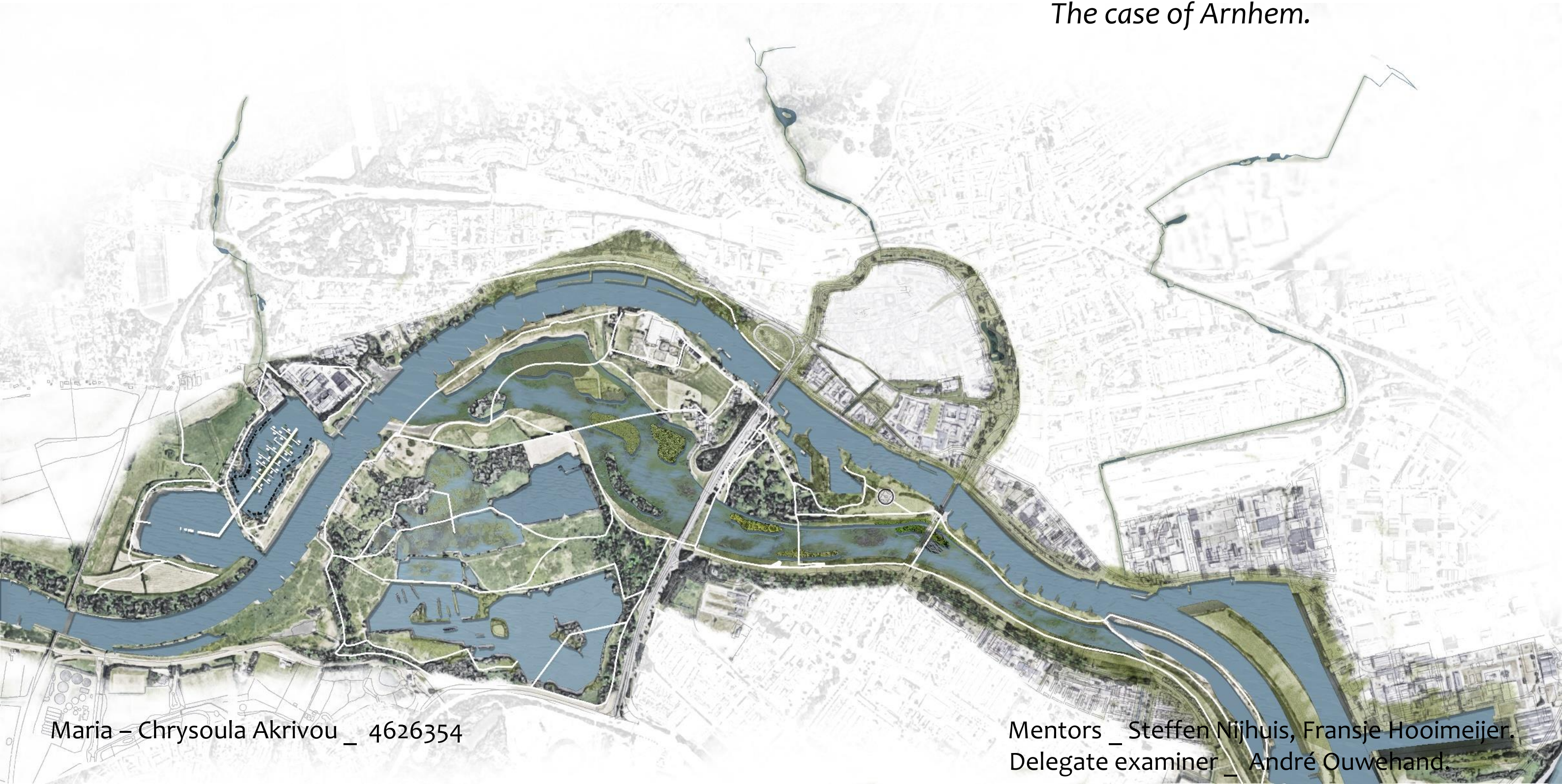


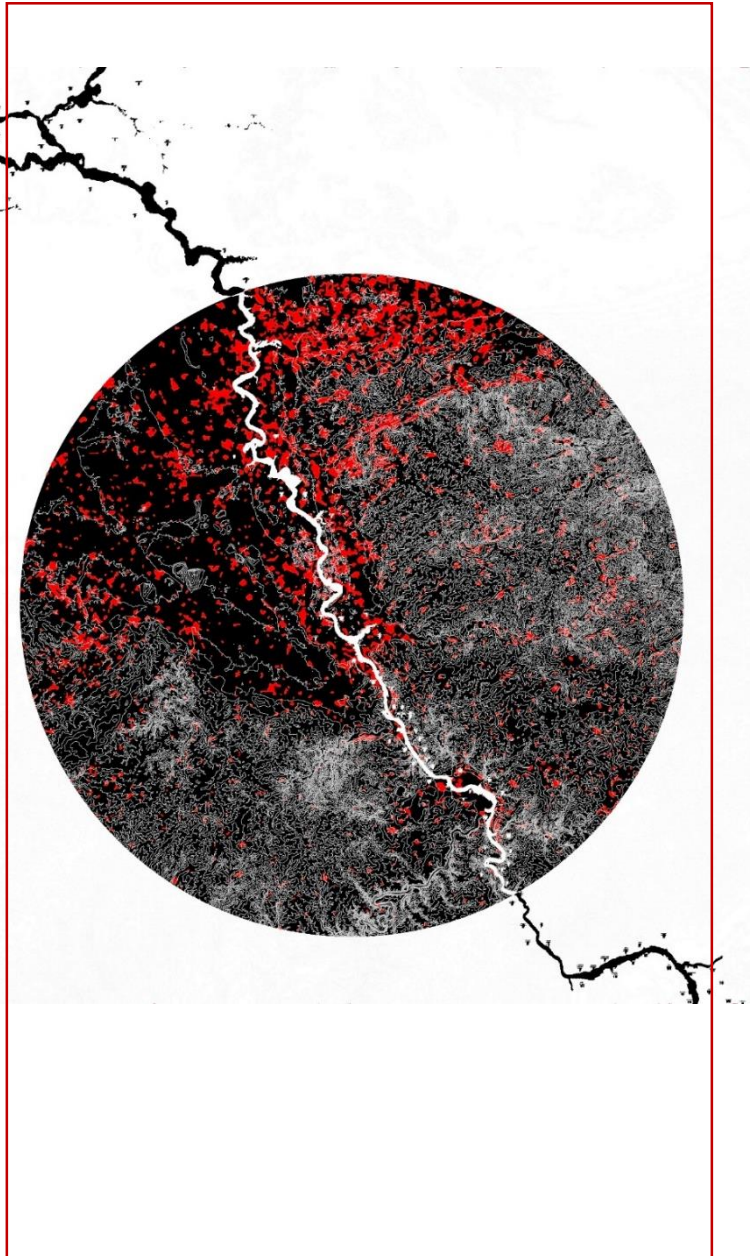
## **Riverscapes** \_ a dialogue between Rhine and cityscapes.

*The case of Arnhem.*

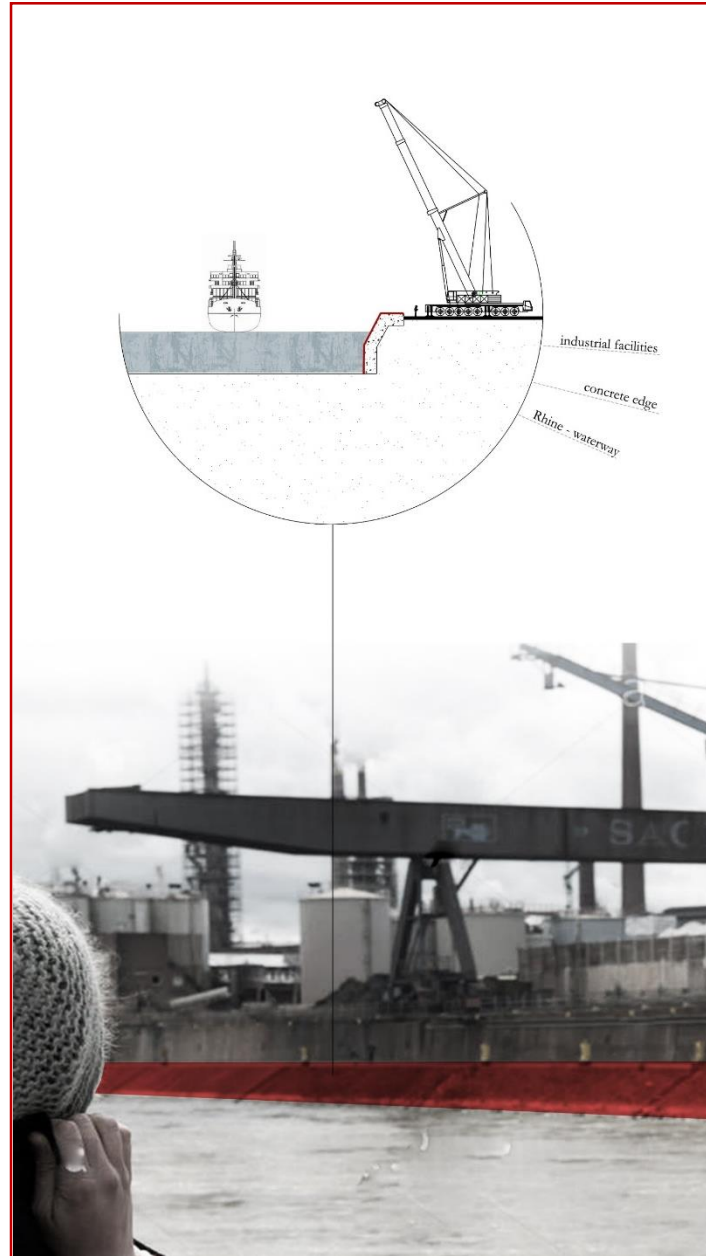


# THE STRUCTURE

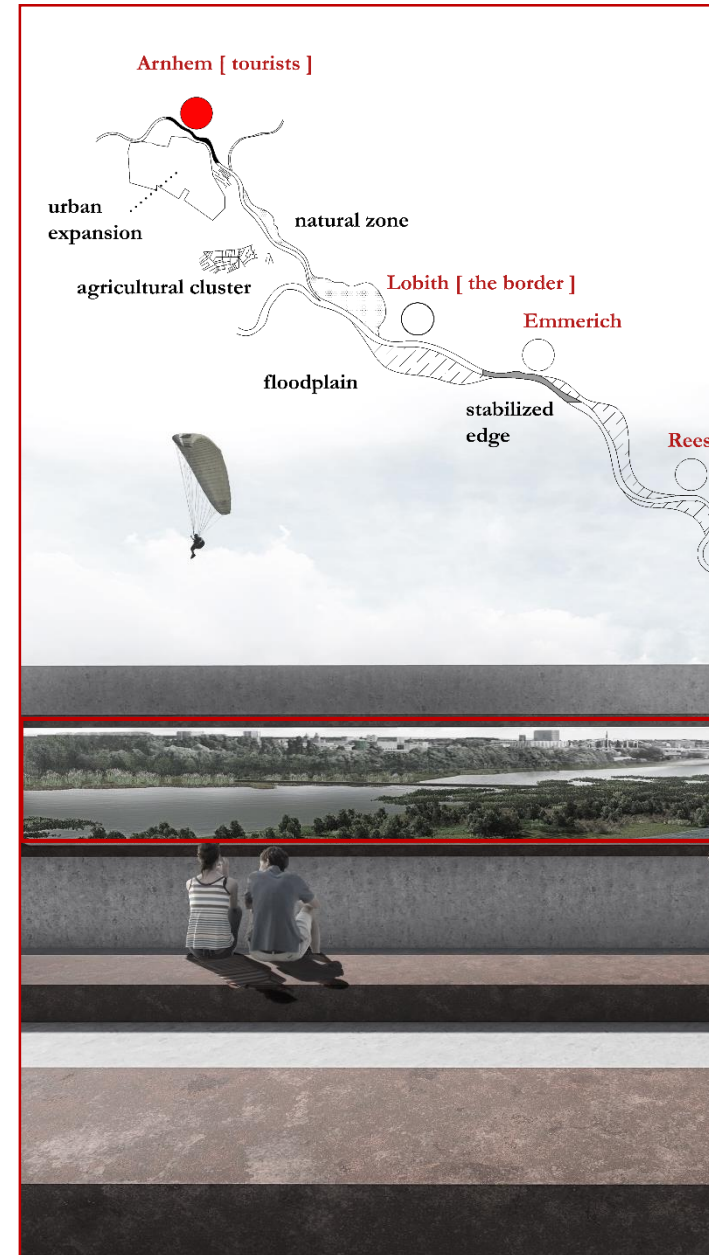
## \_Fascination.



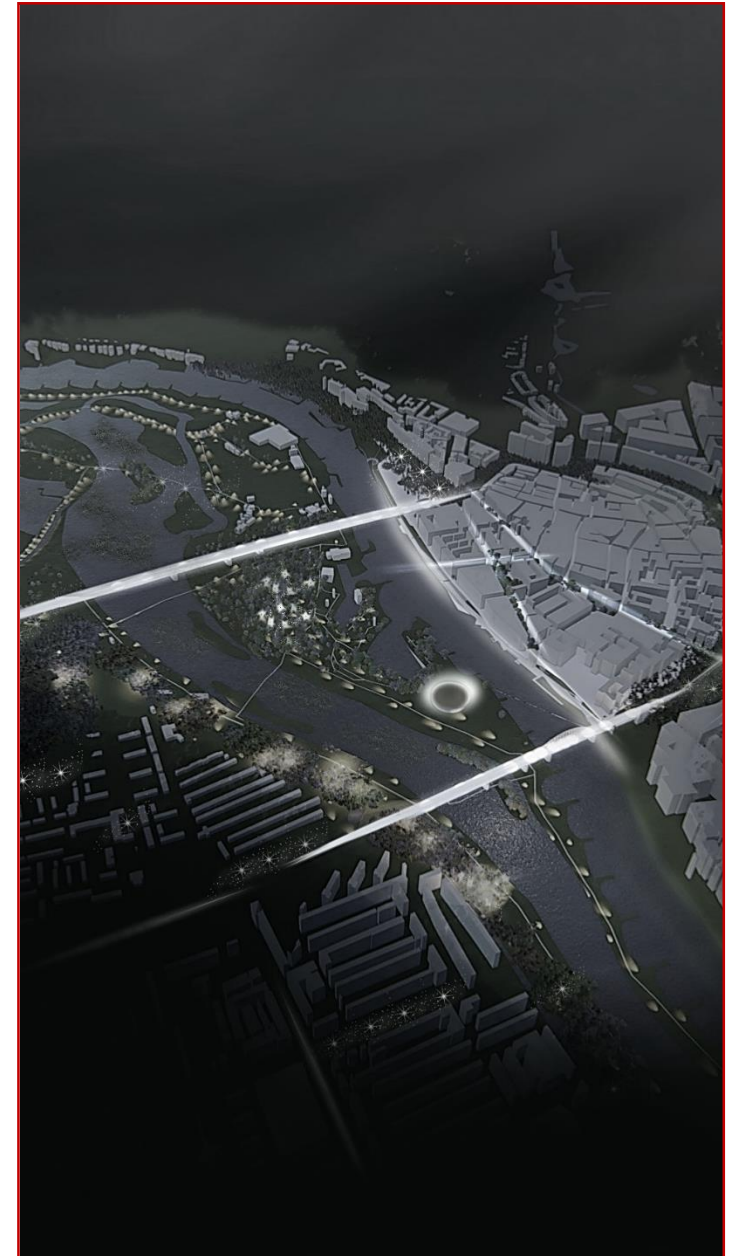
## \_The symptom.



## \_Arnhem's riverscape.



## \_Reflection.



*\_What is a riverscape ?*



Mýrdalssandur, Iceland \_ Photo: Hjaltisifusson.

FASCINATION



Mýrdalssandur, Iceland \_ Photo: Hjaltisifusson.



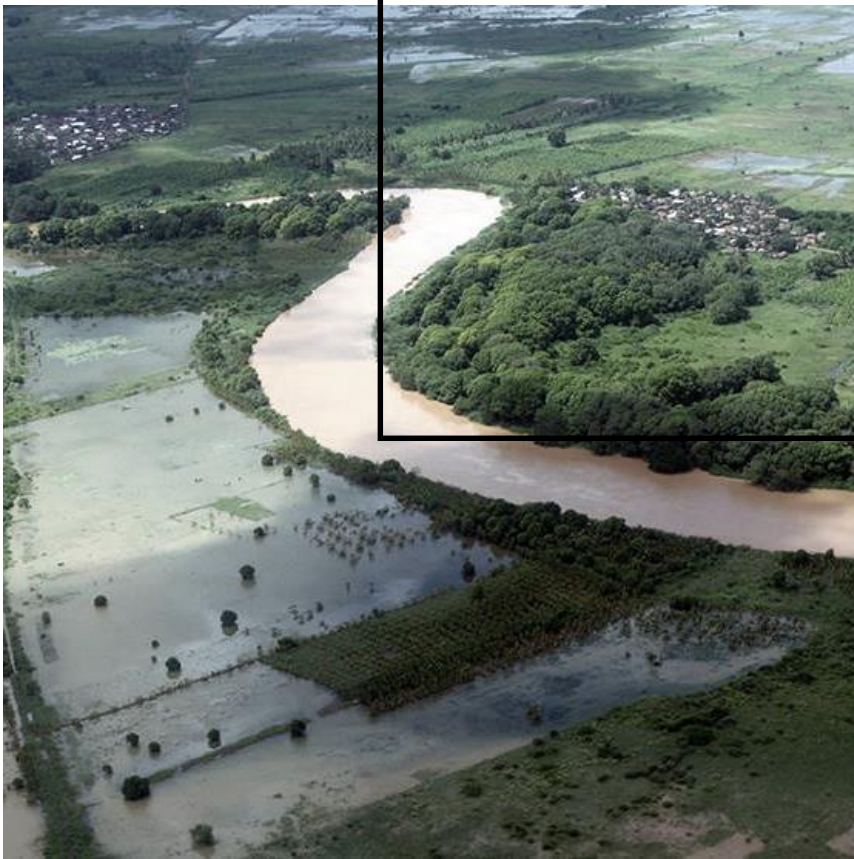
Near Canberra, Australia \_ Photo: Ian Waldie.



Helmand River, Afghanistan \_ Photo: Romeo Gacad.



Oder River, Ratzdorf, Germany \_ Photo: Patrick Pleul.



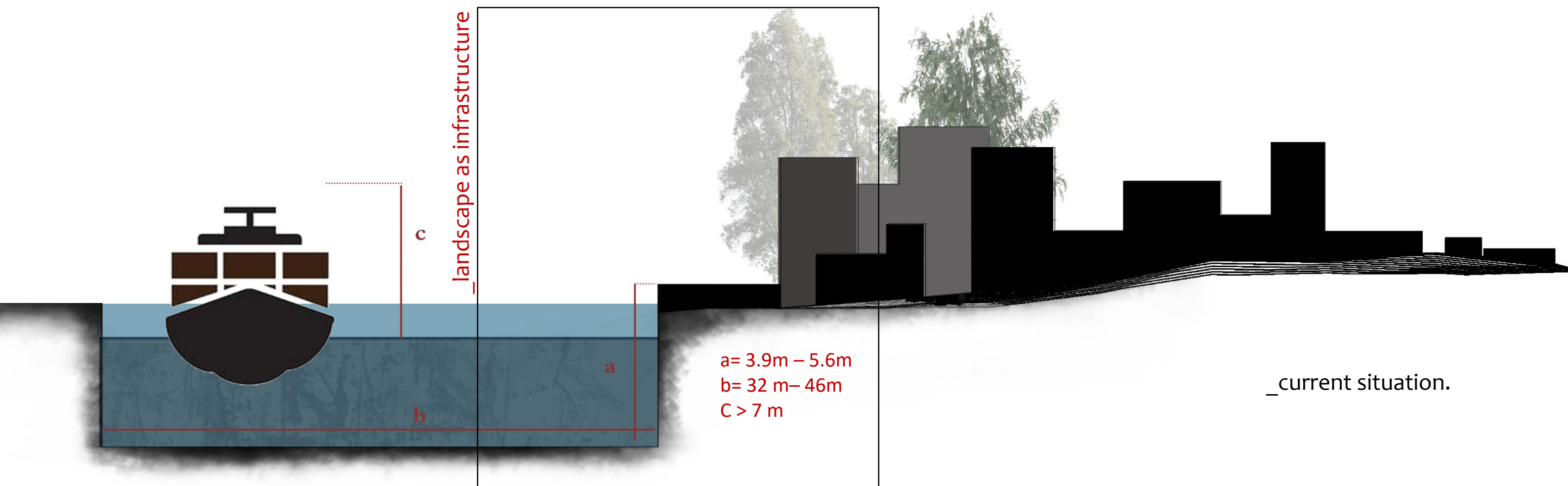
Jamame, Somalia \_ Photo: Stephen Morrison/AFP.



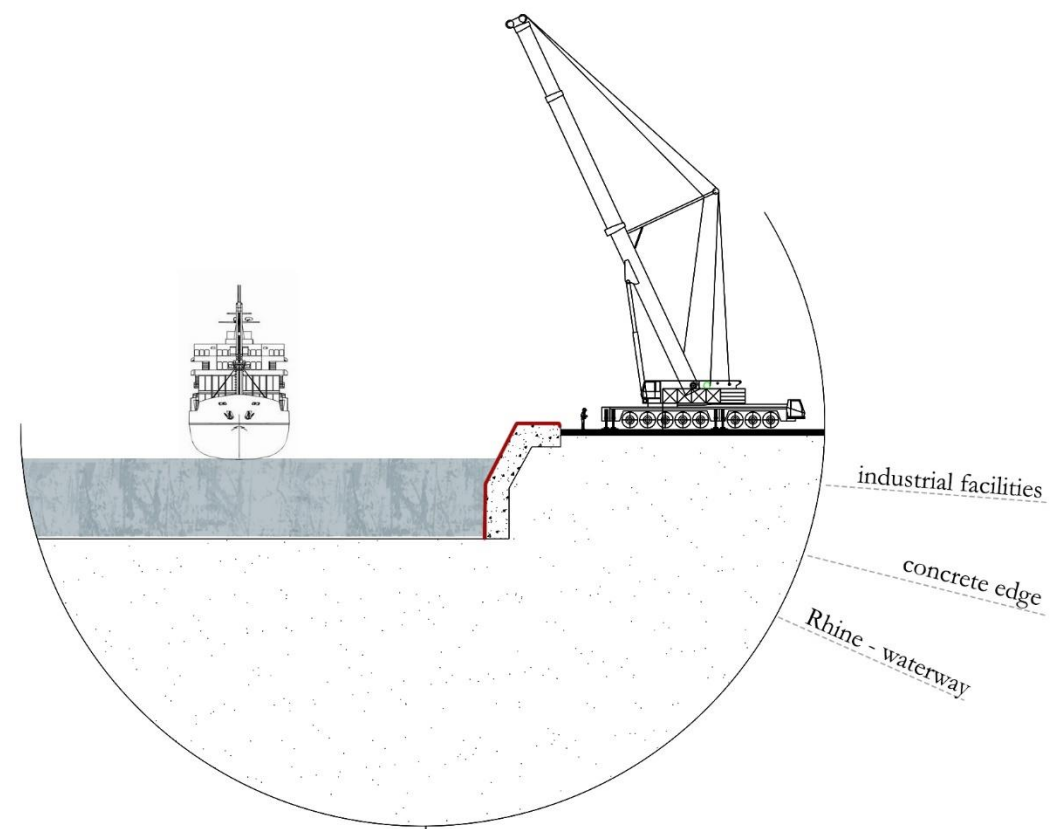
River Ebro, Zaragoza, Spain \_ Photo: Xurxo Lobato.

## THE SYMPTOM

The relation between the **elements** of the **riverscapes** has changed.  
Cities ignore the rivers as elements of a highly dynamic ecological system,  
development corridors and places of social invention and have already transformed them  
into urbanized landscapes and transport routes.



# THE SYMPTOM



# BECOMING A RIVERSCAPE AGAIN



Photo: <http://www.in-situ.fr/#/projets/berges-rives/les-berges-nord-de-lile>.

Nantes, France, In situ Architectural office.

## RESEARCH OBJECTIVE & QUESTIONS

The development of design principles to **re-activate relations** and **interactions** between the elements of the riverscapes, emphasizing on the rivers treated as waterways that should be **experienced** as zones of processes and gradients interacting with the urban fabric and not as lines of infrastructure.

