

AN ECO SYNERGIST HUB IN ROTTERDAM:

Reuse and Regeneration of neglected urban fragments into ecological hotspots

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Urban Ecology & Eco-Cities Lab. - MSc Architecture, Urbanism and Building Sciences:
Landscape Architecture track



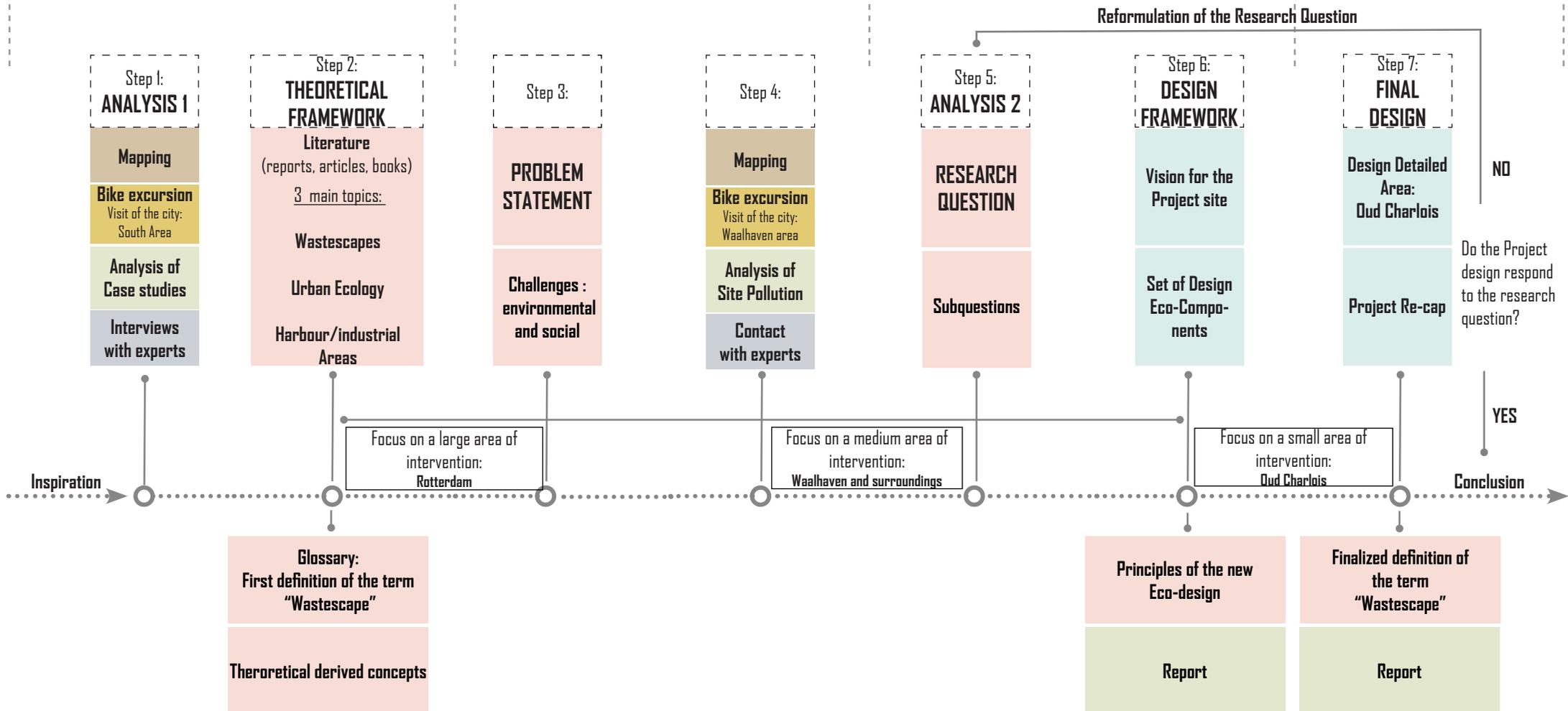
RESEARCH PLAN

1st Phase: P1-P2

2nd Phase: P2

3rd Phase: P2-P3

4th Phase: P4-P5



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INSPIRATION

WASTESCAPES



**Schöneberger Südgelände
Park,
Berlin, Germany**



**Chausseestraße, Berlin,
Germany**



**“C-mine” Cultural Square,
Genk, Belgium**



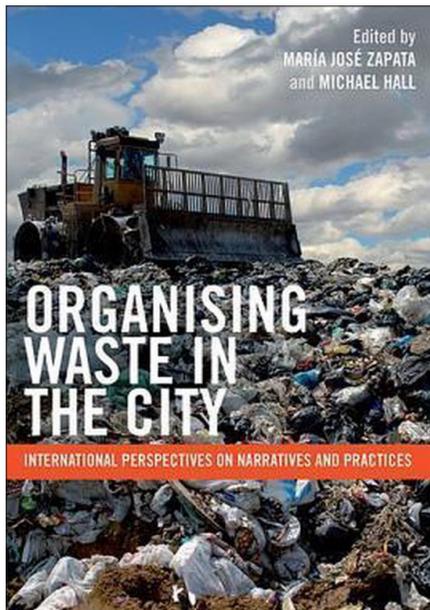
**Building complex in the
Zhongzheng district of Keelung
city in northeastern Taiwan**

THEORETICAL FRAMEWORK

LITERATURE (Reports, Articles, Books)

- Wasteland is not a waste!
- Wastelands beneficial for urban biodiversity
- Wastescapes as means of urban and social regeneration

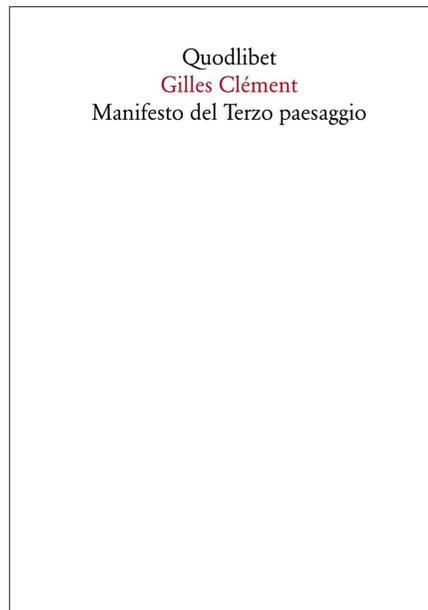
WASTESCAPE



Hall, C. M. (2011). **The Ecological and Environmental Significance of Urban Wastelands and Drosscapes.**

- Integration of nature in the city is necessary, no more separation.
- Ecosystems should be preserved at any scale
- Rotterdam: future eco-city

ECOLOGY



Clément, G. (2004). **Manifesto del Terzo paesaggio** (Manifeste du Tiers Paysage).

- Common Qualities and Issues in Harbour/Industrial areas along the water.

HARBOUR/INDUSTRIAL AREAS



Municipality of Rotterdam, Rotterdam **"Structural Vision on Plan Stadhavens"** (adopted in 2011).

- Techniques of soil remediation and relative usage of plants against pollutants

SOIL POLLUTION



Besse, S. K. (2020). **From Degradation to Productive Rehabilitation; a cross sectoral exploration of a renewable production landscape and bioremediation for the rehabilitation of the contaminated industrial site of Shell-Pernis.**

GLOSSARY

Cyclical Nature

Brownfield/Greenfield

Disordered Nature

Invisible Nature

“Terrain Vague”

Abandoned Nature

Valueless Nature

Ambiguous Nature

Unintentional Nature

WASTESCAPE

Marginal Nature

Mysterious Nature

Fragmented Nature

Empty place

Forgotten Nature

‘Post Romanticism’ Nature

Neglected Nature

Regenerative Nature

Wild Nature

Non place

Dangerous place

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Cyclical Nature

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PERSONAL DEFINITION

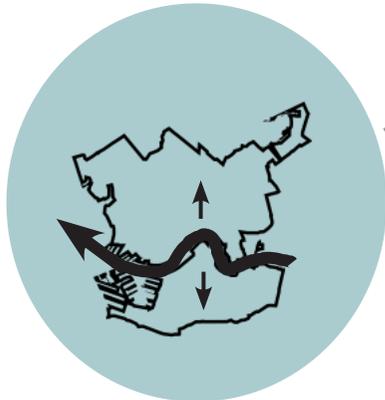
A **WASTESCAPE** is :

- a space of social and environmental **regeneration**. It can help to overcome the divisions between people and to improve the quality of species' life. Its appearance and function are continuously **changeable** according to different times and places.
- a '**Non-place**' of passage where there is no local identity to recognize. Its nature is invisible and apparently **worthless to citizens**.
- a place where nature, with its **wild** and **disordered** aspect, takes on a charm of its own, **mysterious**, **ambiguous** due to its indefinite form and function.
- a space lacking of own **identity**, recognizable social, spatial and cultural features by a community.

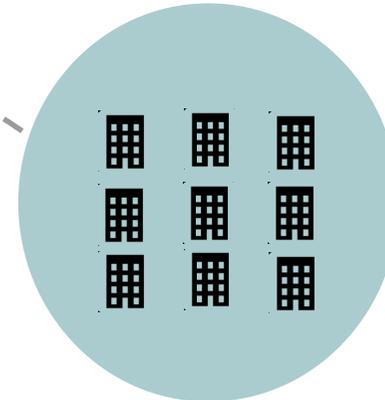
SITE: ROTTERDAM (SOUTH HOLLAND)



