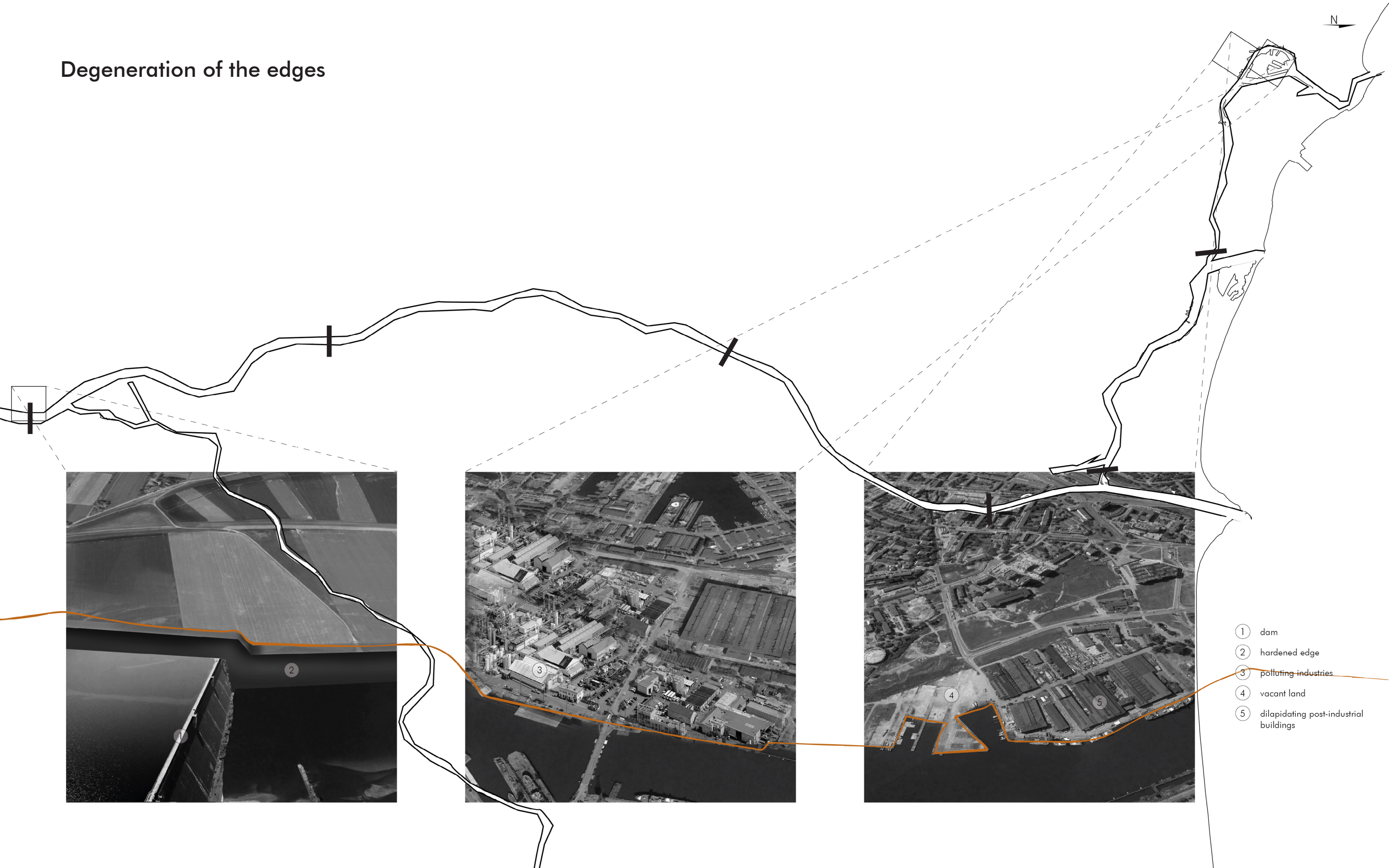
Taxonomy | temporal scale



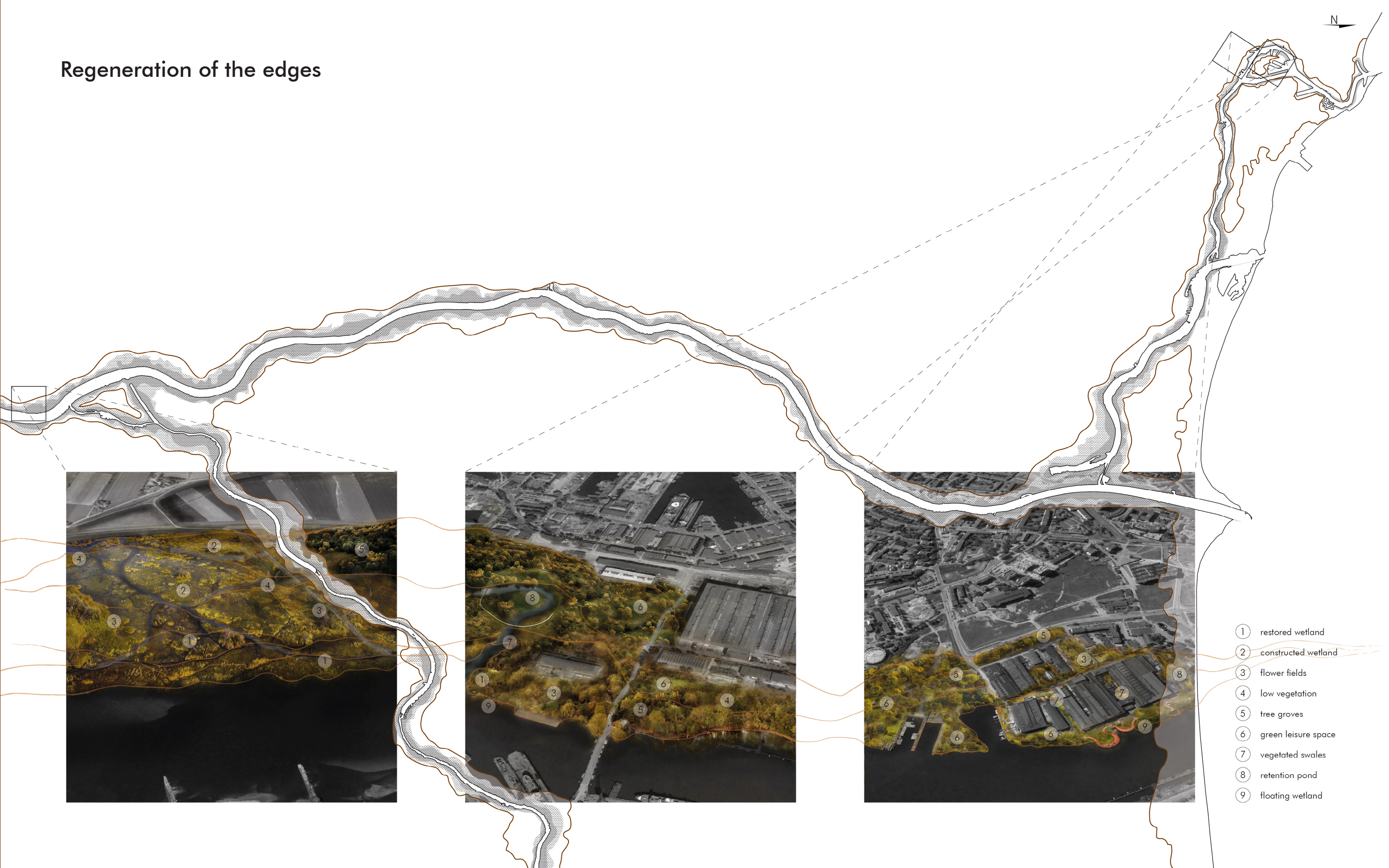
Taxonomy | transitions of the edges



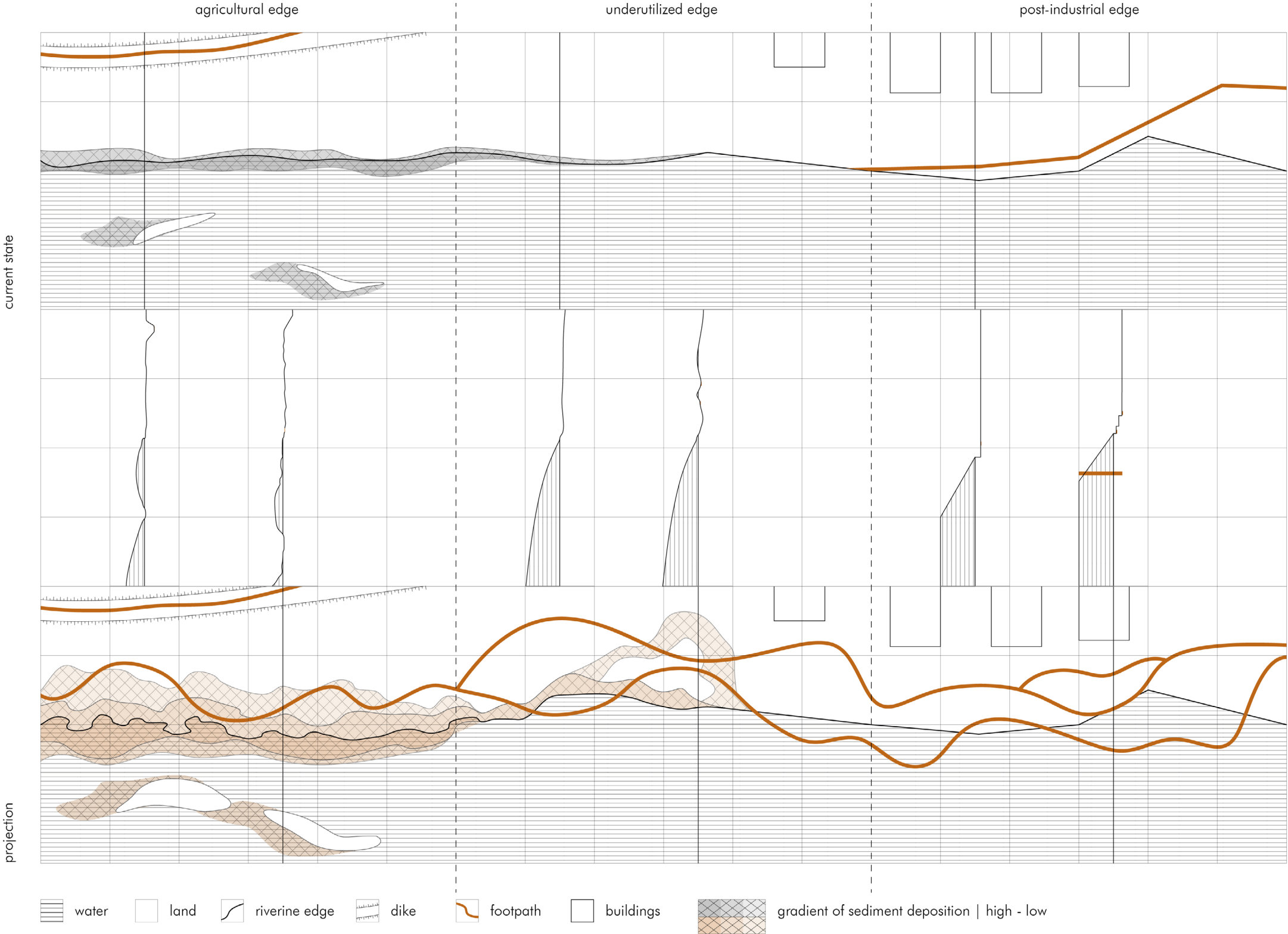
Degeneration of the edges



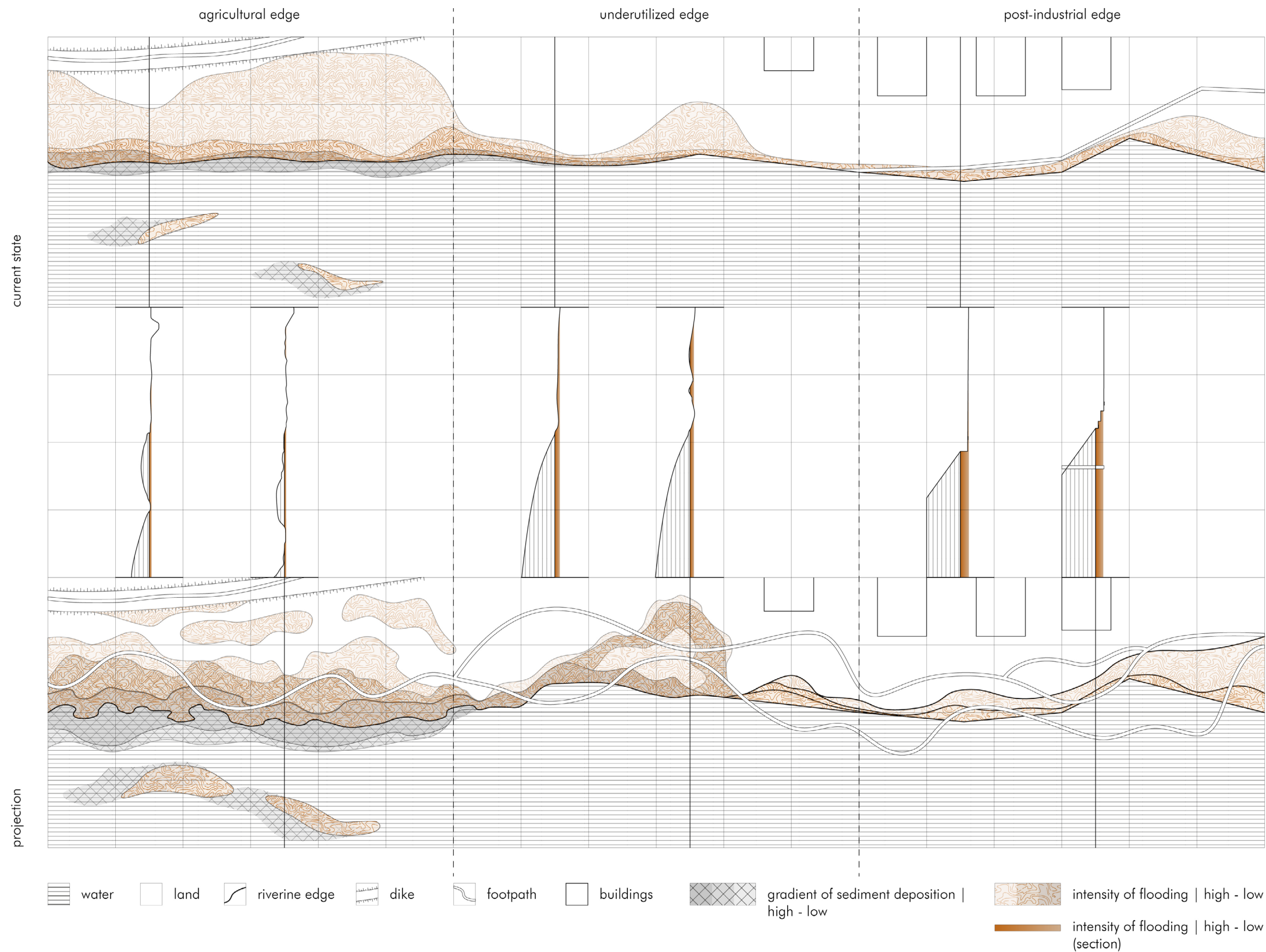
Regeneration of the edges



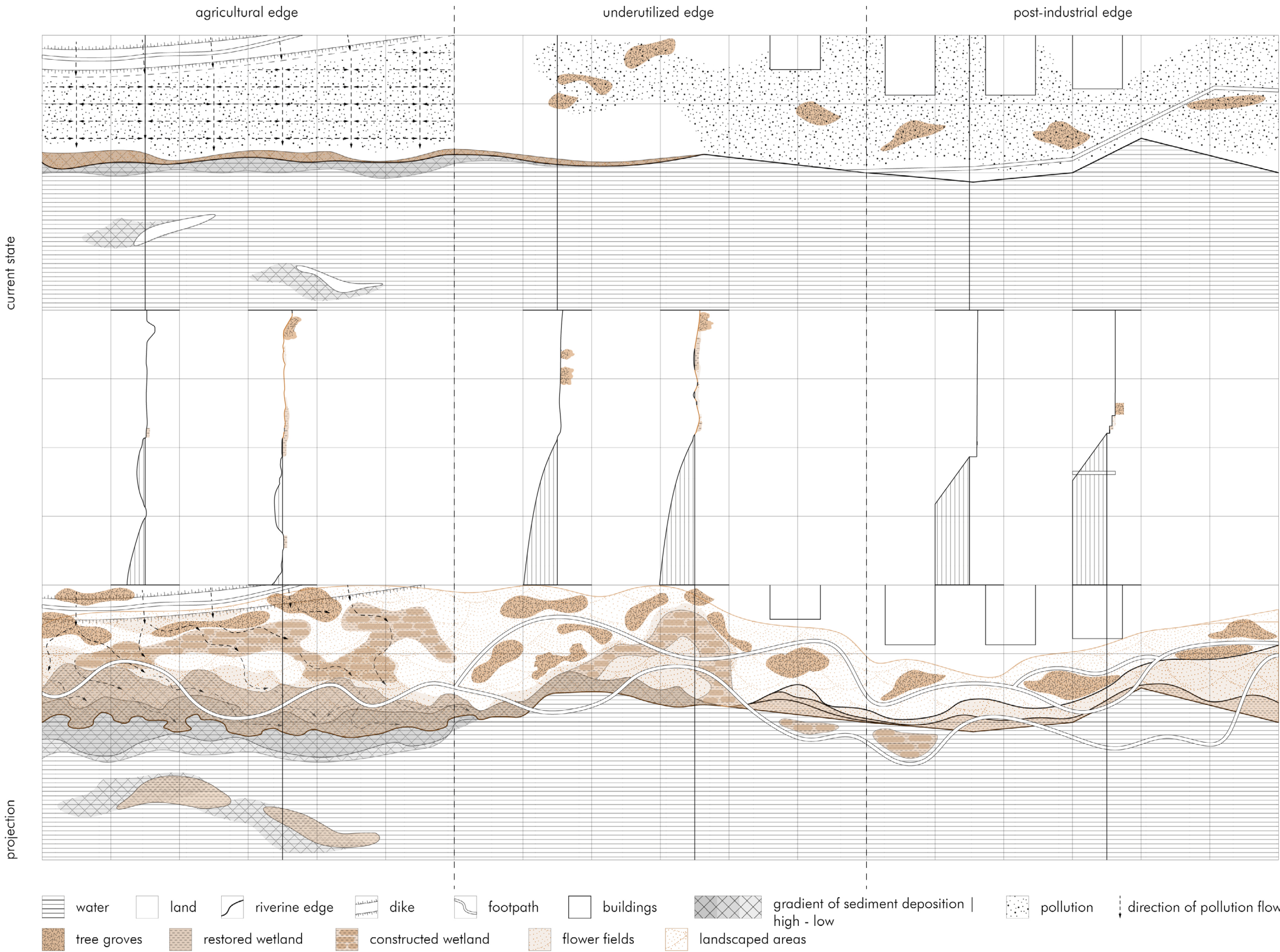
Performance and diversity



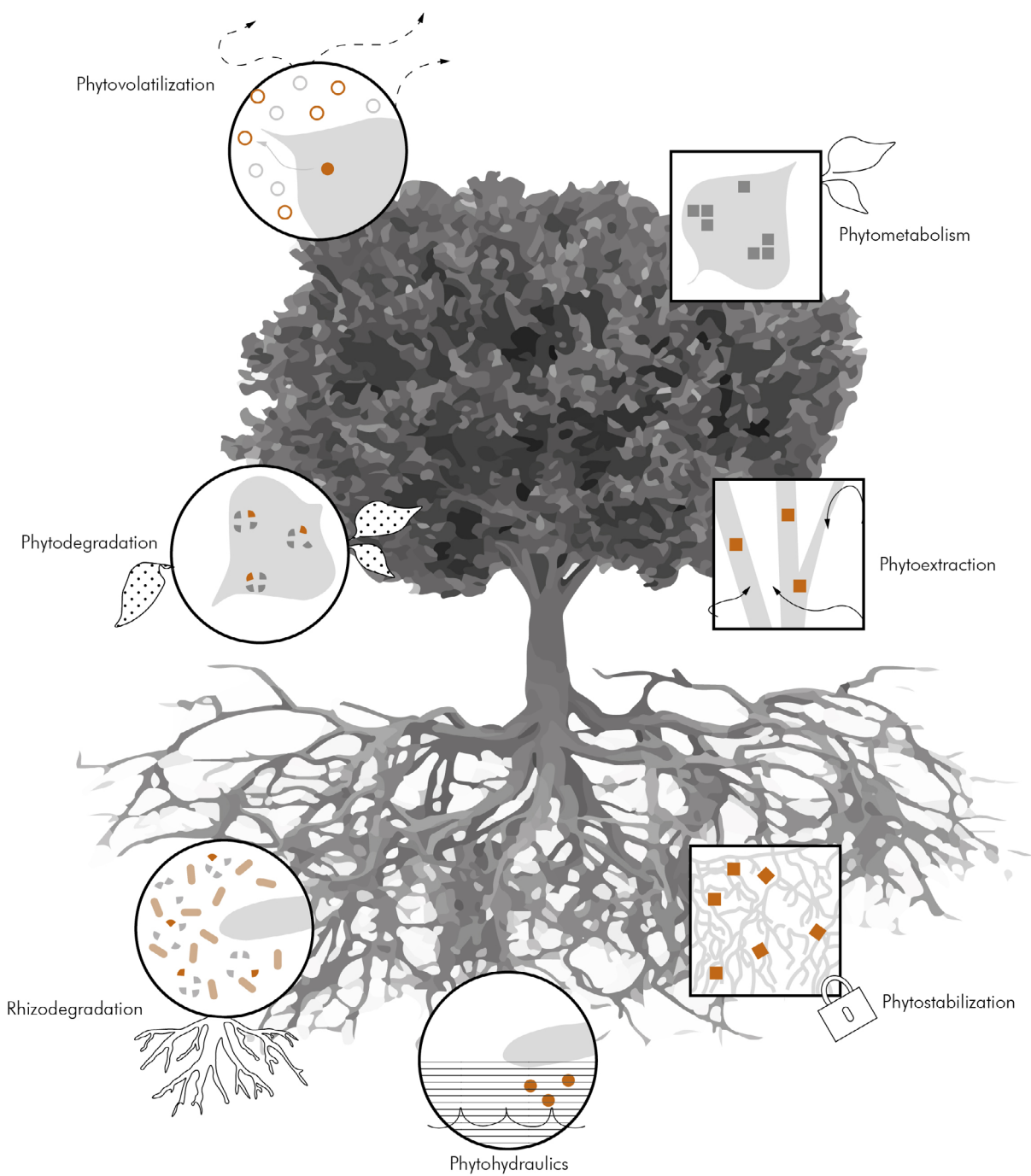
Flood resilience



Remediation



Phytotechnology



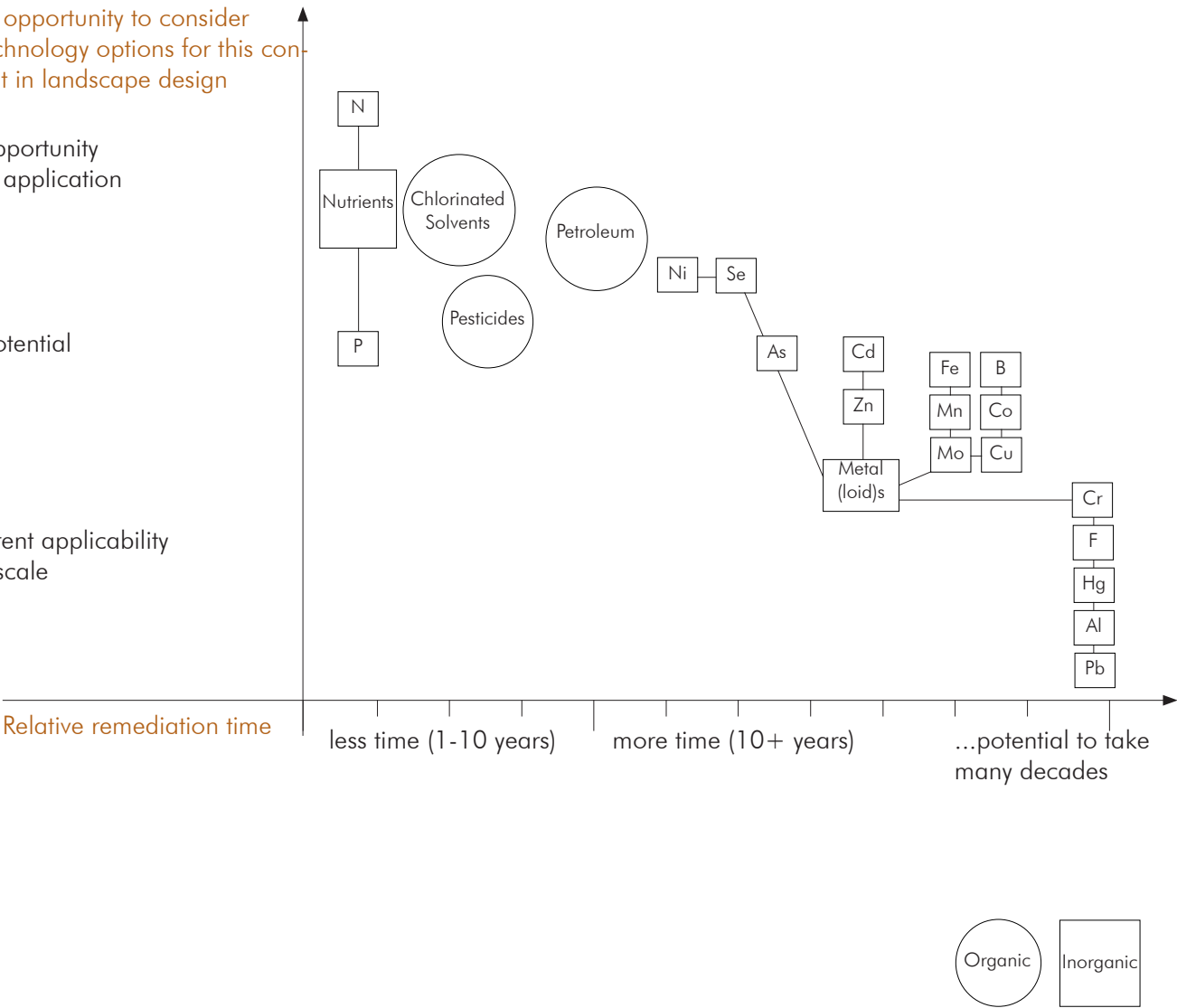
source | Kirkwood and Kennen (2015)

Relative opportunity to consider phytotechnology options for this contaminant in landscape design

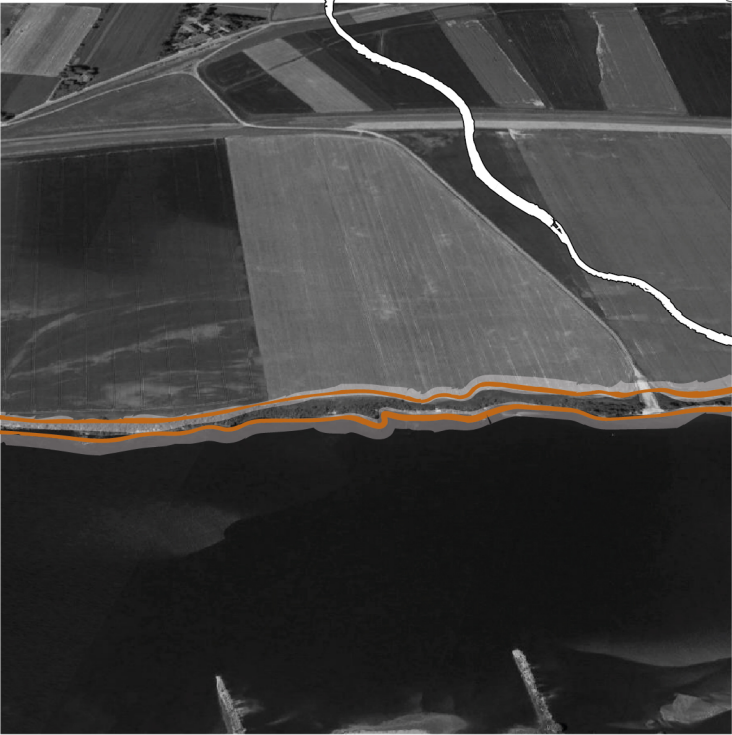
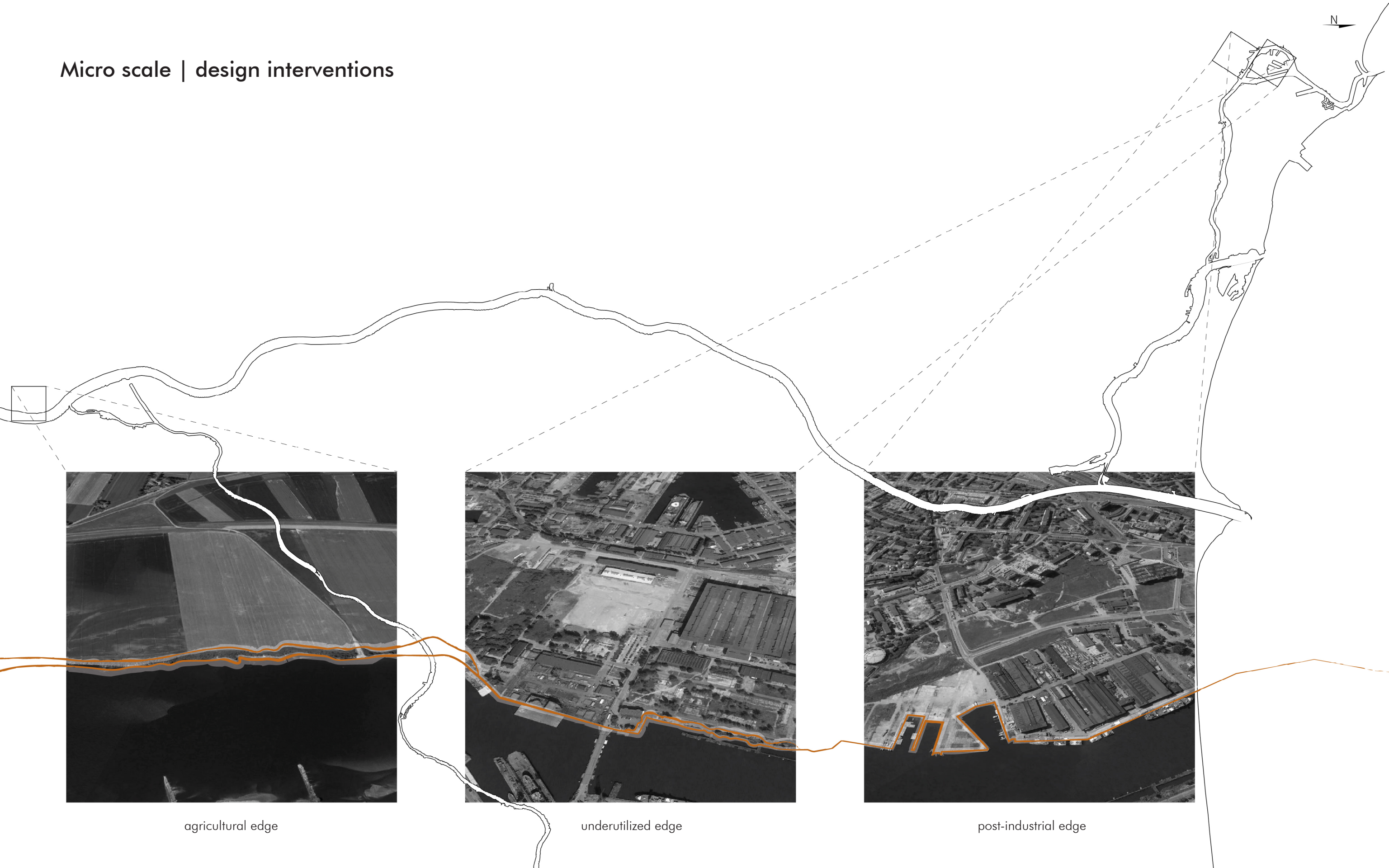
good opportunity for field application