### Questions

- 1 \_ What are the **potentials** and **restrictions** of the spatial context of the rivers - waterways in relation with the urban fabric and how has the current situation been formed?
- 2 \_ What are the **design principles** that could be developed and applied in order to re-introduce the waterway in the riverscape landscape in relation with the urban fabric?
- 3 \_ How can the **dynamics** and the **processes** of the riverscapes' ecosystem enhance the potentials of the design process ?
- 4 \_ Was the **goal** of this research **achieved** and how could it be beneficial in all scales, from local to regional ?

## SELECTED SITE

**Rhine River** - Rhein, Rijn, Rhin, Rain, Reno.

**Source:** Mountain brooks in the Swiss Alps.

**Outflow:** North Sea.

**Countries:** Italy, Switzerland, Liechtenstein, Austria, Germany, France, Netherlands.

**Length:** 1.232 km.

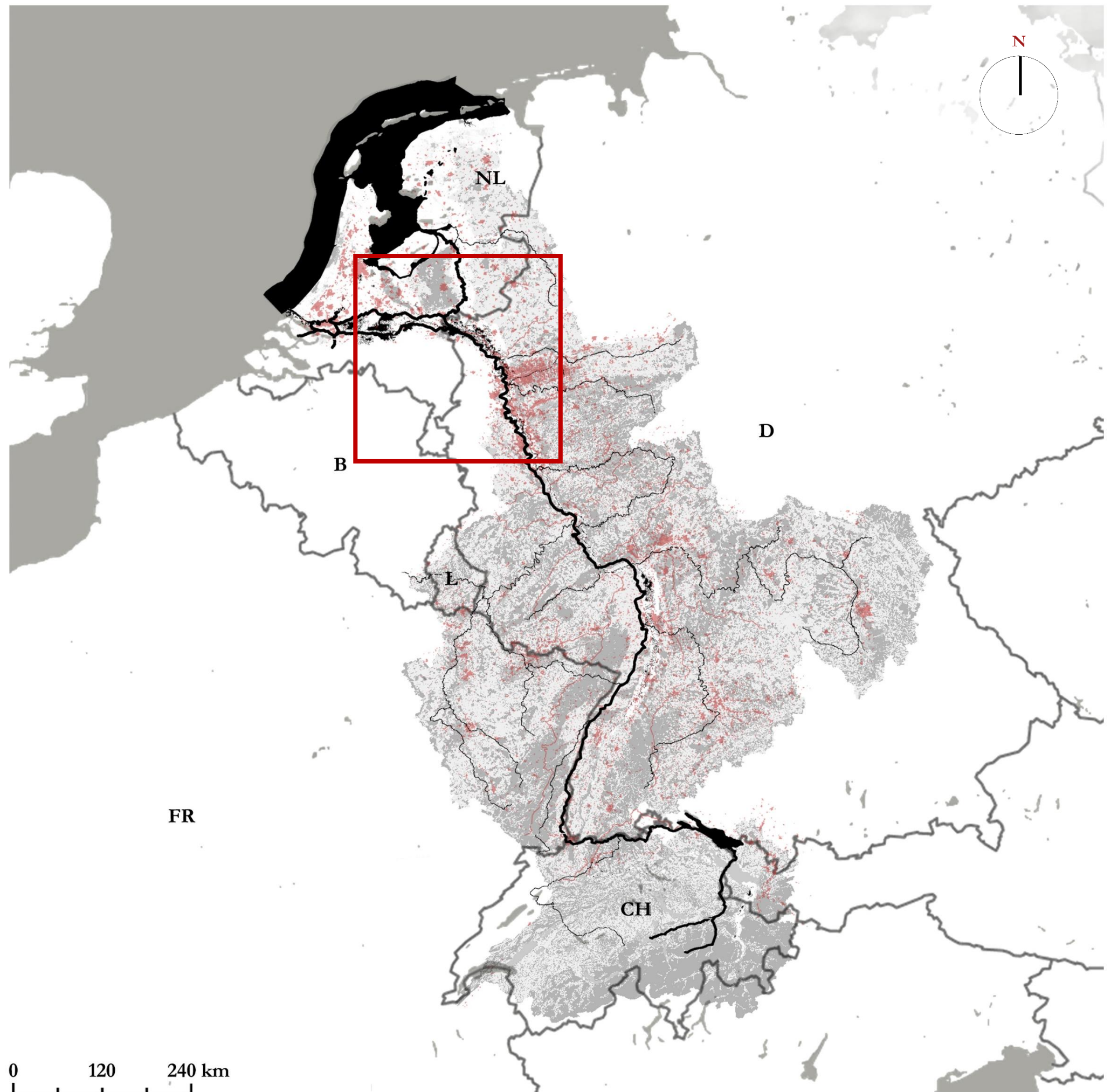
\_ Culturally and historically one of the **great** rivers of the Europe.

\_ Among the most important arteries of **industrial transport** in the world.

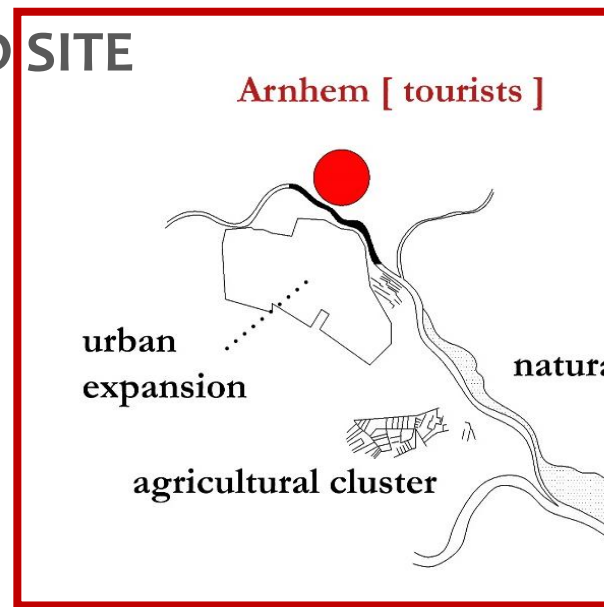
\_ A **constantly changing** system affected by natural and manmade processes.

\_ Anthropogenic transformations of the Rhine flood plains in the 19th and 20th century have turned the perception of the river changed from being **dynamic** to being **controllable**.

\_ The landscape along Rhine presents **two faces**, one historically charged and the other formed by industrial development. (Holzer, 2008).



## SELECTED SITE



Arnhem [ tourists ]

urban  
expansion

natural zone

agricultural cluster

floodplain

Lobith [ the border ]

Emmerich

stabilized  
edge




Rees

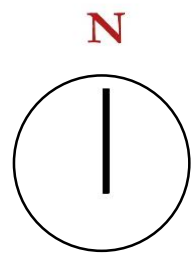
water bodies

Wesel

canalized  
river

agricultural pattern

-  urban clusters
-  canalized river parts
-  stabilized river parts



agricultural  
pattern

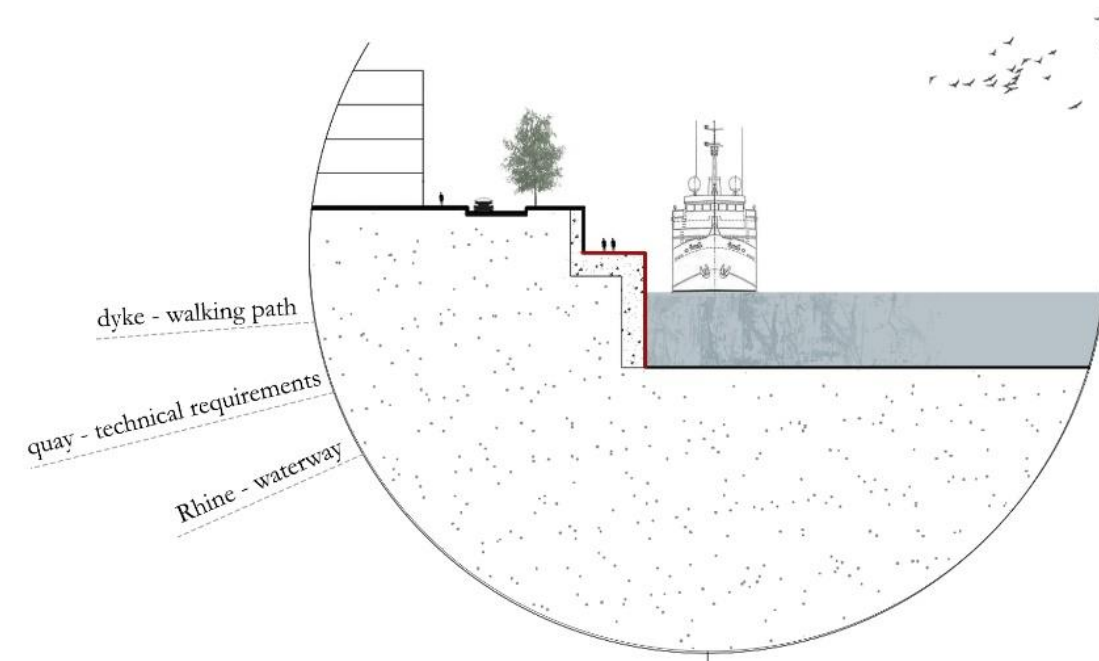
urban  
expansion

Duisburg [ the port ]

floodplain  
forest

\_ the Lower and Delta Rhine's riverscape system.

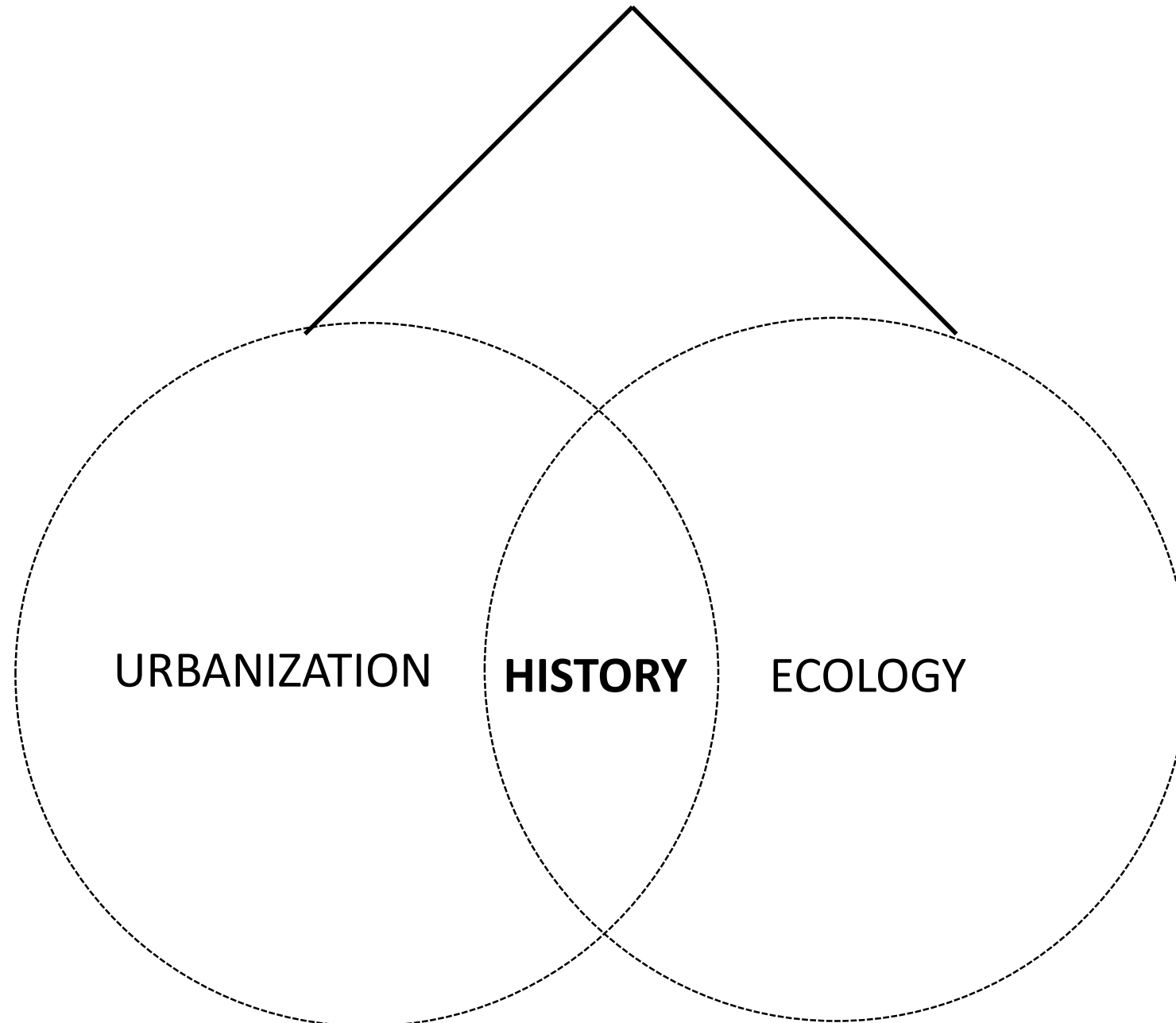
# THE ARNHEM'S RIVERSCAPE



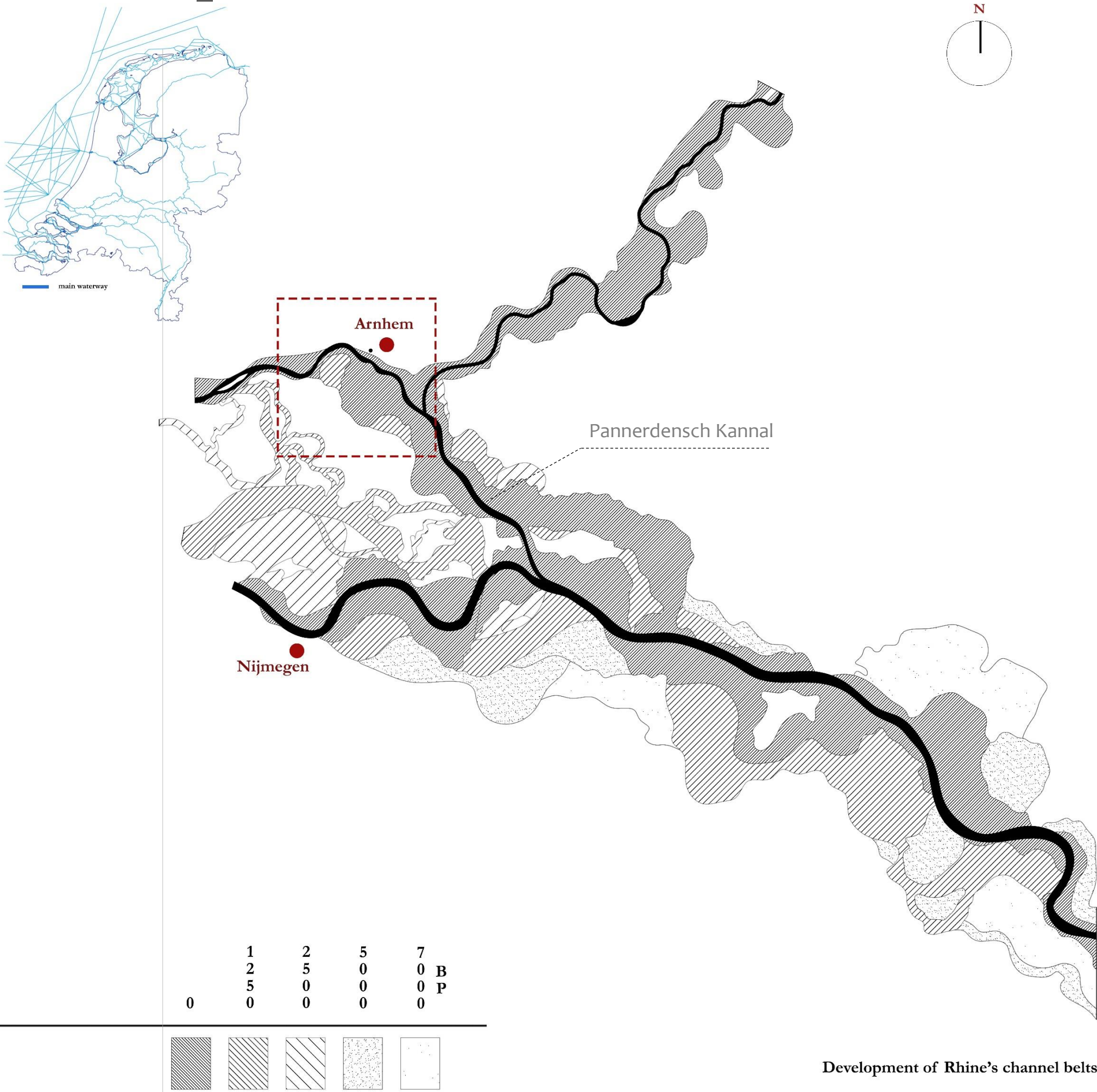
## ARNHEM'S RIVERSCAPE



understanding the system

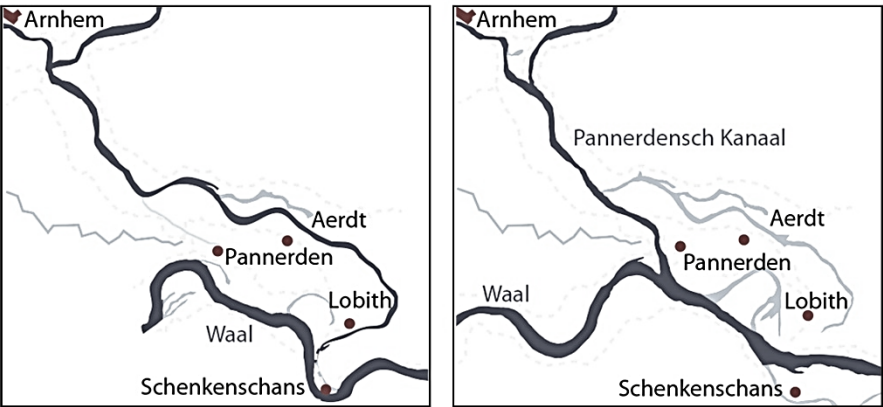


ANALYSIS \_ ARNHEM’S RIVERSCAPE



51°59'N 5°55'E  
Nederriijn \_ Netherlands

- \_ Average drain : 400 m3/sec.
- \_ Sediment : 0.5 Mton/j.
- \_ Meandered shape.
- \_ Water levels: 600 – 980 cm



Pannerdensch Kanaal

Development of Rhine’s channel belts

# ANALYSIS \_ ARNHEM'S RIVERSCAPE



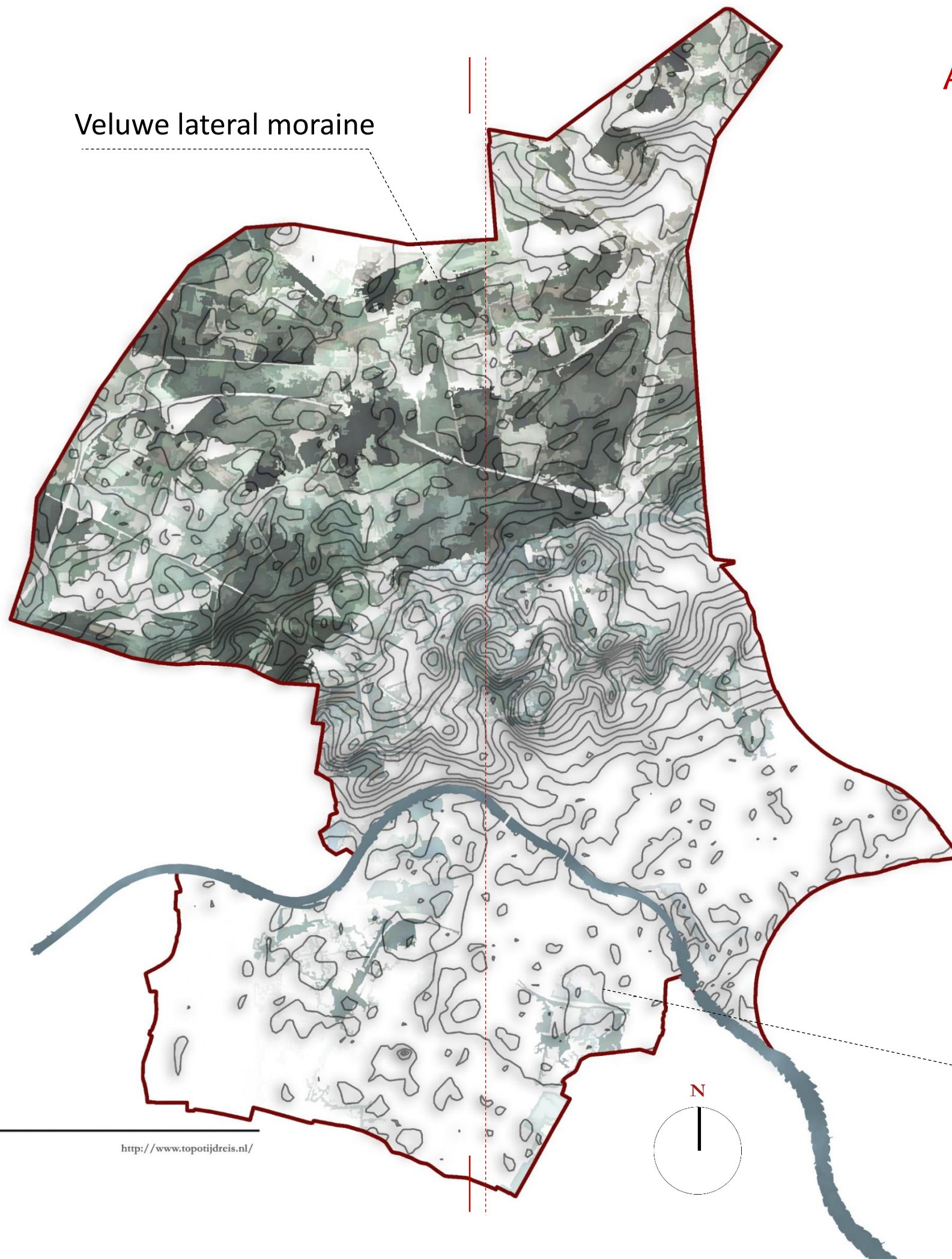
51°59'N 5°55'E

Arnhem's riverscape \_ Netherlands

Veluwe lateral moraine

\_ Situated on the **east** part of the Netherlands

\_ On **three very different landscapes**: The Veluwe lateral moraine, the river with water meadows and the Betuwe polder area.



Betuwe polder area

Arnhem's riverscape

<http://www.topotijdreis.nl/>



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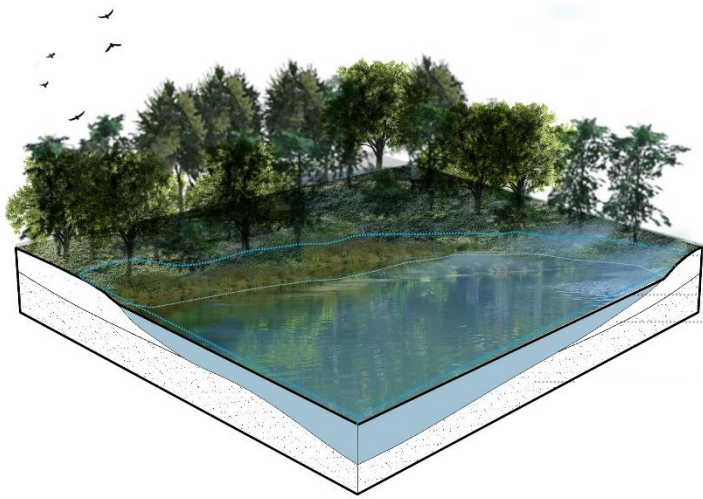
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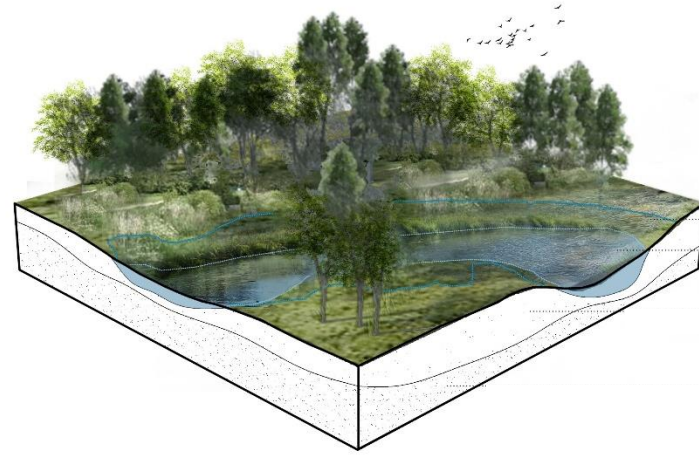
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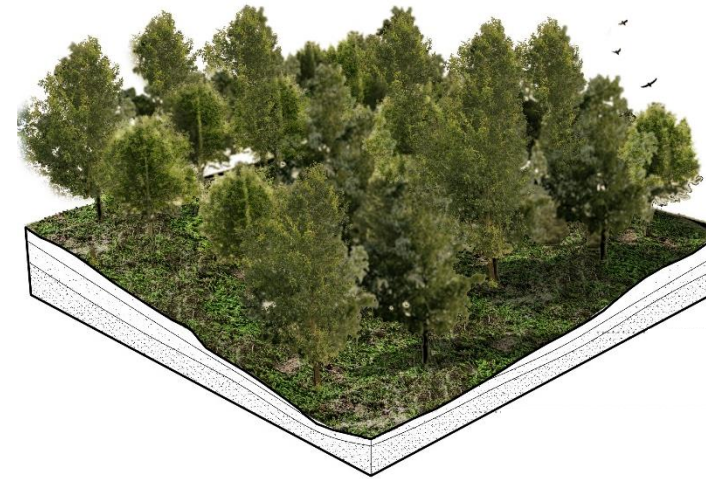
# ANALYSIS\_HABITATS



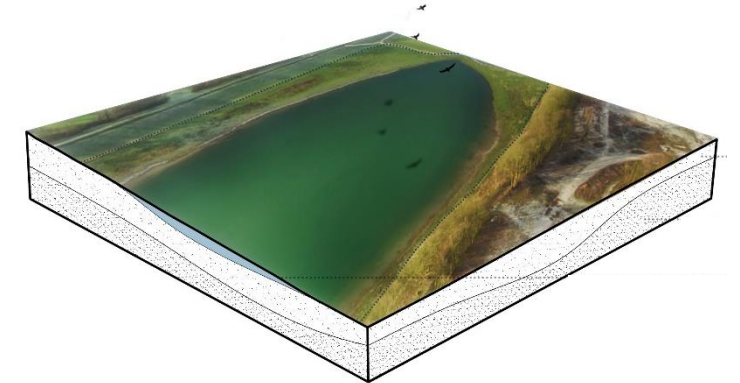
Floodplain forest.