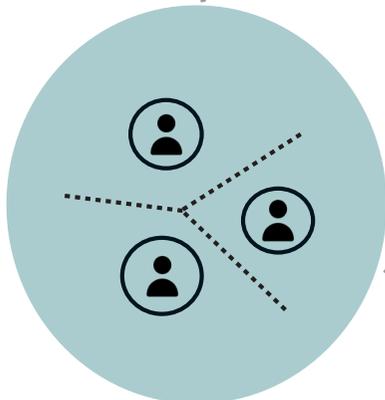
CHALLENGES IN ROTTERDAM



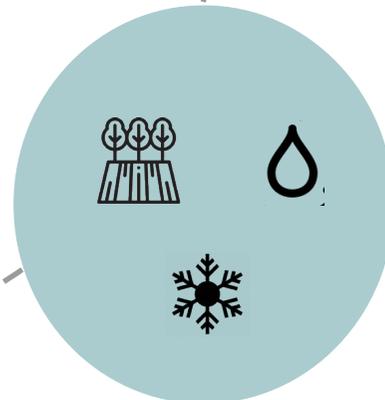
DIVISION BETWEEN NORTH AND SOUTH SIDES



PRESSING URBANIZATION



URBAN (SOCIAL/SPATIAL) FRAGMENTATIONS



**ENVIRONMENTAL POLLUTION:
SOIL, WATER, AIR**

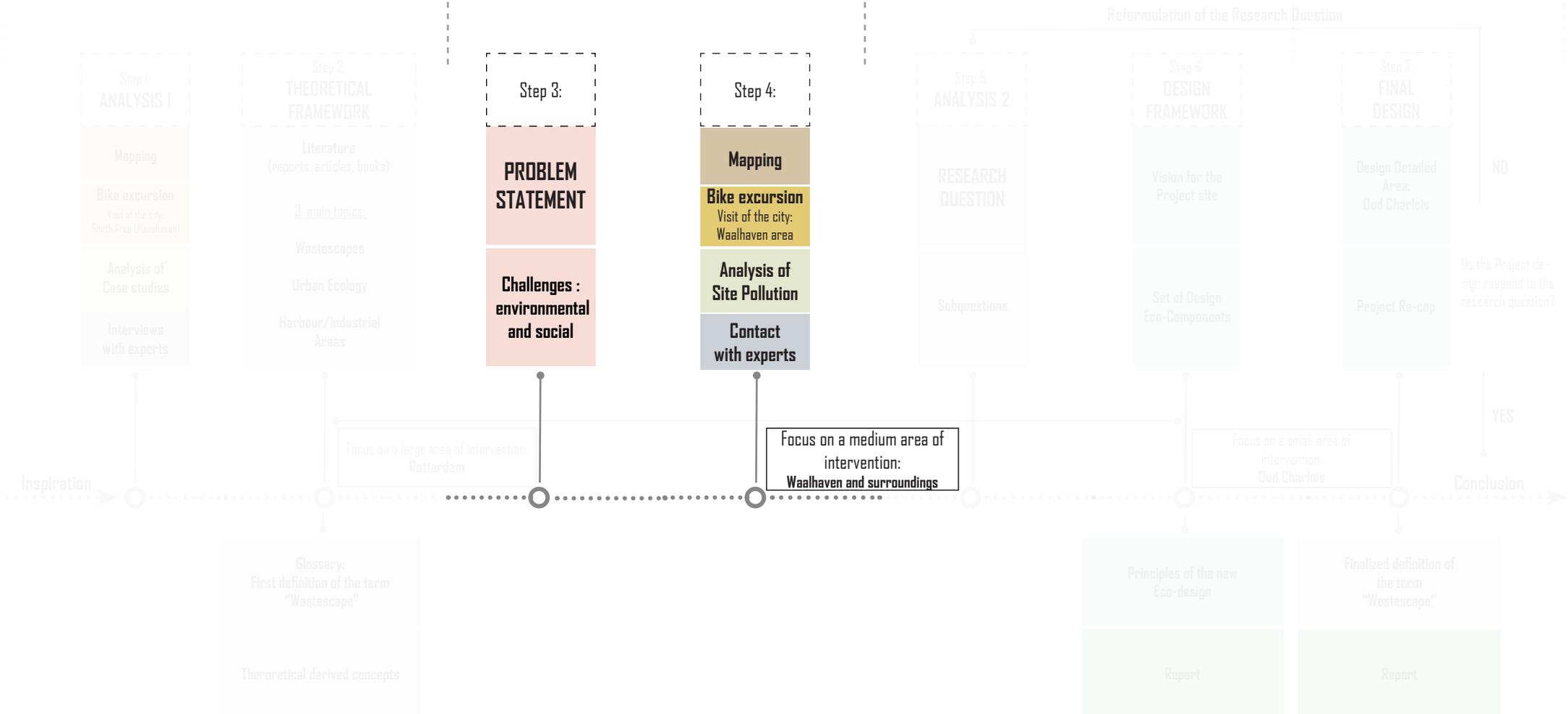
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PROBLEM STATEMENT

What is the future of the Wastescapes in the city of Rotterdam ?

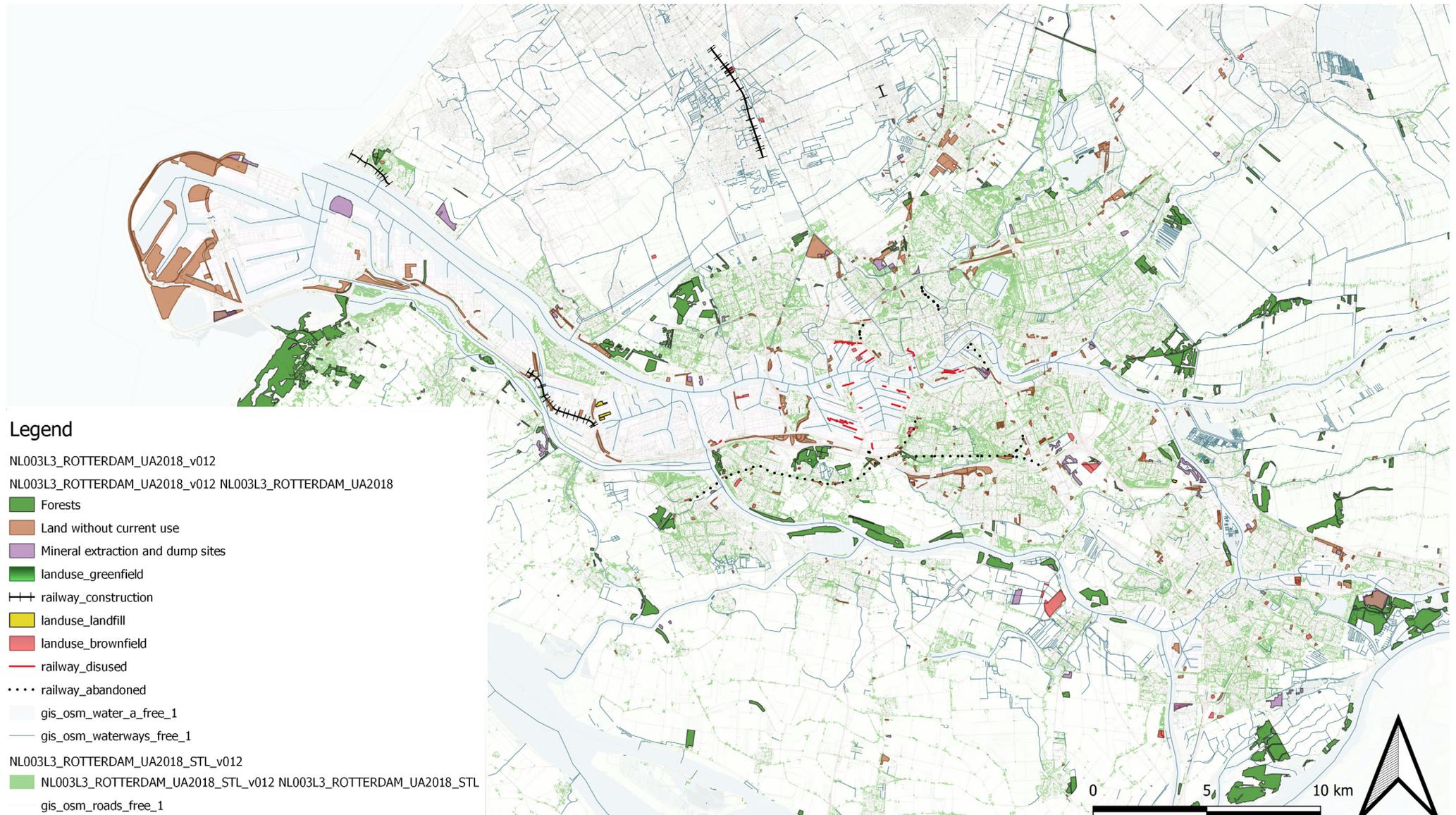
Due to an economic process of "urban pressure" undergoing in the city, the majority of the old industrial, harbour areas or buildings are demolished and replaced by new structures with different functions and forms 'erasing' the memory of the past urban structures.

Some lands instead are used and then abandoned or even never used and left uncultivated. These, usually covered by wild vegetation, can host a high range of biodiversity, especially in not polluted soils.

ANALYSIS : REGIONAL > CITY > DISTRICT

Abandoned spaces and Green areas

- Combination of wasted areas and vegetation in and around the city of Rotterdam.



ANALYSIS : REGIONAL > CITY > DISTRICT

Green areas and Soil pollution

- Soil quality in/around the city of Rotterdam varies considerably. Some areas have a high rate of pollution, while others a lower one.



ANALYSIS : REGIONAL > CITY > DISTRICT

Potential Green Connections (“Green Sewing Corridors”) through industrial areas.

- Potential ecological corridors can be created or other existing ones to be strengthened.
- A central vertical one is for **BIRD MIGRATION**, while the horizontal one is important for **FISH MIGRATION**.



ANALYSIS : REGIONAL > CITY > DISTRICT

Individuation of Four Critical Points

- Due to the central industrial zones, four important points along the Maas river show a discontinuity of green areas between North and South. The presence of such industrial areas also hinders the accessibility to the river from the city.



ANALYSIS : REGIONAL > CITY > DISTRICT

Industrial Areas converted into New Eco-Hotspots

- The transformation of industrial critical areas into new ecological hotspots leads to the increase of urban vegetation (biodiversity), the depollution of the soil, water and air.



ANALYSIS : REGIONAL>CITY>DISTRICT

Selection of a critical area of interest. Large Scale.

- The chosen area of intervention represents a crucial crossing point where the contrast between city and harbour/industry is much stronger and more evident.



ANALYSIS : REGIONAL>CITY>DISTRICT

Area of Intervention: **Waalhaven and surroundings. Medium scale.**

- The area is going to host a future increase of population, building densification and green urbanization.



ANALYSIS : REGIONAL>CITY>DISTRICT

Area of intervention: Waalhaven and surroundings. Connections.

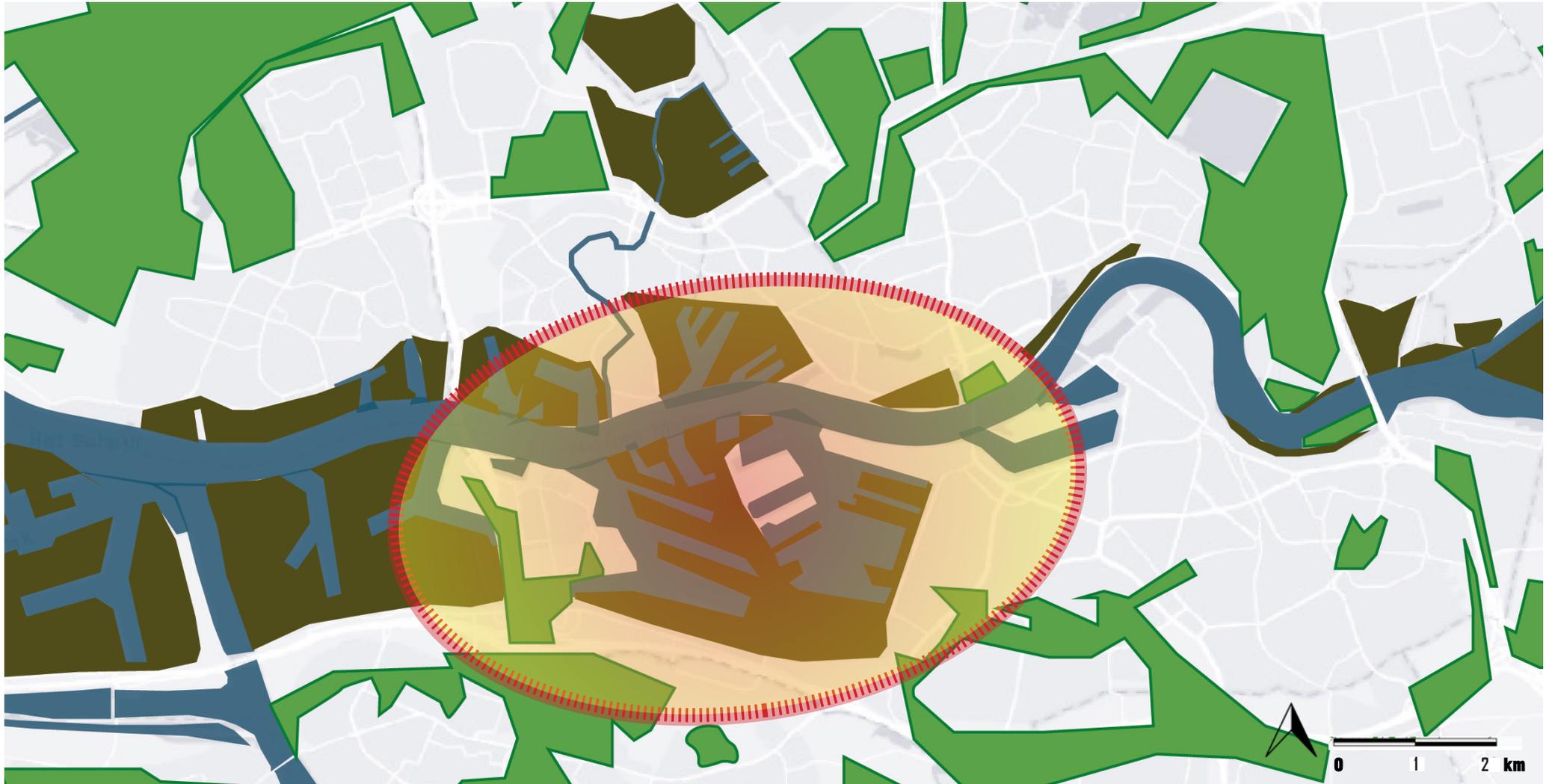
- The presence of a Vertical/Horizontal Green Connection in the area fosters the mobility along the water and the improvement of relation between North and South.