some potential

less current applicability at field scale



Micro scale | design interventions



agricultural edge



underutilized edge

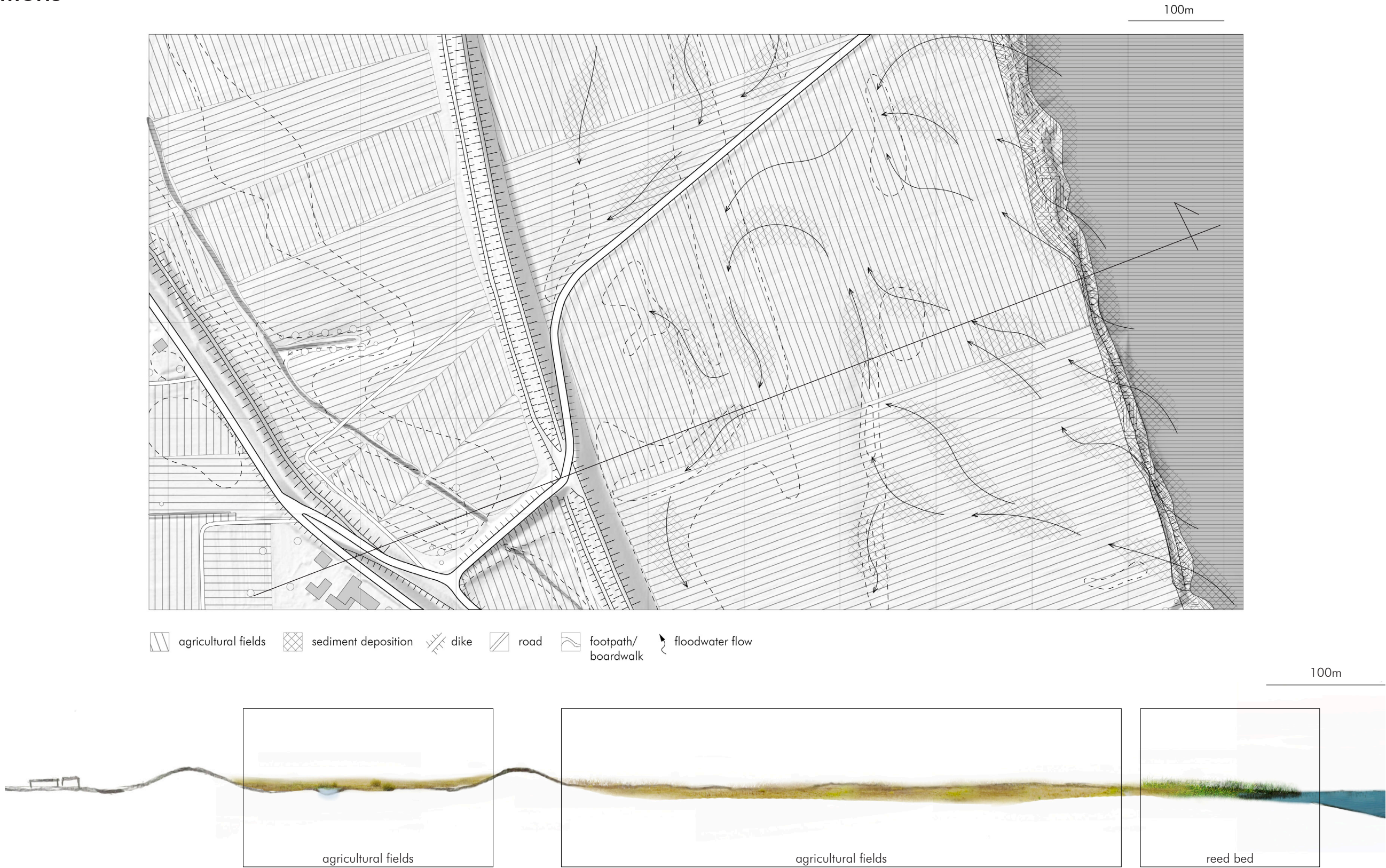


post-industrial edge

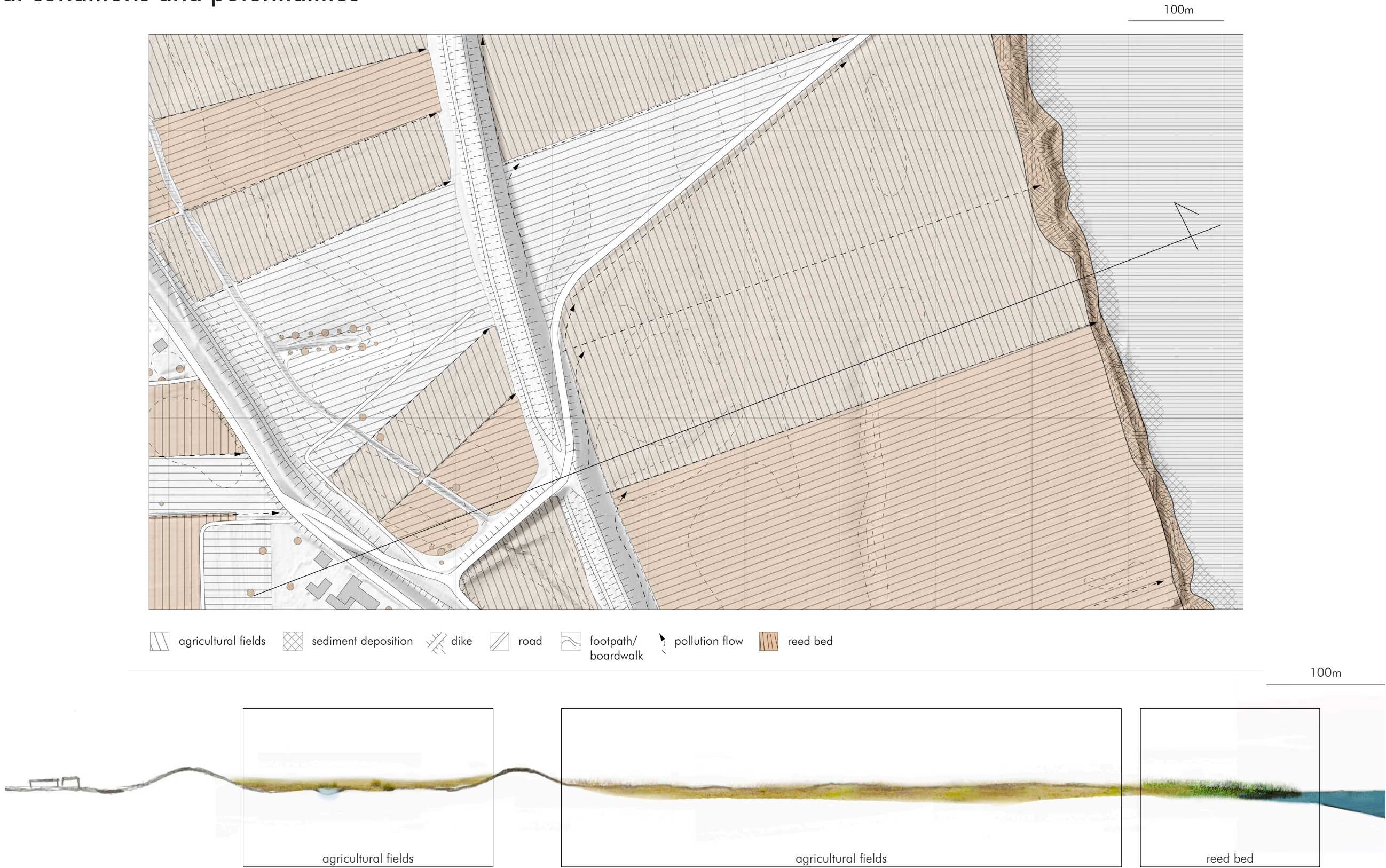
Agricultural edge



Spatial conditions

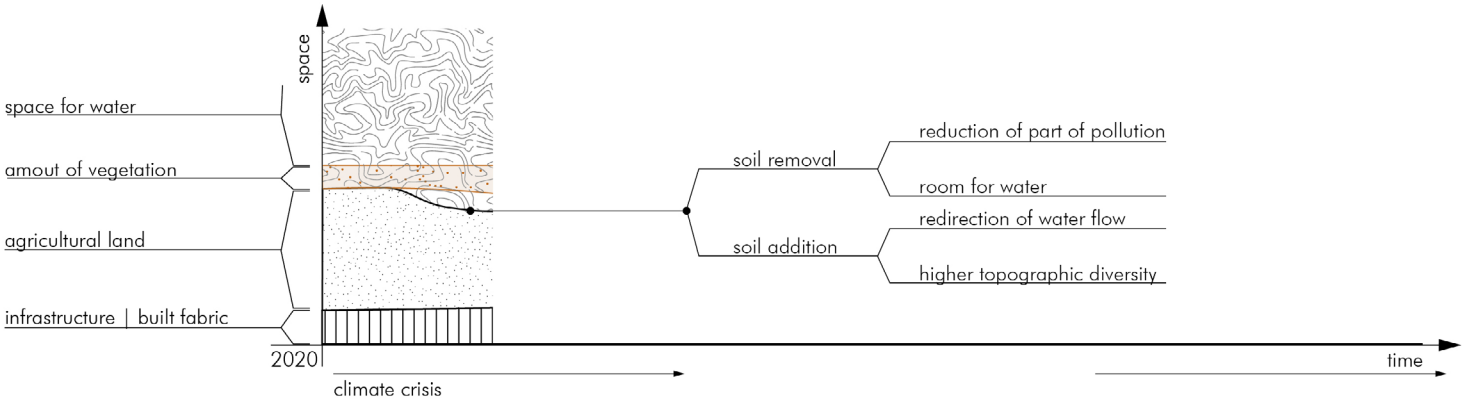
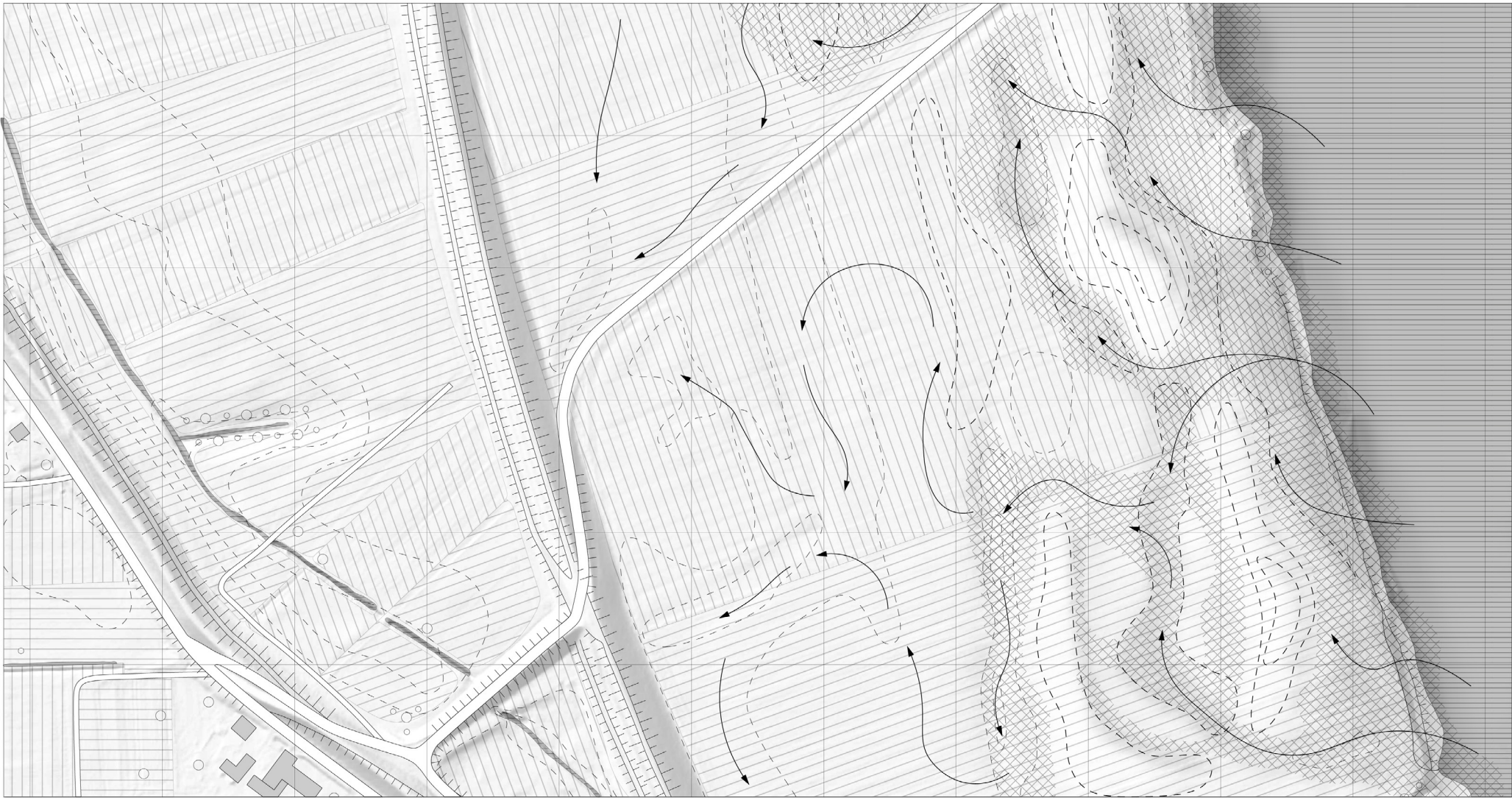


Environmental conditions and potentialities



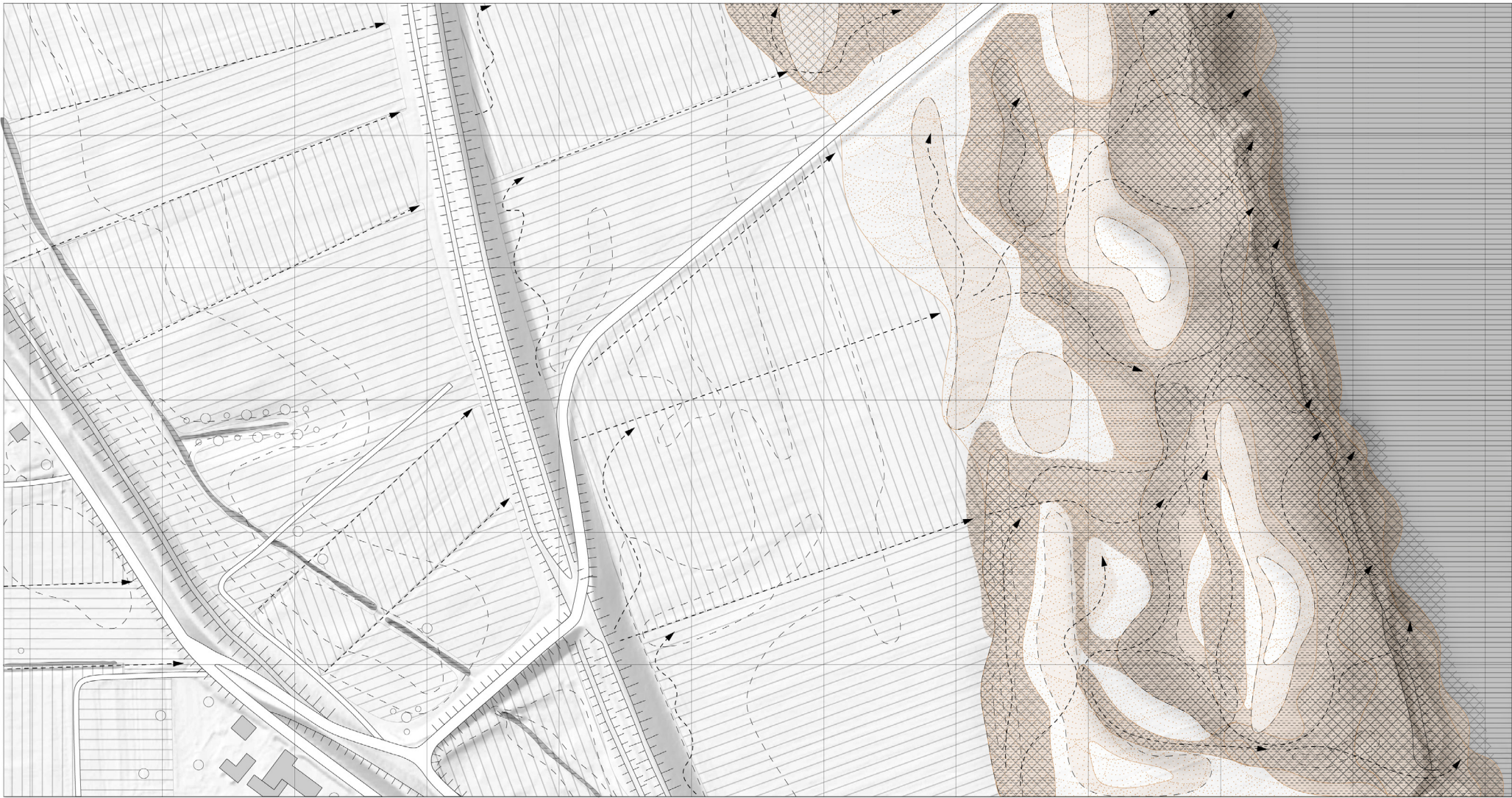
Phase 1

100m

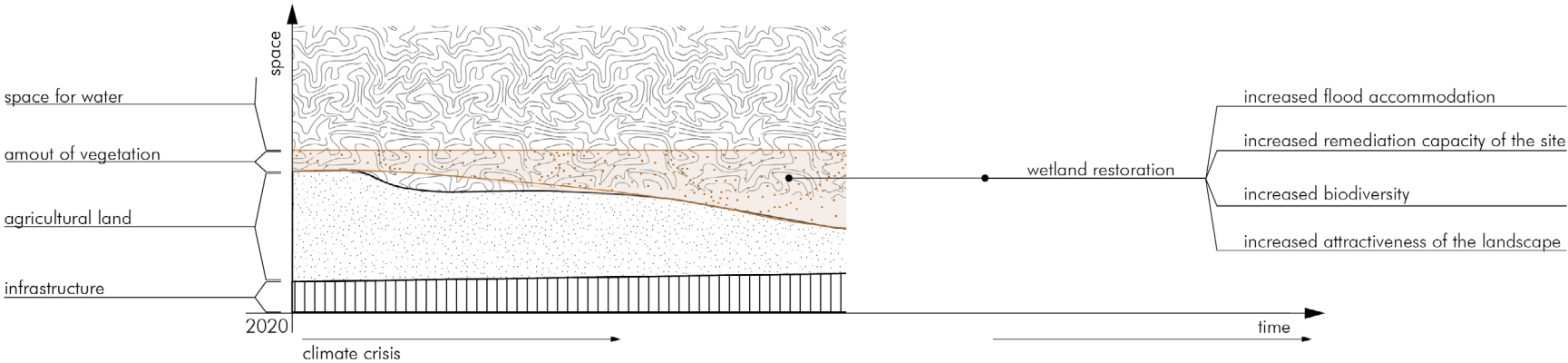


Phase 2

100m

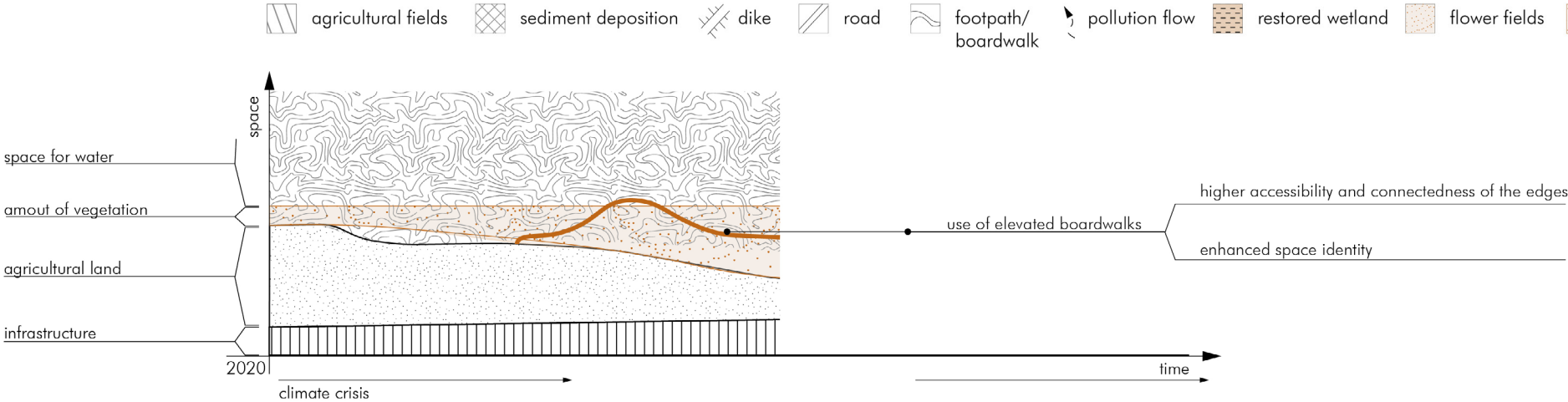
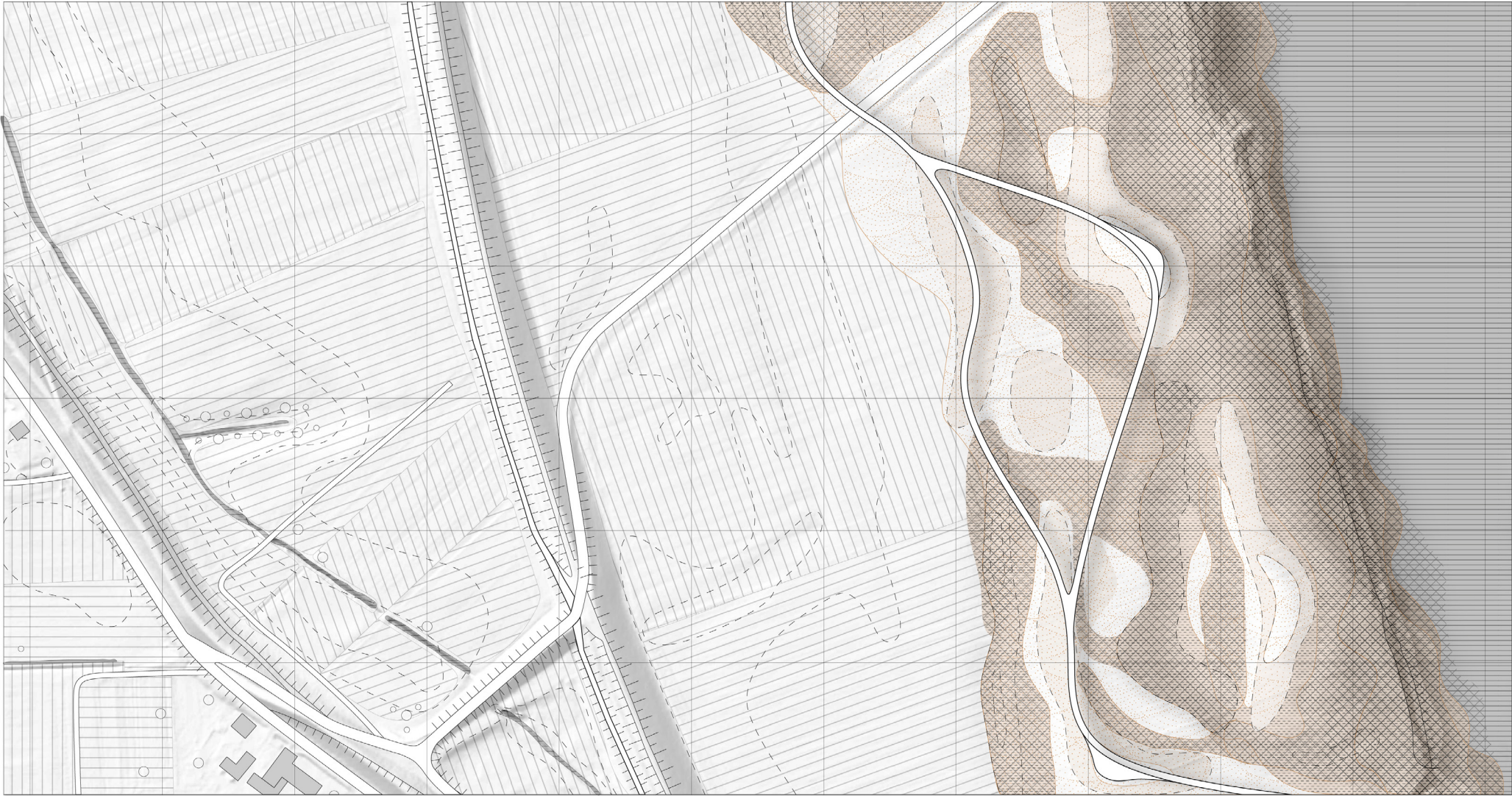


- agricultural fields
- sediment deposition
- dike
- road
- footpath/boardwalk
- pollution flow
- restored wetland
- flower fields
- landscaped areas / low vegetation



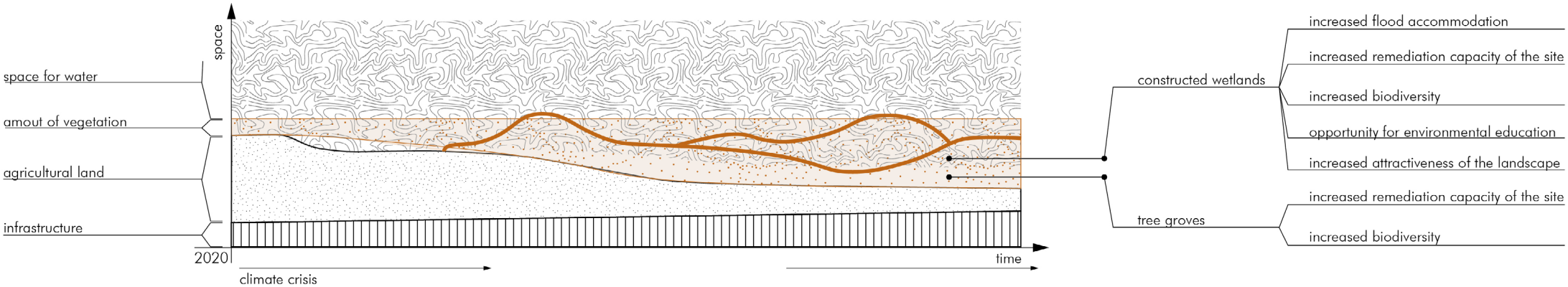
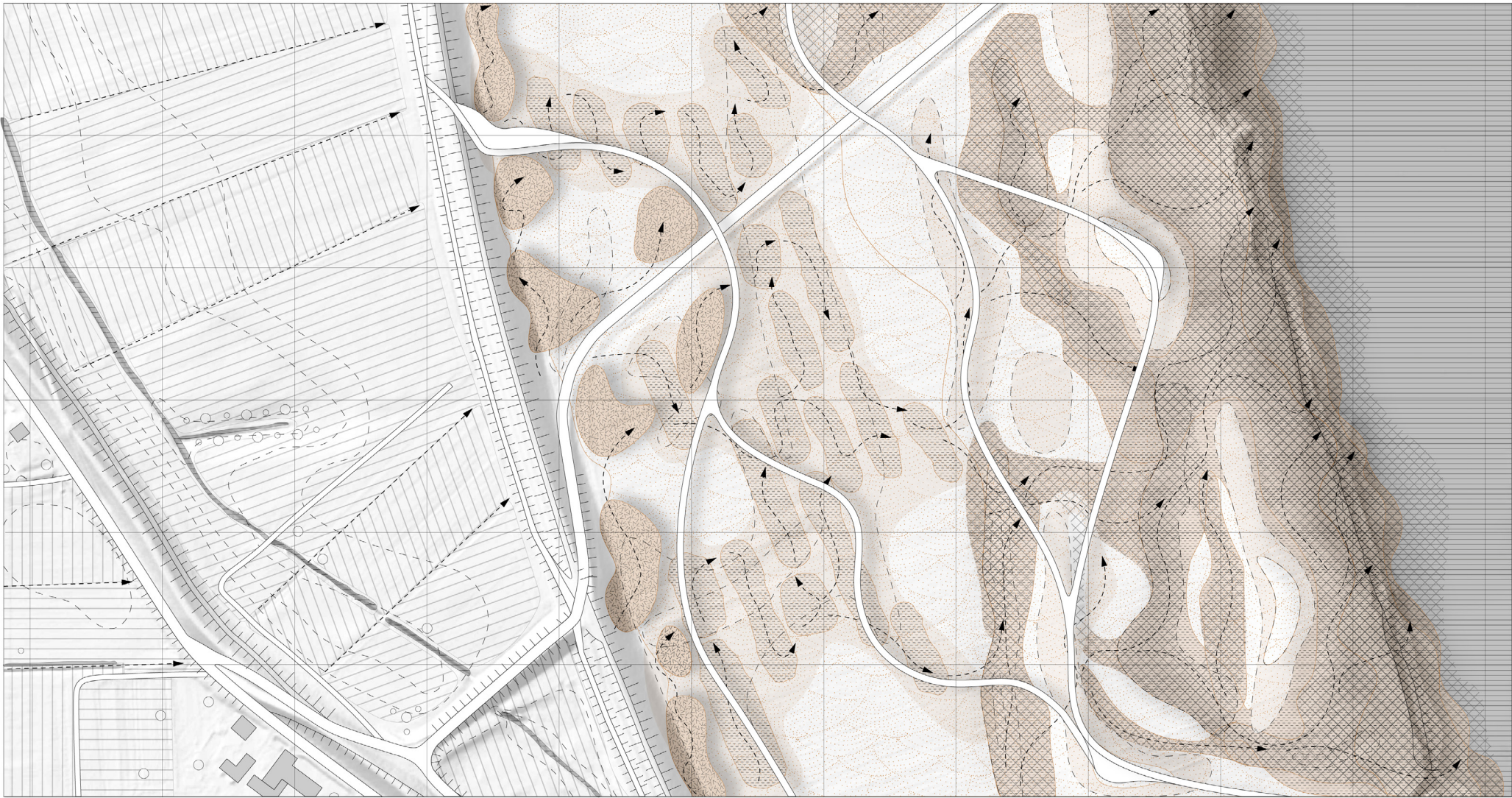
Phase 3