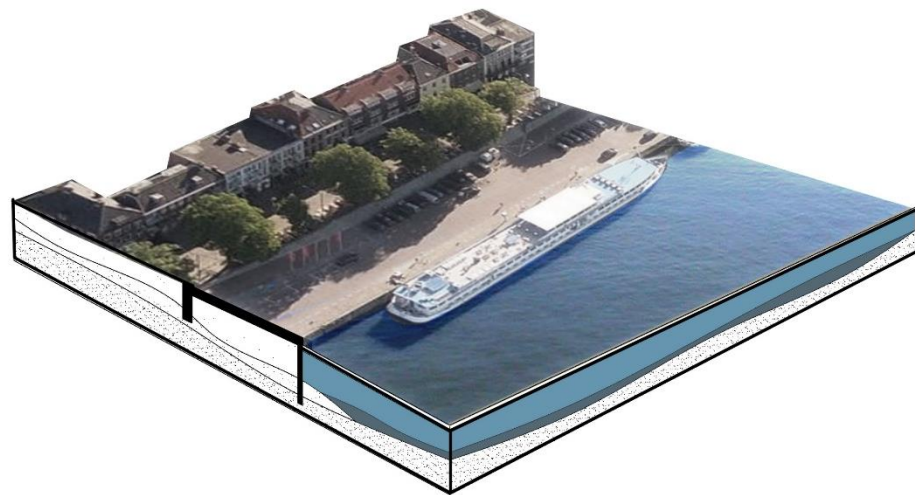
Alluvial alder ash forest.



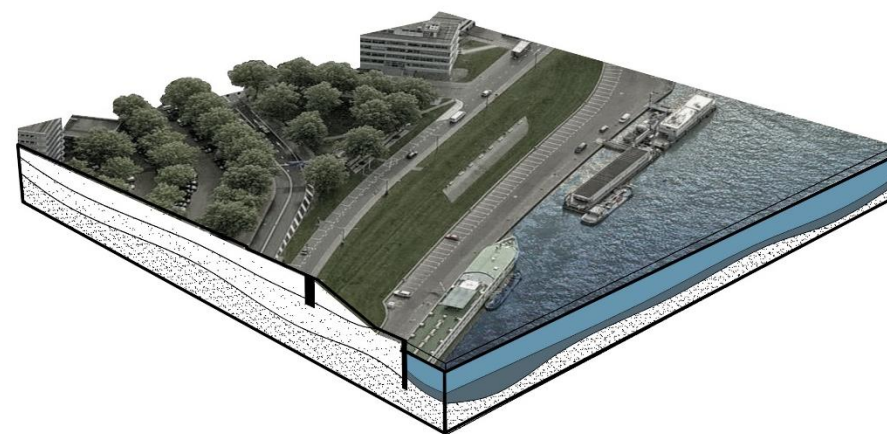
Oak beech forest.



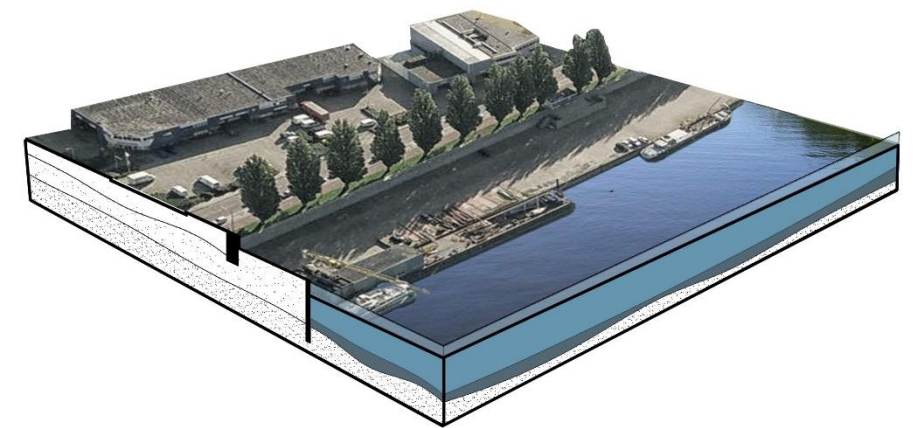
Riverine wetlands.



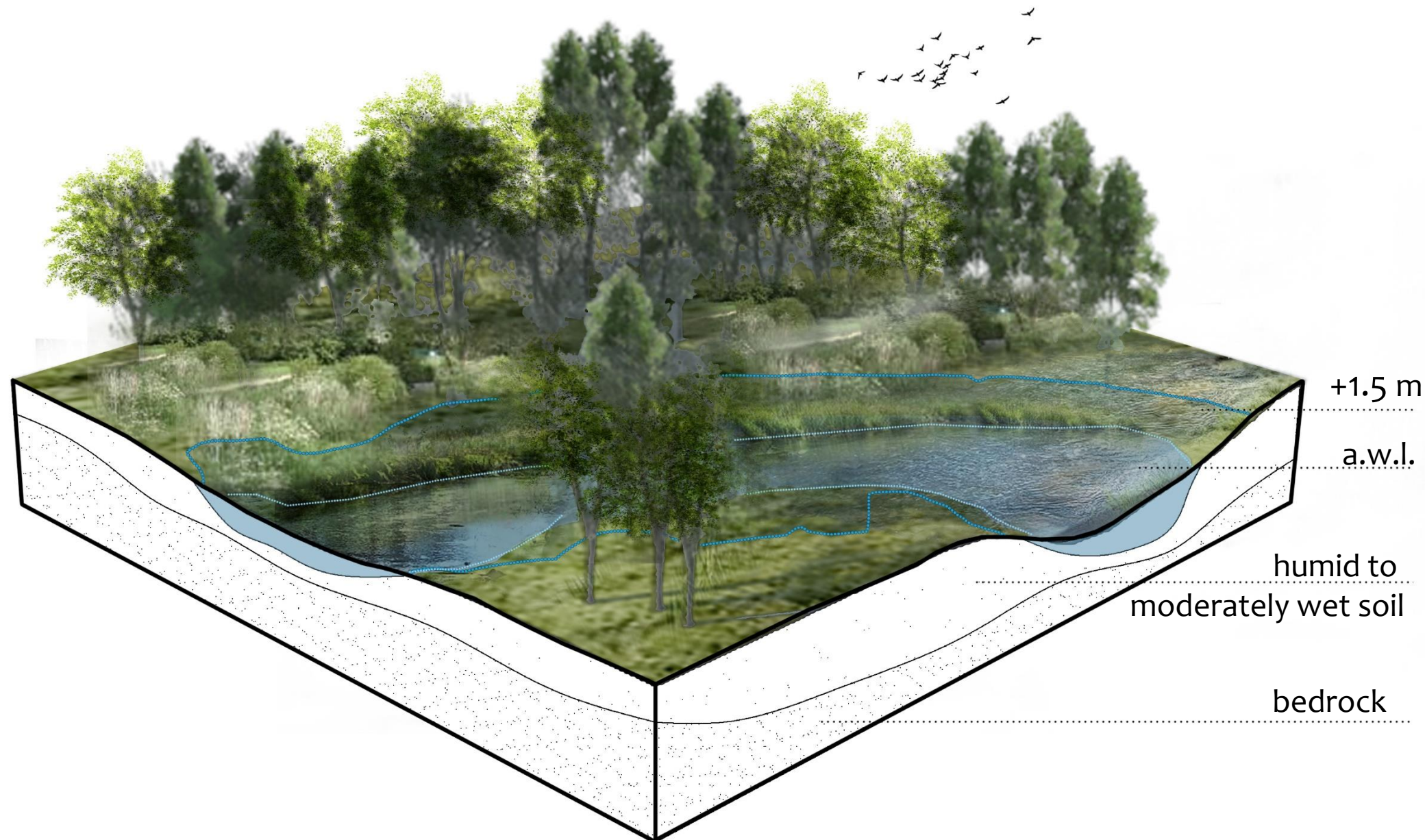
Industrial facilities.



Public space – infrastructure.



Promenade – Residential.



## Alluvial alder ash forest

\_ The name Pruno-Fraxinetum is derived from the scientific names of two important species within this association, the common bird cherry ( *Prunus padus* ) and the common ash ( *Fraxinus exelsior* )

\_ The location is moderately **humid to moderately wet**.

\_ **Floods** occur only to a **limited extent**, especially during the winter months and are always short-lived. During the spring the **soil is moist**, without being wet.

\_ The tree and shrub layer usually consists of **black** and **white alder**, **ash**, **hazel** and locally a number of **willow** species. In many places these forests have been planted with **poplar**, so that this is often the aspect determining tree species.

\_ Finally, is a high rising **deciduous** forest with a clear layering. The tree and shrub layer are well developed and species rich, the herb layer has many spring flowering plants , just like the oak **beech** forest . In the summer, **herbaceous herbs** often predominate. Also, **vines** are frequently present.

## ANALYSIS \_ NATURAL HABITAT



ANALYSIS \_ NATURAL HABITATS \_ CONCLUSIONS

Different relations between the river and the land can result to different landscape types.  
These relations will have a key role for the intervention at the riverscape of Nederrijn.

nutrient- poor soil



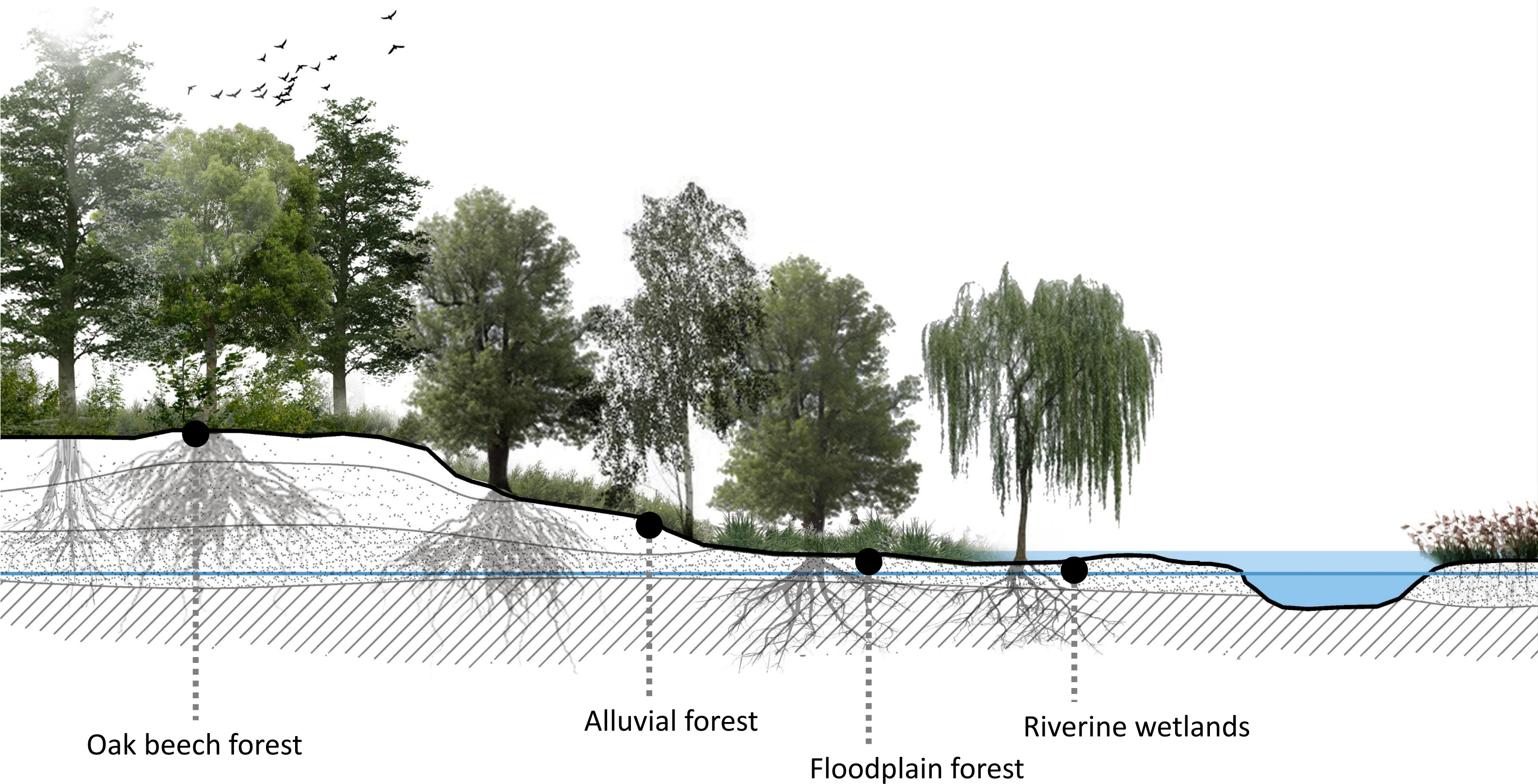
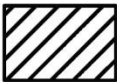
humid to moderately wet soil



soddy soil



bedrock



# ANALYSIS \_ URBAN HABITATS



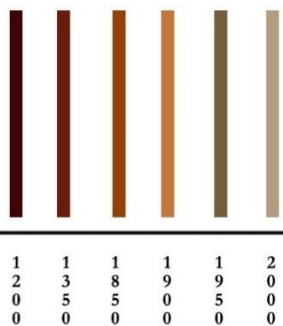
51°59'N 5°55'E

Arnhem \_ Netherlands

\_ In the course of the 12th century it developed into a small town.

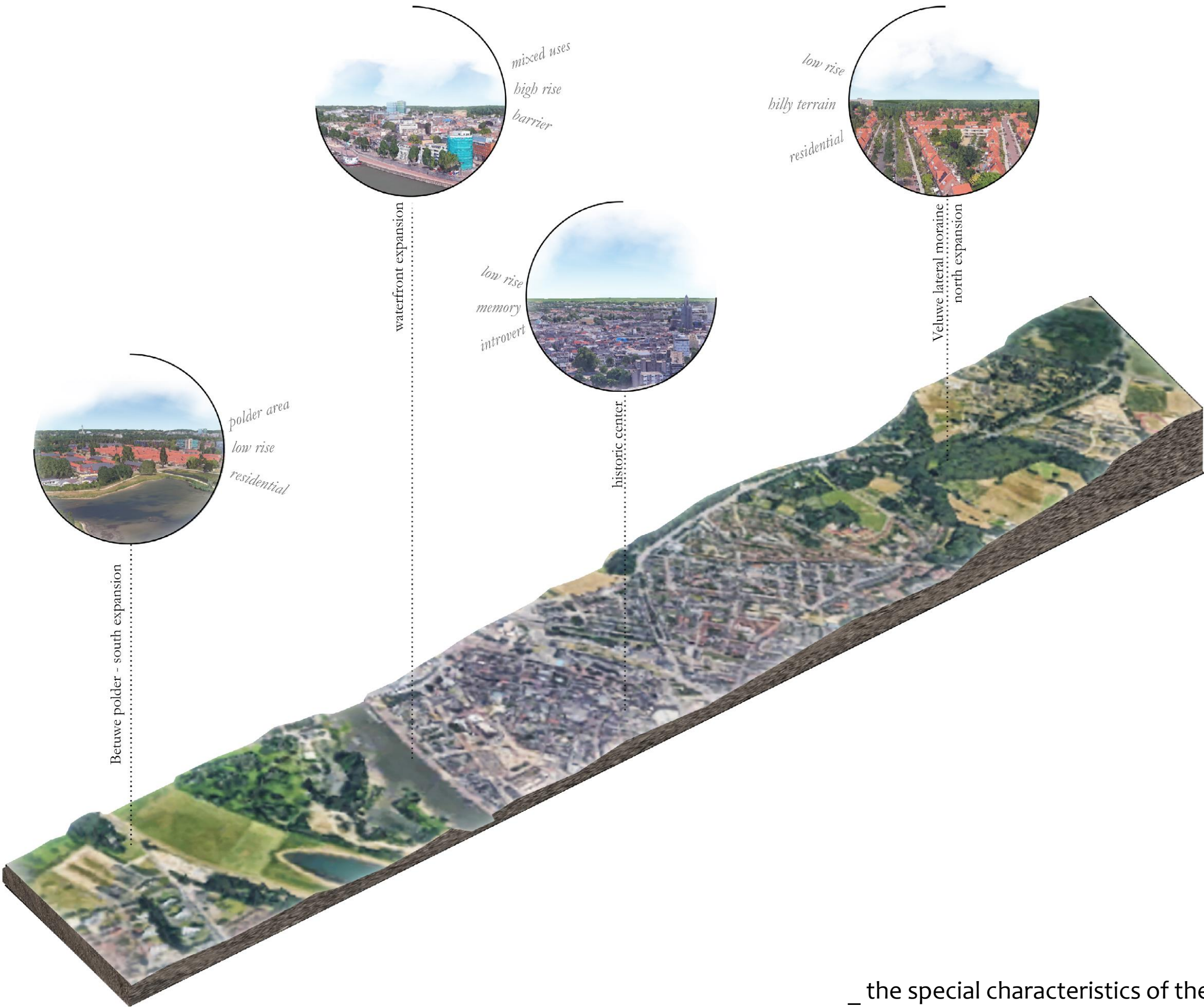
\_ The **14th till mid 19th** century were Arnhem's **heyday**.

\_ Arnhem, in the final decades of the 19th century presents north-west and north-east expansion.



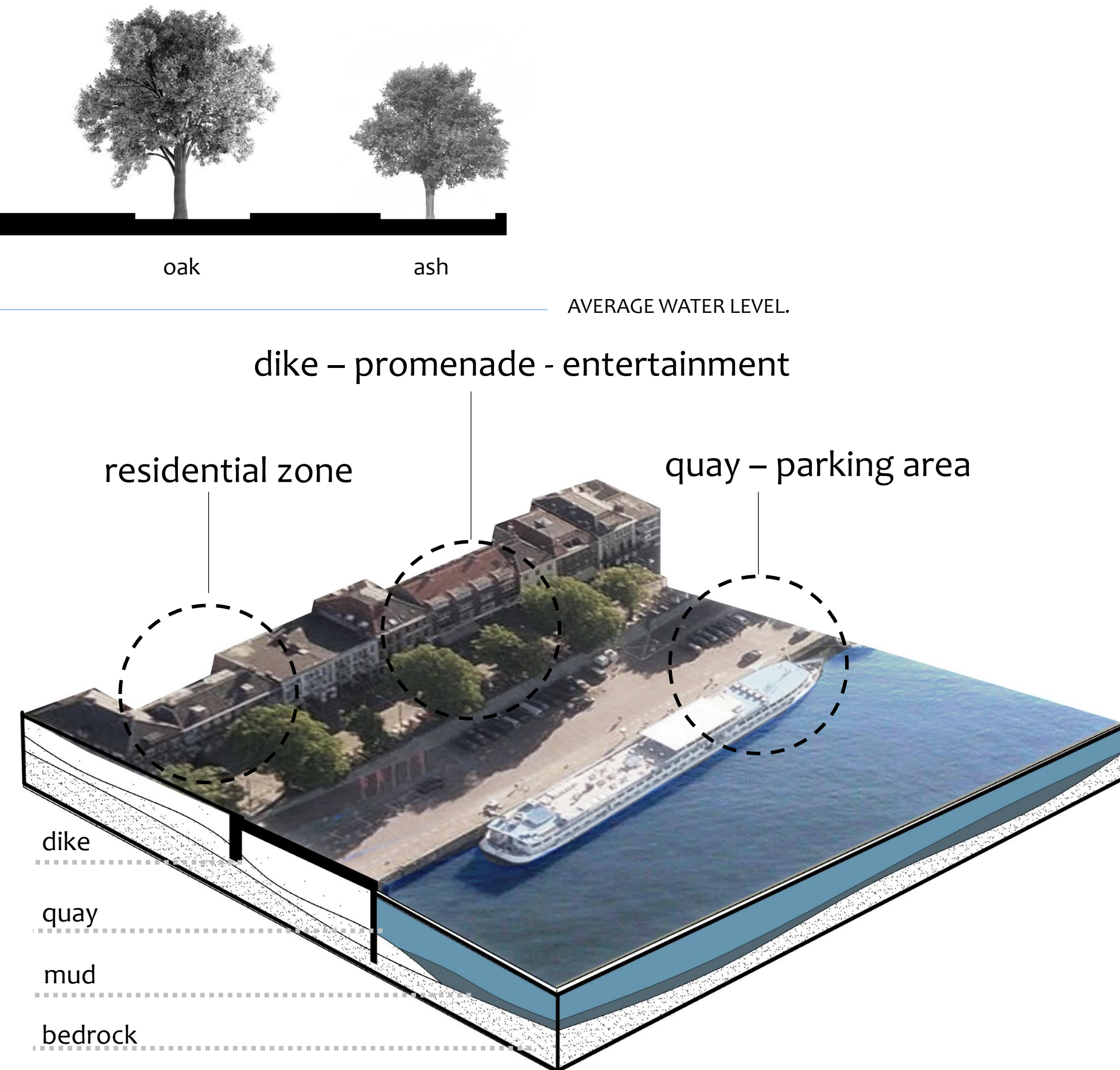
<http://www.topotijdreis.nl/>

ANALYSIS \_ARNHEM'S RIVERSCAPE



\_ the special characteristics of the riverscape system.

# ANALYSIS \_ URBAN HABITAT



## Promenade – Residential

\_ West side of the city, mostly related with **residential** and **commercial** uses.

\_ The **dyke** is the border transformed into a pedestrian zone.

\_ A **line** of trees indicates the level change at the edge.