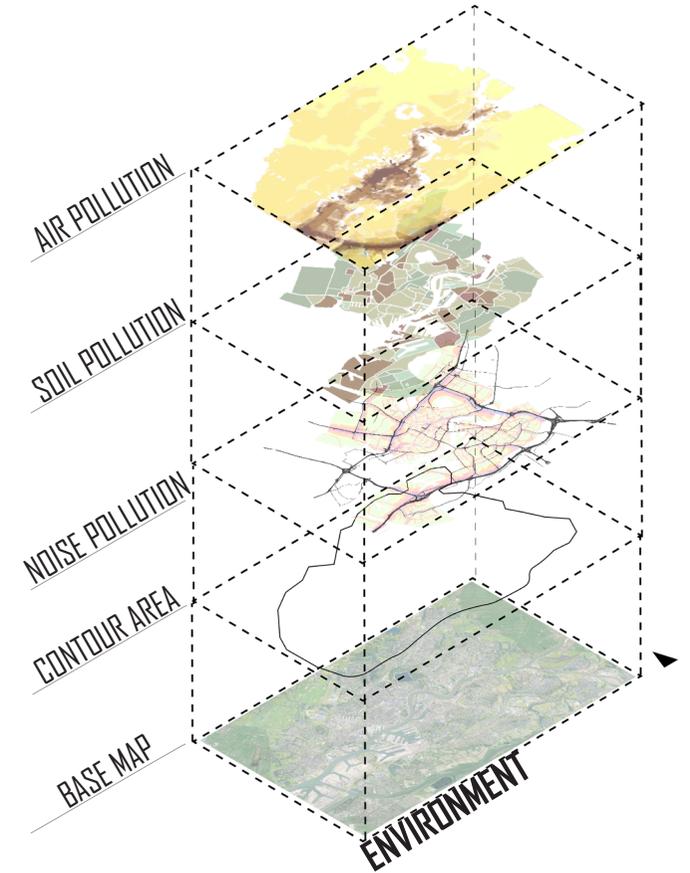
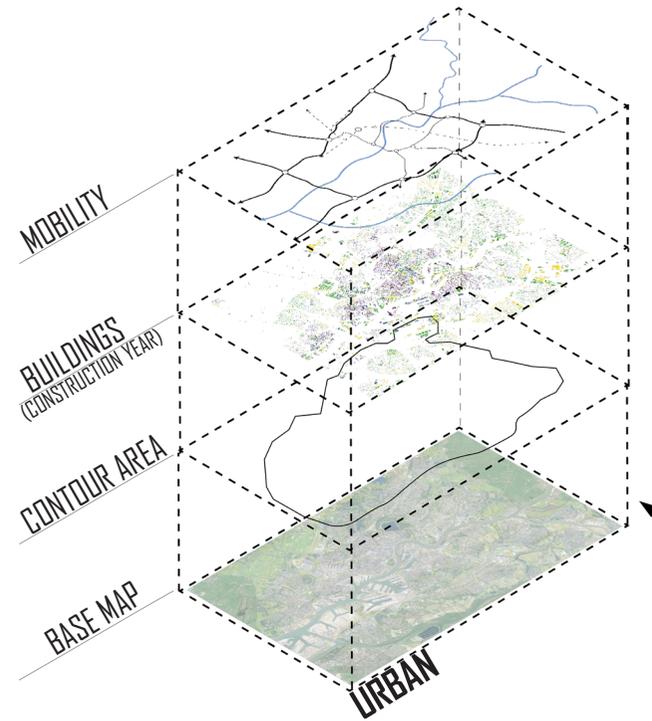
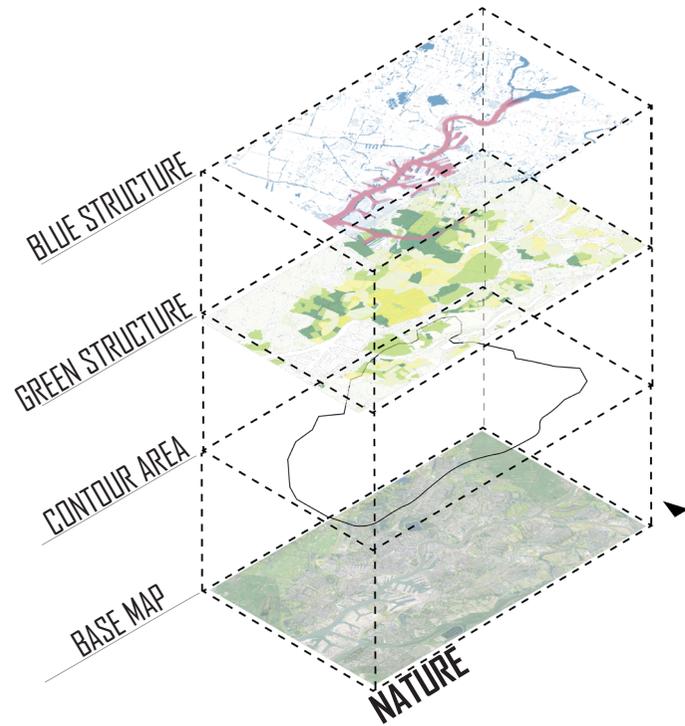
ANALYSIS : REGIONAL>CITY>DISTRICT

Area of intervention: Waalhaven and surroundings. Small Scale.

- Current Plan of Urban Intervention and reconnection between the city and the port: "Plan StadsHaven".



ANALYSIS : OVERVIEW ROTTERDAM - NATURAL /URBAN/ ENVIRONMENTAL LAYERS



ANALYSIS : CONCLUSION

The analysis of the city of Rotterdam and its surrounding region under multiple aspects led to the following **STATEMENTS**:

- **Highest levels of pollution** along the main communication routes: the Maas (Water) river or the highways (Air, Noise).

- The **quality of the urban space** varies according to the location:

Near the port: scarce vegetation and fragmented urban agglomerations.

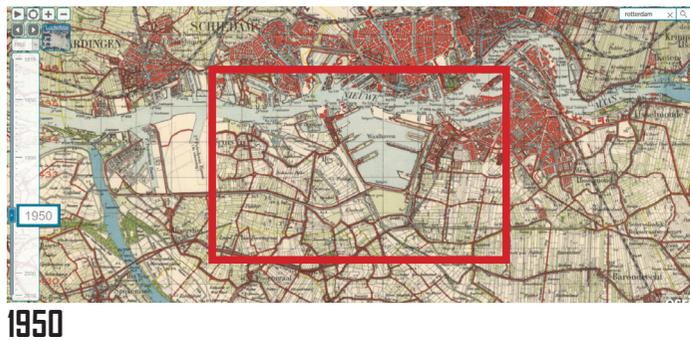
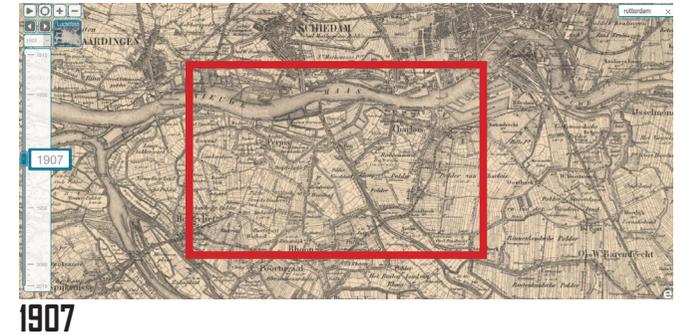
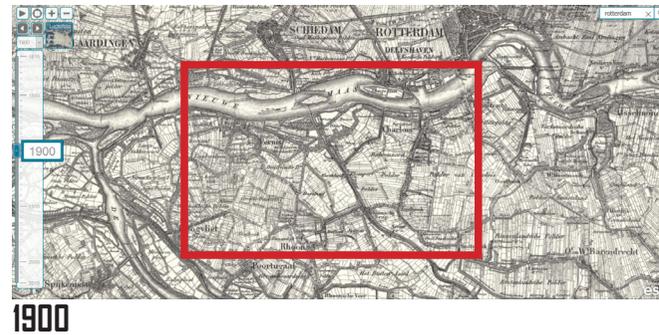
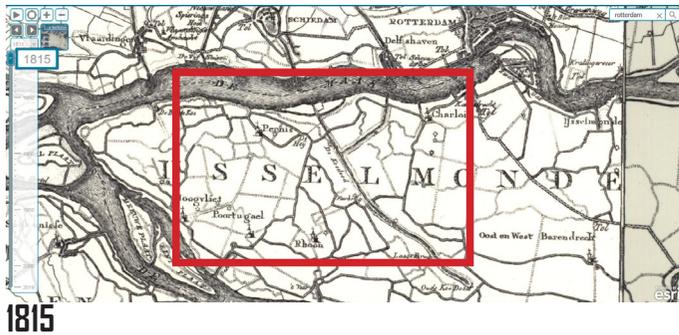
Inner-city: green and built areas more dense and aggregated.

- The **relationship between the density of industrial and building areas** is inversely proportional: in the city center there are fewer industrial areas, and vice versa.

WAALHAVEN AREA

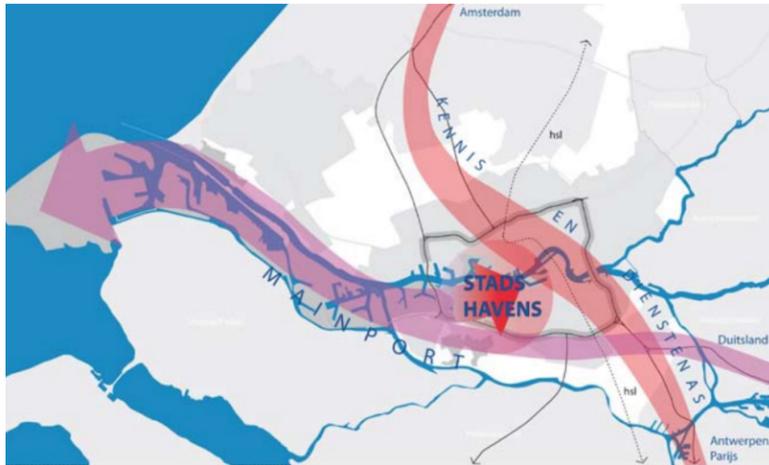


A GRADUAL FRACTURE OVER TIME BETWEEN THE PORT AND THE CITY

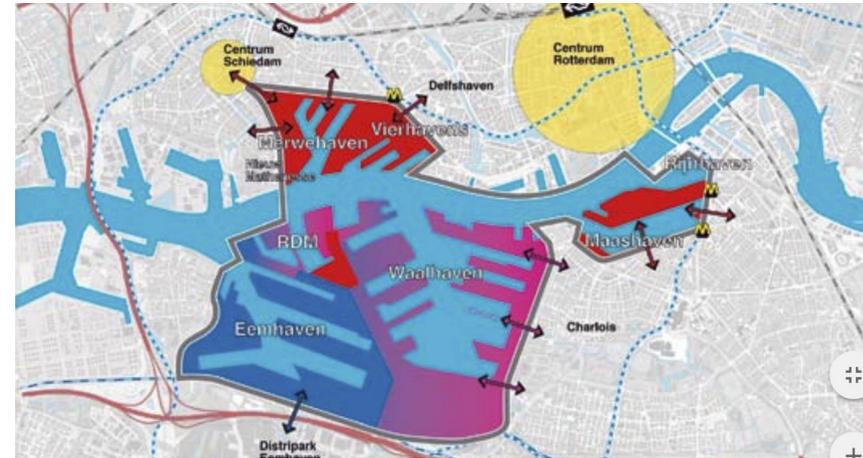


- **Containerization and technological revolution** in second half of 20th century: important breakthrough for the port. Port and city drifted apart, and huge areas were left behind for new urban uses.