100m



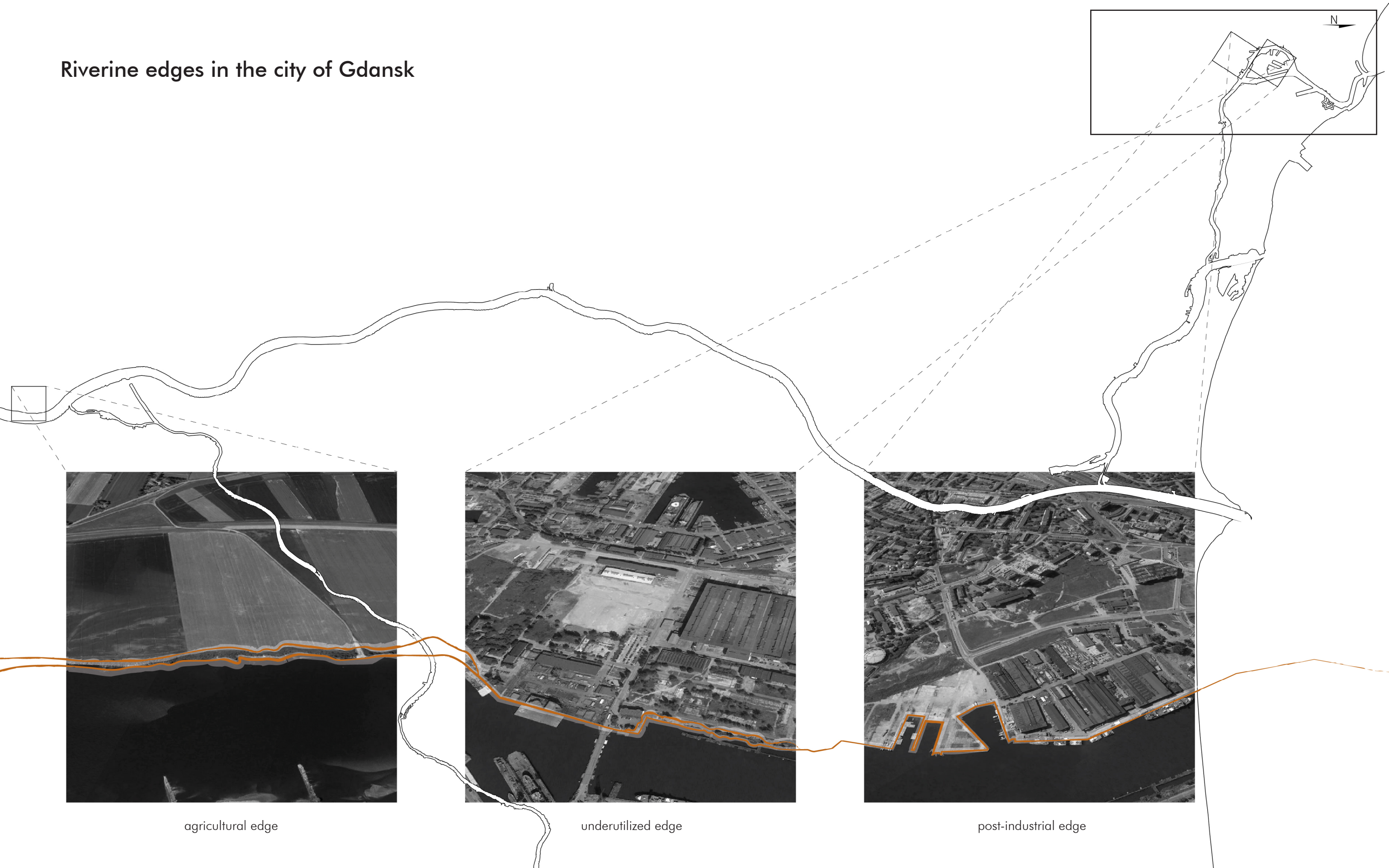
Phase 4

100m





Riverine edges in the city of Gdansk



agricultural edge

underutilized edge

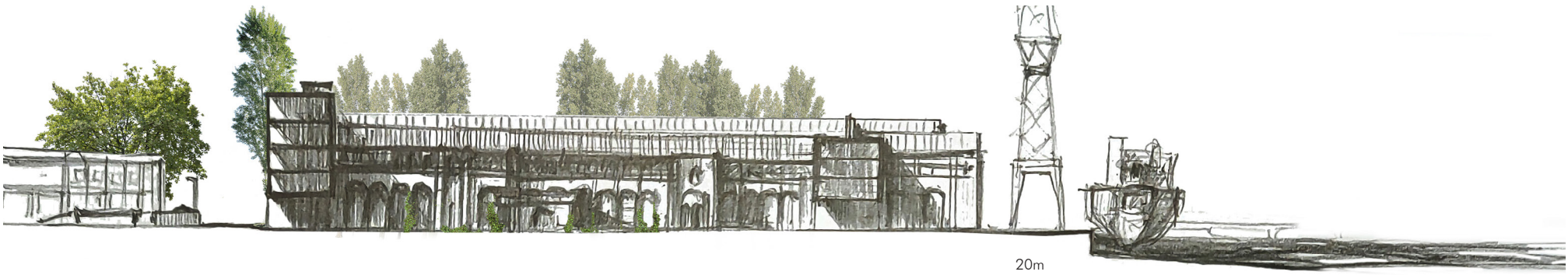
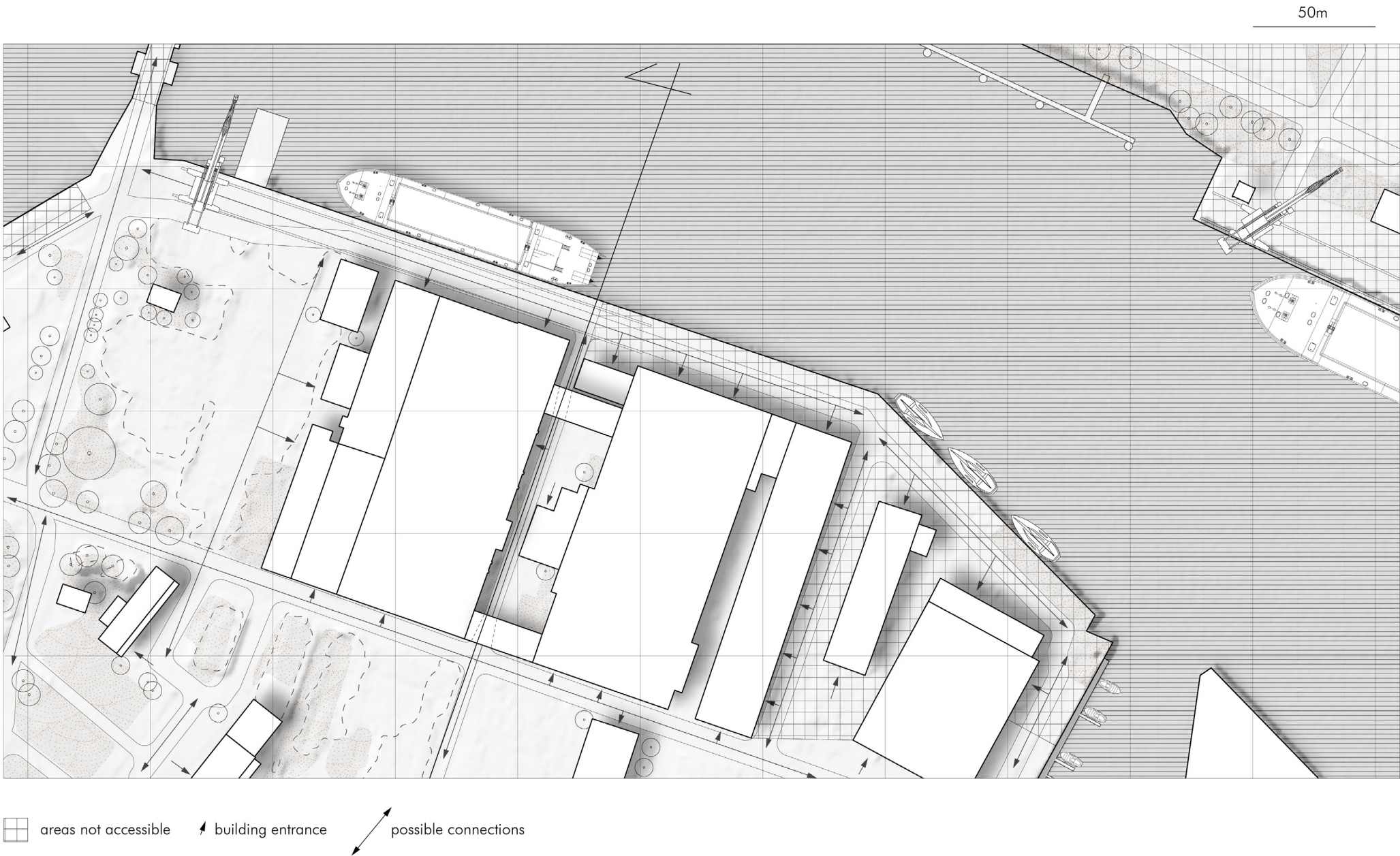
post-industrial edge

Post-industrial edge

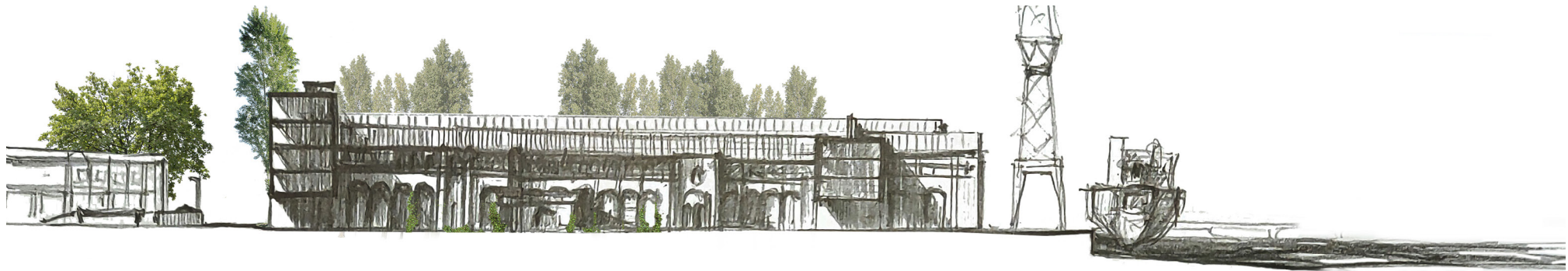
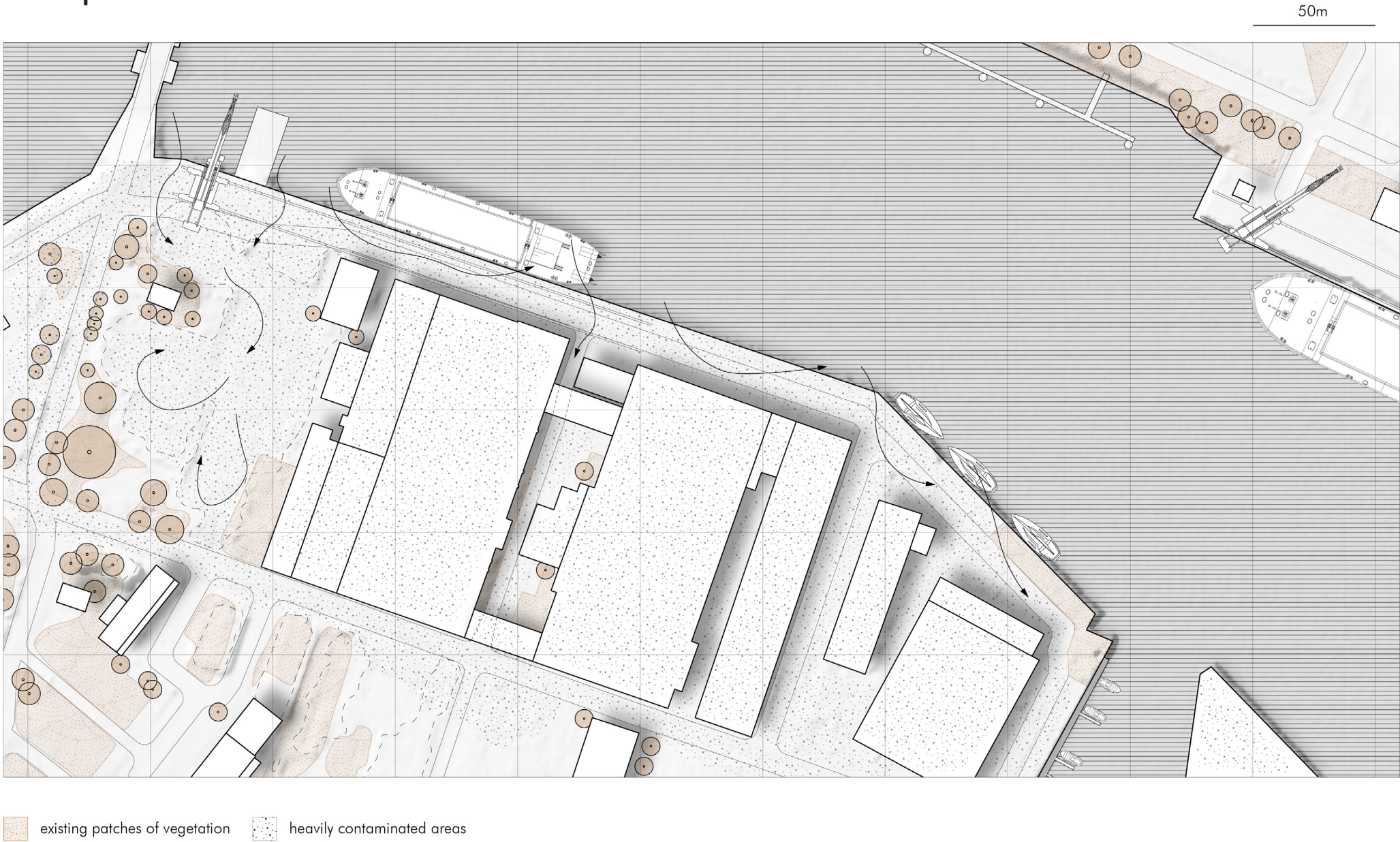


source | image taken by the author during the field trip in February 2021

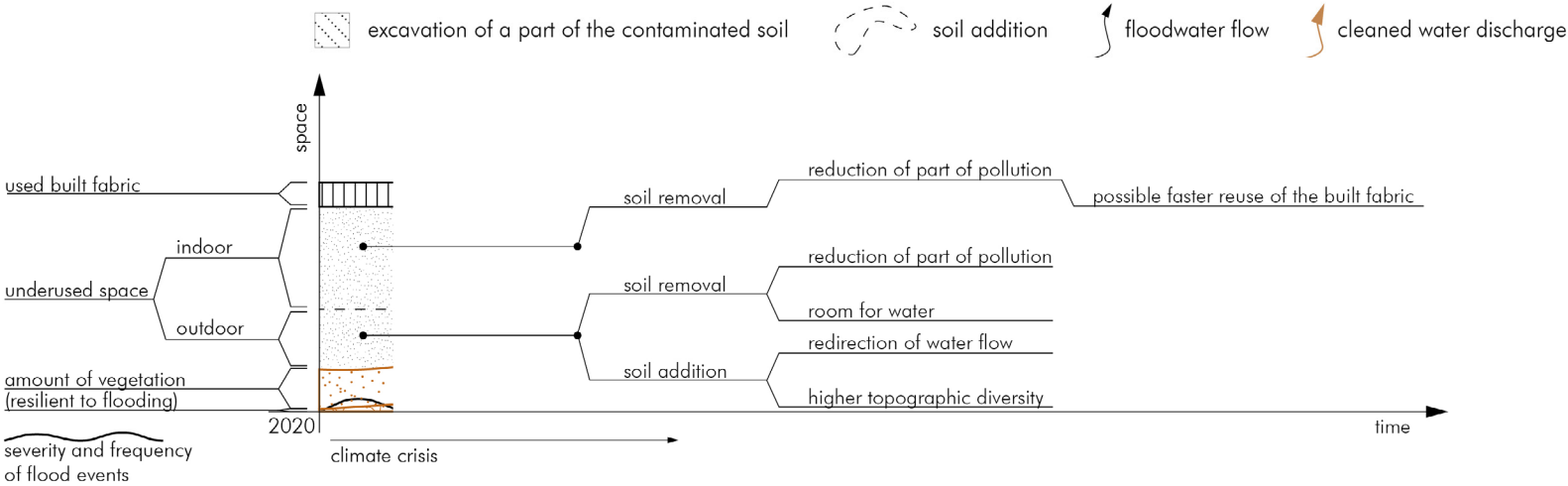
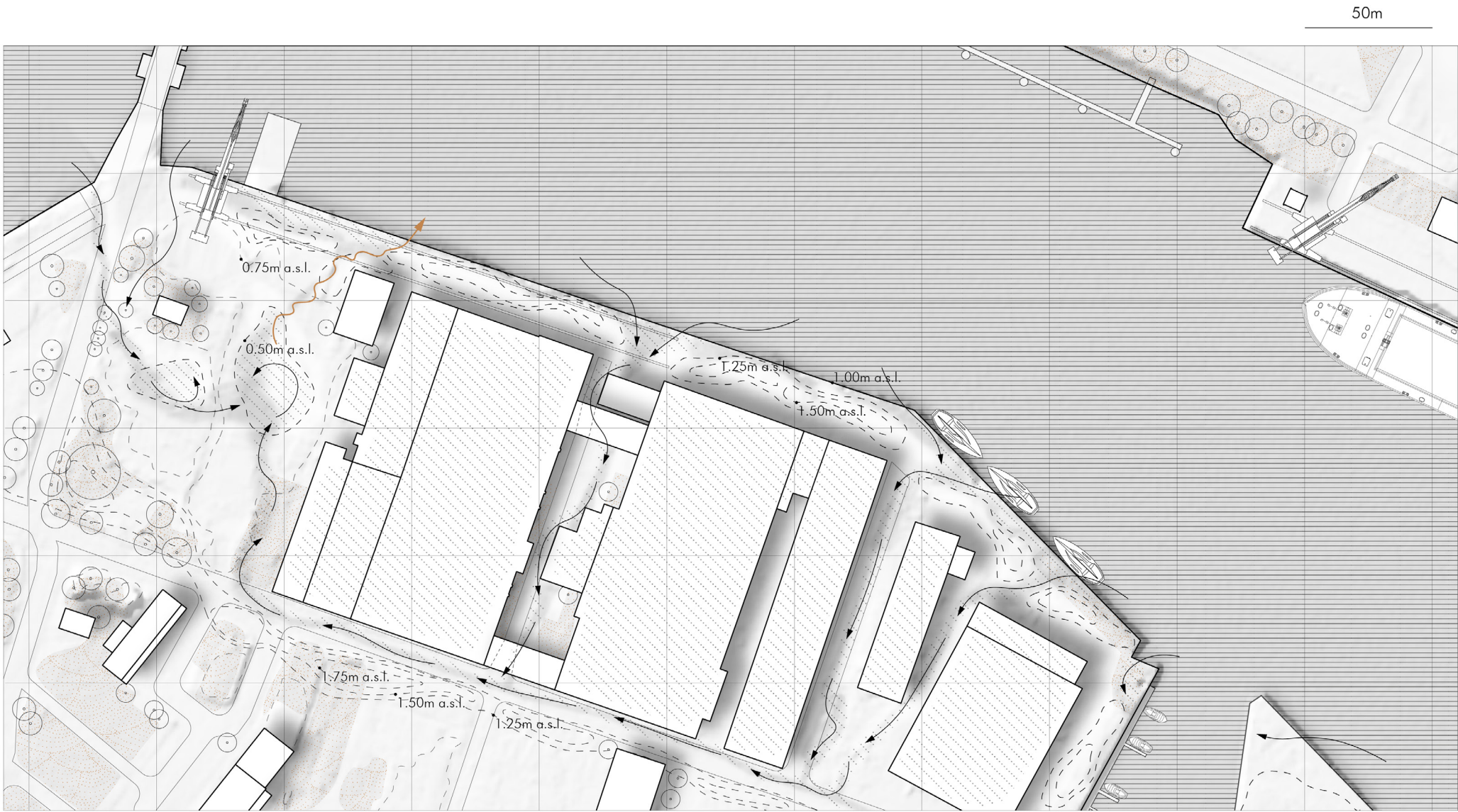
Spatial conditions and potentialities