\_ **Limited** connection with the water level.



edge



promenade



pavement

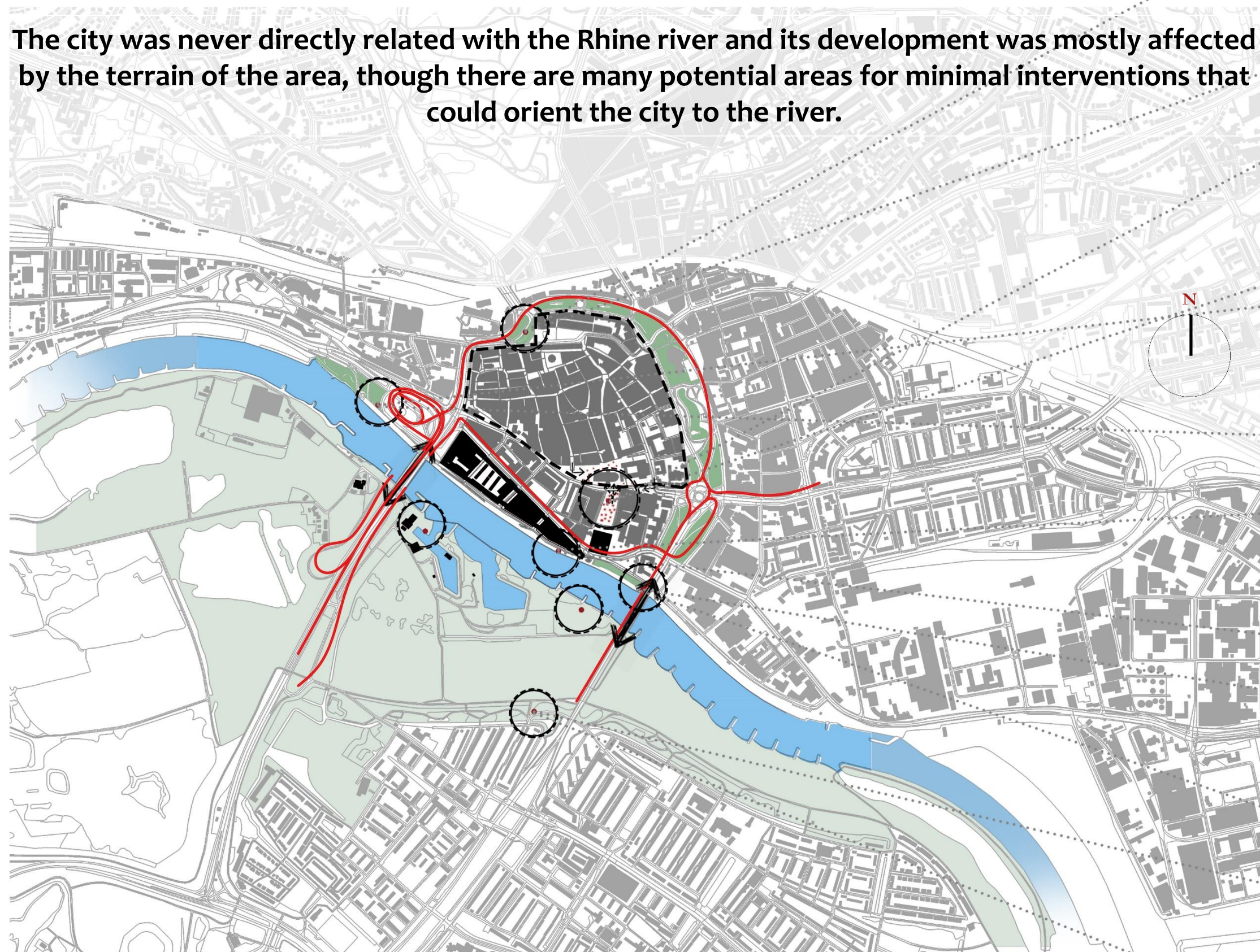
## ANALYSIS \_ URBAN HABITAT



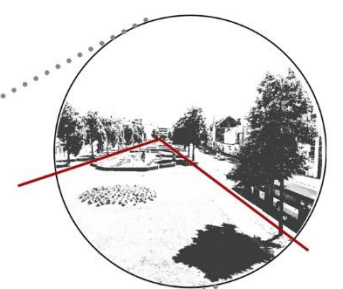
# ANALYSIS \_ URBAN HABITATS \_ MATERIALITY



The city was never directly related with the Rhine river and its development was mostly affected by the terrain of the area, though there are many potential areas for minimal interventions that could orient the city to the river.



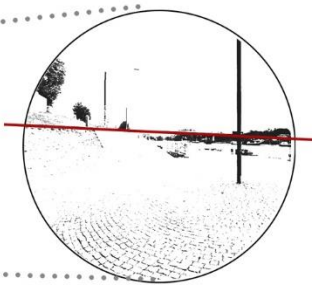
— Arnhem's conclusion map.



— fragments of nature



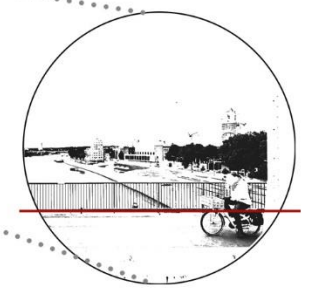
— remainings



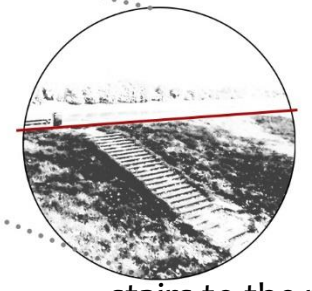
— at the edge



— following the flow



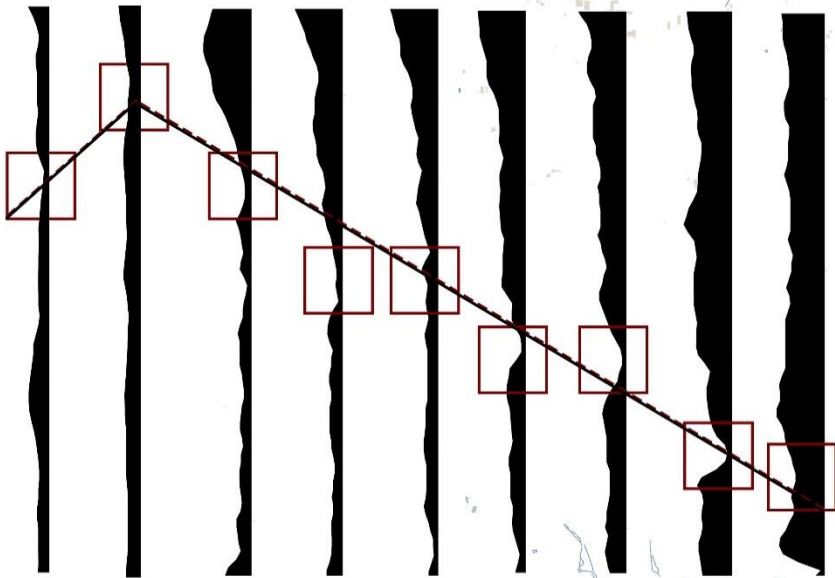
— crossing a landmark



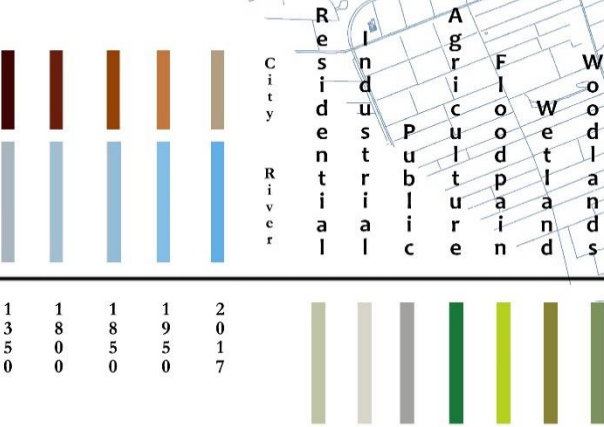
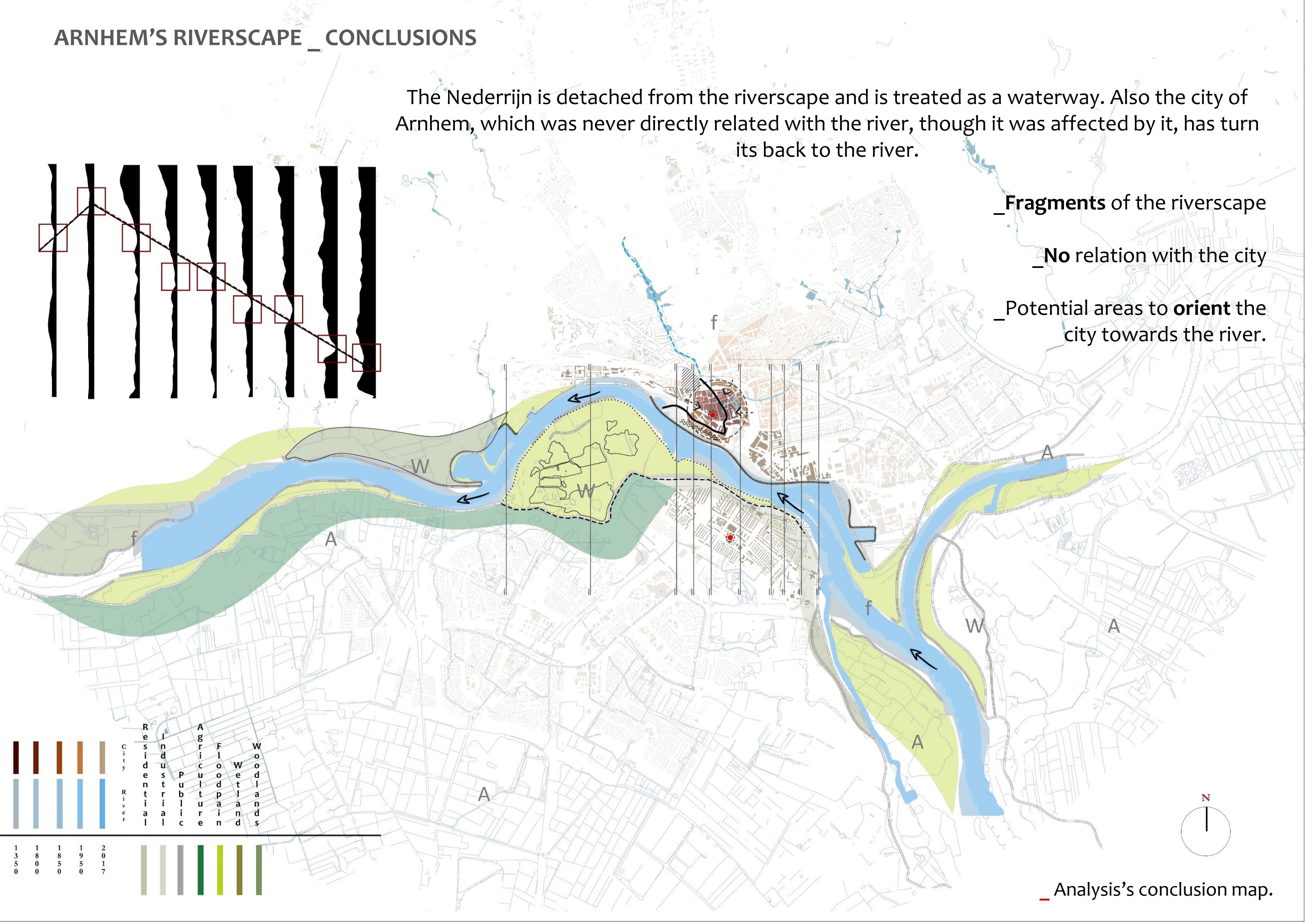
— stairs to the river

ARNHEM'S RIVERSCAPE \_ CONCLUSIONS

The Nederrijn is detached from the riverscape and is treated as a waterway. Also the city of Arnhem, which was never directly related with the river, though it was affected by it, has turn its back to the river.

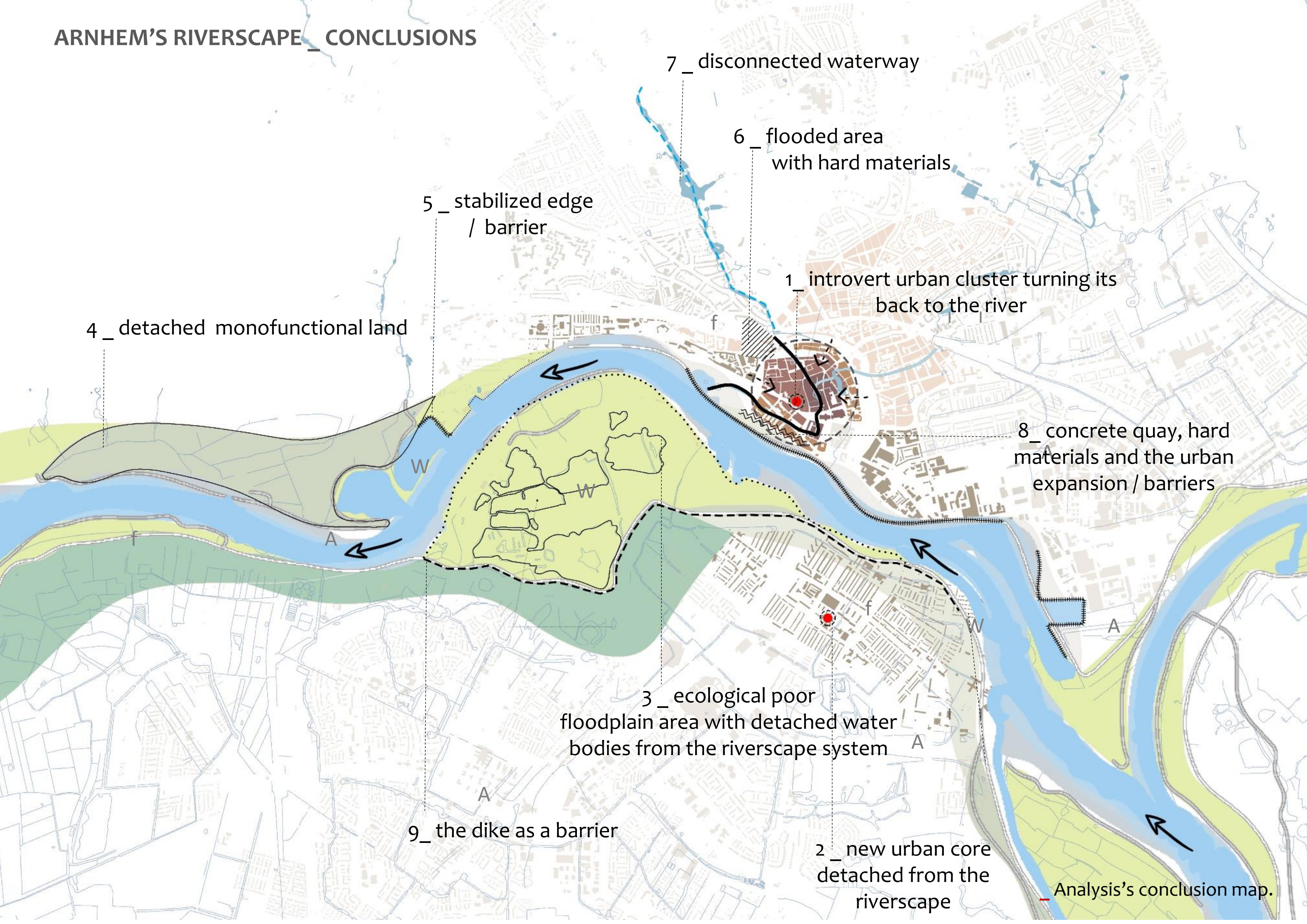


- \_Fragments of the riverscape
- \_No relation with the city
- \_Potential areas to **orient** the city towards the river.



\_ Analysis's conclusion map.

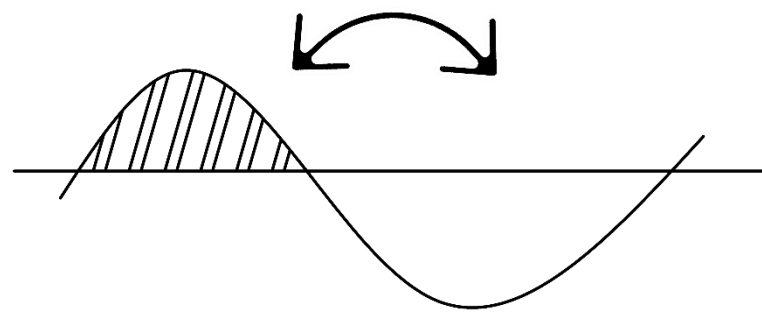
# ARNHEM'S RIVERSCAPE \_ CONCLUSIONS



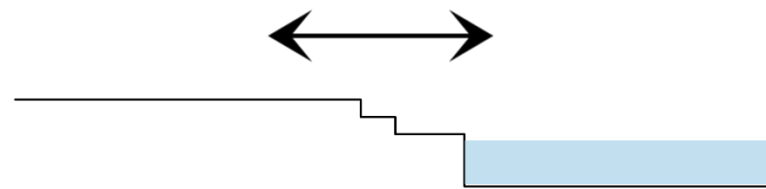
## DESIGN PRINCIPLES

The design principles should focus on the **connection** between the **fragments** of the riverscape, emphasizing in the connection between the city and the river, in relation with the **flows** of the water, the movement and the views.

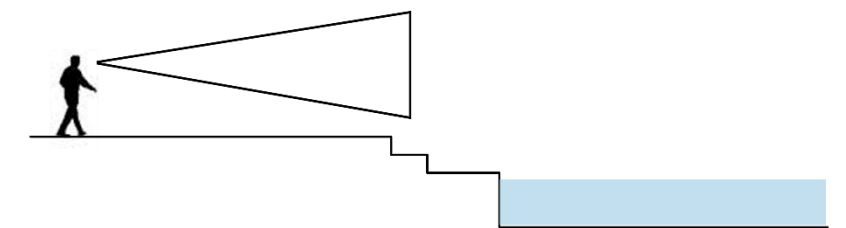
This connection could be physical, visual but also mental.



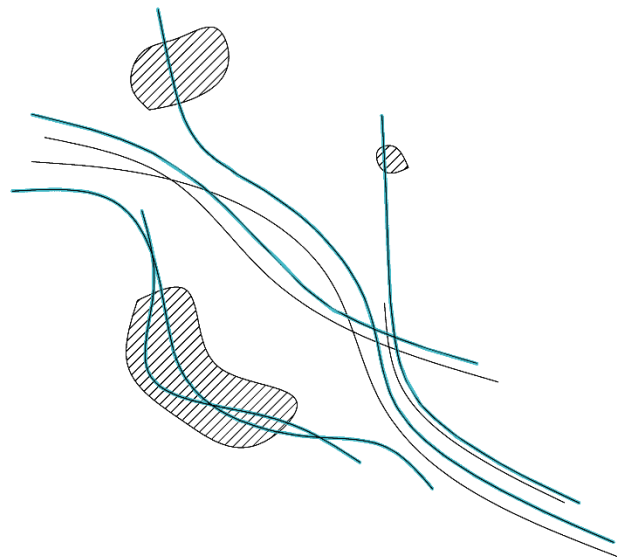
Cut & fill



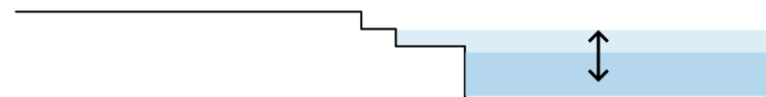
Enhance accessibility



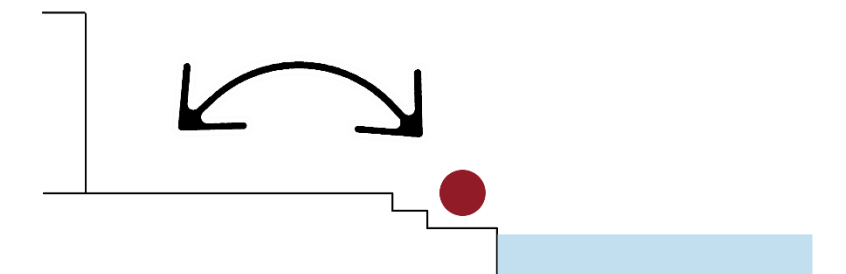
Visual and mental relation \_ Landmarks



Work with water flows

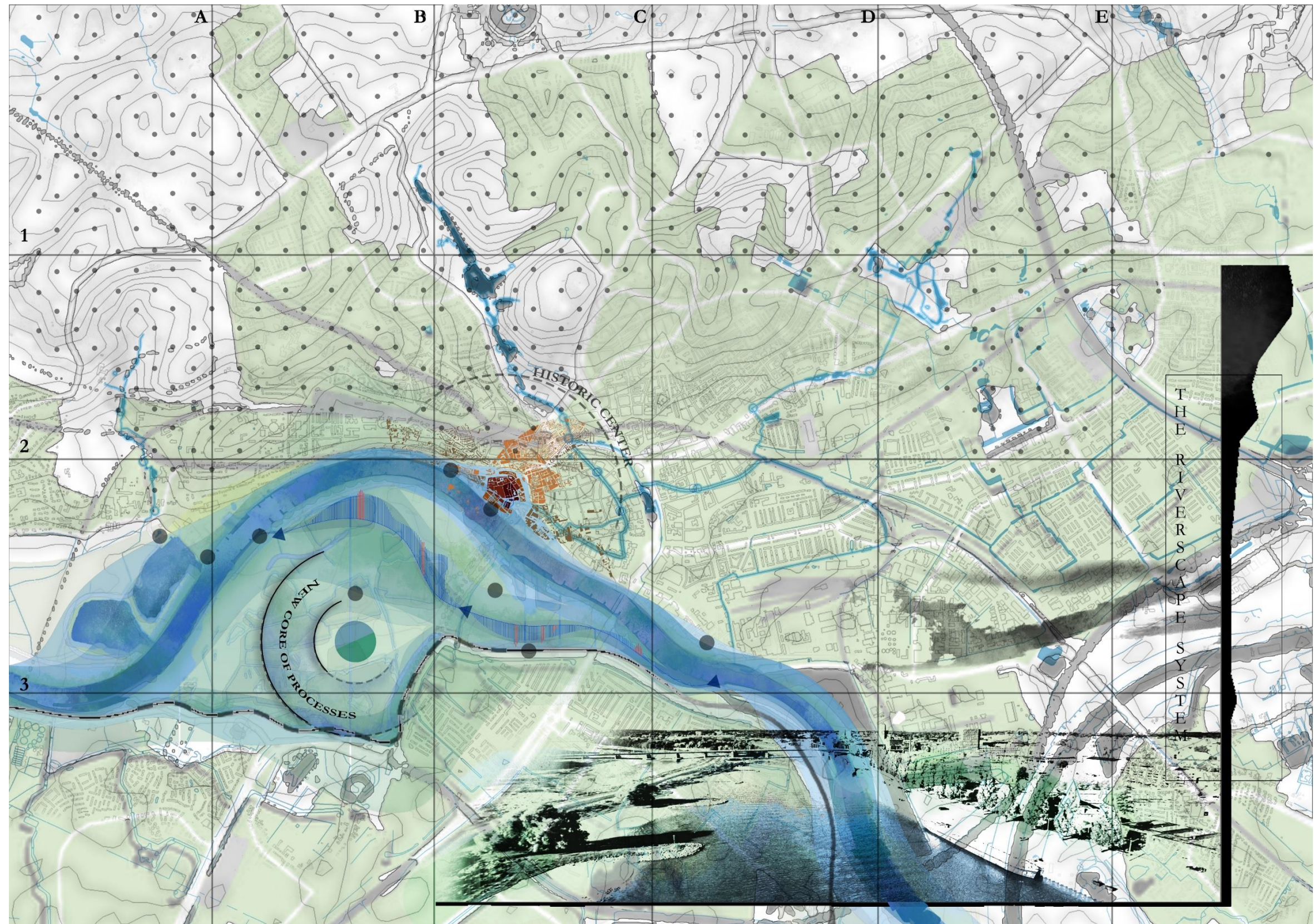


Reveal the natural processes.