PLAN "STADHAVENS": A WAY OF RECONNECTING THE PORT AND THE CITY



Plan Stadhavens, contextualized on a regional scale.

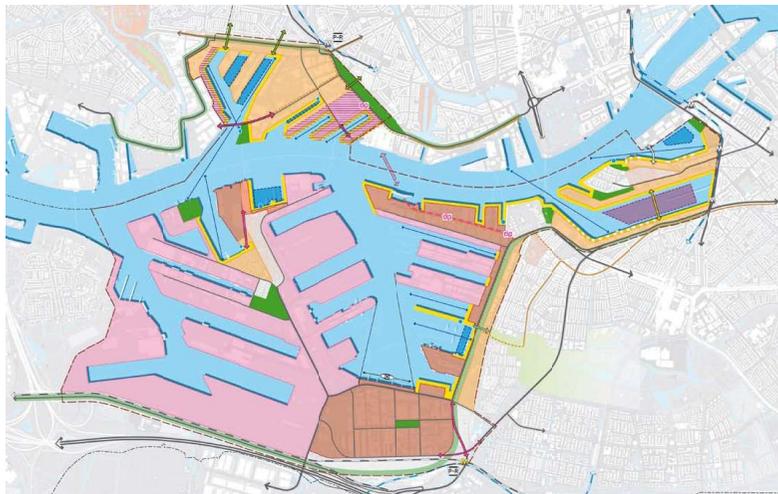


Plan Stadhavens and its links to the surrounding urban areas.

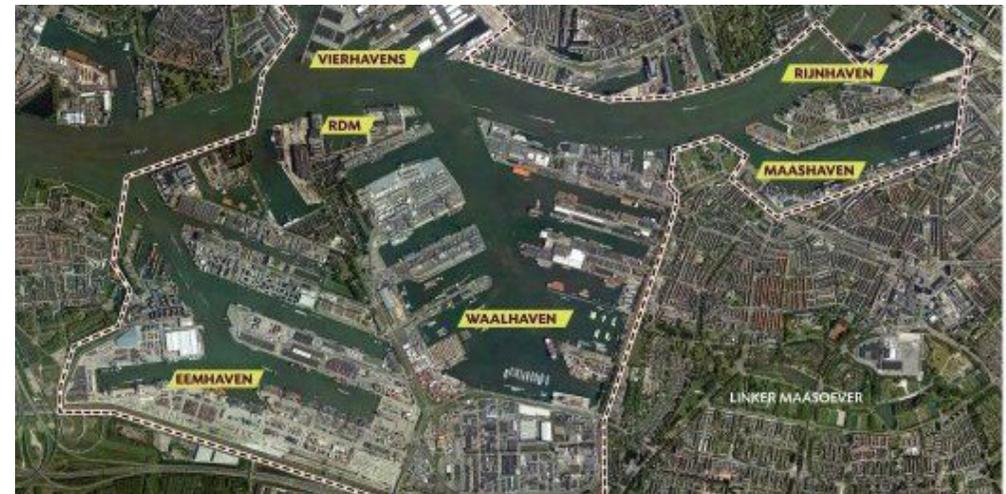
Stadshavens: extensive area consisting of **Merwehaven** and **Vierhaven**, **Rijn- and Maashaven**, **RDM site** and **Heijsehaven** and **Waal- and Eemhaven**.

Plan Goal: - Increase in scale and relocations of port companies create space for new functions.

- Coexistence of different stakeholders: Port of Rotterdam, Business Companies and Citizens.

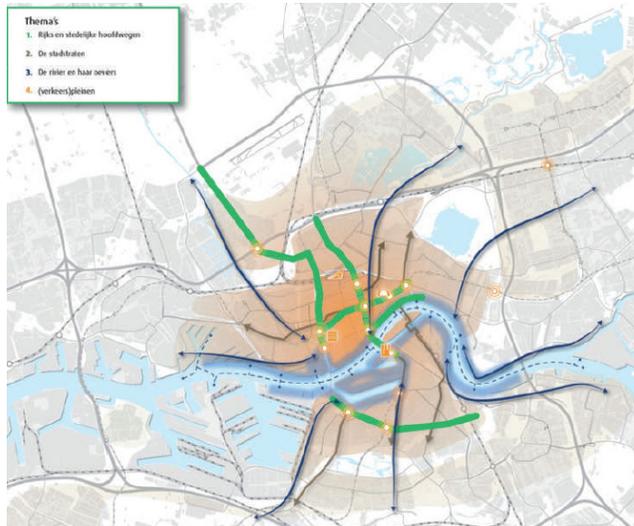


Plan Stadhavens: Program.

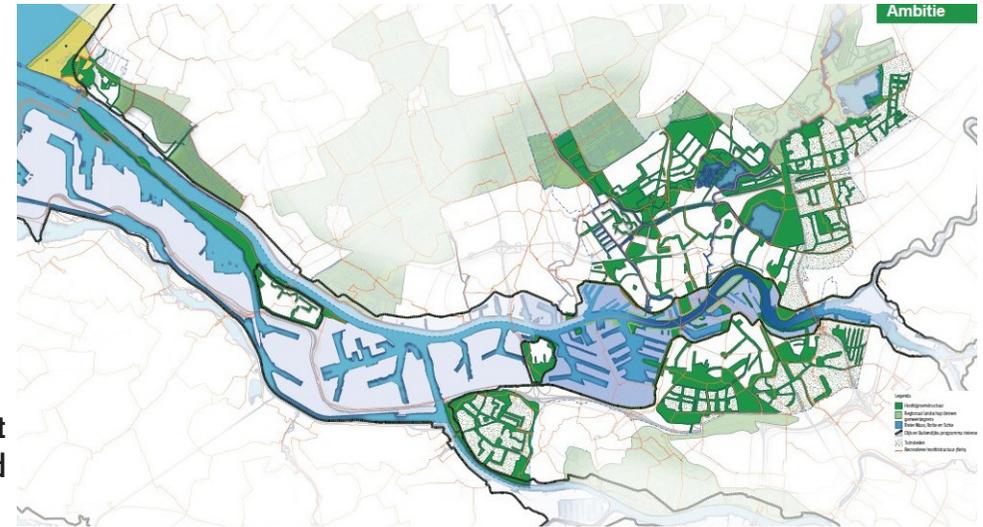


Sub-areas belonging to Plan Stadhavens.

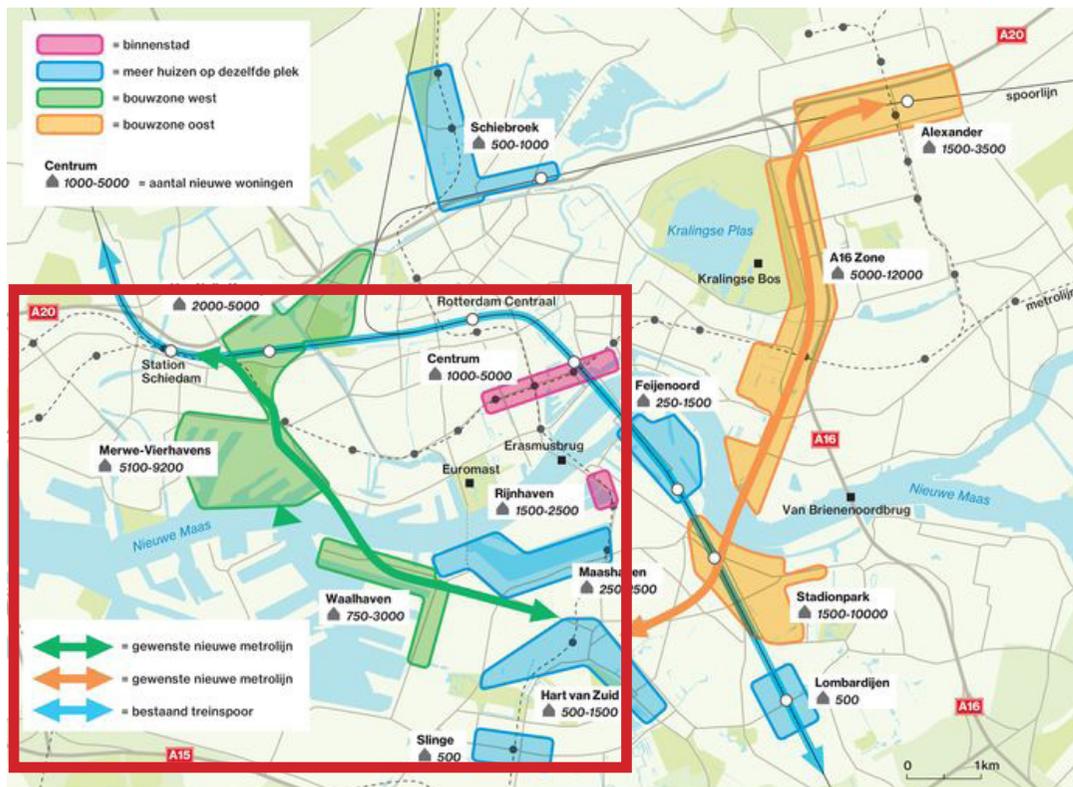
FUTURE UILDING DENSIFICATION AND GREEN URBANIZATION IN ROTTERDAM



Future Urban Traffic Plan. Improvement of connection between Northern and Southern sides of the city.



Plan of Future Green Urbanization in Rotterdam.



- 50,000 new houses or more will be needed in open and green areas within the ring road.

- East side: 22,000 homes.

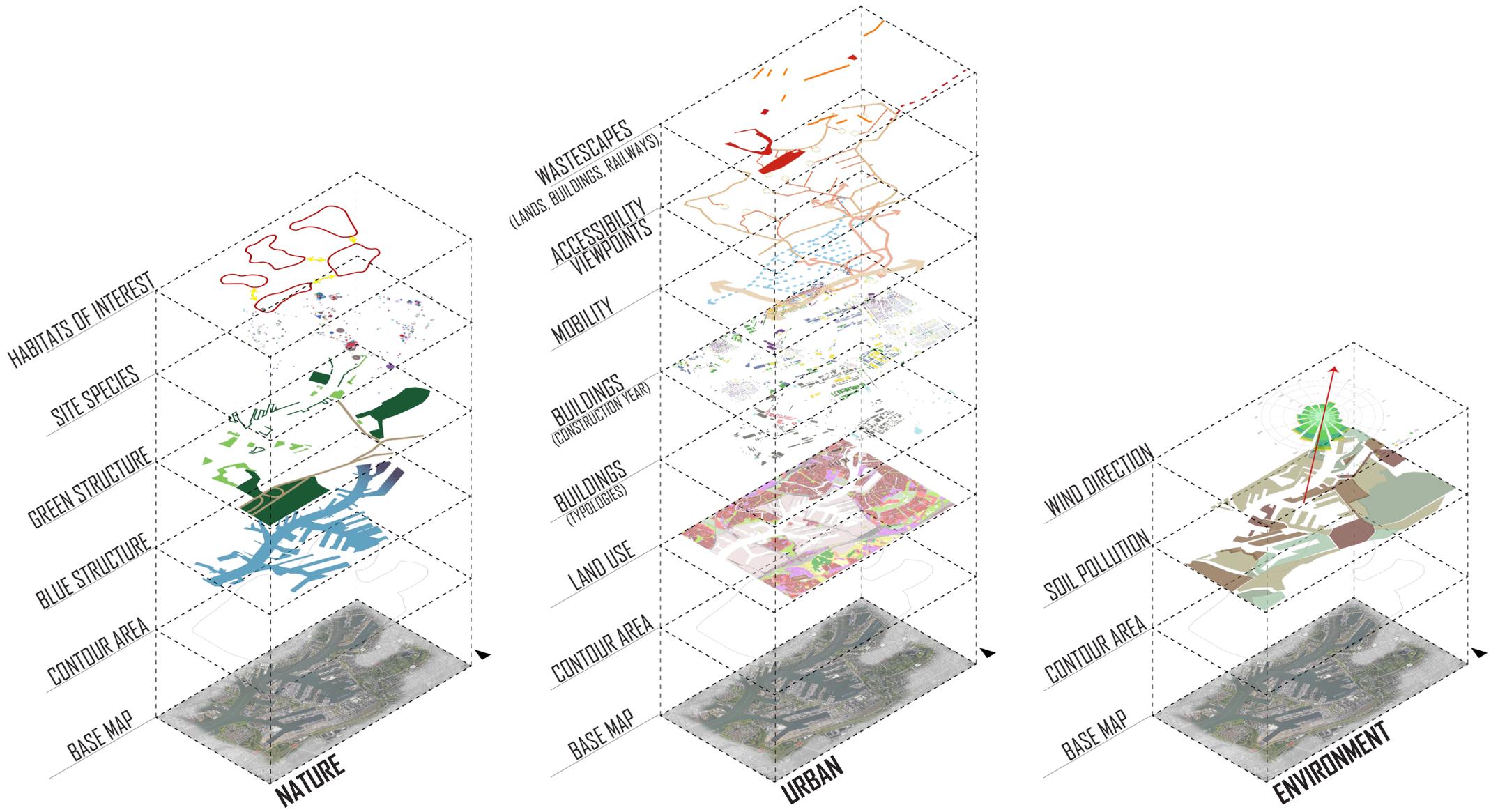
- Other side of the Maas: 10,000 homes.