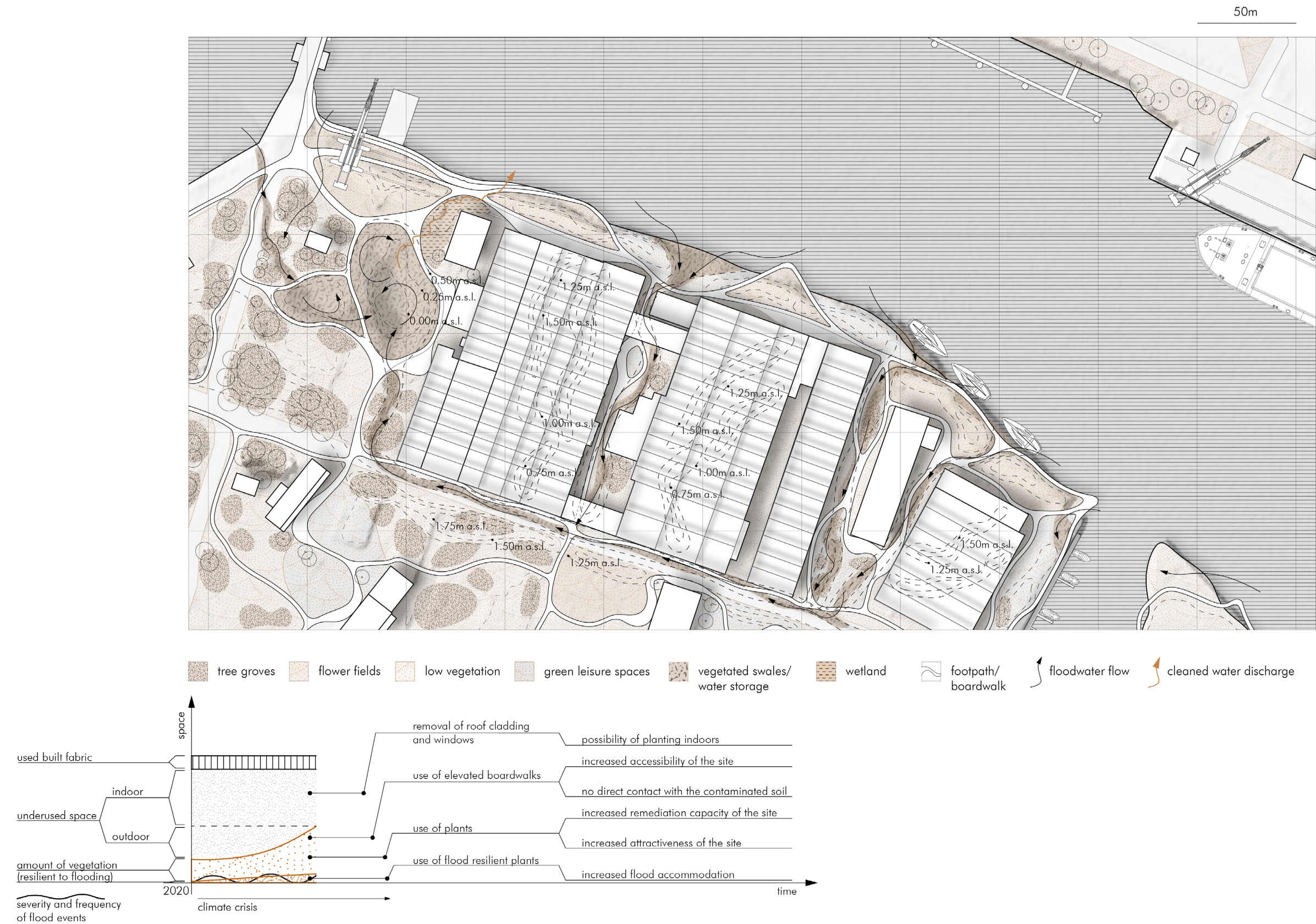
Environmental conditions and potentialities