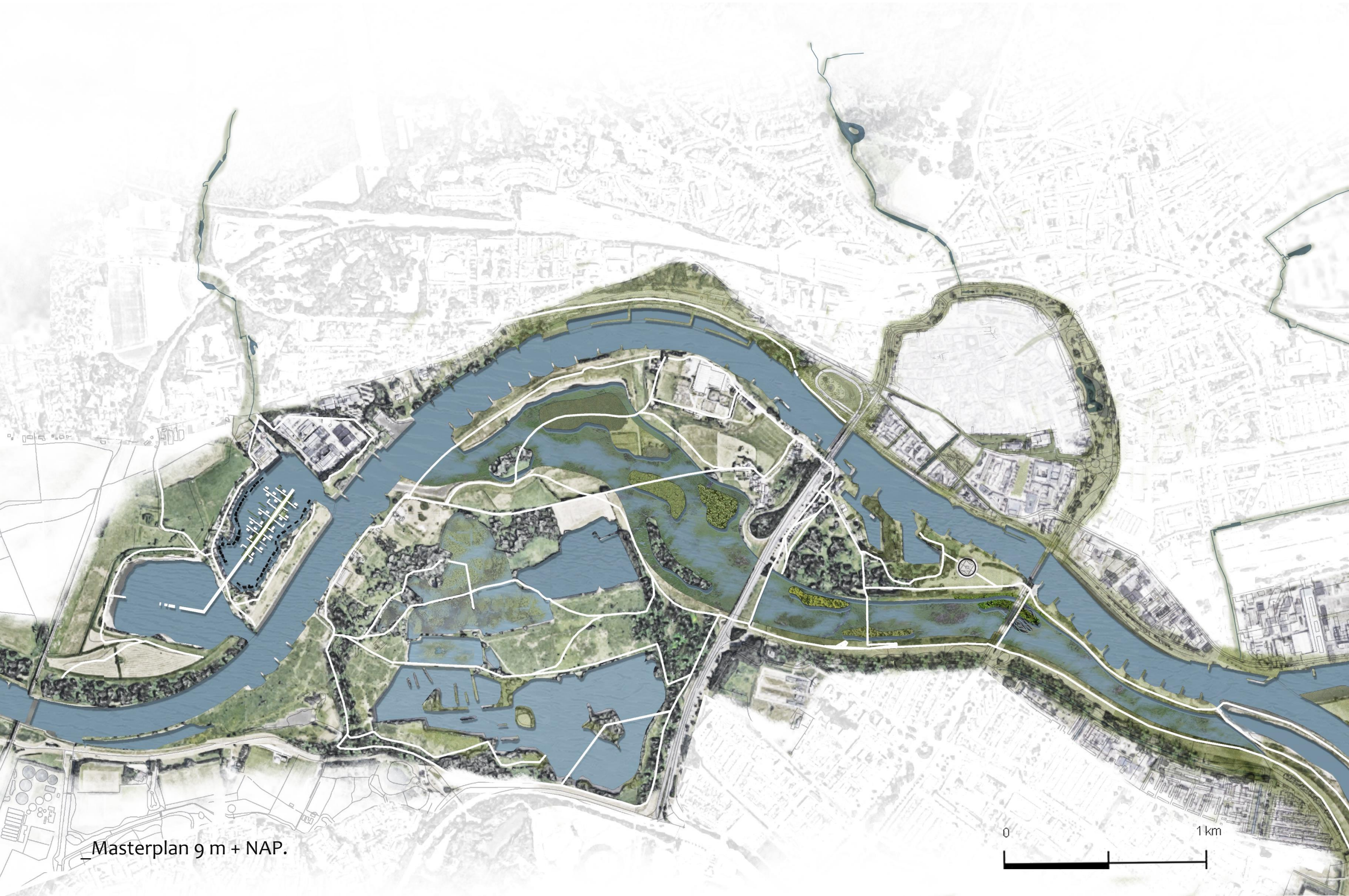
Function to the river edge referring to the urban fabric

# THE VISION \_CONCEPT



\_Concept drawing.

# THE VISION OF ARNHEM'S RIVERSCAPE



Masterplan 9 m + NAP.

0 1 km

# THE VISION OF ARNHEM'S RIVERSCAPE



— Masterplan 7 m + NAP.

0 1 km

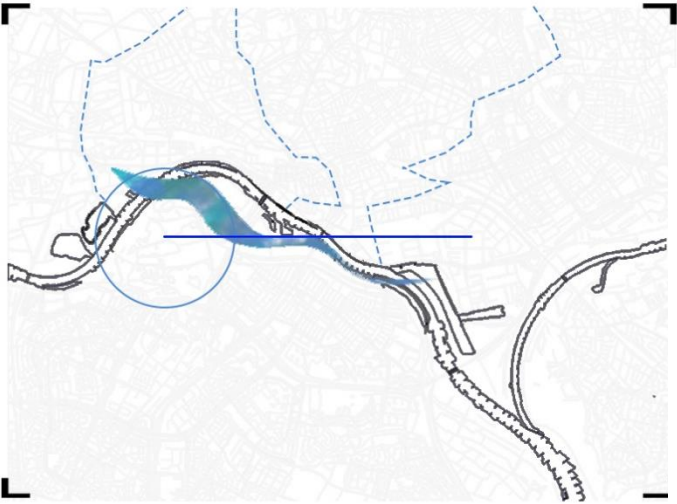
# THE VISION OF ARNHEM'S RIVERSCAPE



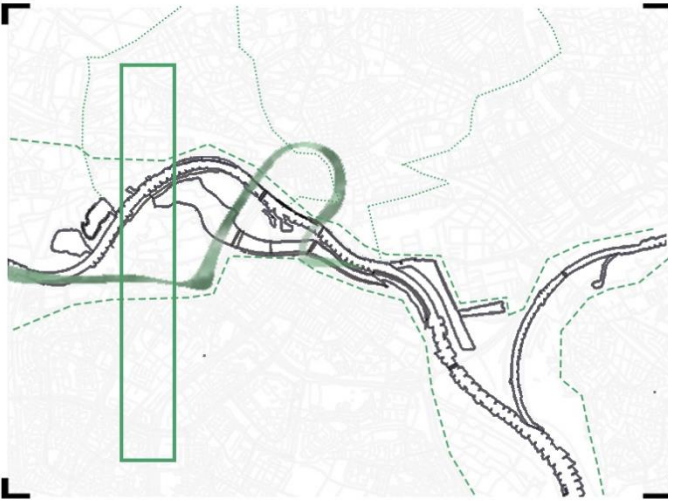
Masterplan 14 m + NAP.

0 1 km

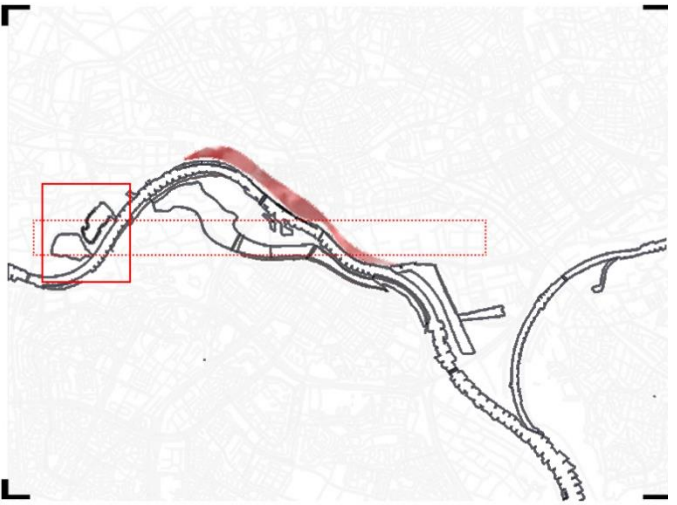
DECOMPOSING THE VISION \_ THE LAYERS



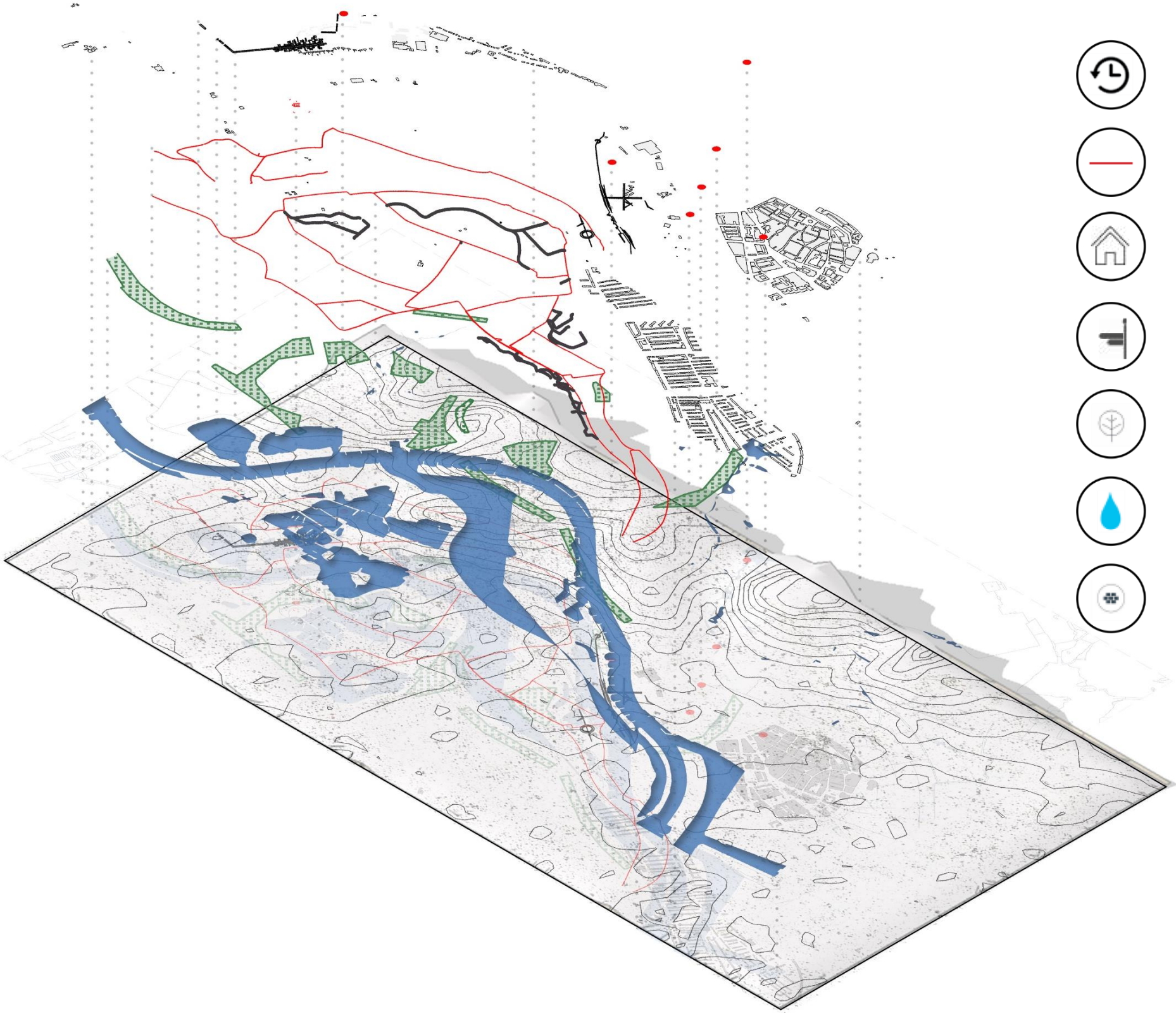
water flows



vegetation flows



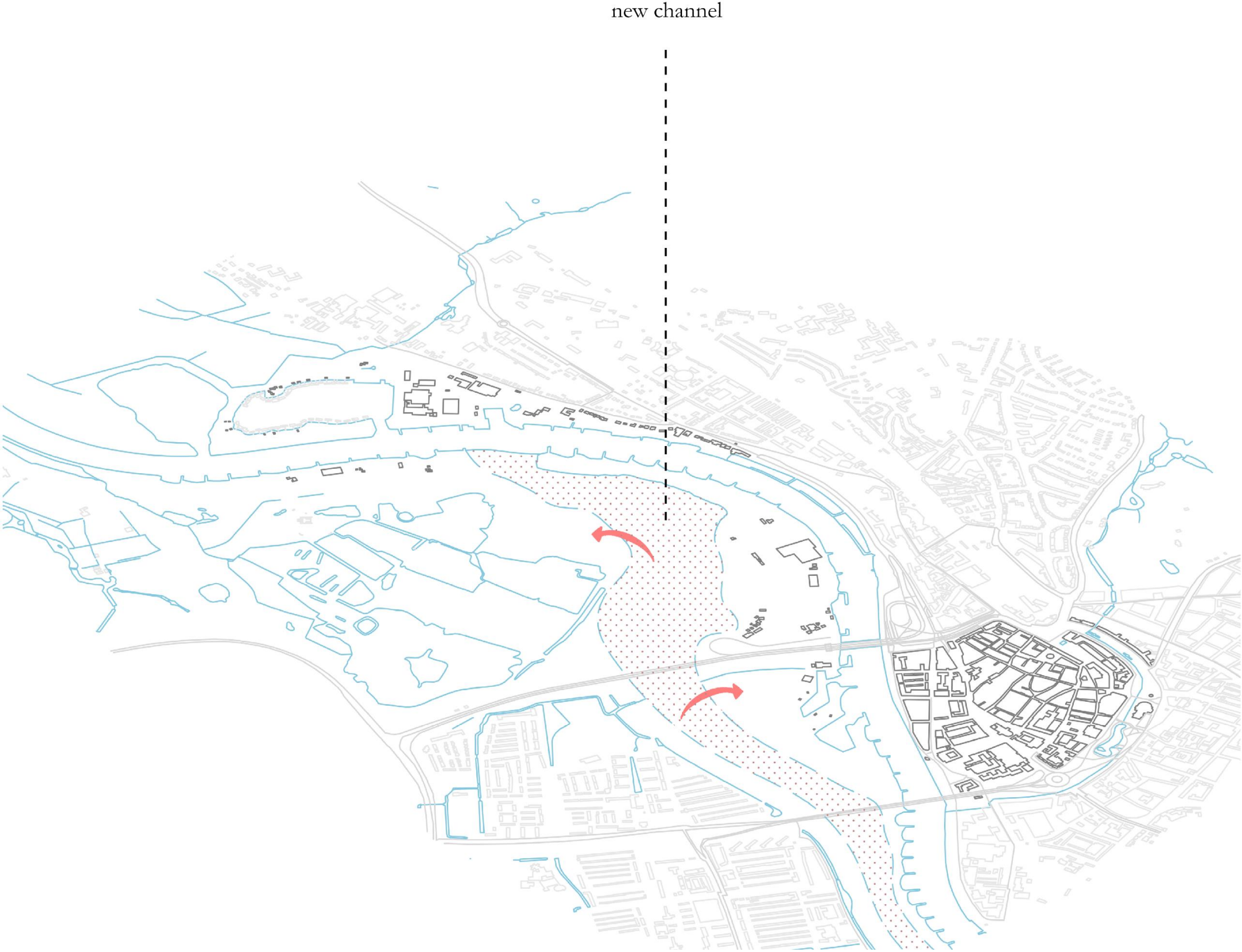
social flows



\_Masterplan layers.

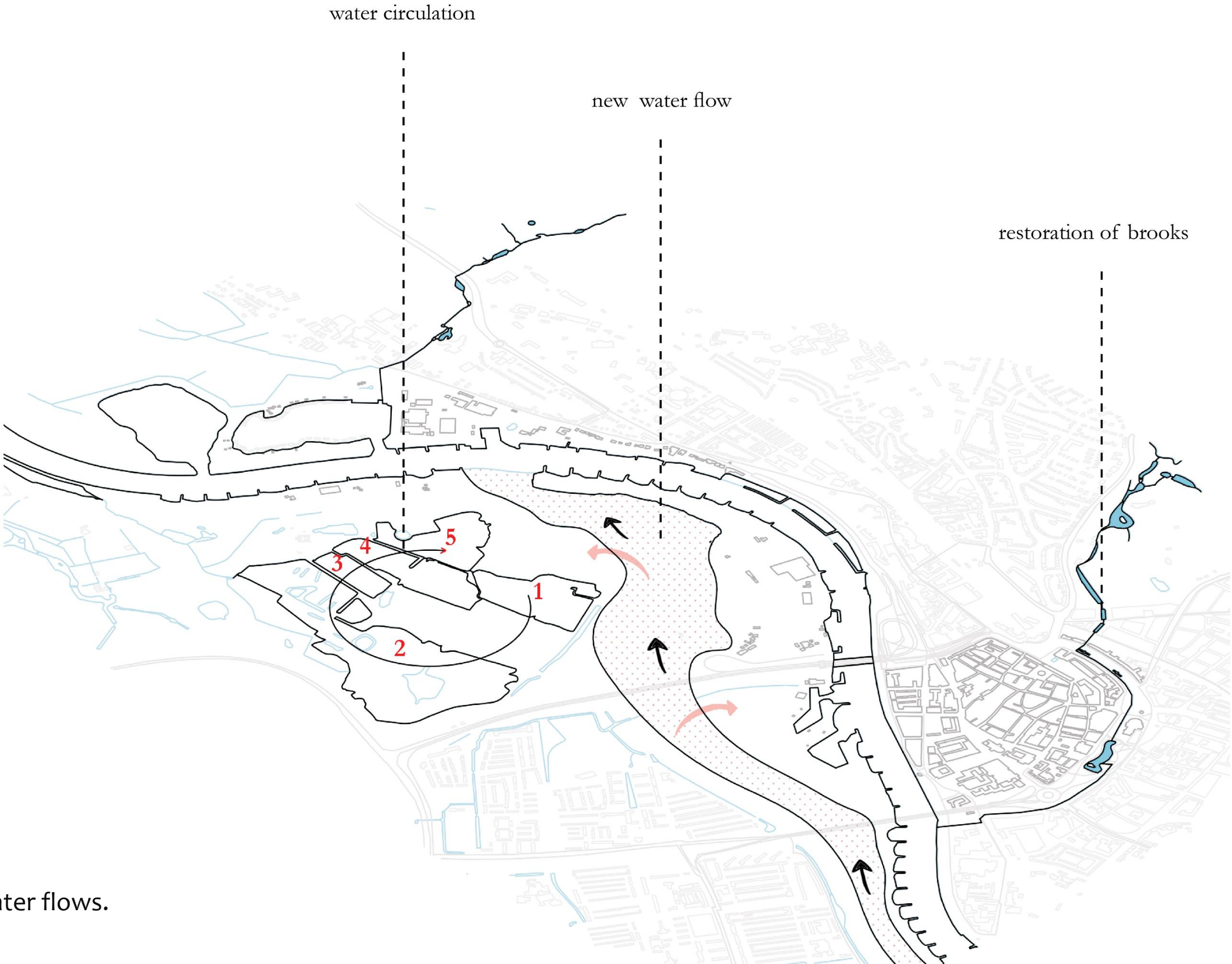
- memory
- architecture
- urbanization
- paths
- vegetation
- water
- terrain

DECOMPOSING THE VISION \_ THE DESIGN PRINCIPLES



\_Cut & fill.

DECOMPOSING THE VISION \_ THE DESIGN PRINCIPLES



\_Work with water flows.

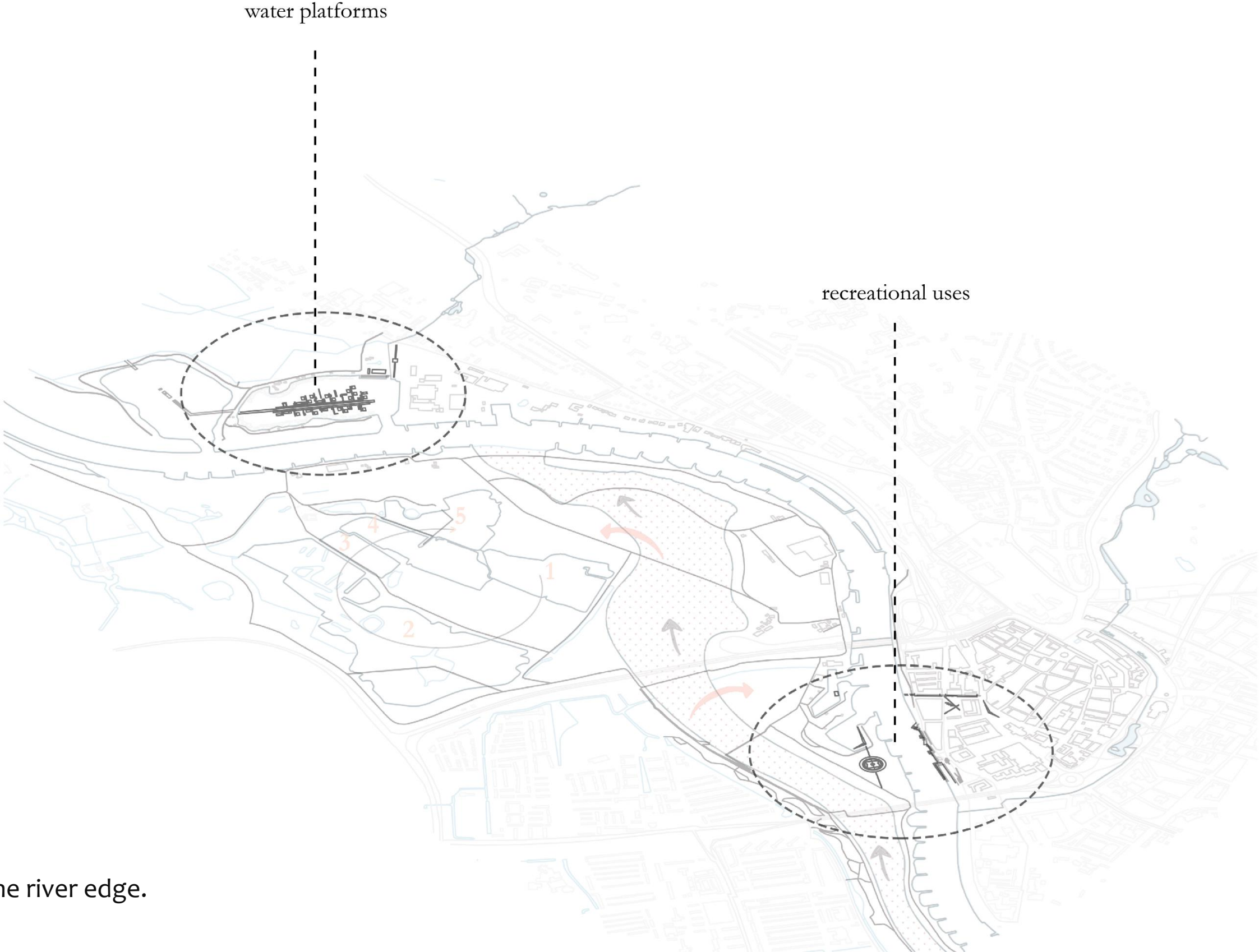
DECOMPOSING THE VISION \_ THE DESIGN PRINCIPLES

proposed path system



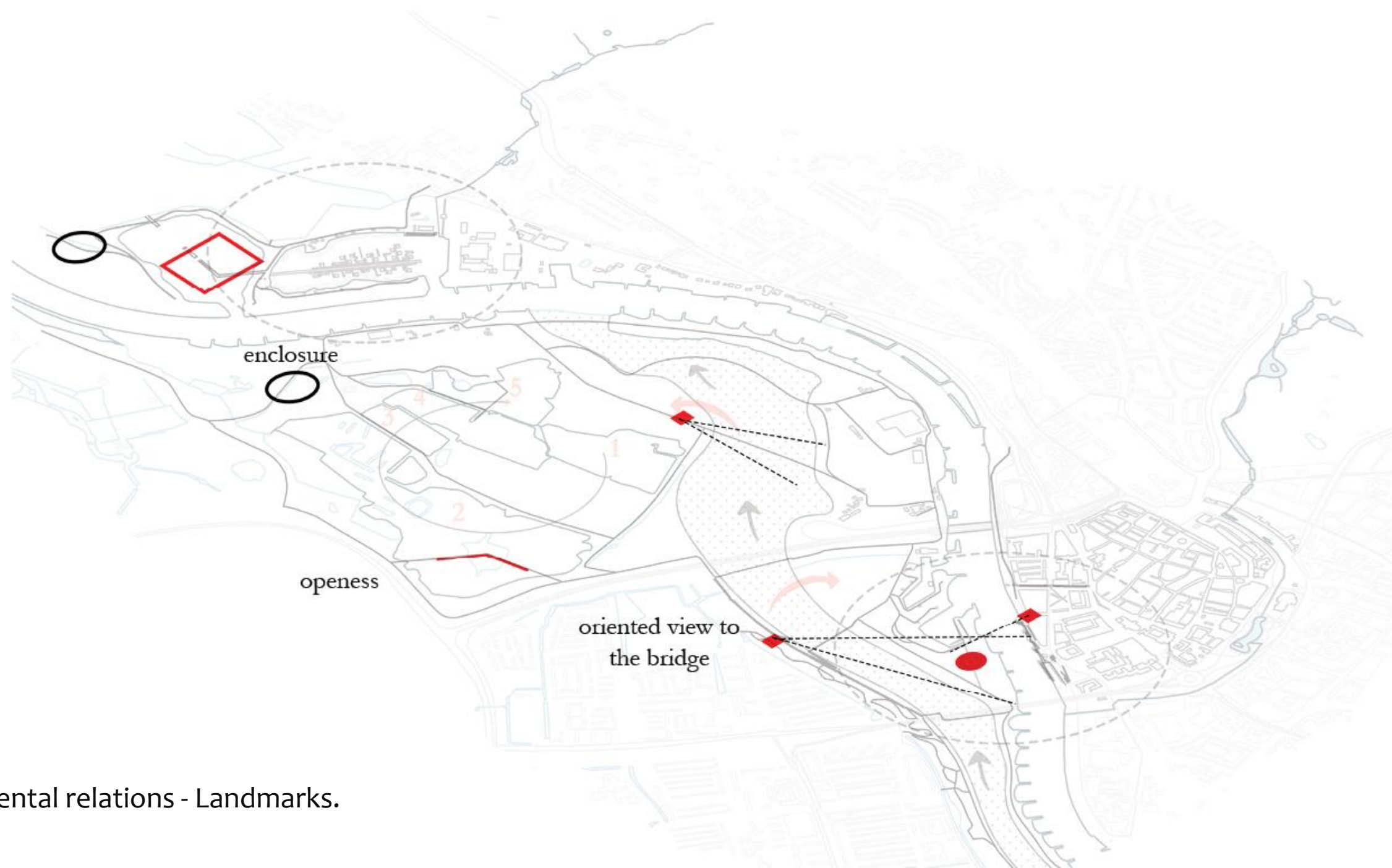
\_Enhance accessibility.