- West side of the city: 5000 homes, including a new metro station 'Spangen'.

Regarding urban mobility, the car will be less central and there will be more space for cyclists, pedestrians and green spaces.

Increase of population in the South of Rotterdam by 2040.

ANALYSIS : OVERVIEW PROJECT AREA - NATURAL /URBAN/ ENVIRONMENTAL LAYERS



ANALYSIS : CONCLUSION

The analysis of the city of Waalhaven area and its surroundings under multiple aspects led to the following **STATEMENTS**:

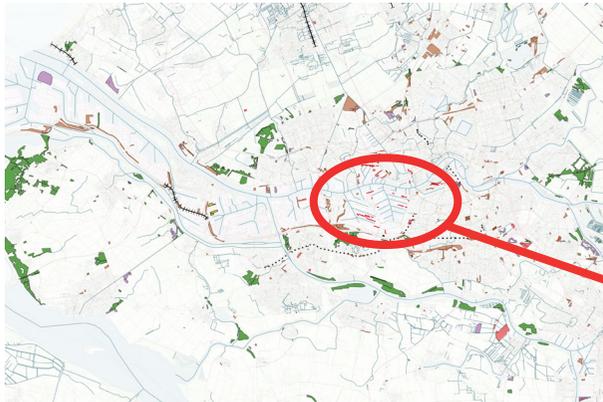
- The **quality of the urban space** varies according to the land use.

Near the port: fragmented Vegetation and Biodiversity, concentrated in some punctual areas. Some of them are easily accessible, others not.

- The most urbanized areas in and around Waalhaven present **high concentrations of mapped species** due to the presence of built structures (shelter).

- Due to a strong urbanization, the **presence of historical port structures** is almost nil. In fact, most of them have been replaced by other, more advanced and modern structures.

WASTESCAPES AROUND WAALHAVEN AREA



Legend

NL003L3_ROTTERDAM_UA2018_v012

NL003L3_ROTTERDAM_UA2018_v012 NL003L3_ROTTERDAM_UA2018

Forests

Land without current use

Mineral extraction and dump sites

landuse_greenfield

railway_construction

landuse_landfill

landuse_brownfield

railway_disused

railway_abandoned

gis_osm_water_a_free_1

gis_osm_waterways_free_1

NL003L3_ROTTERDAM_UA2018_STL_v012

NL003L3_ROTTERDAM_UA2018_STL_v012 NL003L3_ROTTERDAM_UA2018_STL

gis_osm_roads_free_1

WASTESCAPES AND SOIL POLLUTION AROUND WAALHAVEN AREA



Legend

NL003L3_ROTTERDAM_UA2018_v012

NL003L3_ROTTERDAM_UA2018_v012 NL003L3_ROTTERDAM_UA2018

- Forests
- Land without current use
- Mineral extraction and dump sites
- landuse_greenfield
- railway_construction
- landuse_landfill
- landuse_brownfield
- railway_disused
- railway_abandoned
- gis_osm_water_a_free_1
- gis_osm_waterways_free_1

NL003L3_ROTTERDAM_UA2018_STL_v012

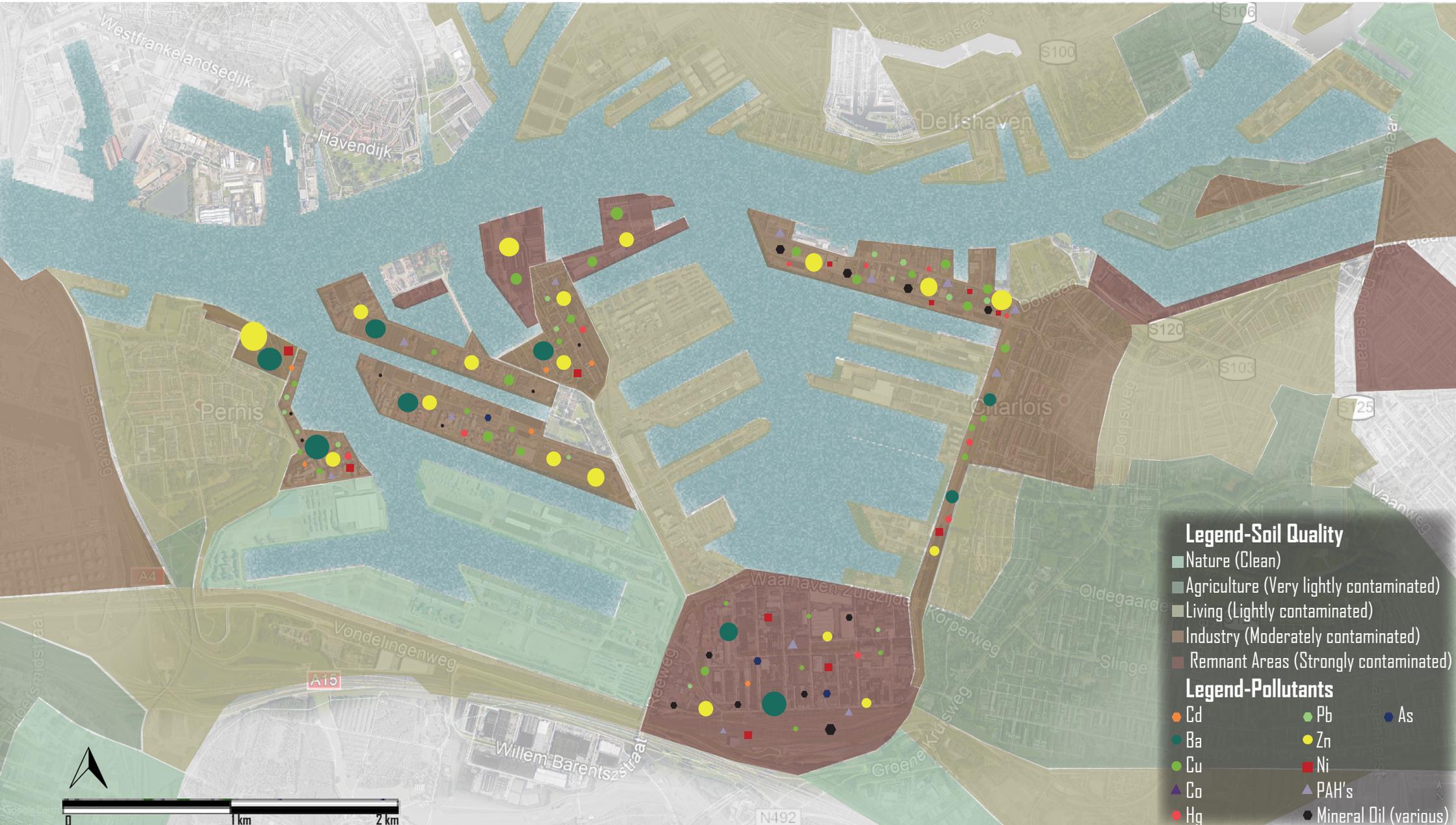
NL003L3_ROTTERDAM_UA2018_STL_v012 NL003L3_ROTTERDAM_UA2018_STL

ois osm roads free 1

SOIL QUALITY

- Nature (Clean)
- Agriculture (Very lightly contaminated)
- Living (Lightly contaminated)
- Industry (Moderately contaminated)
- Remnant Areas (Strongly contaminated)