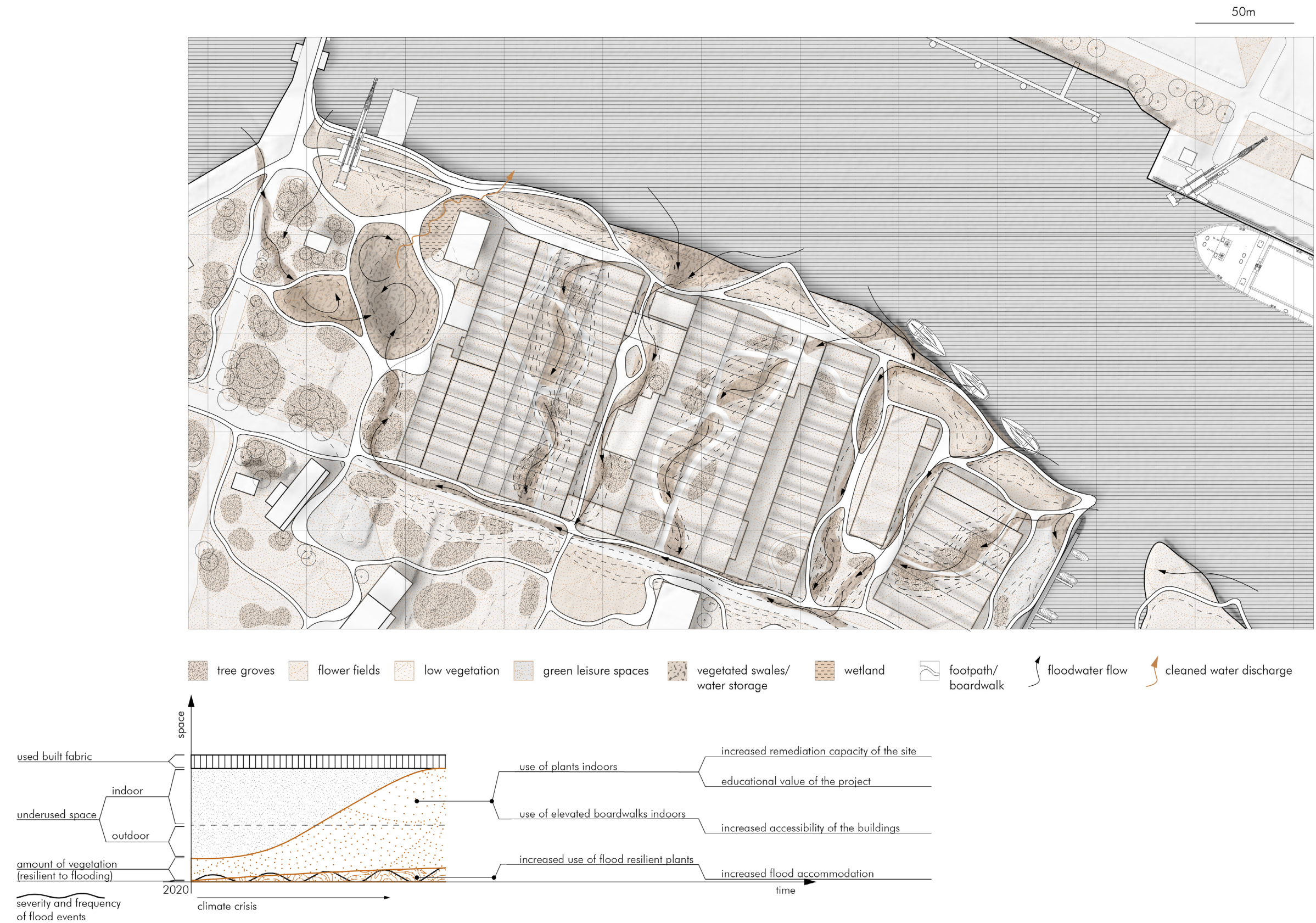
Phase 1



Phase 2



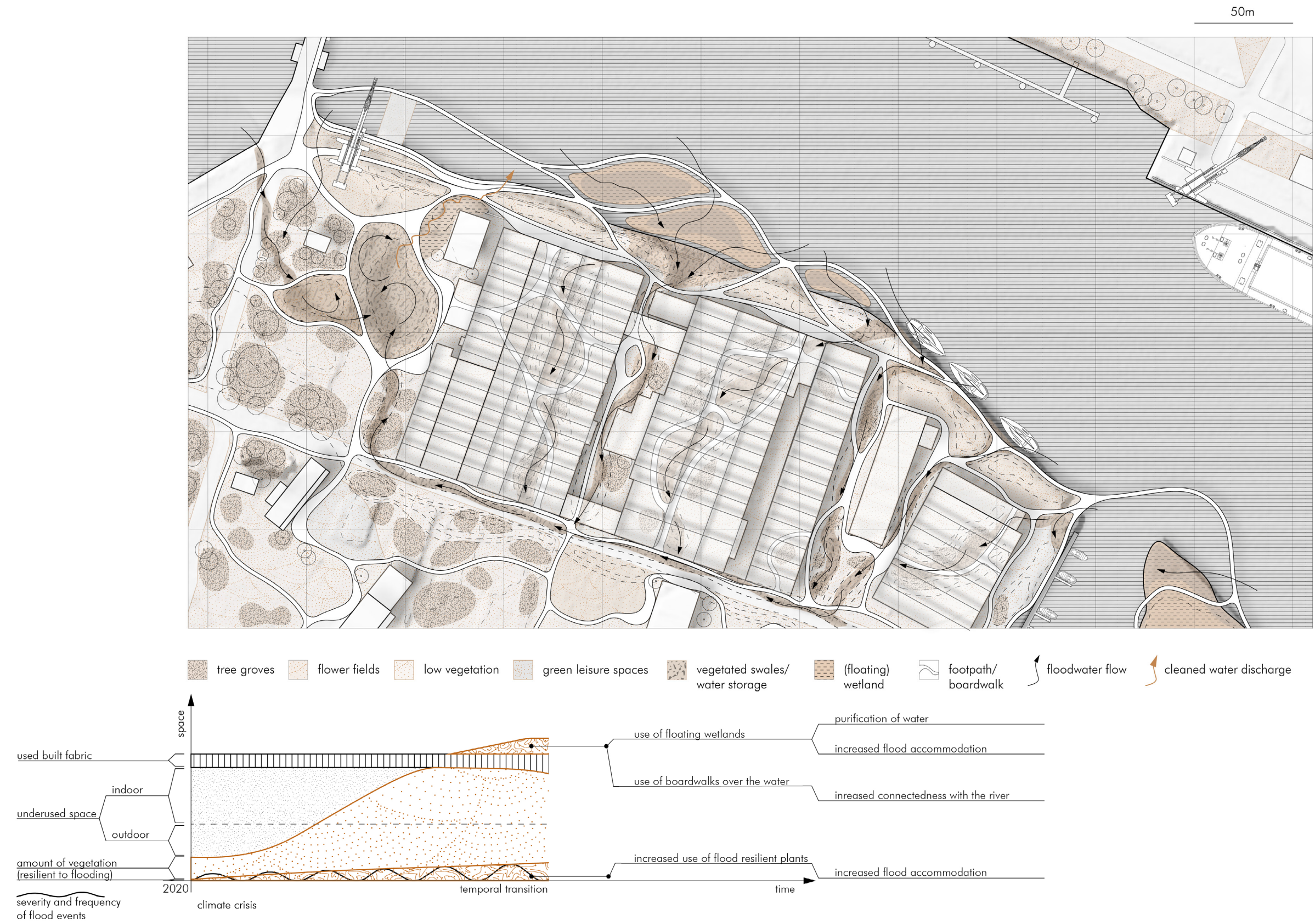
Phase 3



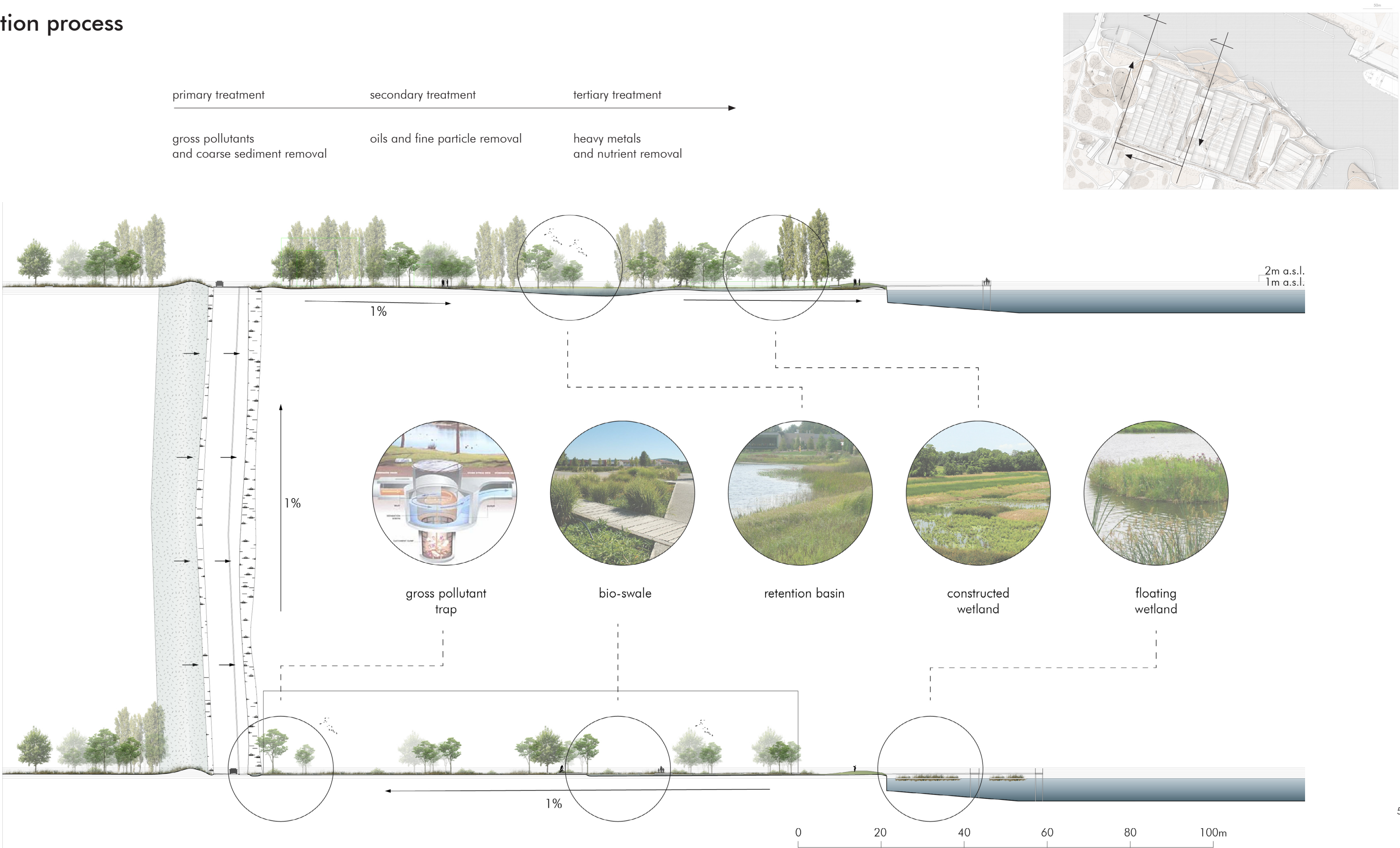
Use of indoor spaces for remediation



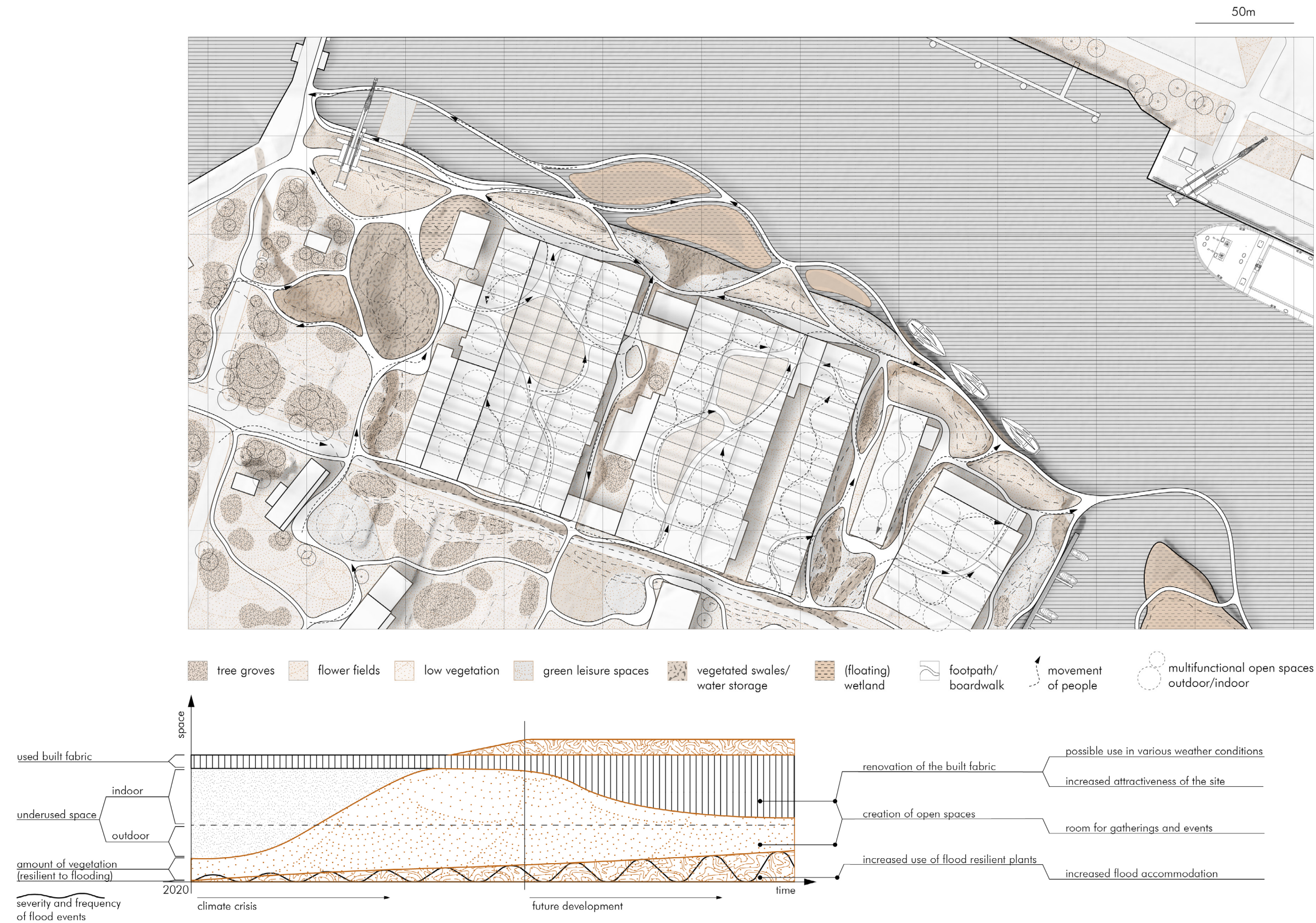
Phase 4



Remediation process



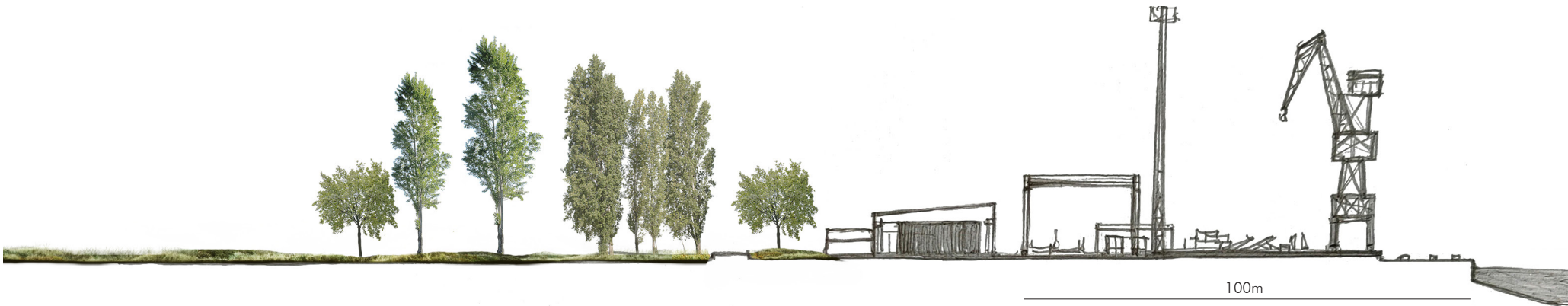
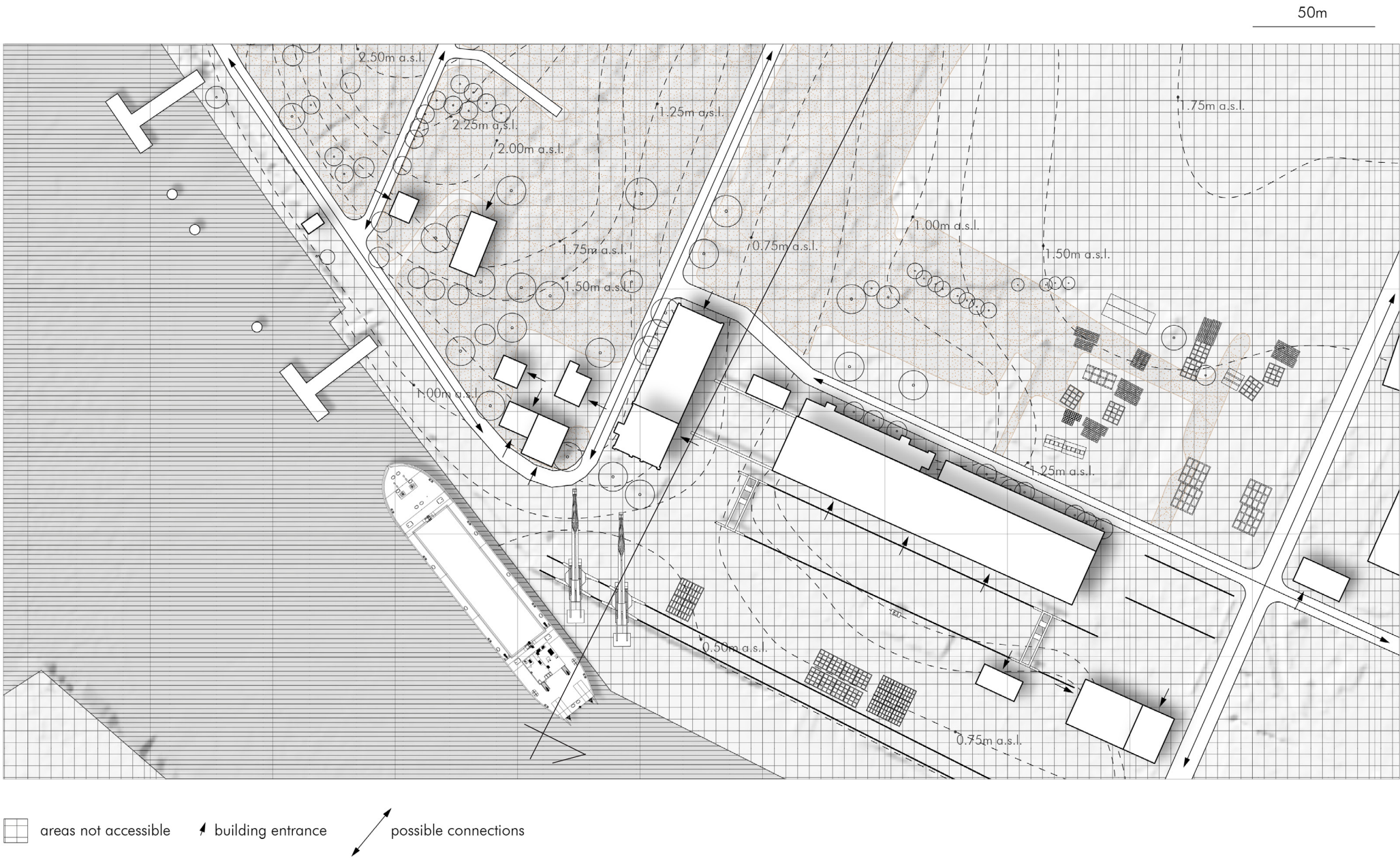