DECOMPOSING THE VISION \_ THE DESIGN PRINCIPLES



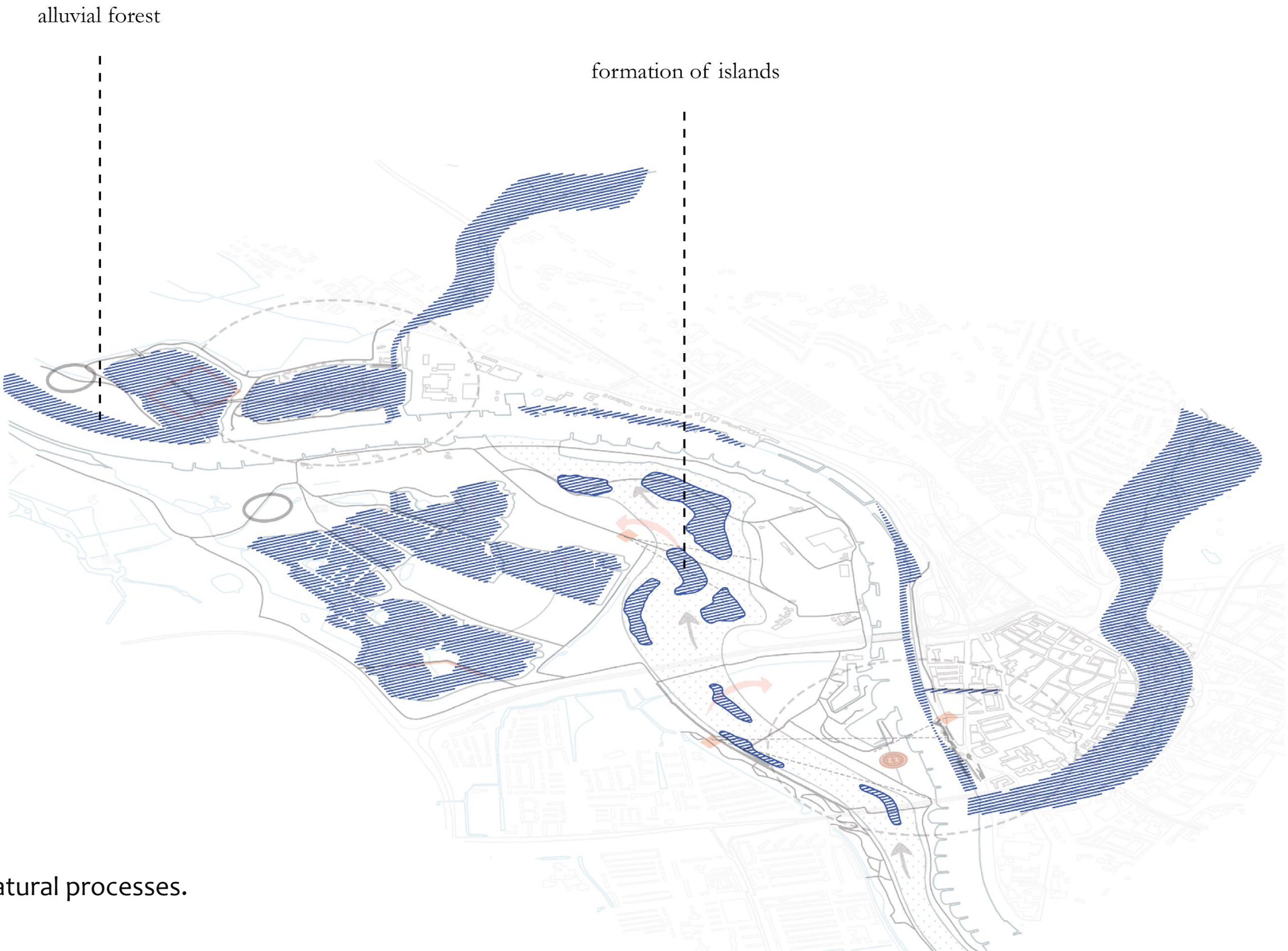
\_Function to the river edge.

## DECOMPOSING THE VISION \_ THE DESIGN PRINCIPLES



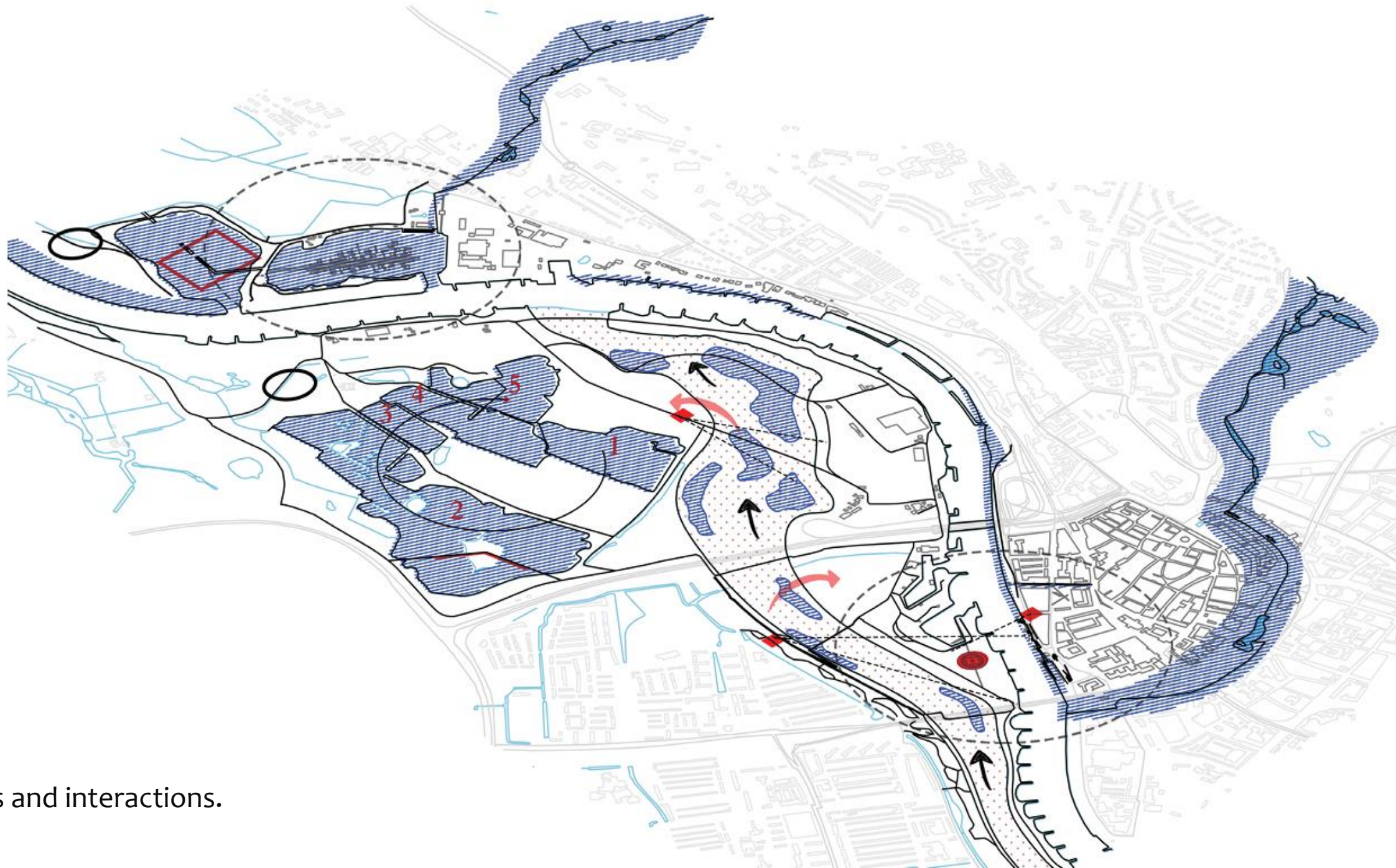
\_Visual and mental relations - Landmarks.

DECOMPOSING THE VISION \_ THE DESIGN PRINCIPLES



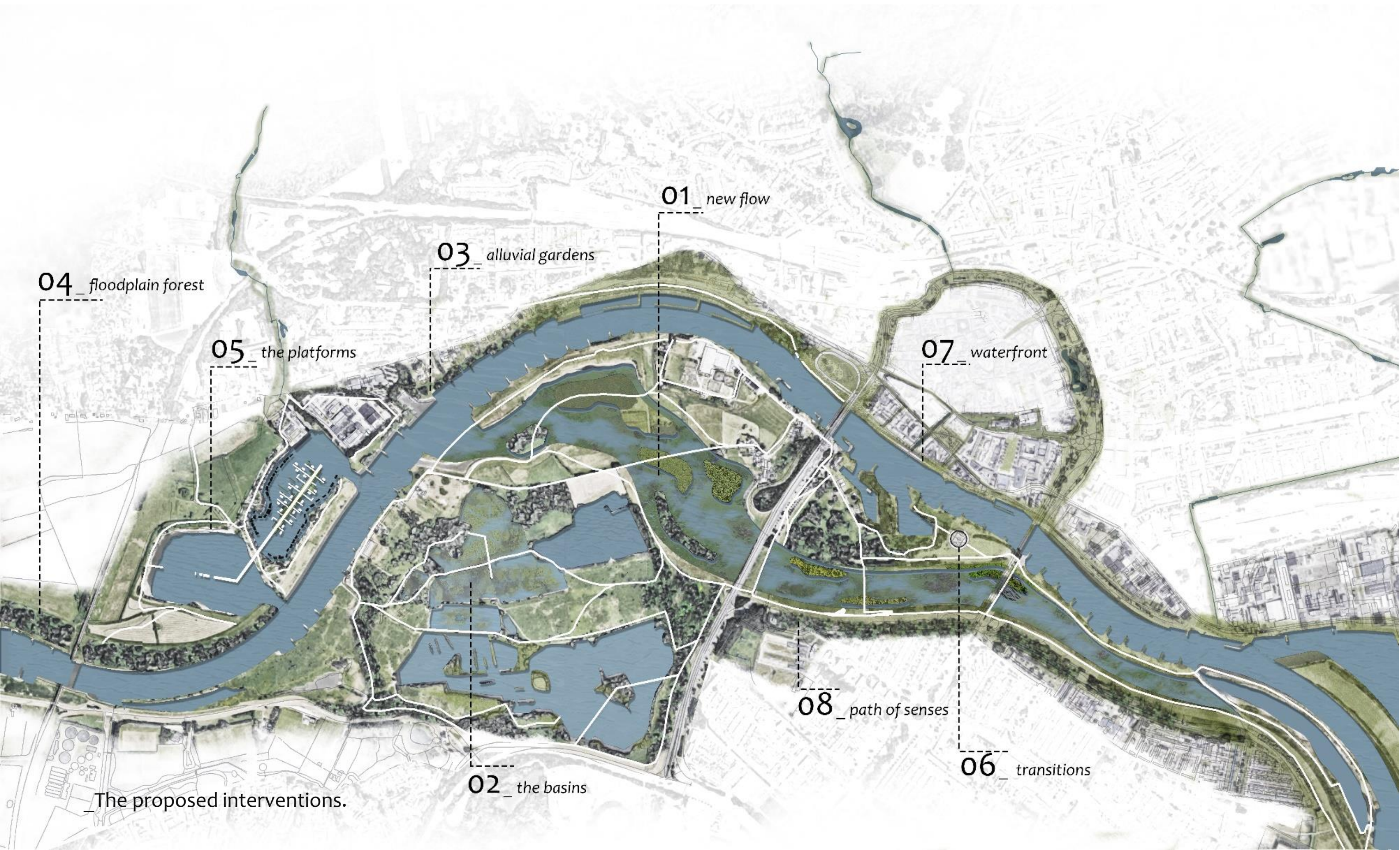
\_Reveal the natural processes.

## DECOMPOSING THE VISION \_ THE DESIGN PRINCIPLES



\_Interrelations and interactions.

# THE VISION \_ THE PROJECTS



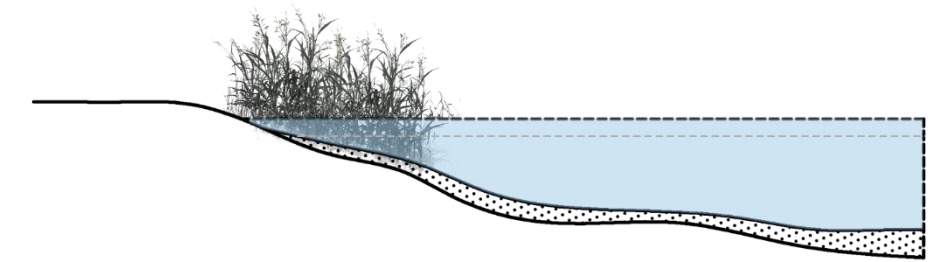
\_The proposed interventions.

## THE VISION \_ LENSES

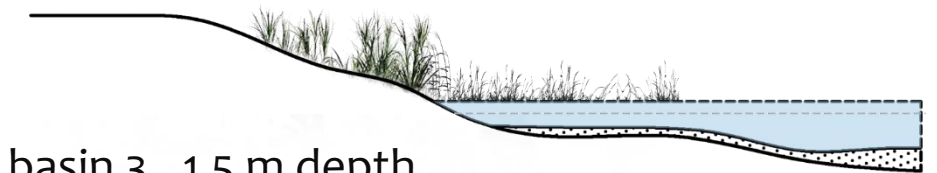
\_introduce the new water channel.

\_connect the single water bodies.

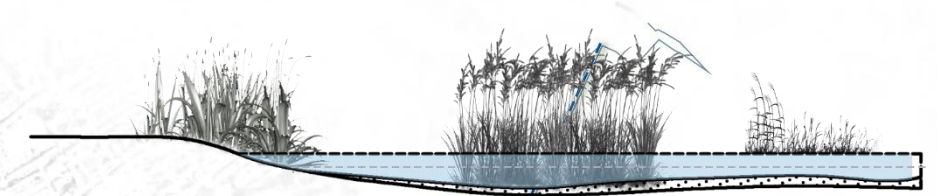
\_regulate the depths.



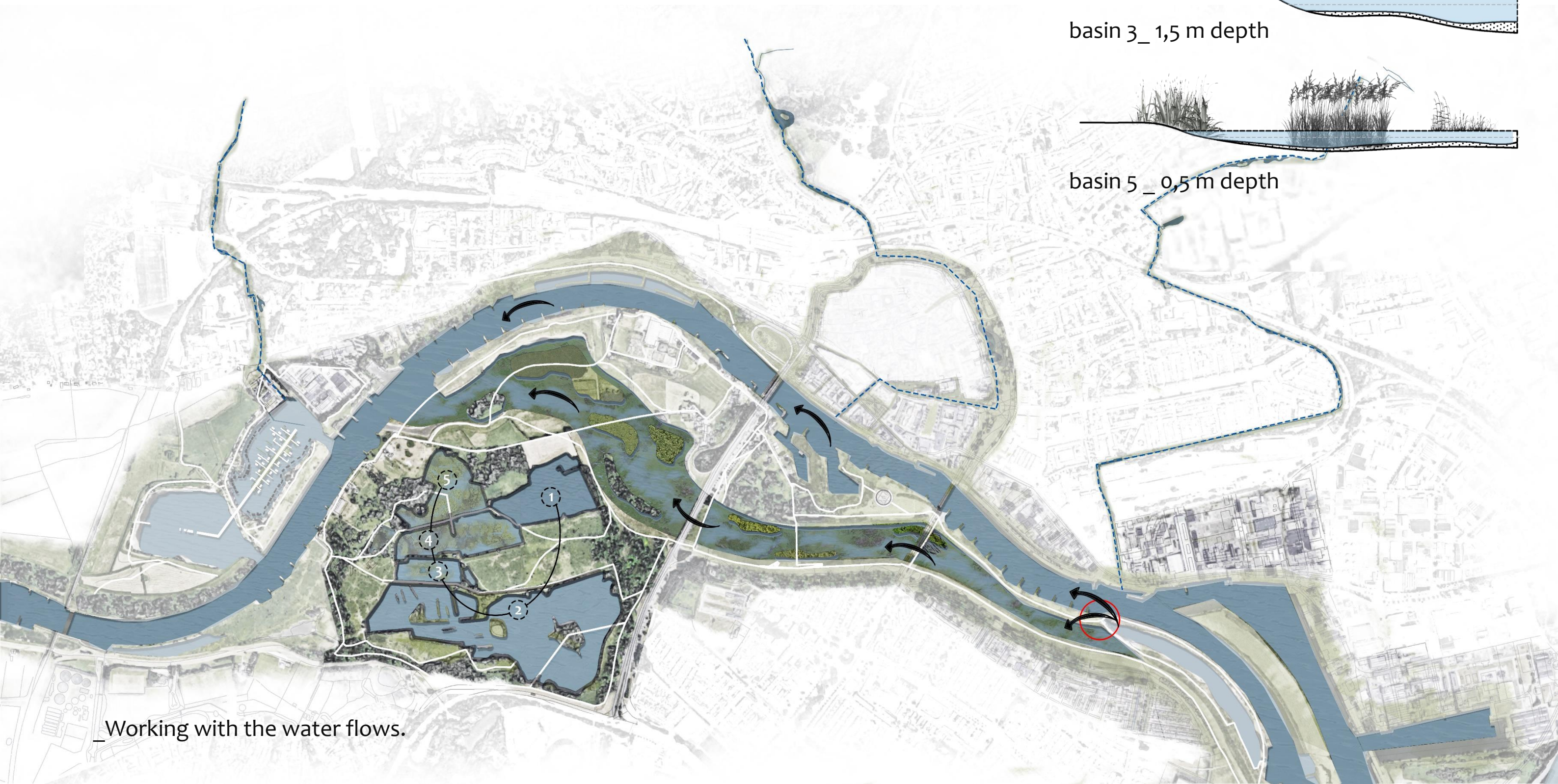
basin 1 \_ 2,5 m depth



basin 3 \_ 1,5 m depth



basin 5 \_ 0,5 m depth



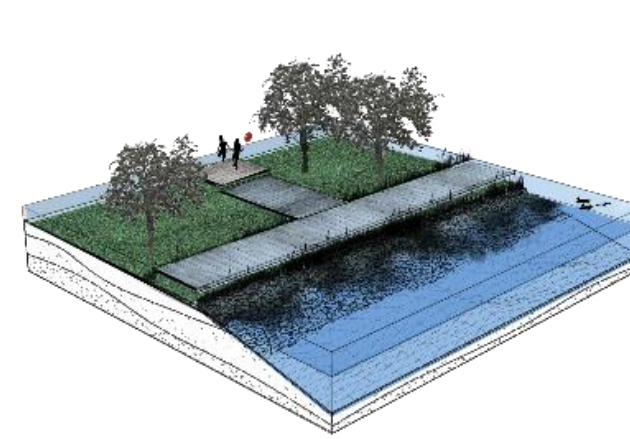
\_Working with the water flows.

# THE VISION \_ LENSES

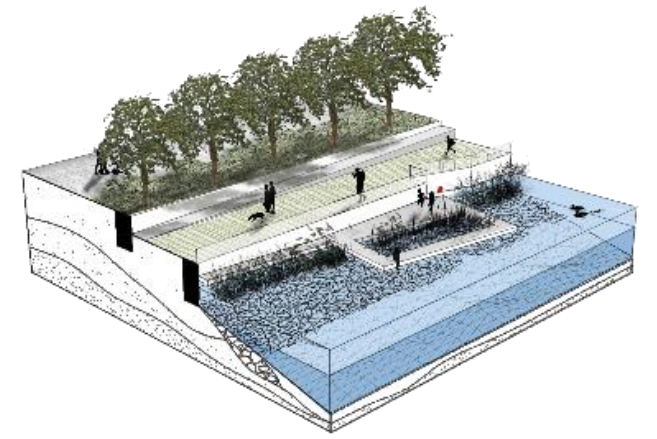
\_water - soil relations.

\_dynamics.

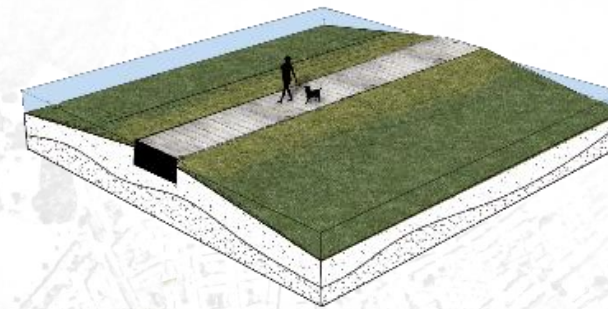
\_new vegetation patches.



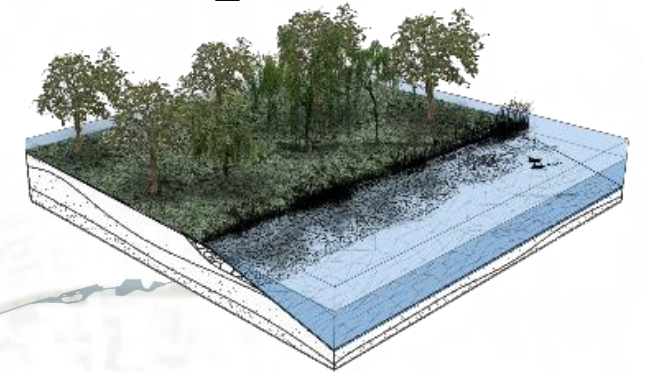
1 \_ floodplains



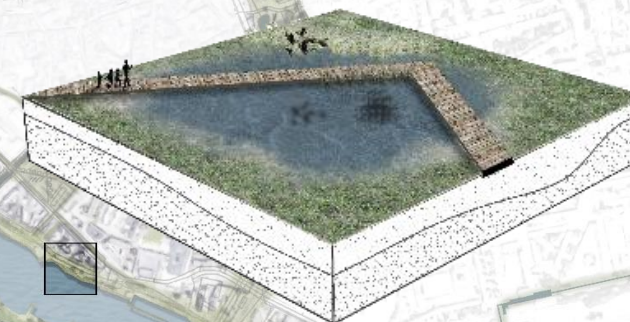
4 \_ waterfront platforms



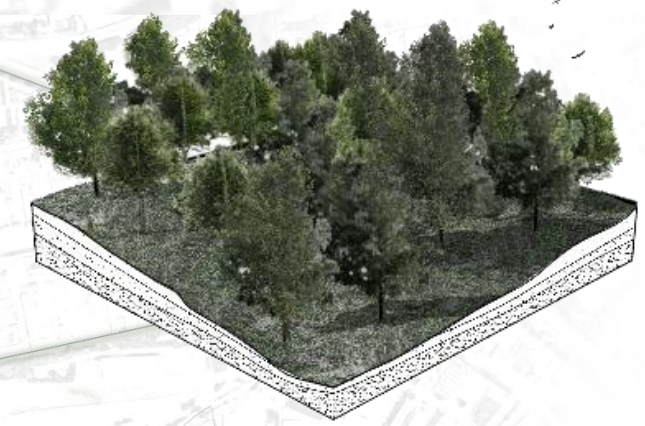
2 \_ summer dike



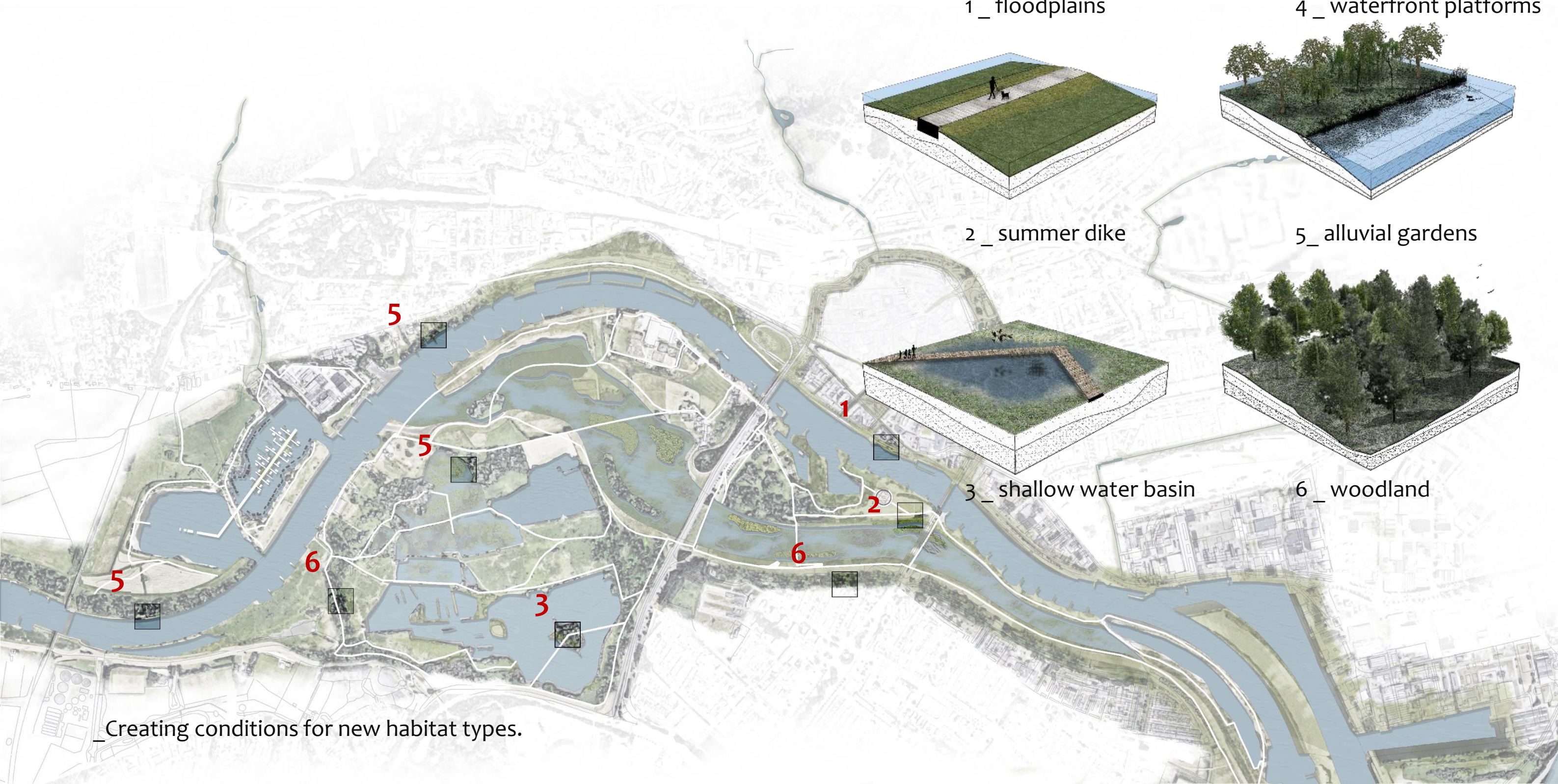
5 \_ alluvial gardens



3 \_ shallow water basin



6 \_ woodland



\_Creating conditions for new habitat types.