SOIL POLLUTION IN THE PROJECT AREA



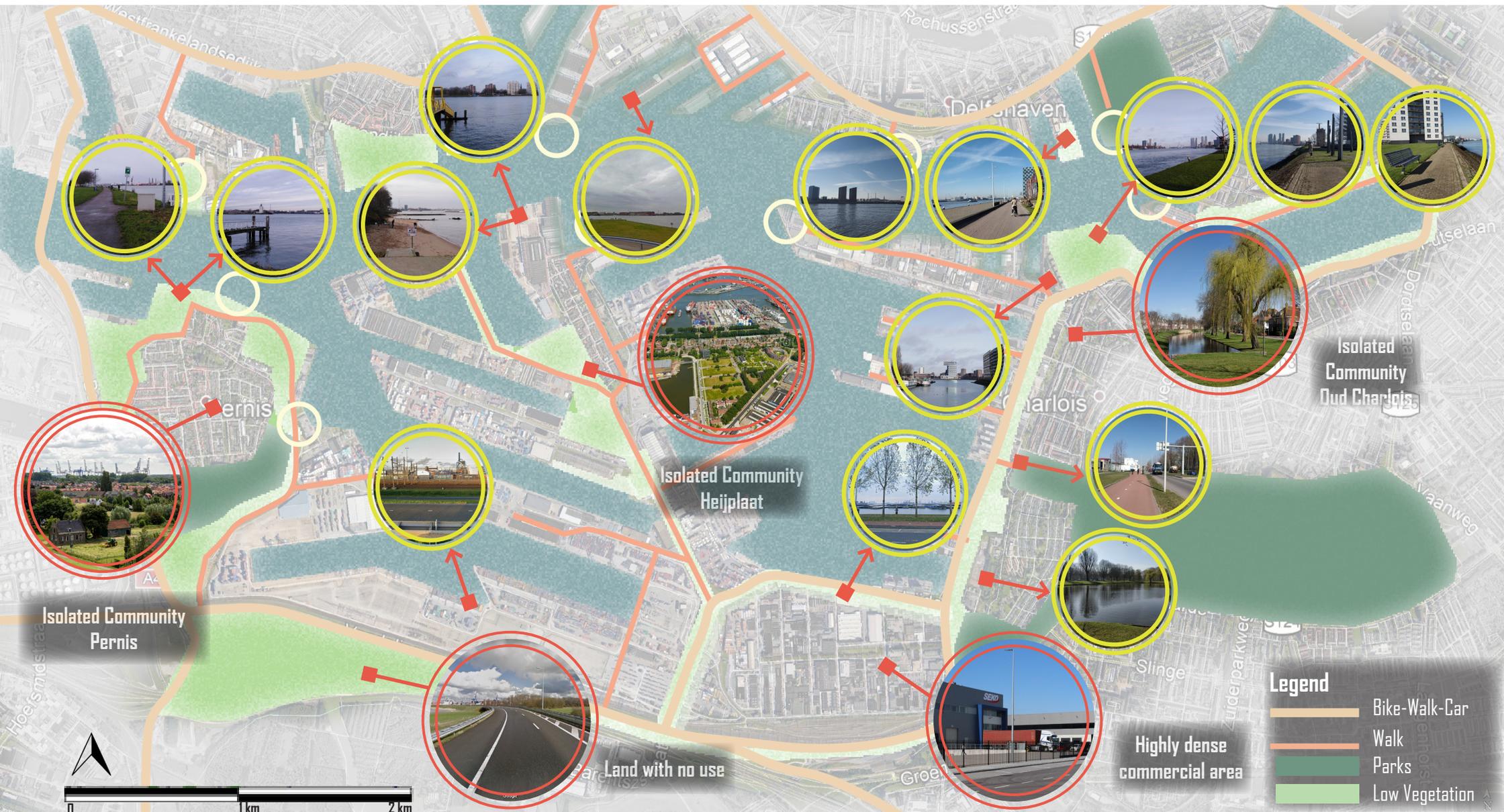
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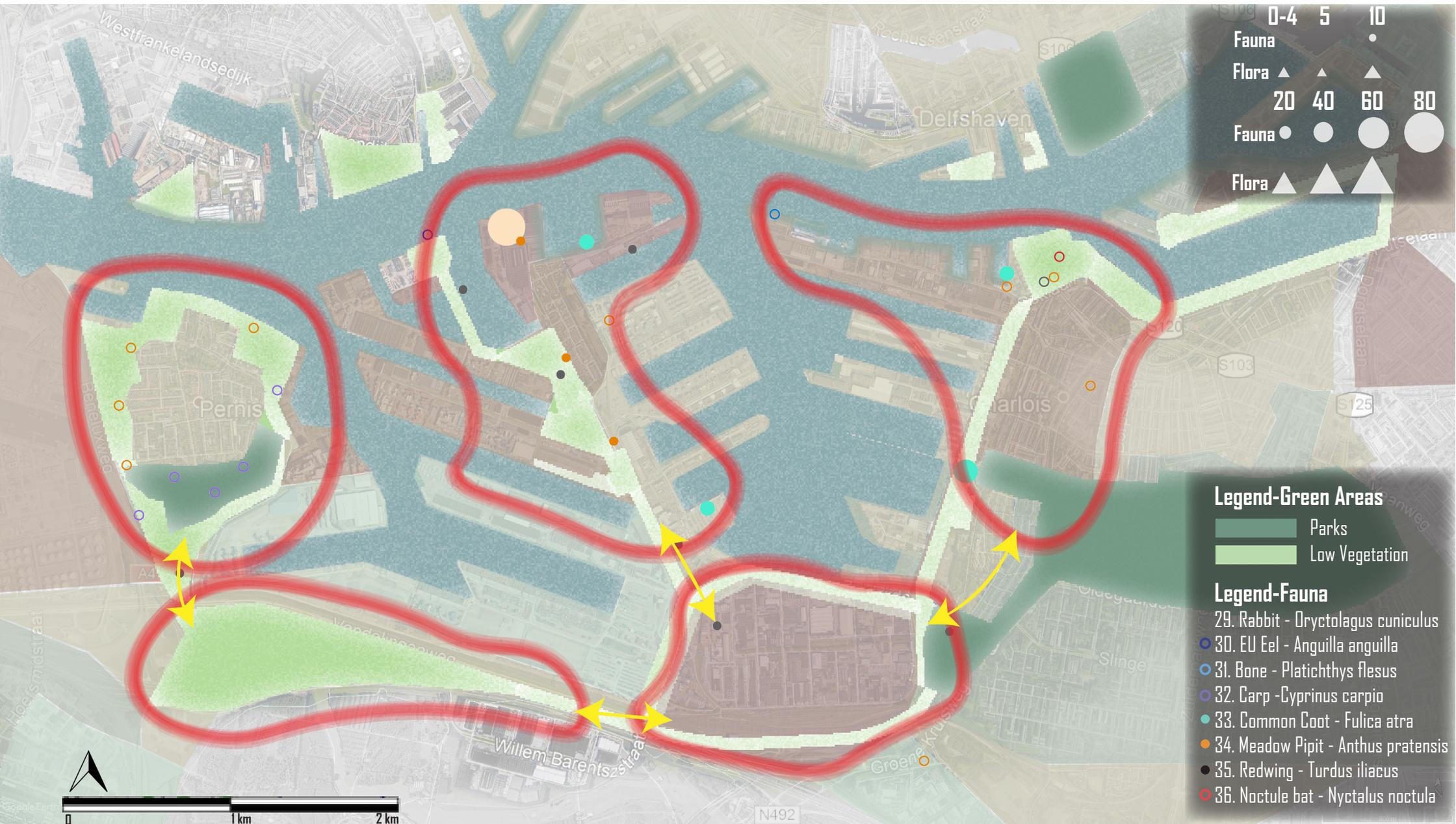
Legend-Pollutants

- Cd
- Ba
- Cu
- ▲ Co
- Hg
- Pb
- Zn
- Ni
- ▲ PAH's
- Mineral Oil (various)
- As

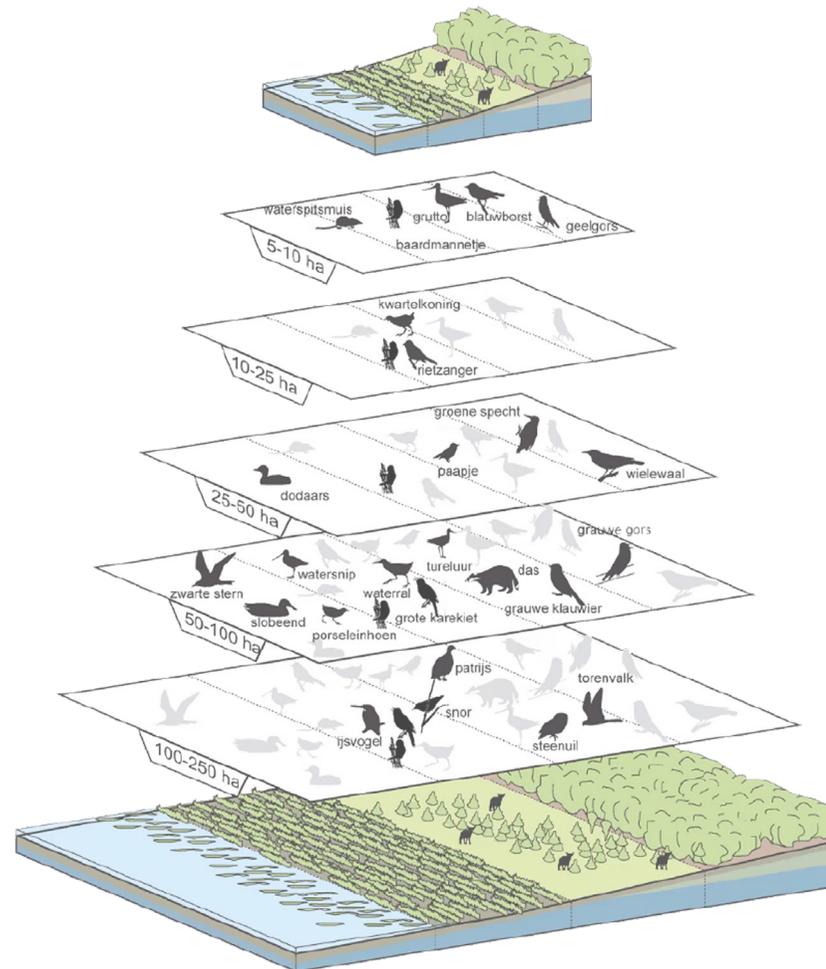
SPATIAL QUALITY IN THE WAALHAVEN AREA



BIODIVERSITY IN THE WAALHAVEN AREA



SPECIES AND THEIR RELATED HABITAT



Source: Jansen, Sief. "Introduction on Ecology". 10 March 2021, Online Lecture.

TYOLOGIES OF GRADIENT



SELECTED SPECIES (FLORA/FAUNA) IN WAALHAVEN AREA

Legend

FLORA - Plants against pollution, tolerant to wind, idoneous for sandy/loamy soils

Forest:

1. Quercus Robur
2. Salix Nigra
3. Populus x canescens

Shrubland:

4. Taxus baccata
5. Crataegus monogyna
6. Berberis vulgaris
7. Amelanchier rotundifolia
8. Rosa canina
9. Salix nigra

Grassland:

10. Helianthus rigidus
11. Brassica Juncea
12. Typha angustifolia
13. Phragmites australis
14. Lythrum salicaria
15. Hypericum calycinum
16. Phalaris arundinacea
17. Chrysopogon zizanioides

Wetland:

- (Underwater plants)
18. Ranunculus aquatilis
 19. Hottonia Palustris
 20. Callitriche palustris
 21. Elodea canadensis

(Plants with floating leaves)

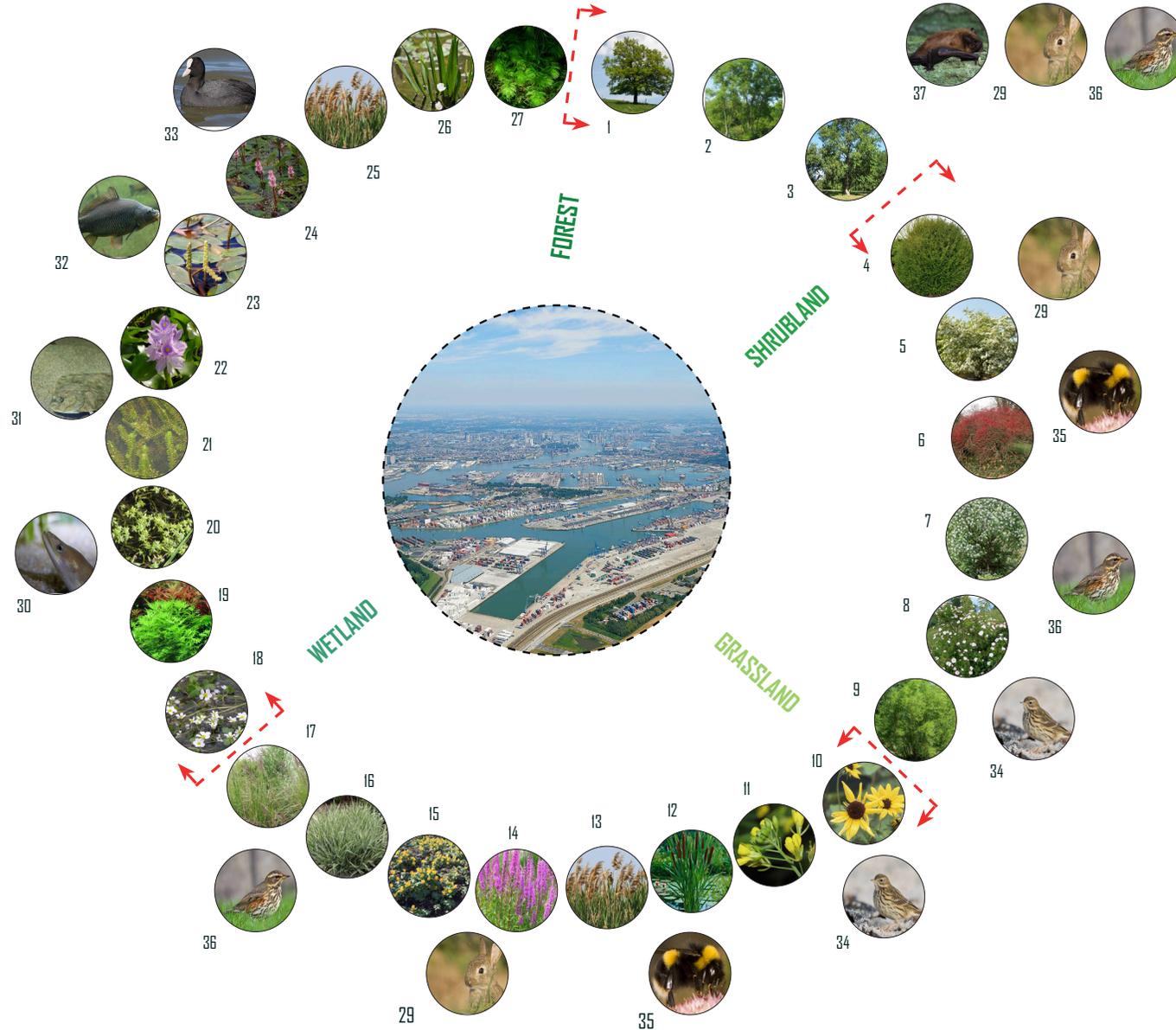
22. Eichhornia crassipes
23. Patamogeton natans
24. Polygonum amphibium
25. Phragmites australis