Phase 5



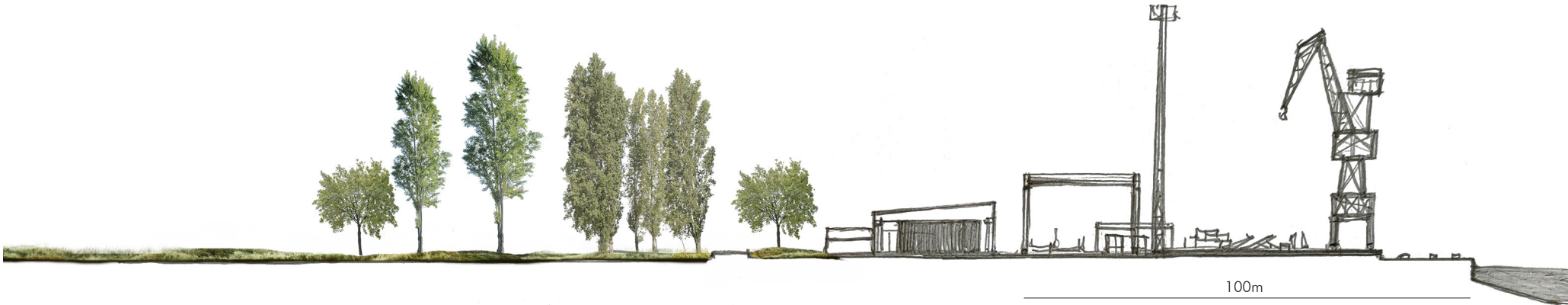
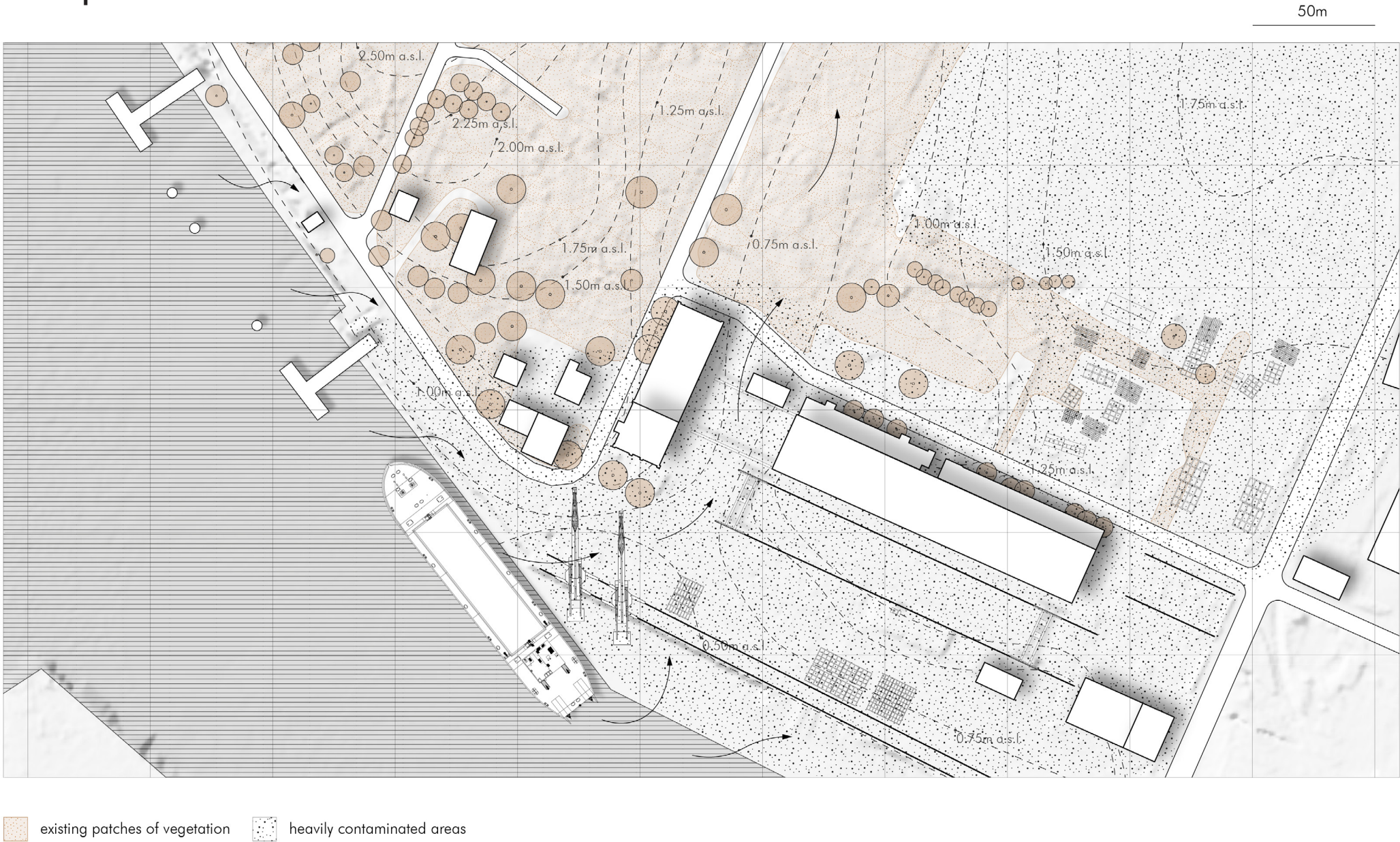
Underutilized edge



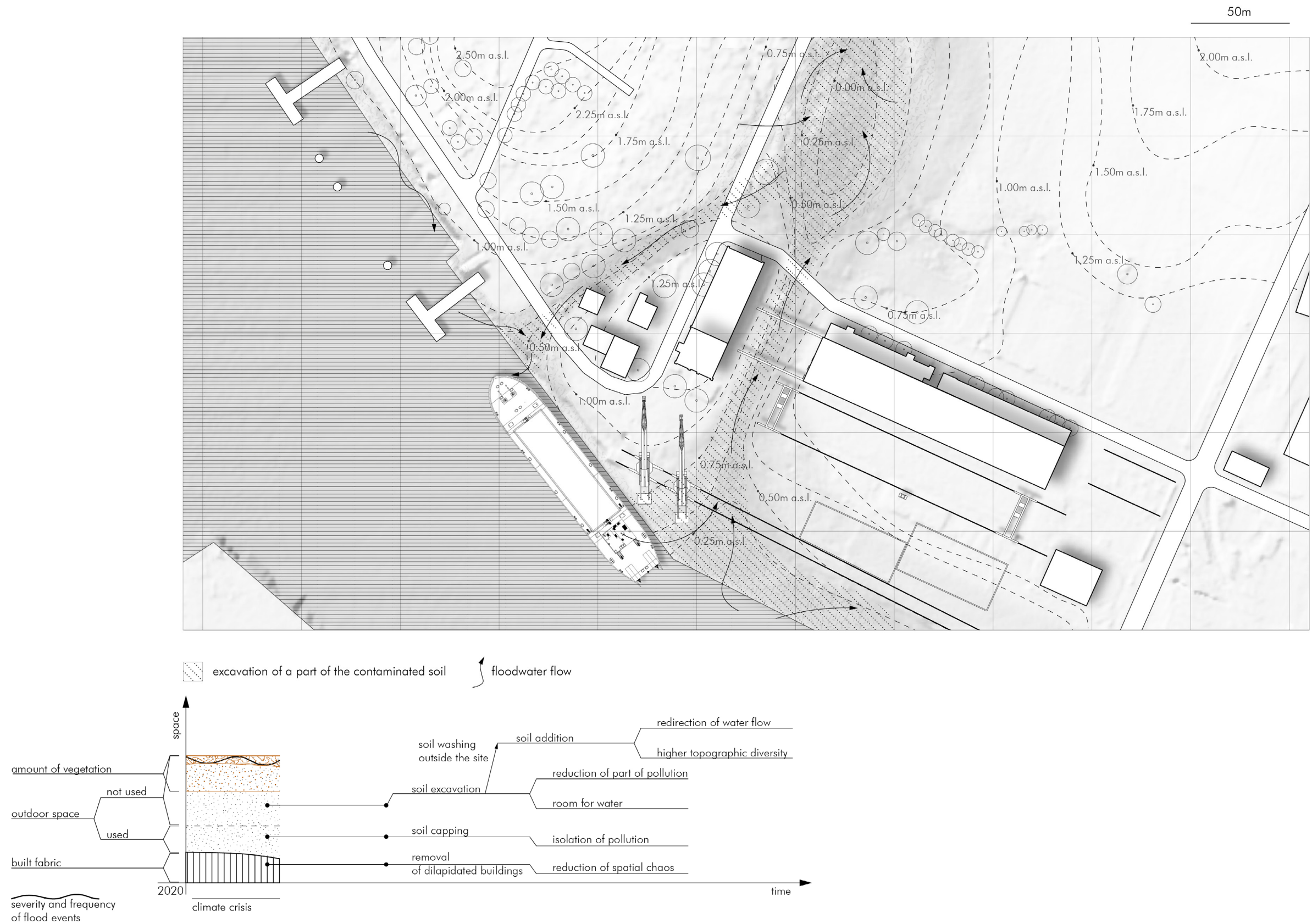
Spatial conditions and potentialities



Environmental conditions and potentialities

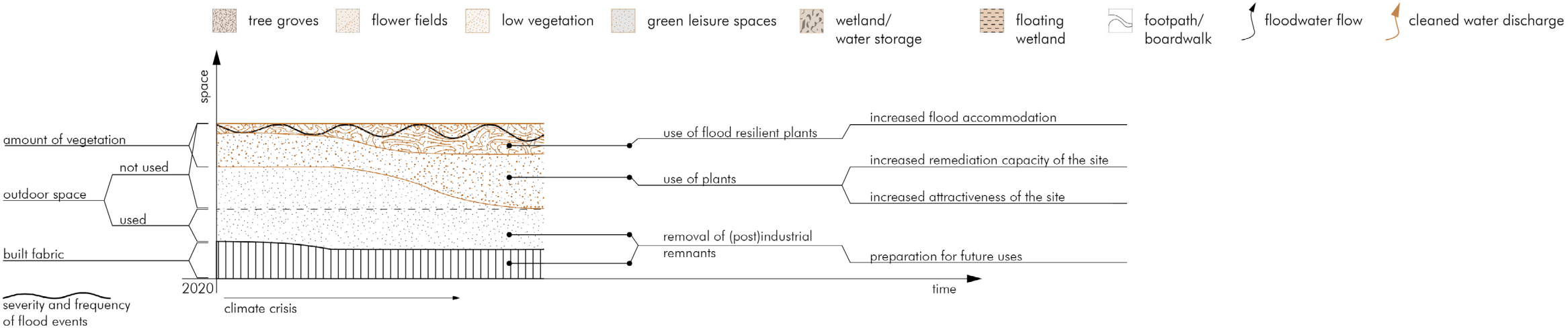
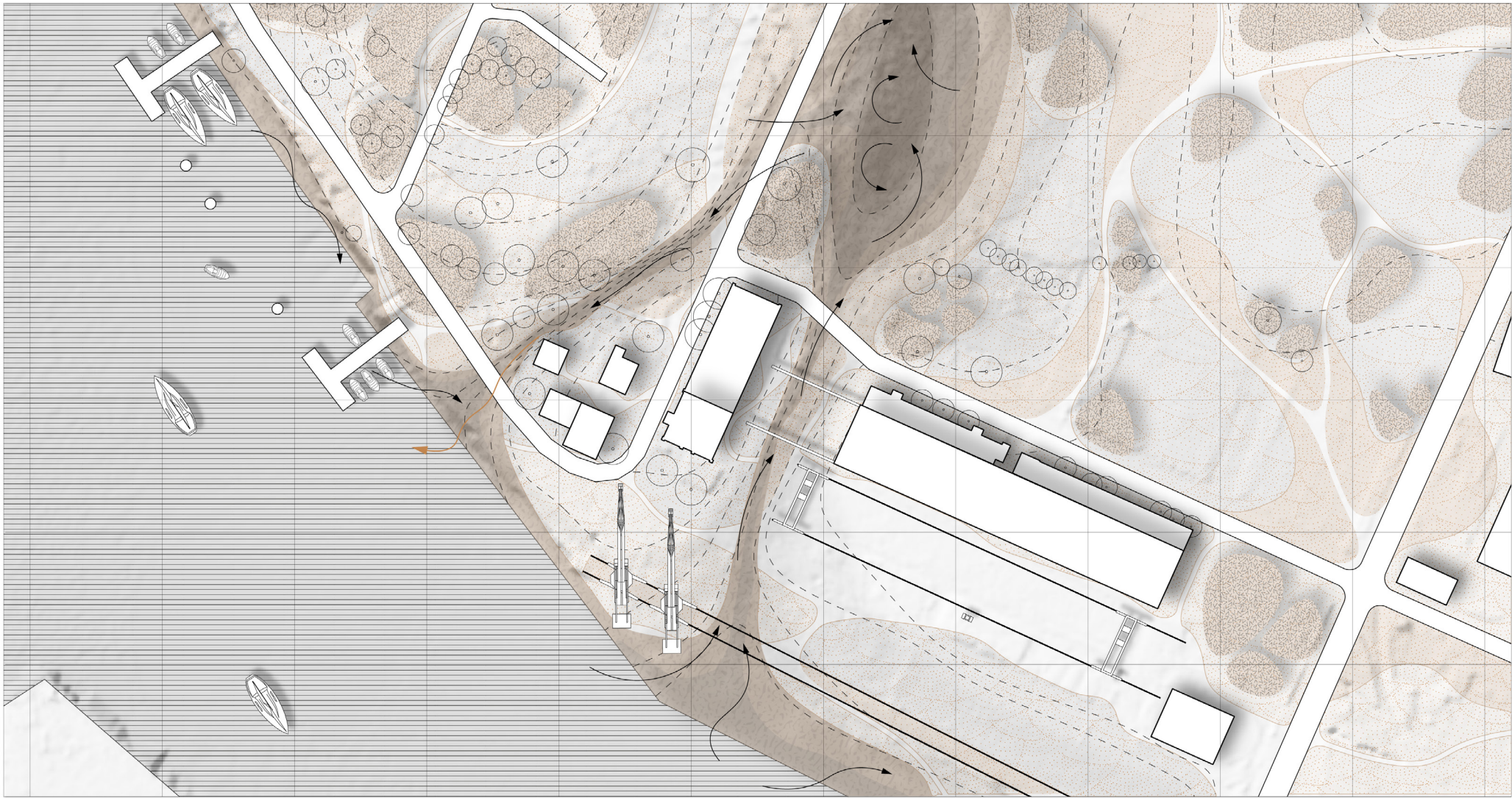