# THE VISION \_ LENSES

\_water - soil relations.

\_proposed vegetation types.

\_architectural elements.



a \_ oriented view



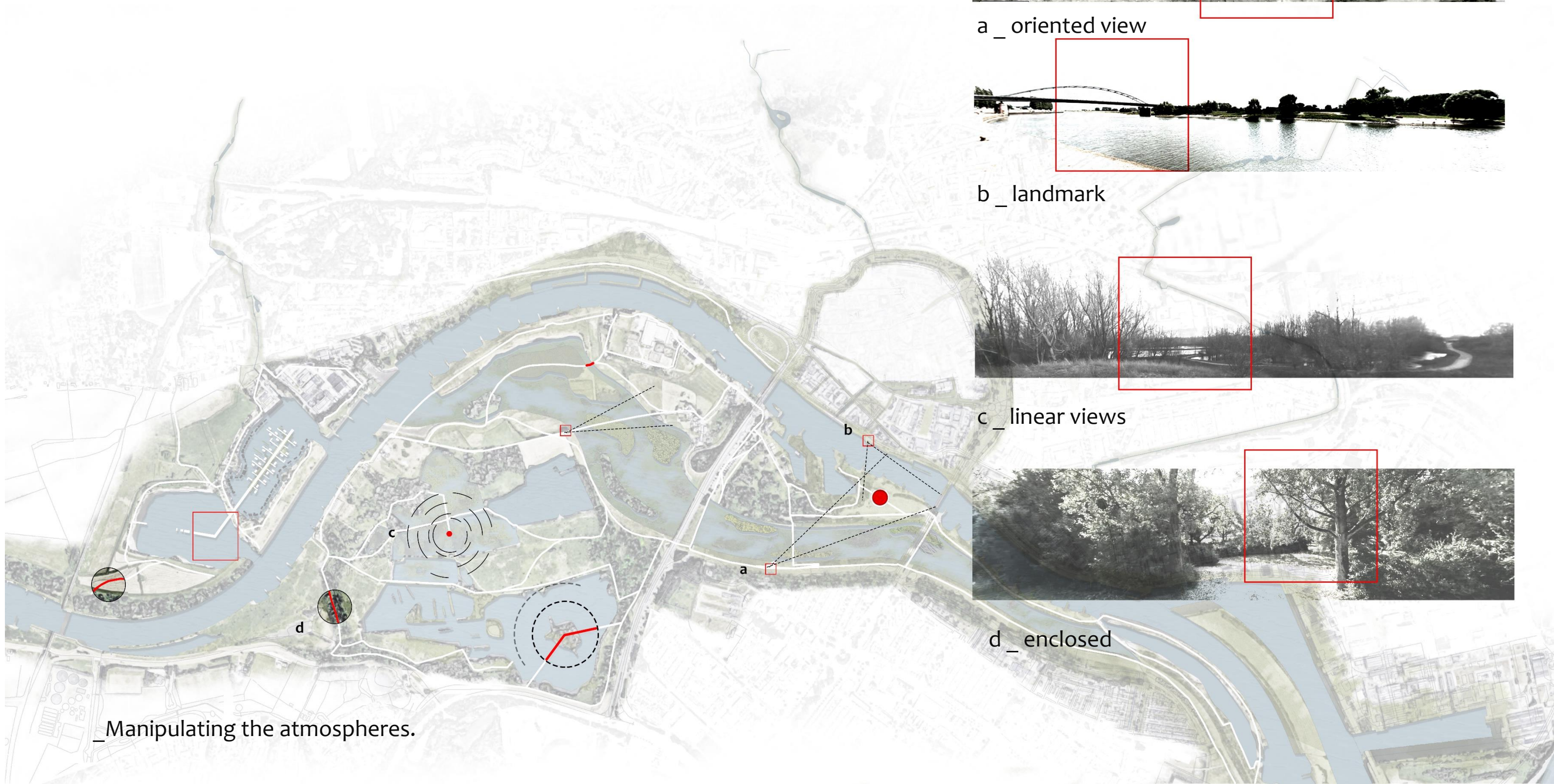
b \_ landmark



c \_ linear views



d \_ enclosed



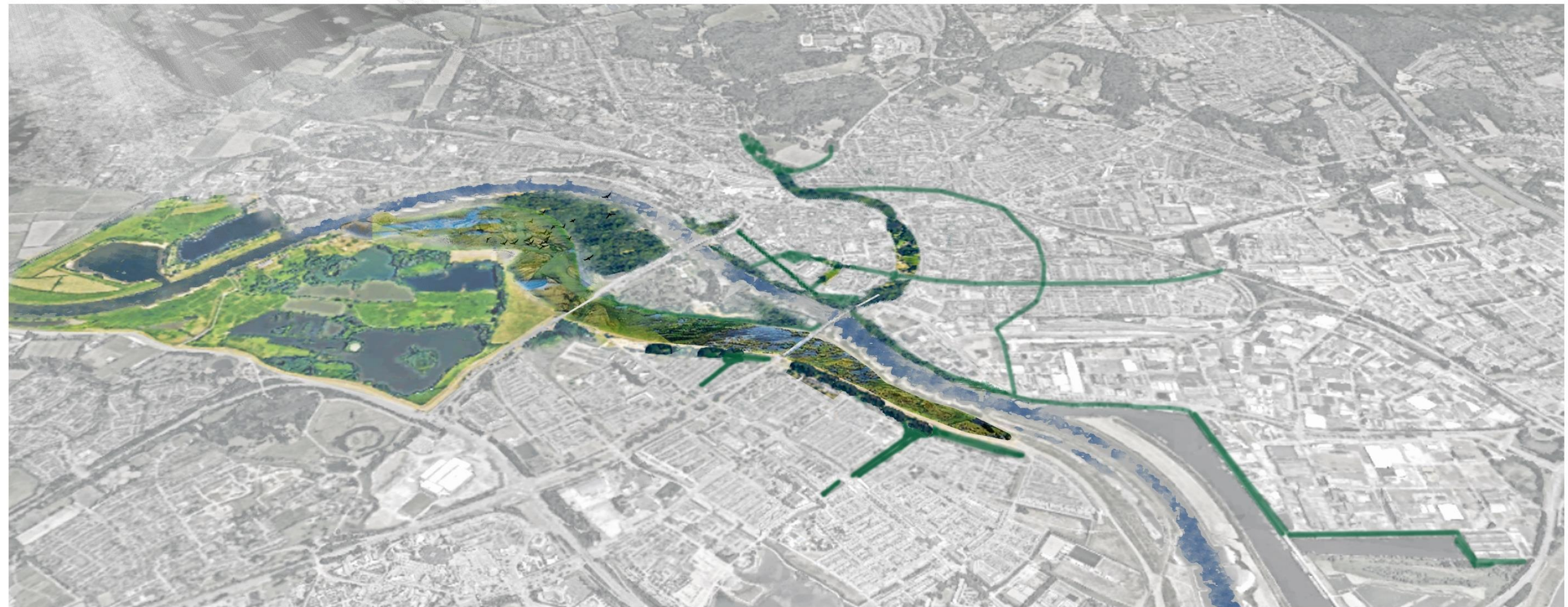
\_Manipulating the atmospheres.

## REGIONAL SCALE \_ BIRD EYE VIEW \_ PROCESSES

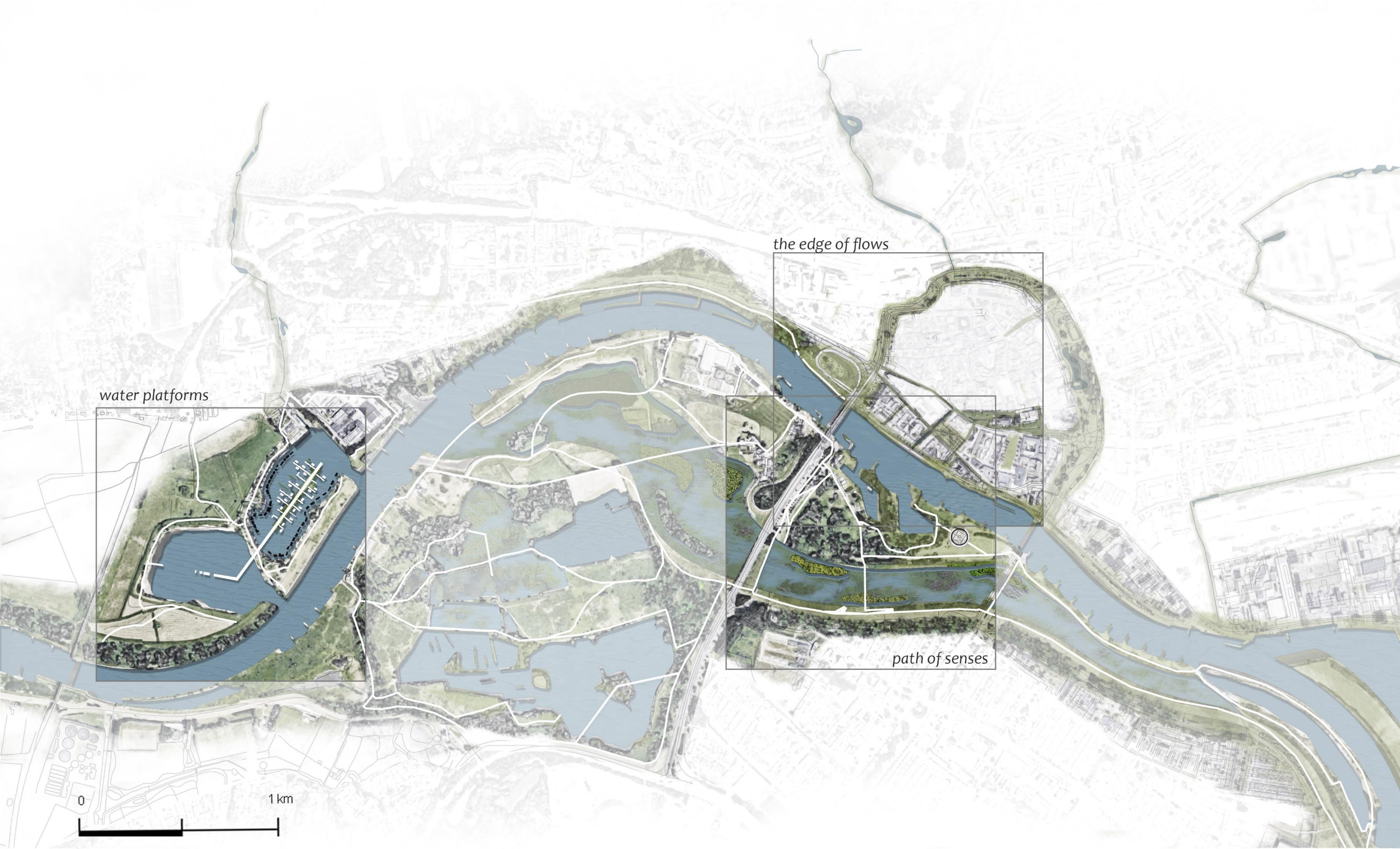
Existing  
situation



The  
Vision.



FOCAL POINTS



## FOCAL POINTS



1\_river / suburban/ agricultural land.

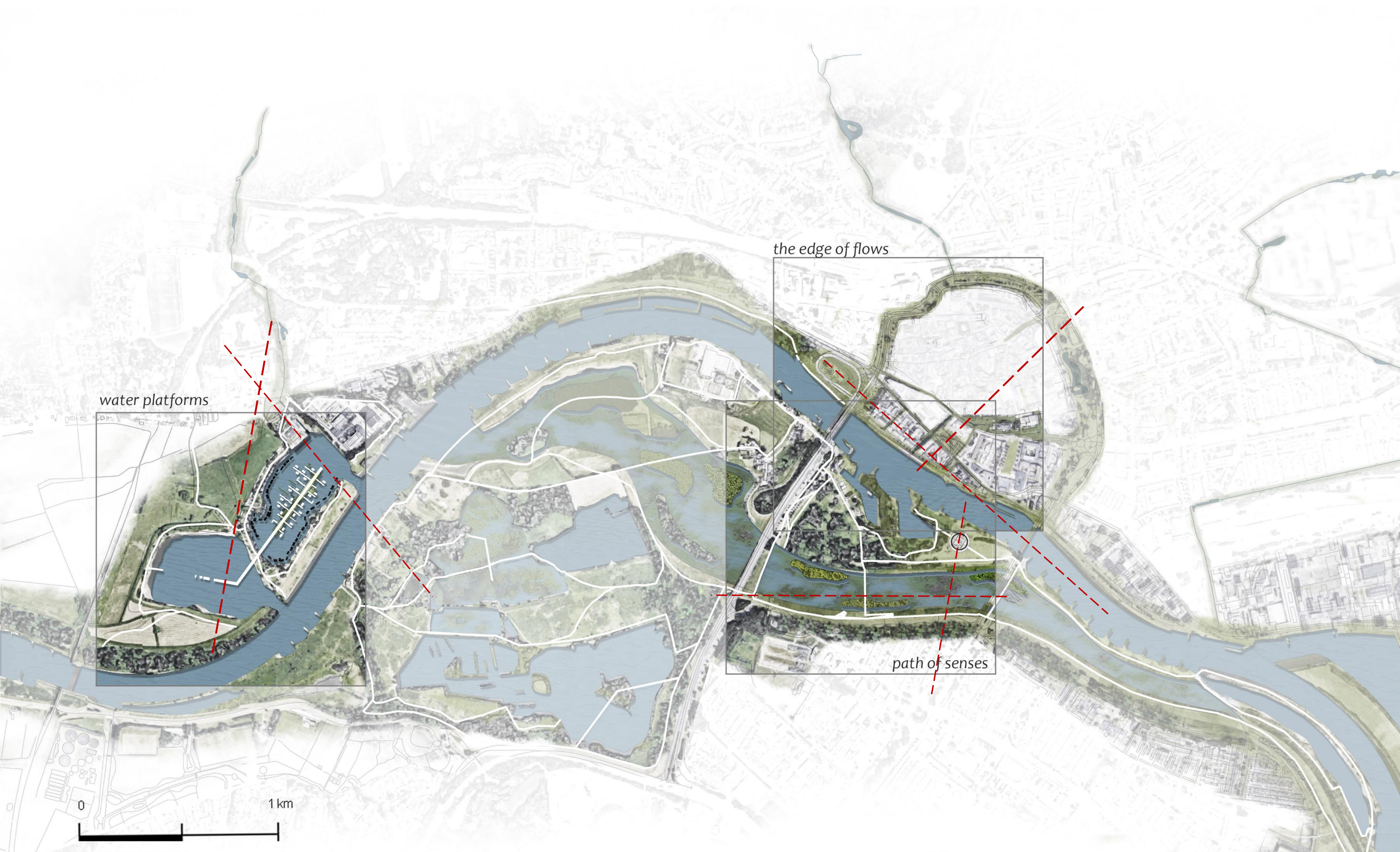


2\_river / wetland/ residential expansion.



3\_\_river / waterfront/ city center.

# FOCAL POINTS \_ SECTIONAL RELATIONS



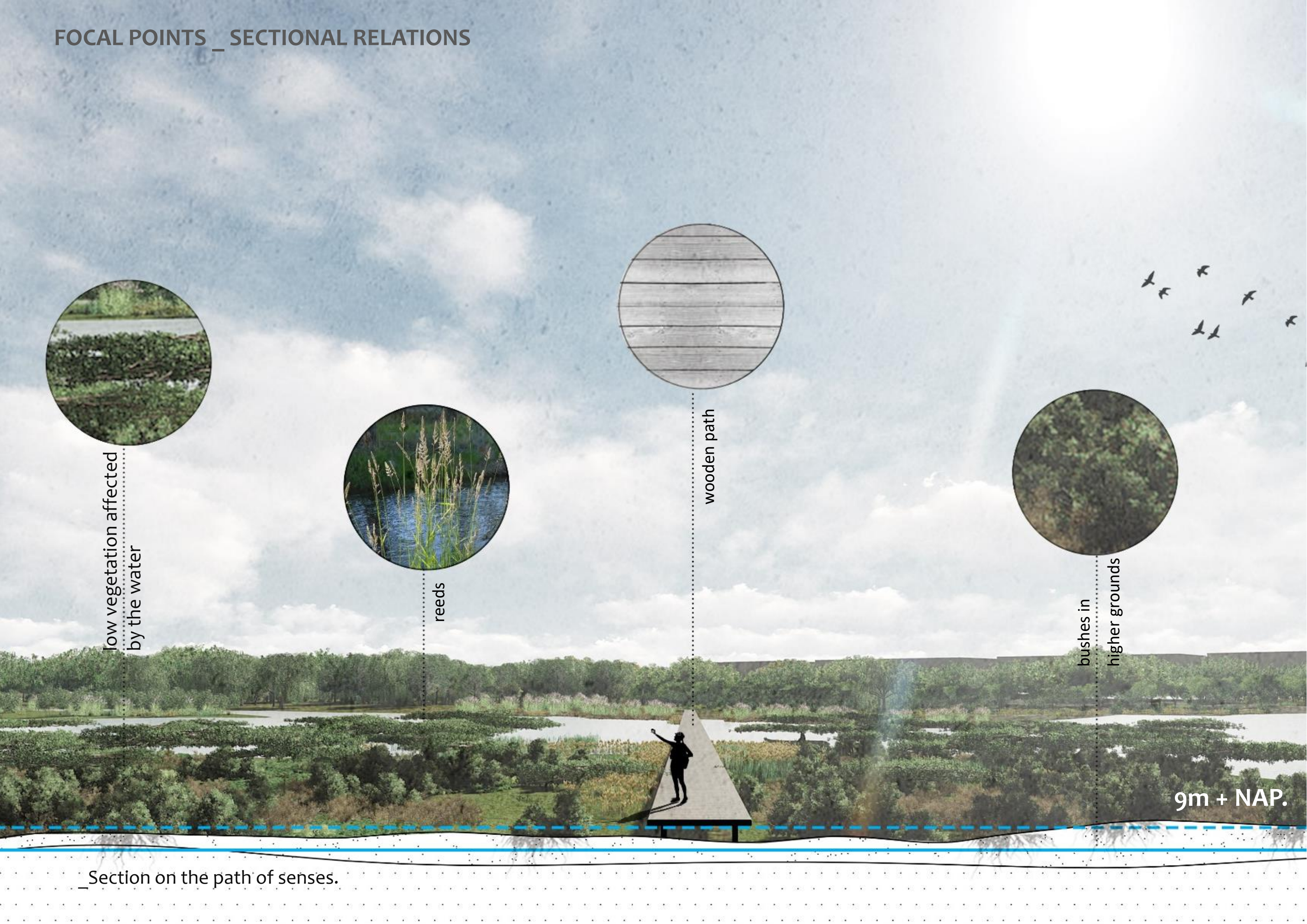
water platforms

the edge of flows

path of senses

0 1 km

# FOCAL POINTS \_ SECTIONAL RELATIONS



low vegetation affected  
by the water

reeds

wooden path

bushes in  
higher grounds

9m + NAP.

\_Section on the path of senses.

## FOCAL POINTS \_ SECTIONAL RELATIONS



12 m + NAP.

\_Section on the path of senses.

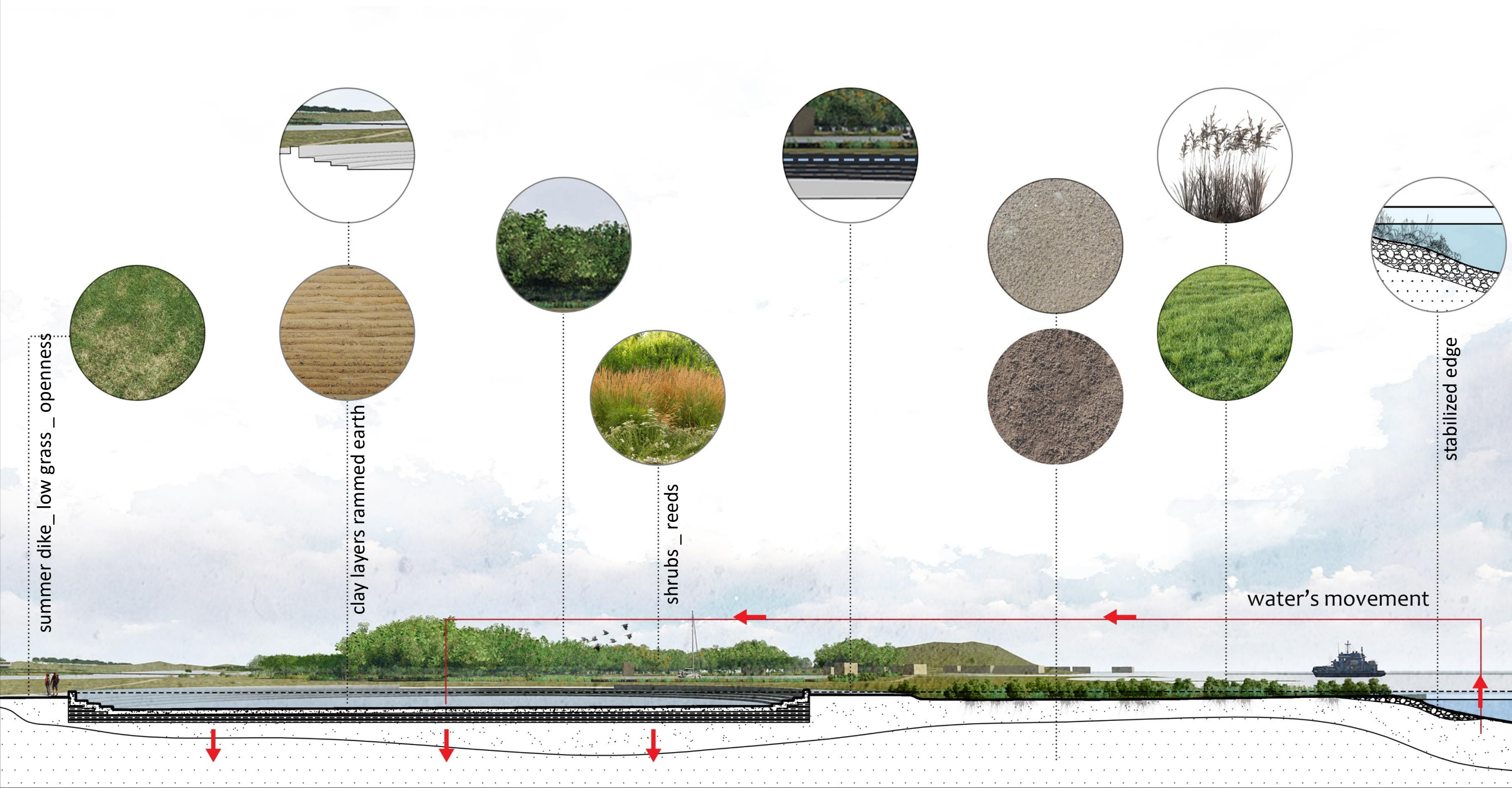
Existing situation \_ Ephemeral secondary path.