(Floating plants)

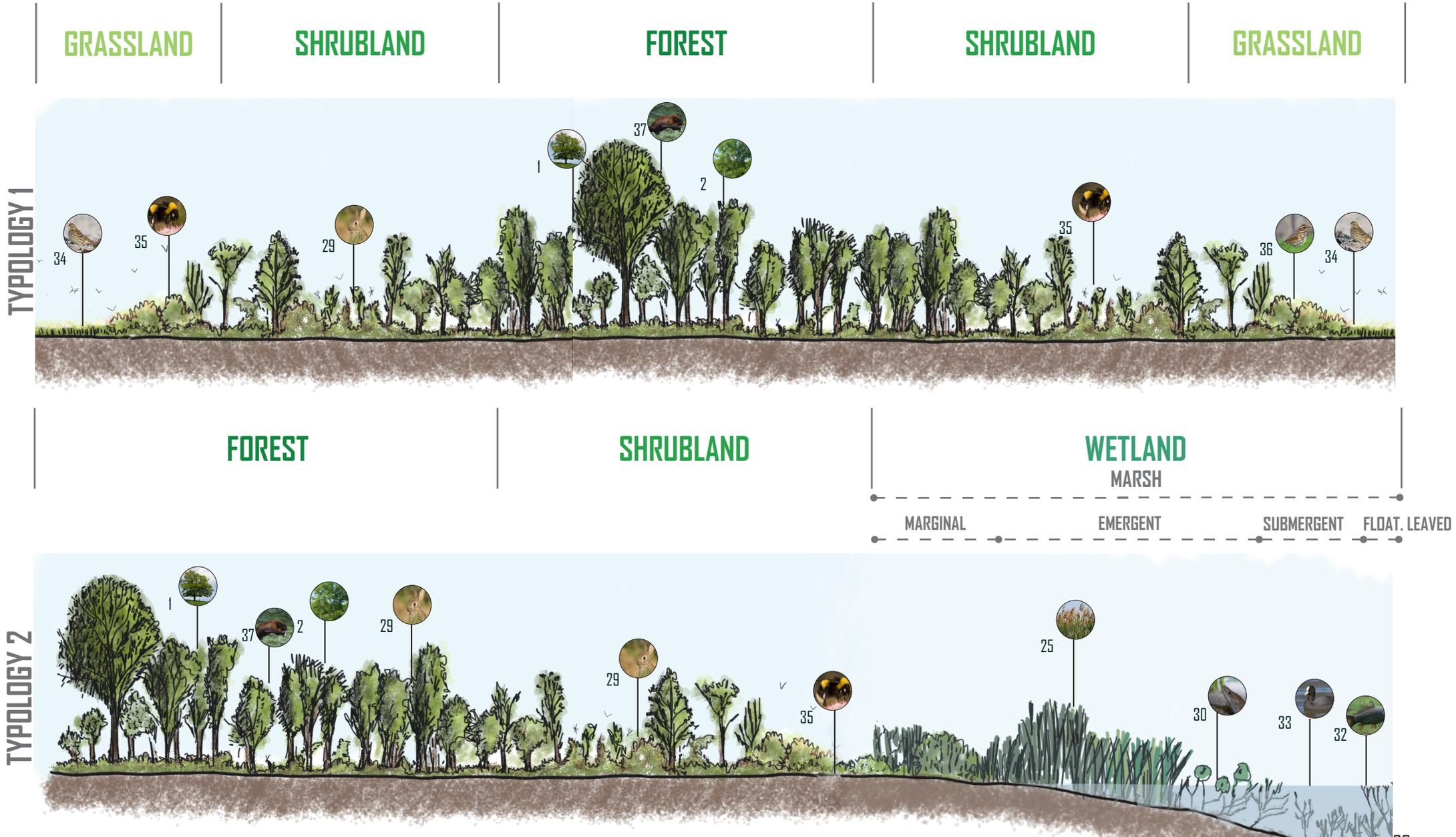
26. Stratiotes aloides
27. Ceratophyllum demersum

FAUNA - Target species (endangered)

29. Rabbit - *Oryctolagus cuniculus*
30. EU Eel - *Anguilla anguilla*
31. Bone - *Platichthys flesus*
32. Carp - *Cyprinus carpio*
33. Common Coot - *Fulica atra*
34. Meadow Pipit - *Anthus pratensis*
35. Bumble bee - *Bombus*
36. Redwing - *Turdus iliacus*
37. Noctule bat - *Nyctalus noctula*

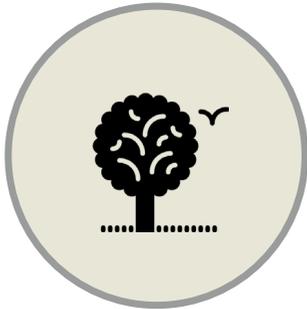


TYOLOGIES OF GRADIENT WITH SOME SELECTED SPECIES

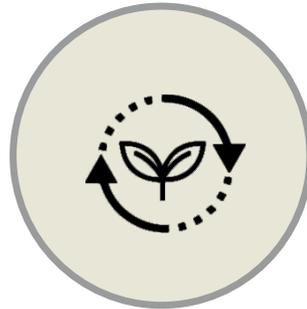


POTENTIAL OF A VEGETATION GRADIENT IN A CITY

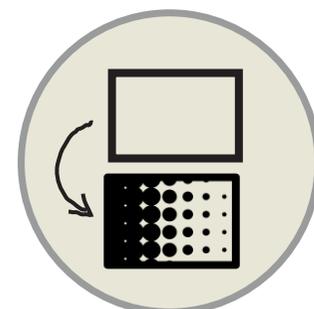
INCREASE OF BIODIVERSITY



ENVIRONMENTAL PURIFICATION



FILLING OF EMPTY SPACES



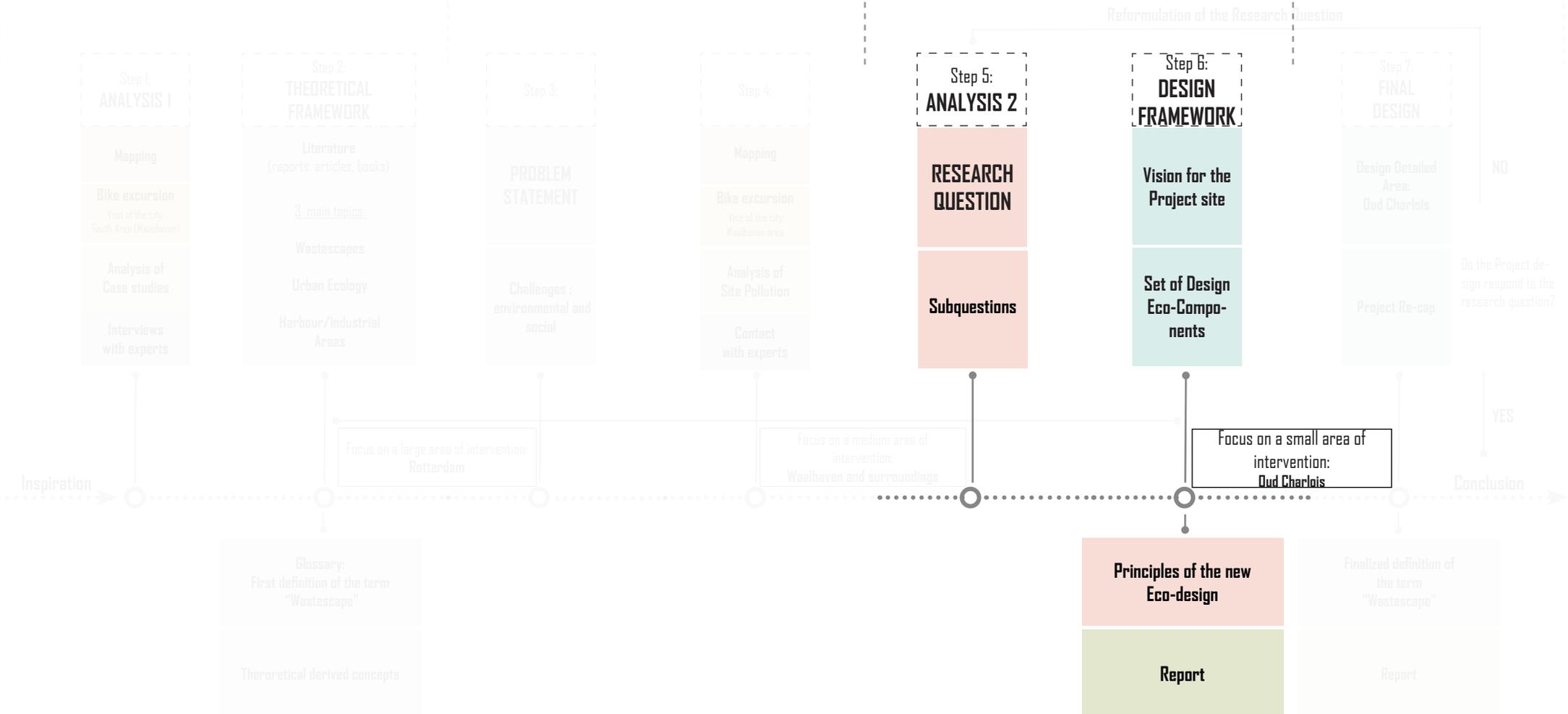
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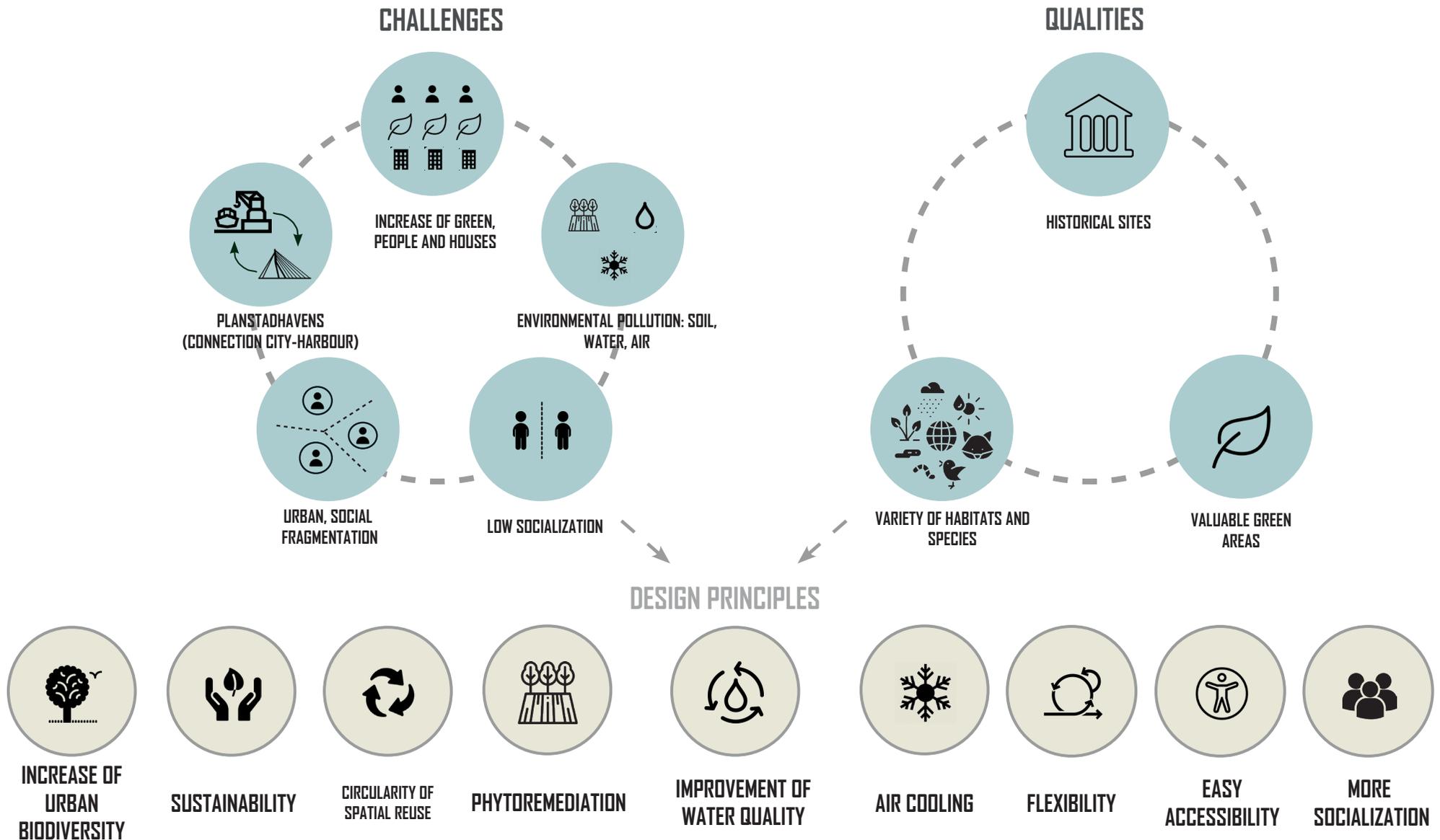