Phase 1



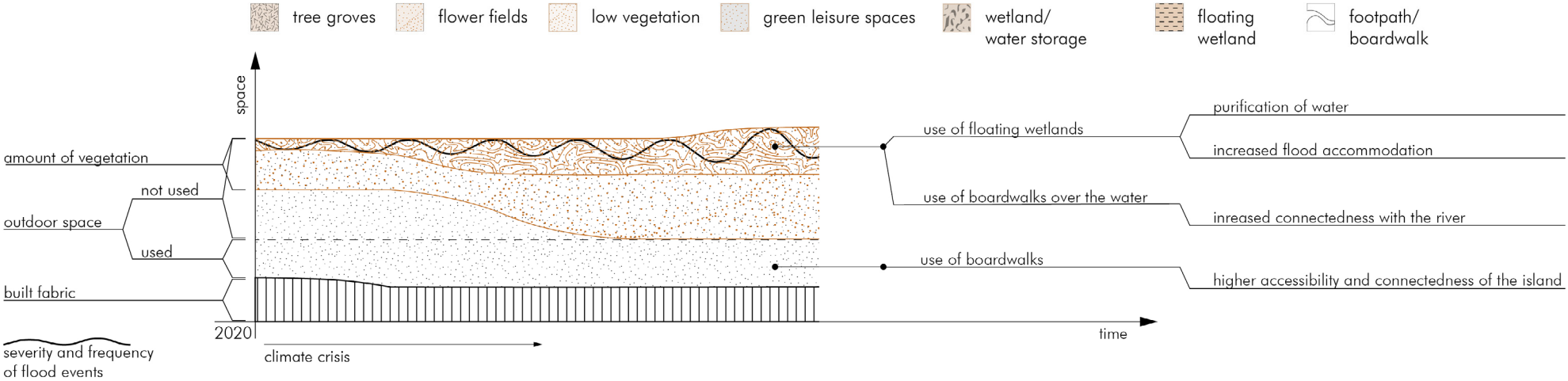
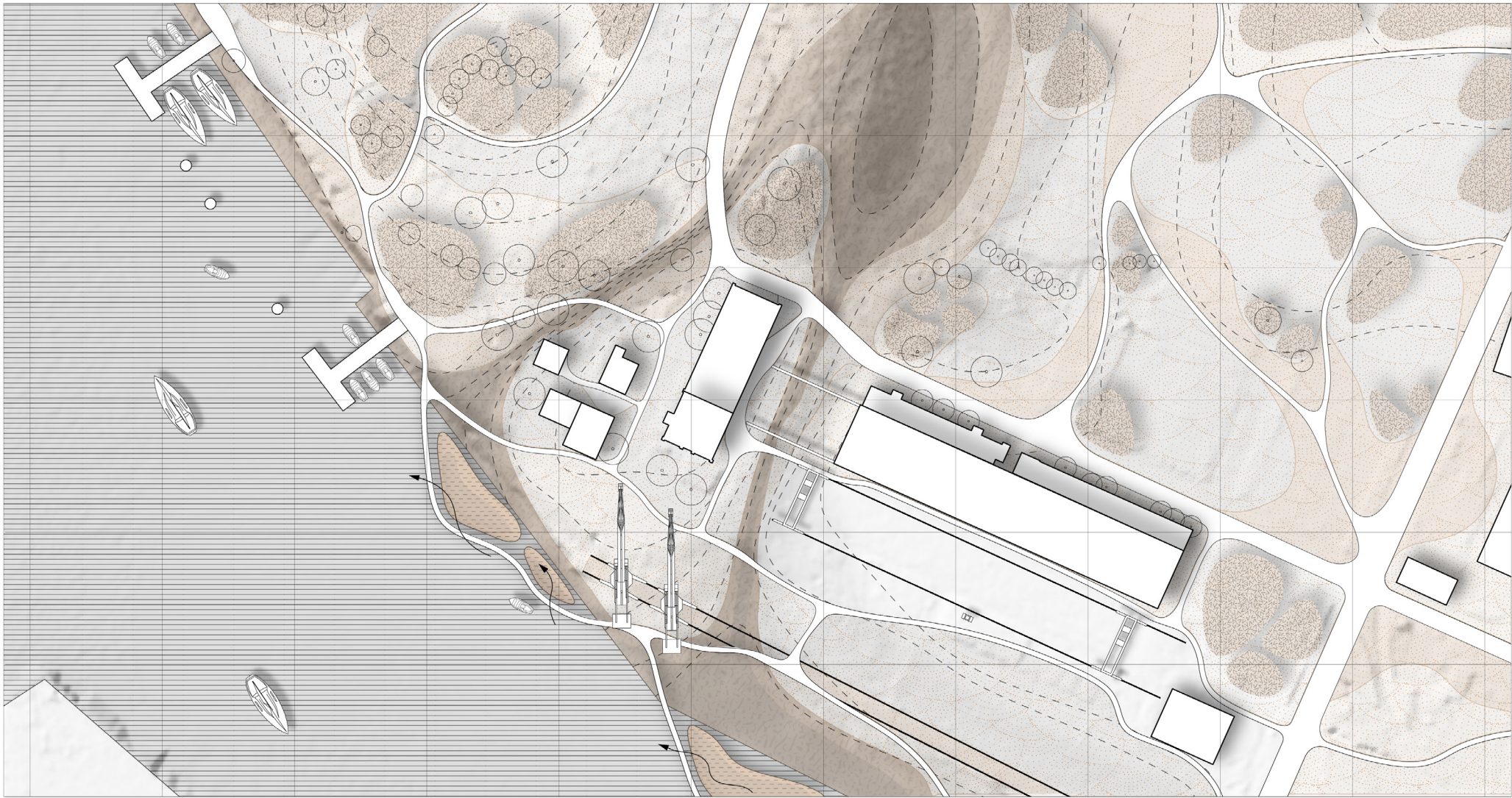
Phase 2

50m



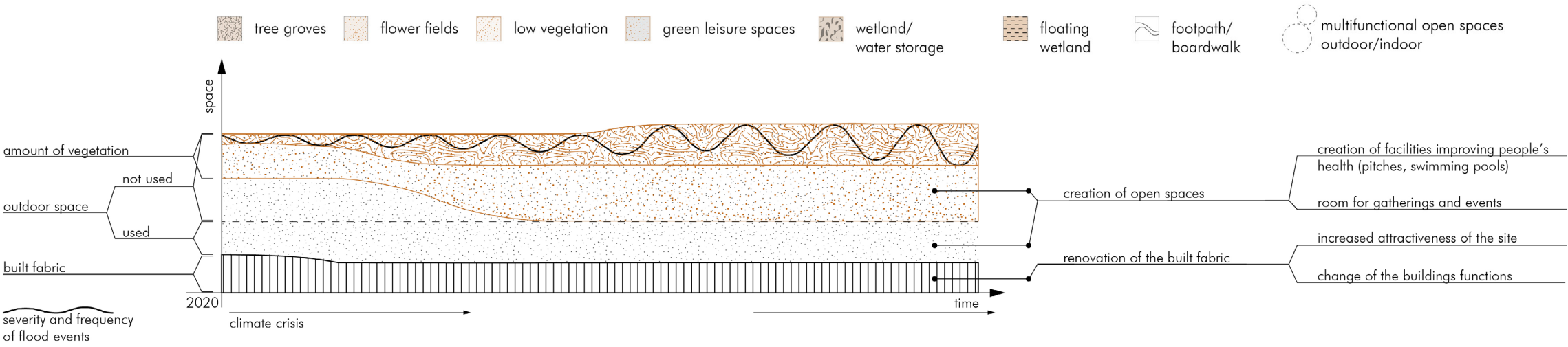
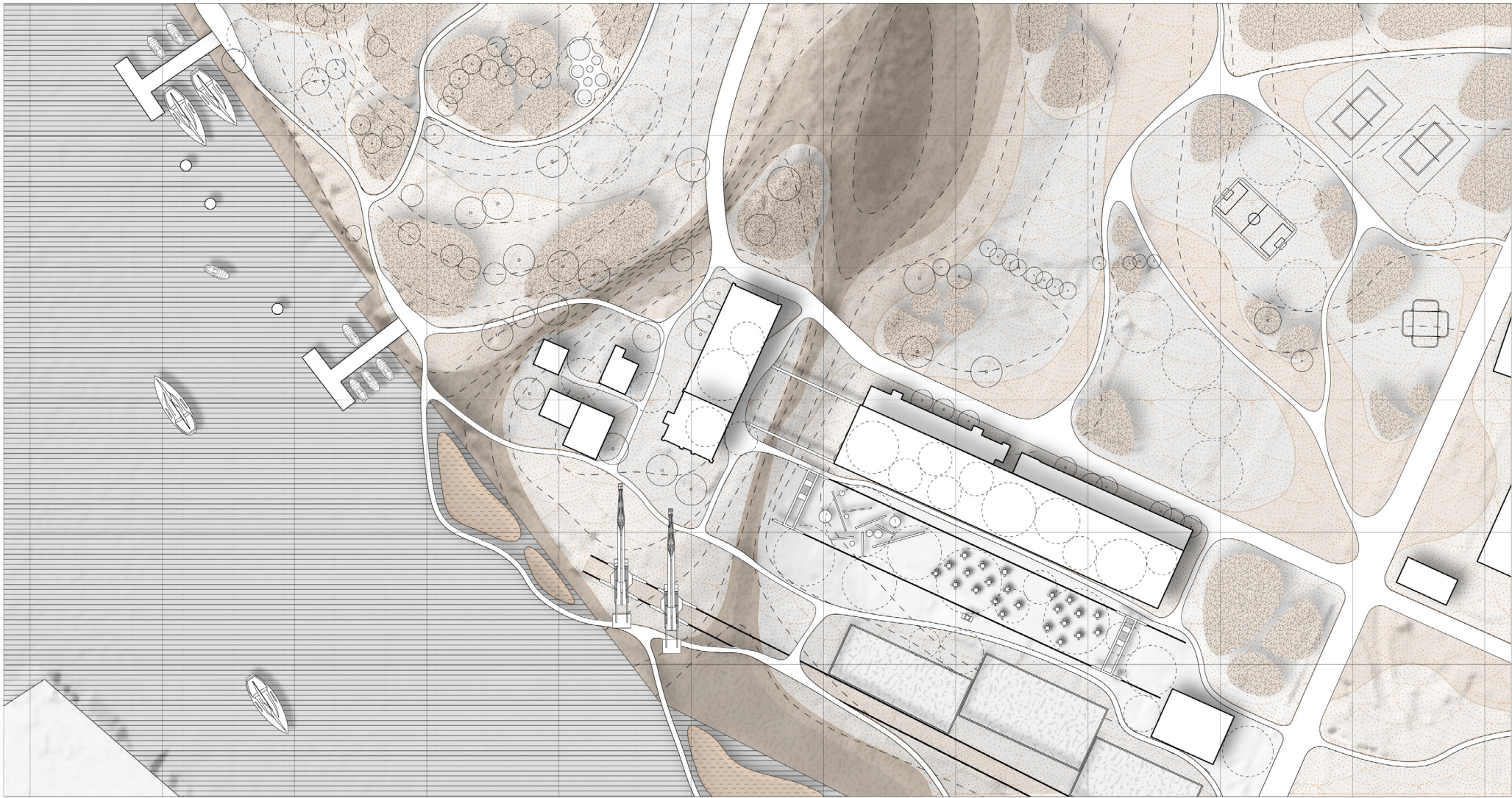
Phase 3

50m



Phase 4

50m



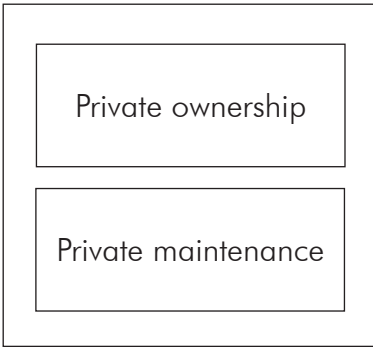


Stakeholders |
power and interest

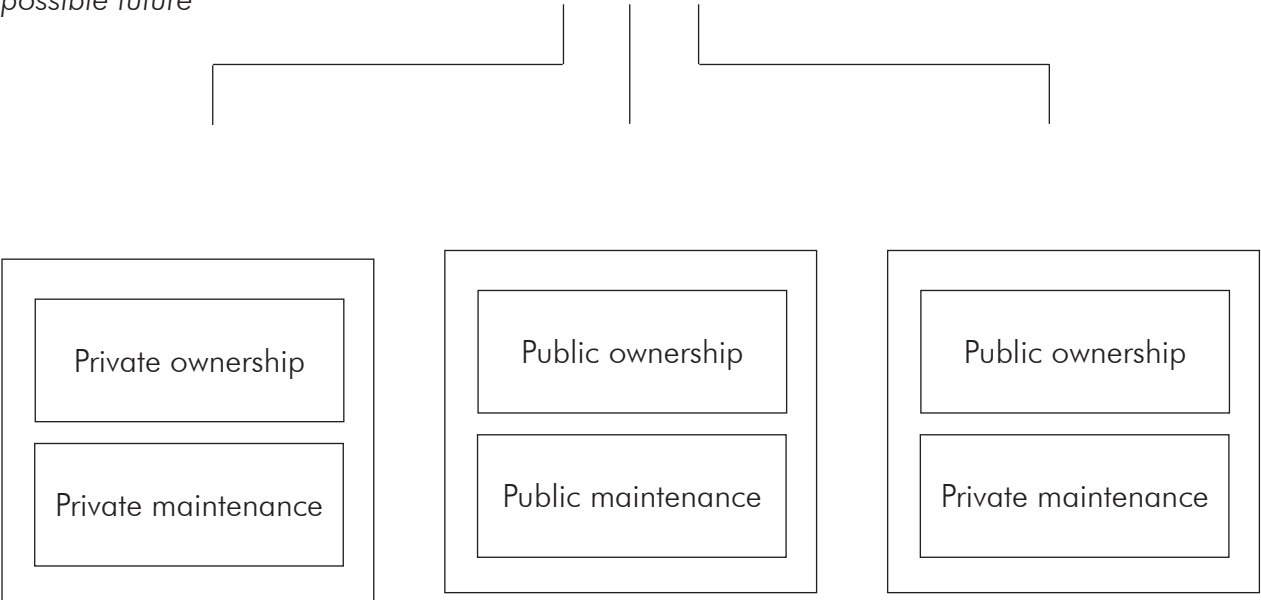


Stakeholders | ownership and maintenance

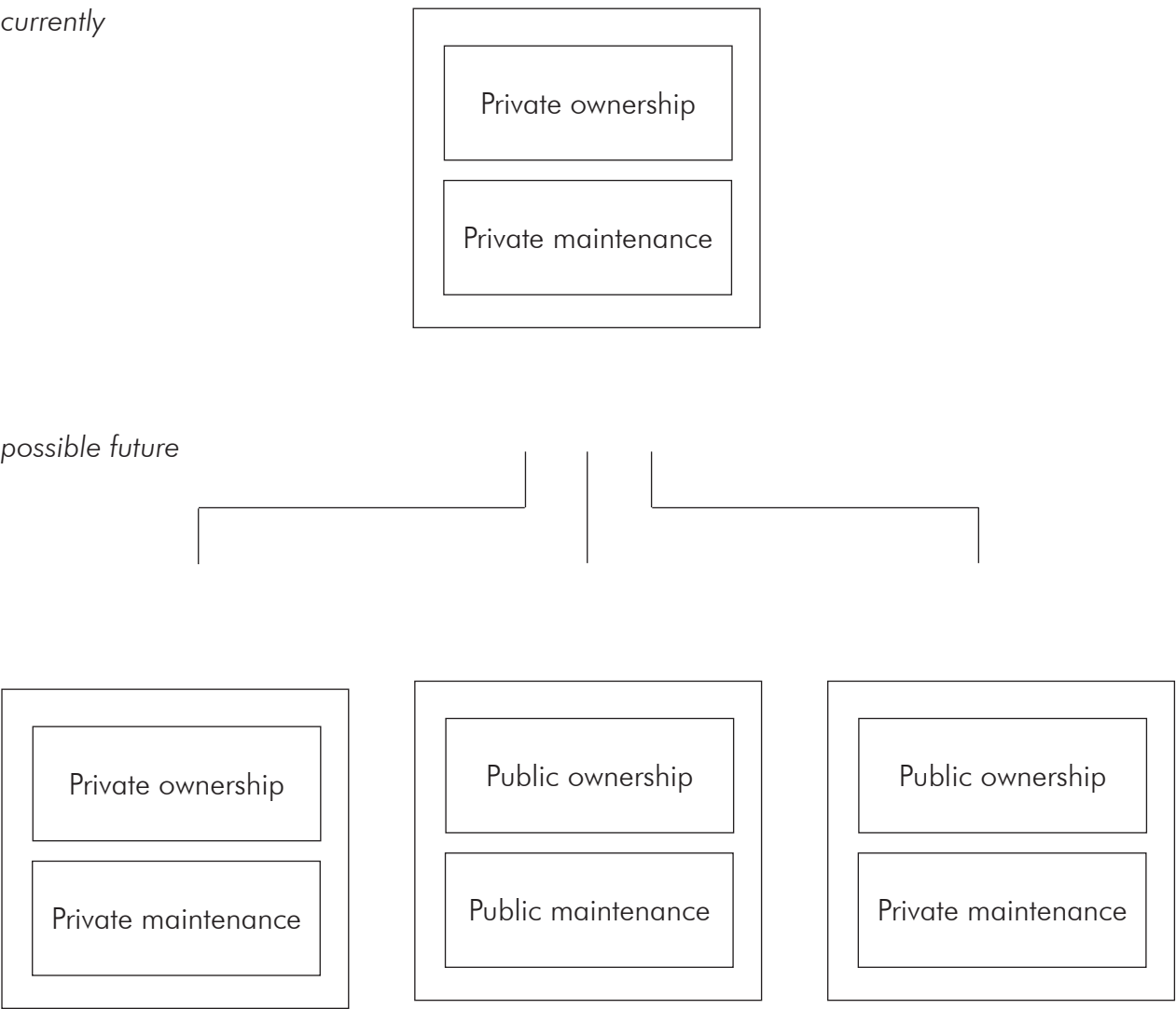
currently



possible future



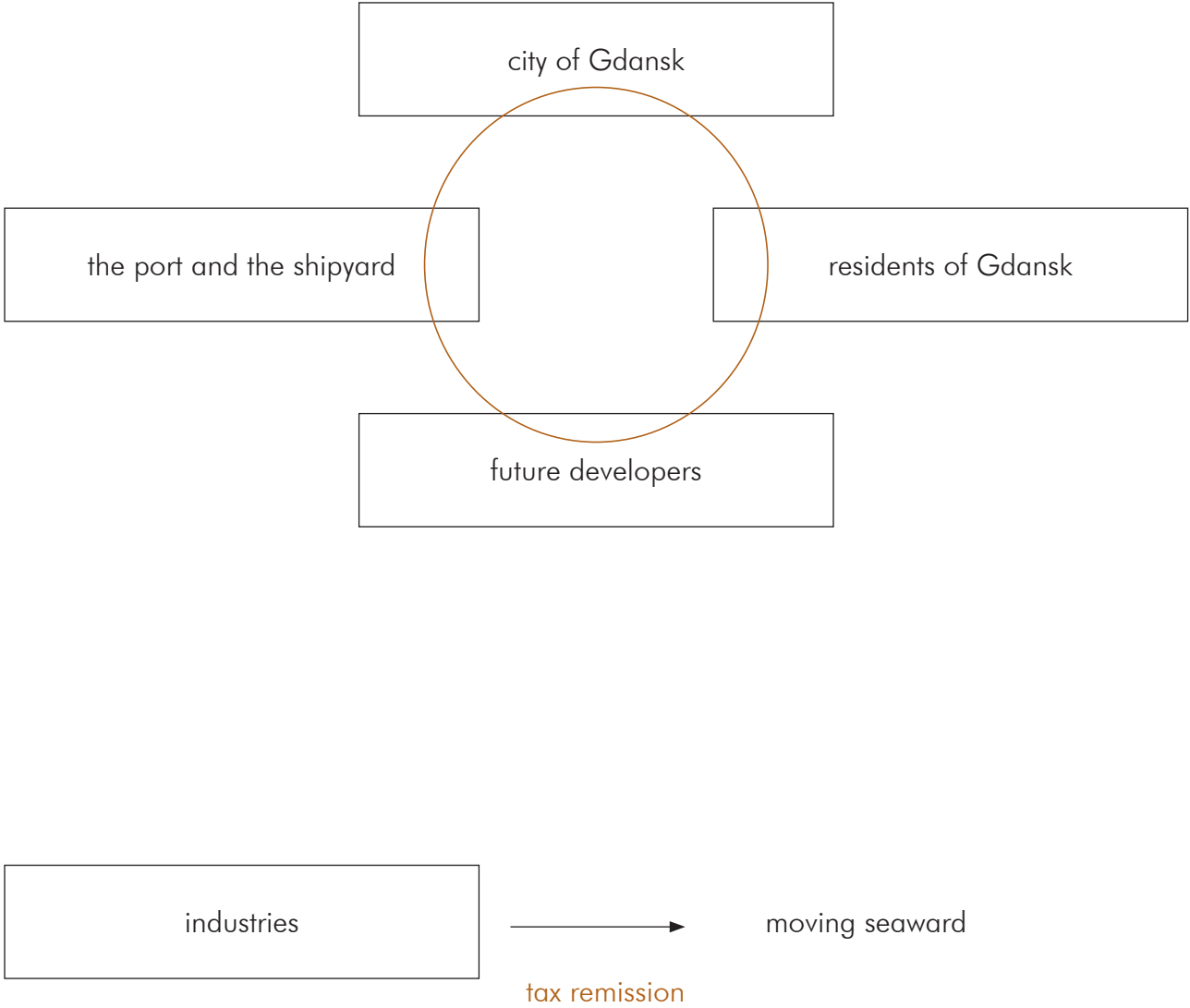
Stakeholders | ownership and maintenance



subsidies from the government
subsidies from EU
compensation from the government
revenue from biomass from harvested vegetation used in bioremediation