Enhance accessibility \_ The proposed path.

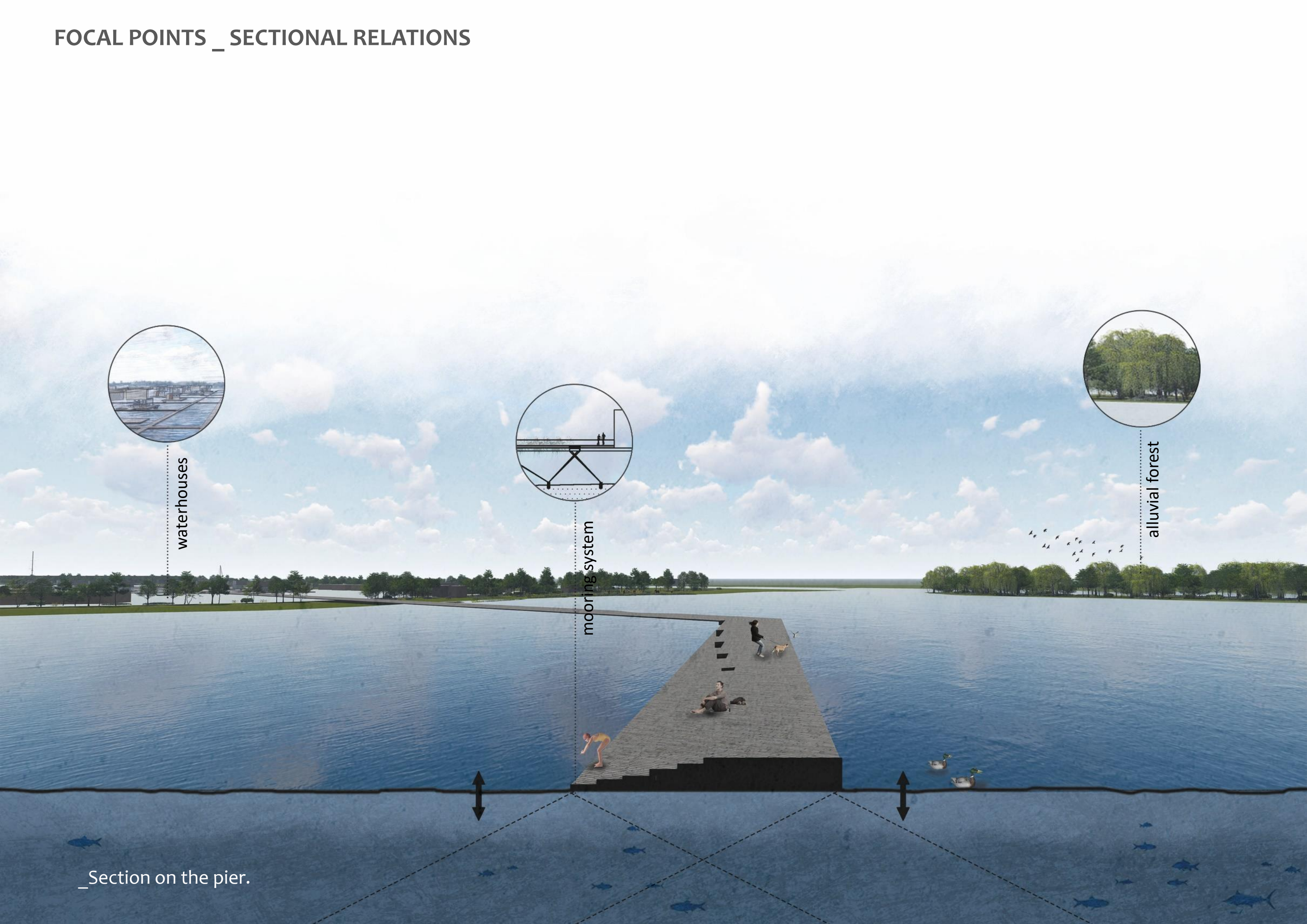


FOCAL POINTS \_ SECTIONAL RELATIONS

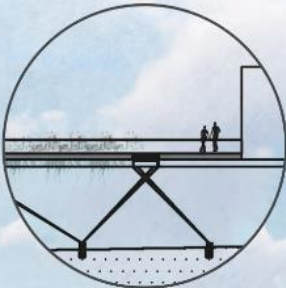


\_Section on the water edge and the plateau / water basin.

FOCAL POINTS \_ SECTIONAL RELATIONS



waterhouses



mooring system



alluvial forest

\_Section on the pier.

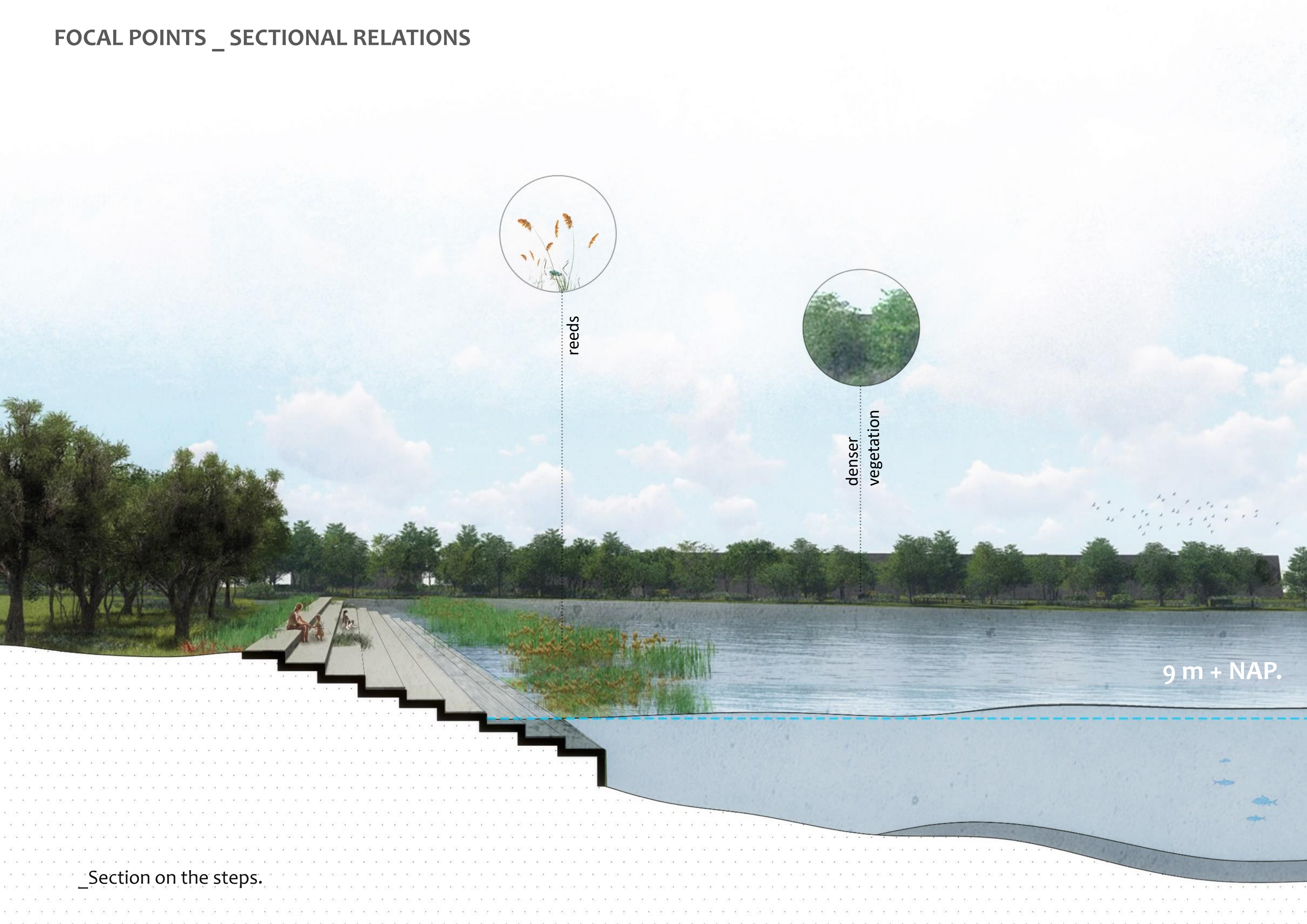
Existing situation \_ North bay.



Function to the river edge \_ The proposed housing units.



FOCAL POINTS \_ SECTIONAL RELATIONS



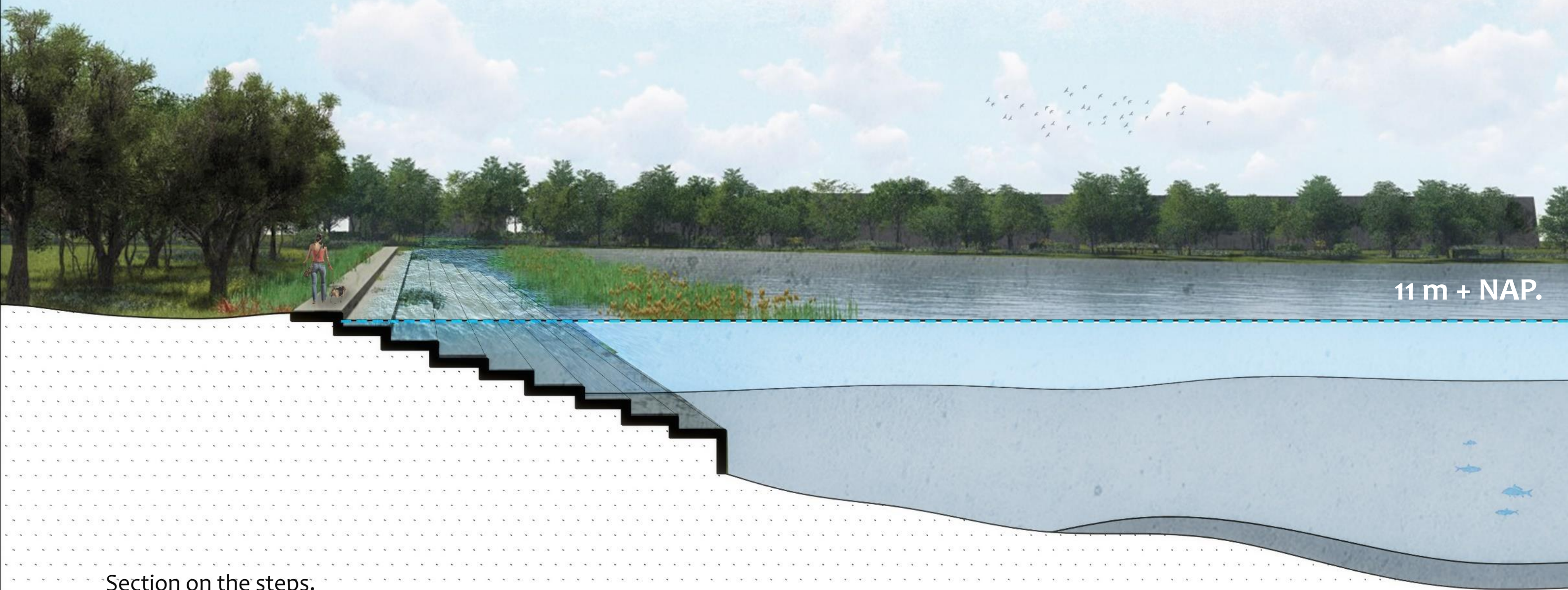
reeds

denser  
vegetation

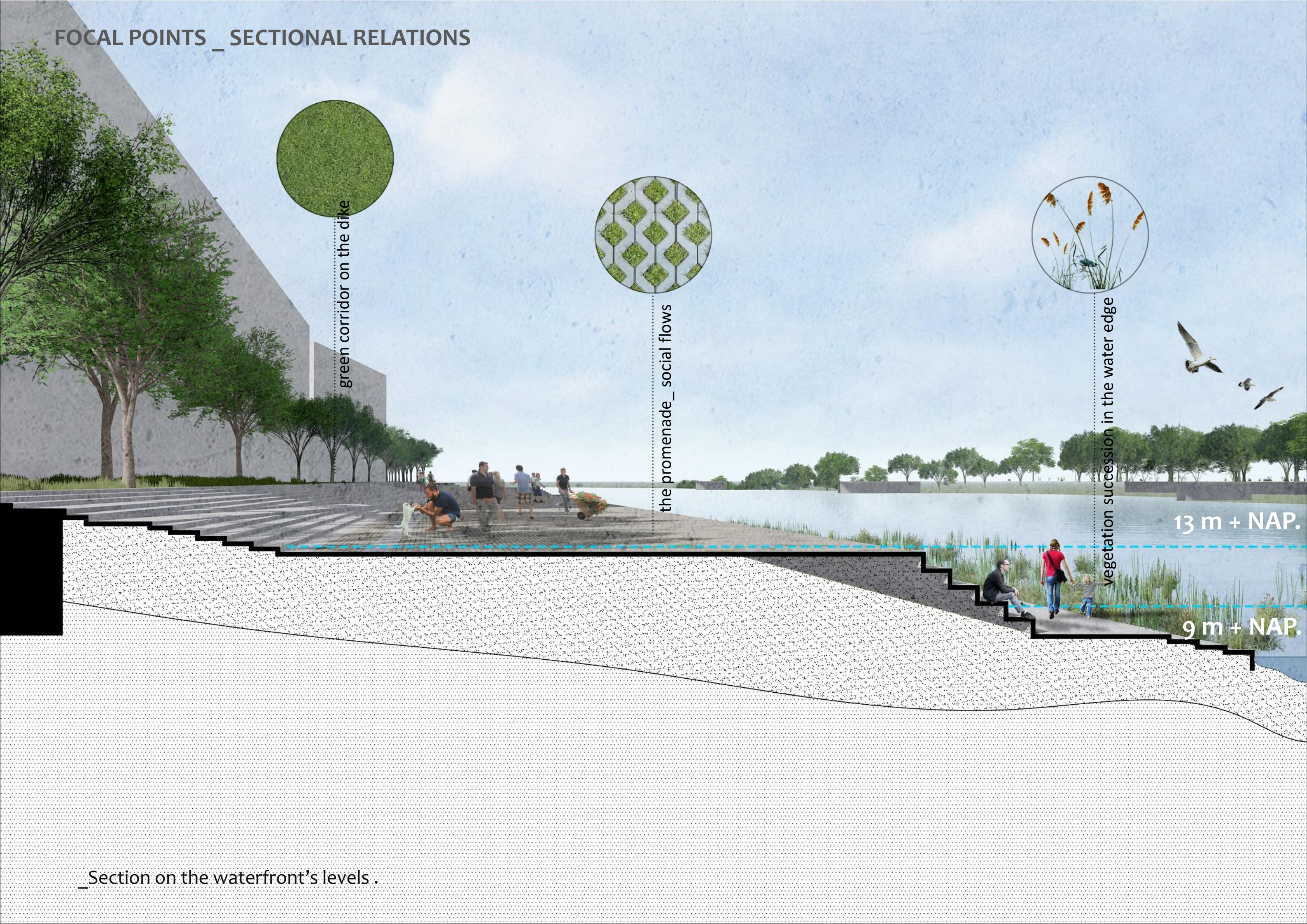
9 m + NAP.

\_Section on the steps.

# FOCAL POINTS \_ SECTIONAL RELATIONS



# FOCAL POINTS \_ SECTIONAL RELATIONS



green corridor on the dike

the promenade\_ social flows

vegetation succession in the water edge

13 m + NAP.

9 m + NAP.

\_Section on the waterfront's levels .

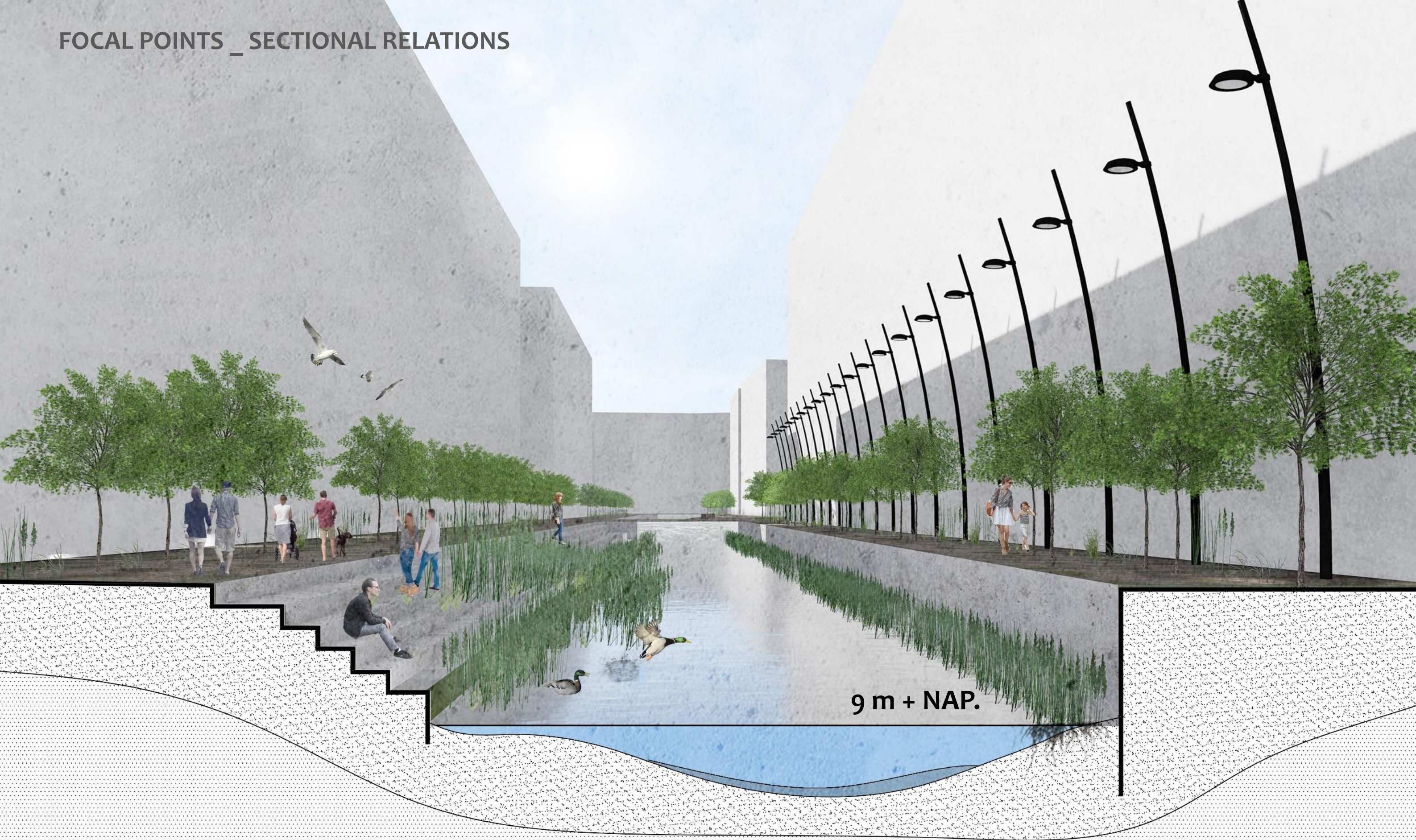
Existing situation \_ The quay.



Enhance accessibility \_ The new waterfront with intermediate levels.

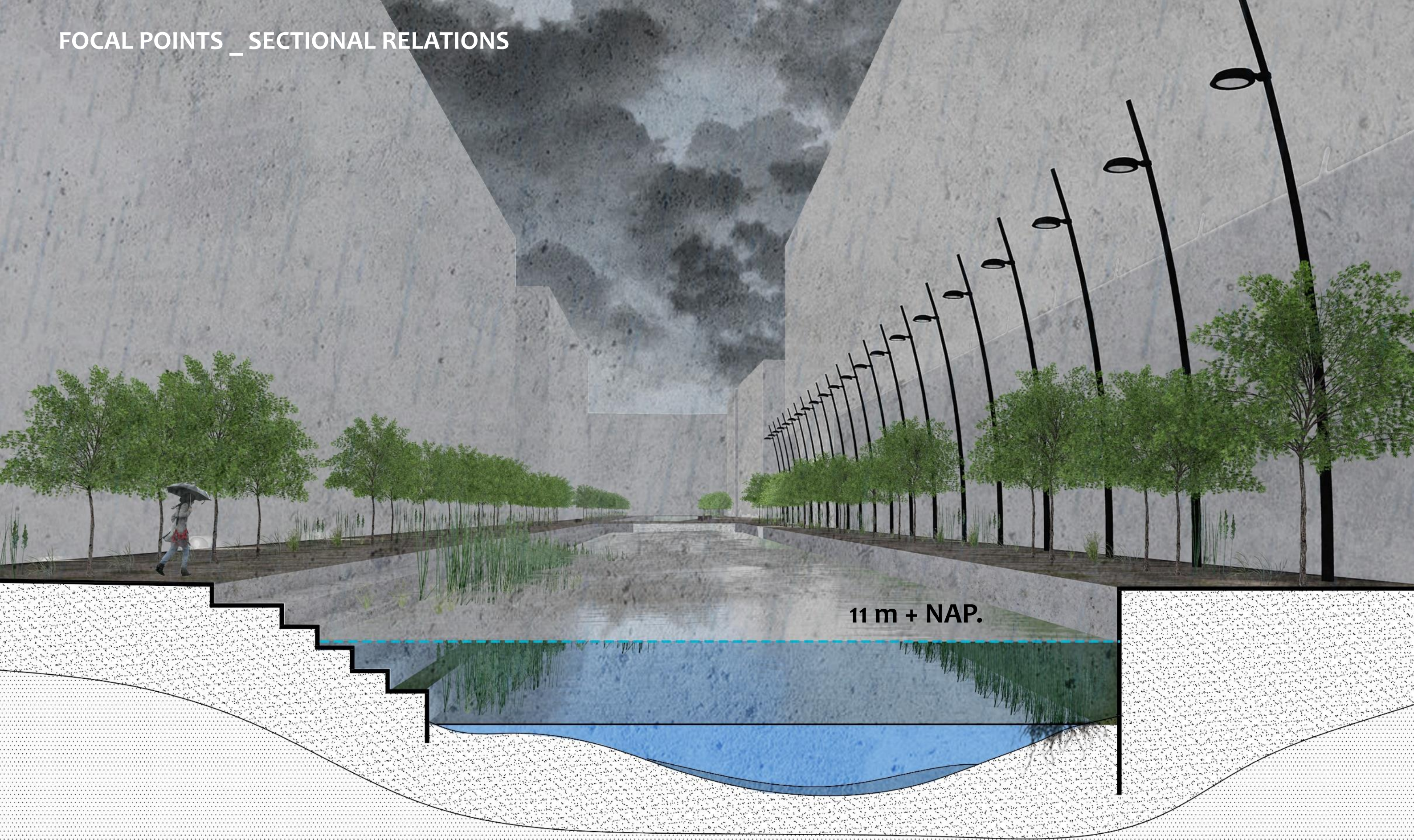


# FOCAL POINTS \_ SECTIONAL RELATIONS



\_Section on the re-introduced brook.

# FOCAL POINTS \_ SECTIONAL RELATIONS



11 m + NAP.

\_Section on the re-introduced brook.

Existing situation \_ The covered brook.



Work with the water flows \_ The re-introduced brook in the riverscape system.









# Reflection