Stakeholders | dialogue



Stakeholders | funding

shipyard and other industries formerly occupying the area

the city of Gdansk

future developers

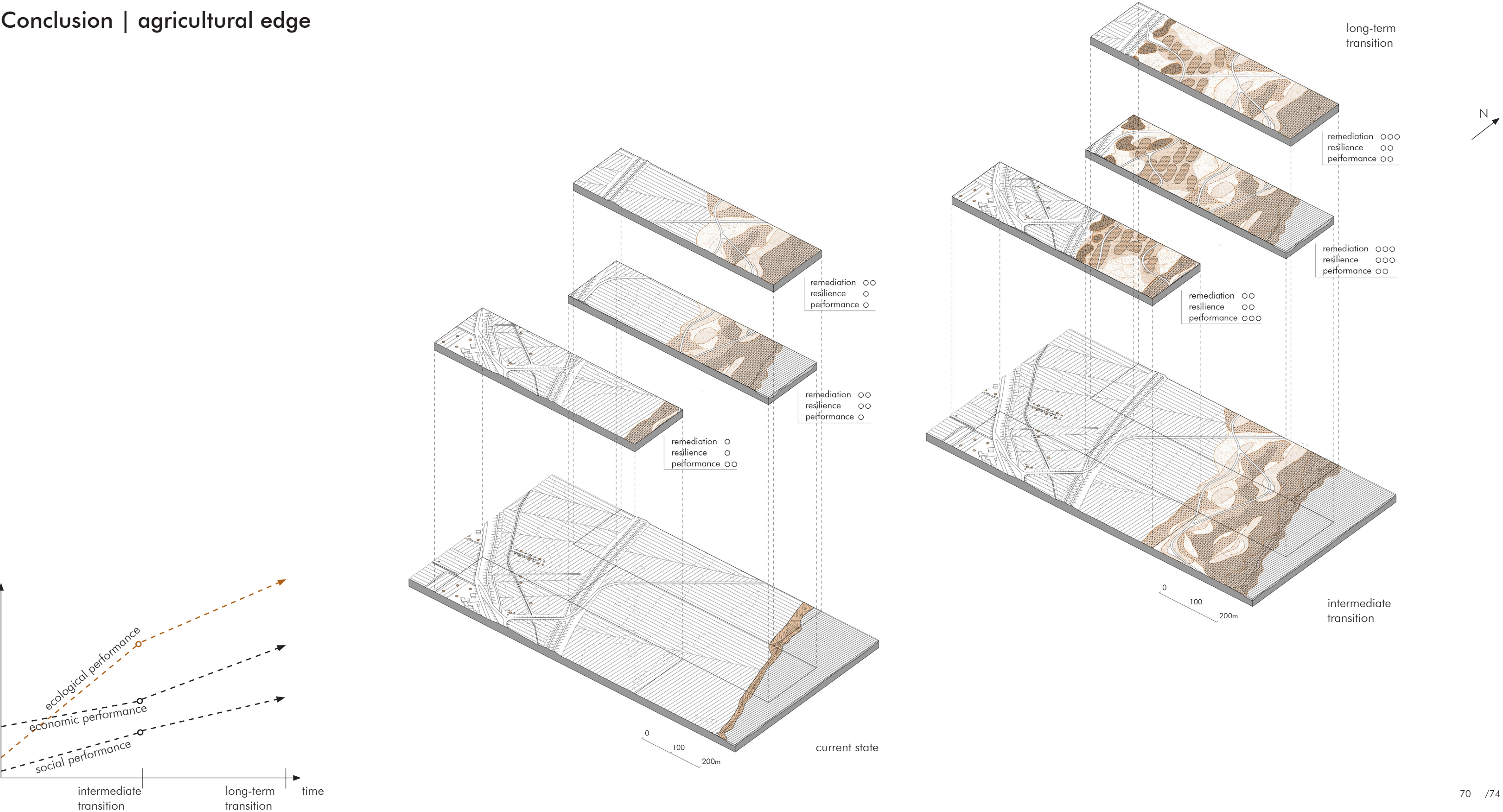
tax remission

investment in social, ecological and economic performance of this part of the city

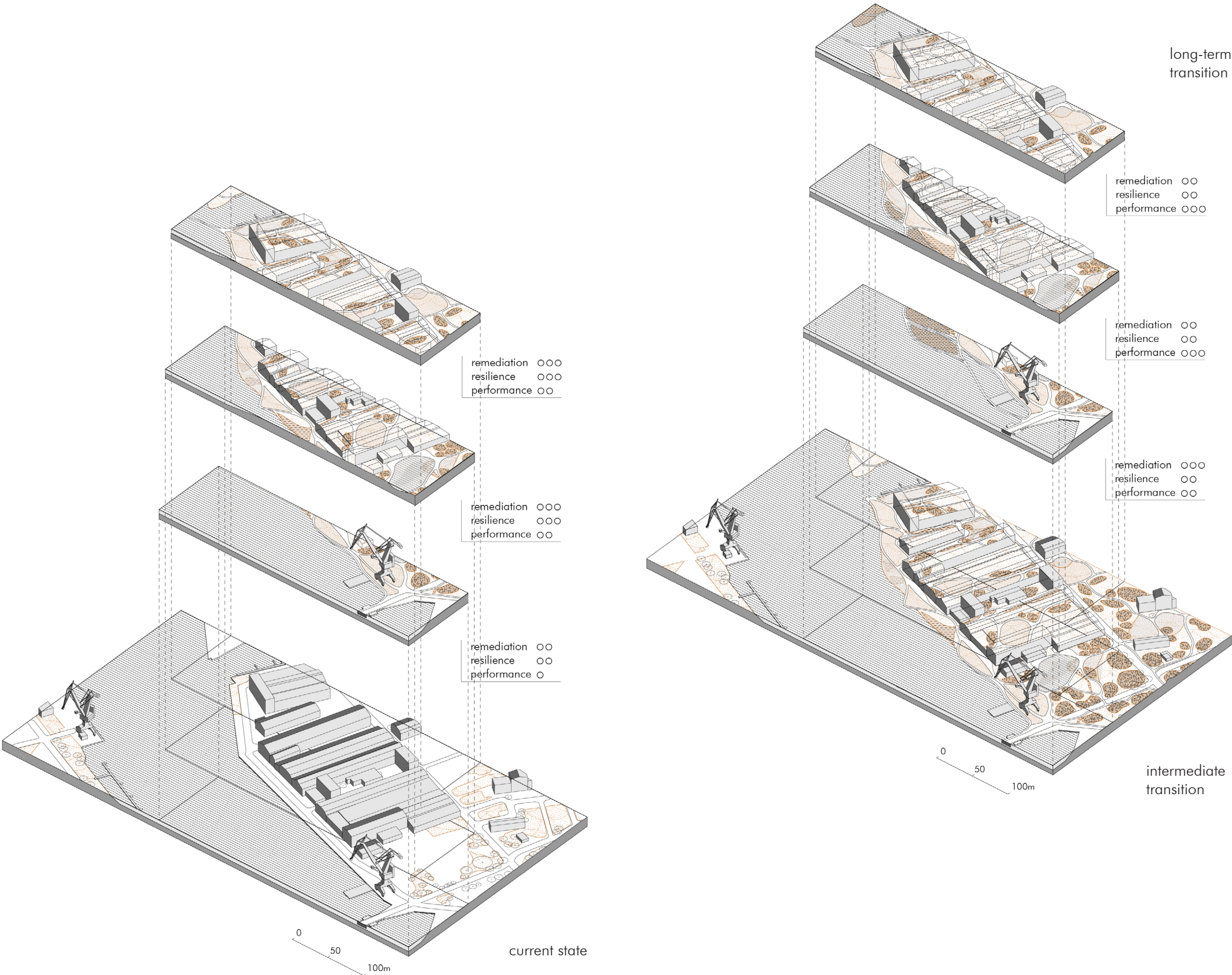
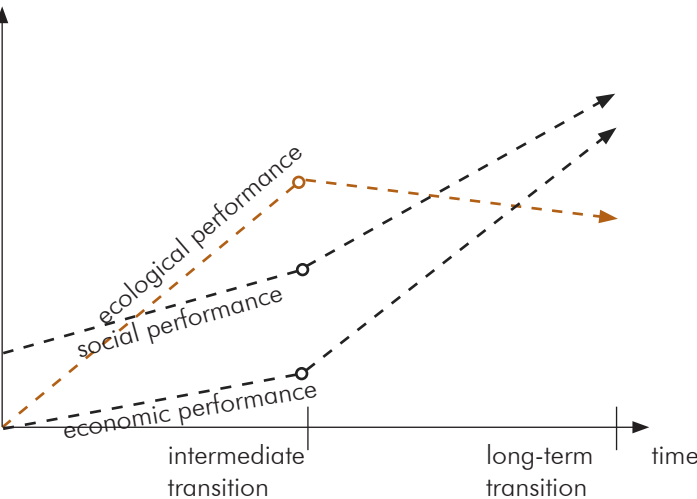
subsidies from the city of Gdansk



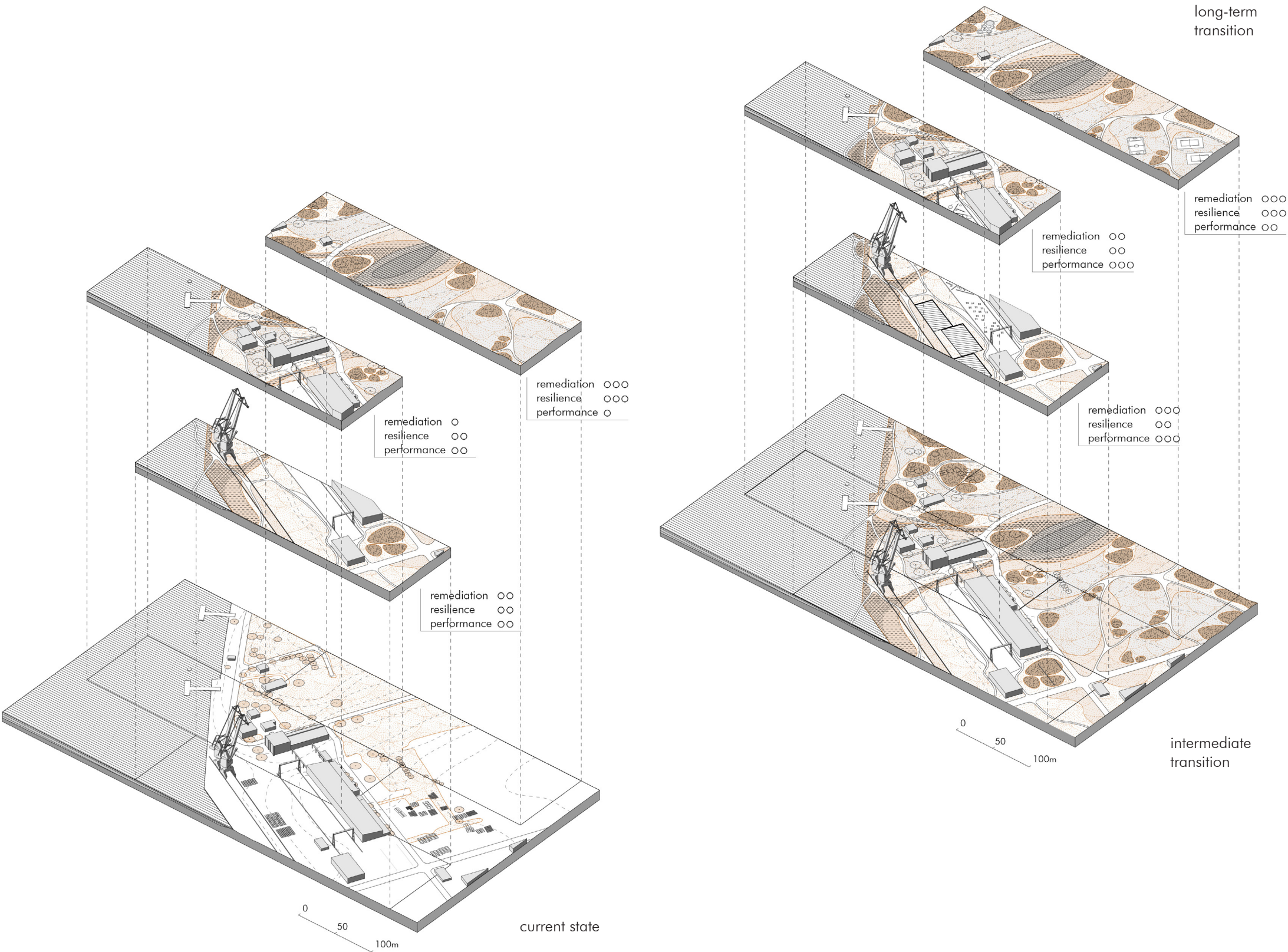
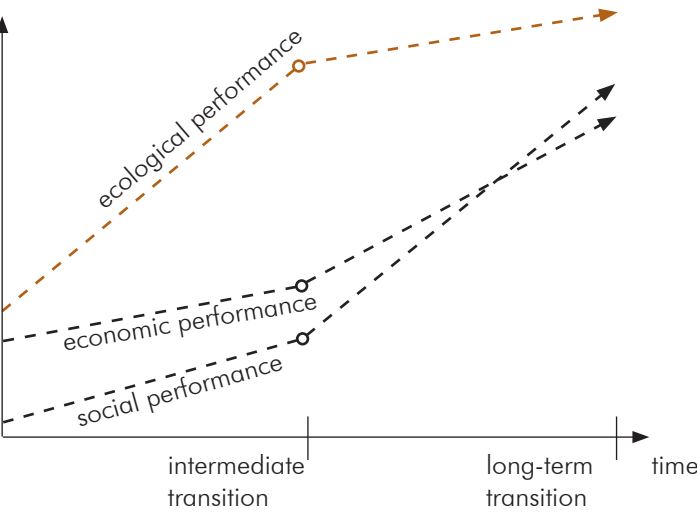
Conclusion | agricultural edge



Conclusion | post-industrial edge

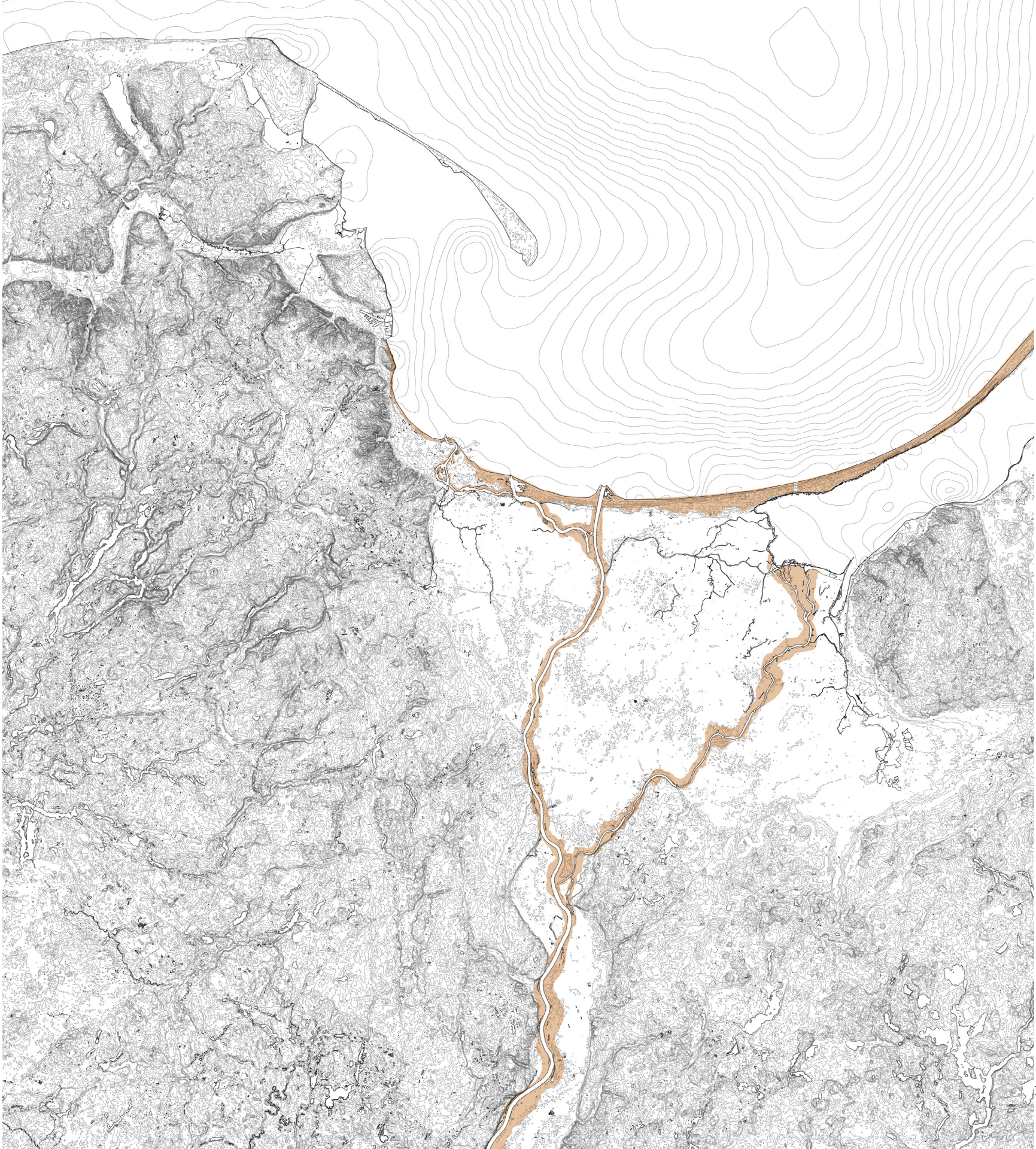


Conclusion | underutilized edge



Hydraulic performance
Location, depth and intensity of pollution

Awareness of benefits of landscape design
and regenerative practices
Long-sightedness in decision making





Thank you!