RESEARCH QUESTION AND SUB-QUESTIONS

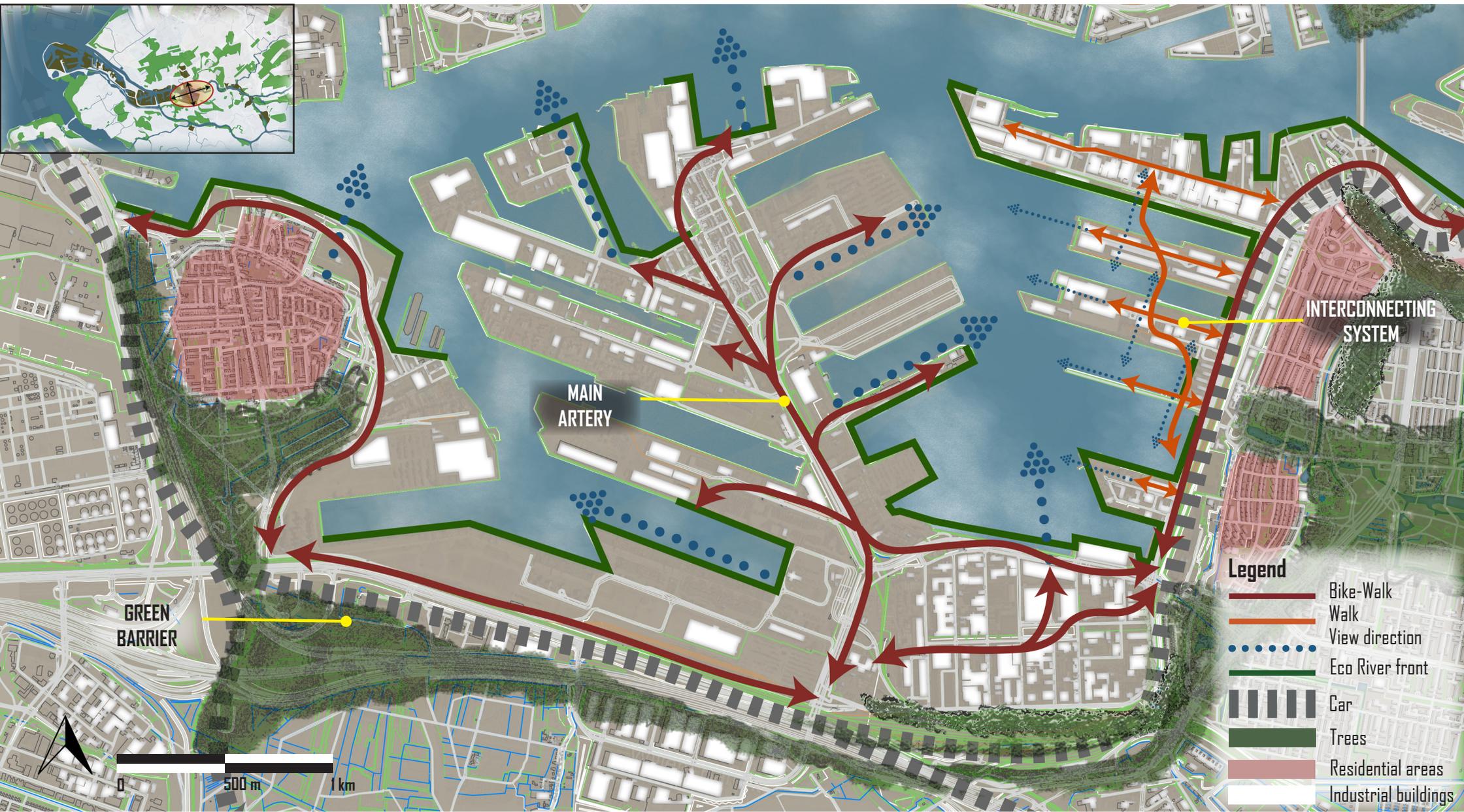
What spatial framework can guide the transition of Wastescapes in Rotterdam into ecological valuable spaces which can foster biodiversity, and improve the quality of people and species' life aspects on small, medium or large scale ?

- Which exact kind of Wastescapes can be considered within the design framework?
- What particular reuse of "Wastescapes" can represent the best, efficient, sustainable and flexible eco-solutions against climate change, urban fragmentation and loss of biodiversity?
- Which green design solution can help to overcome the urban and social fragmentations of the southern districts of the city?
- How can the wastescapes and the existing green areas be combined in order to create new ecological corridors at large scale?
- Which is the best ecological way to depollute the Brownfields improving the quality of the soil, increasing the biodiversity in the city?
- How can certain techniques of Phytoremediation be applied on certain gradients in order to tackle environmental and social issues in the project area?

DESIGN FRAMEWORK

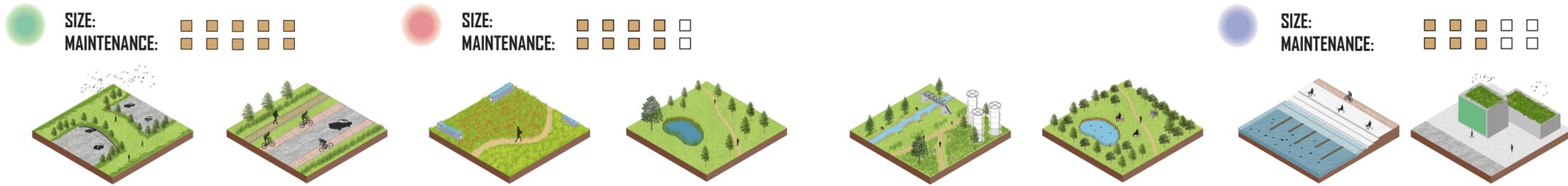


CONCEPT MASTERPLAN - WAALHAVEN AREA

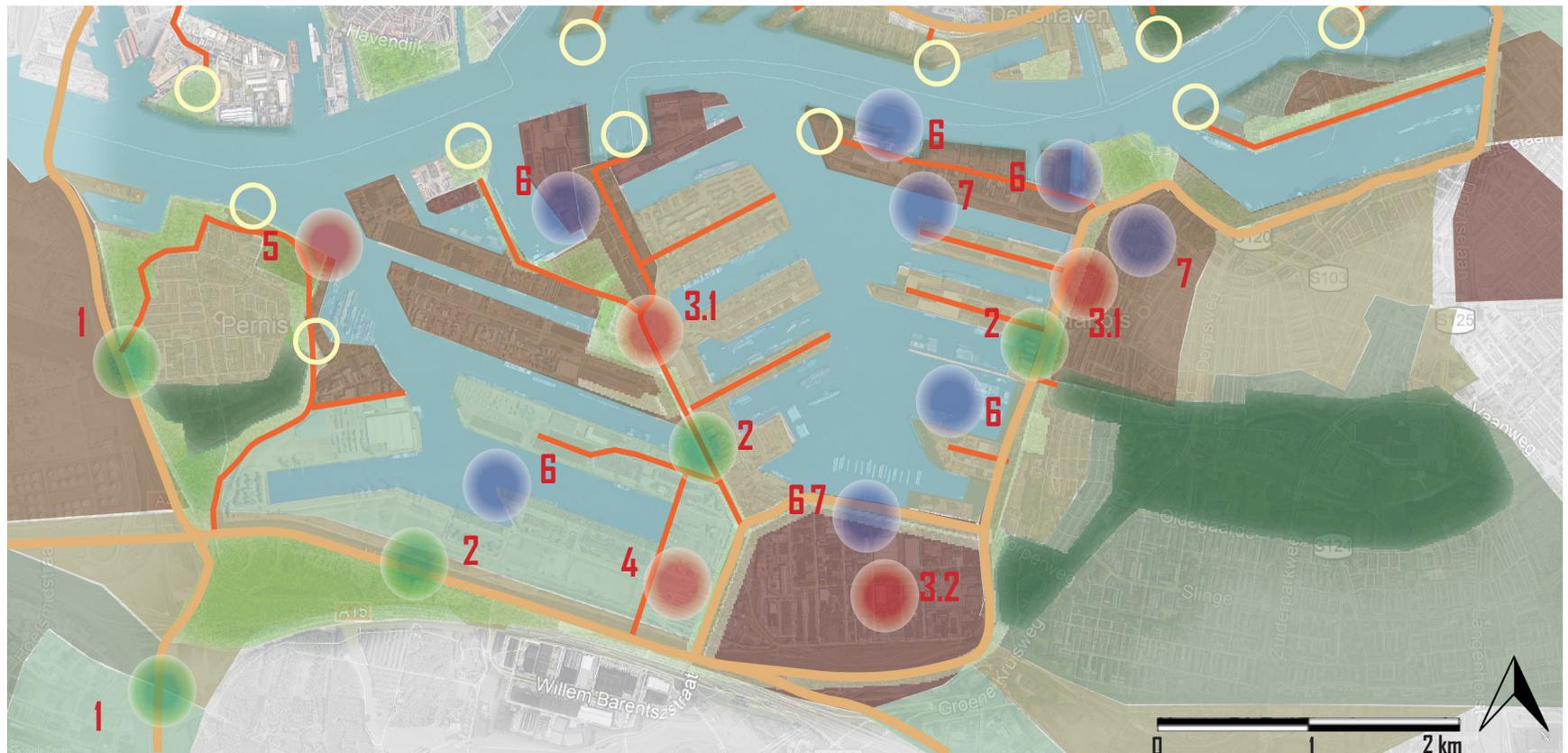


- Legend**
- Bike-Walk
 - Walk
 - View direction
 - Eco River front
 - Car
 - Trees
 - Residential areas
 - Industrial buildings

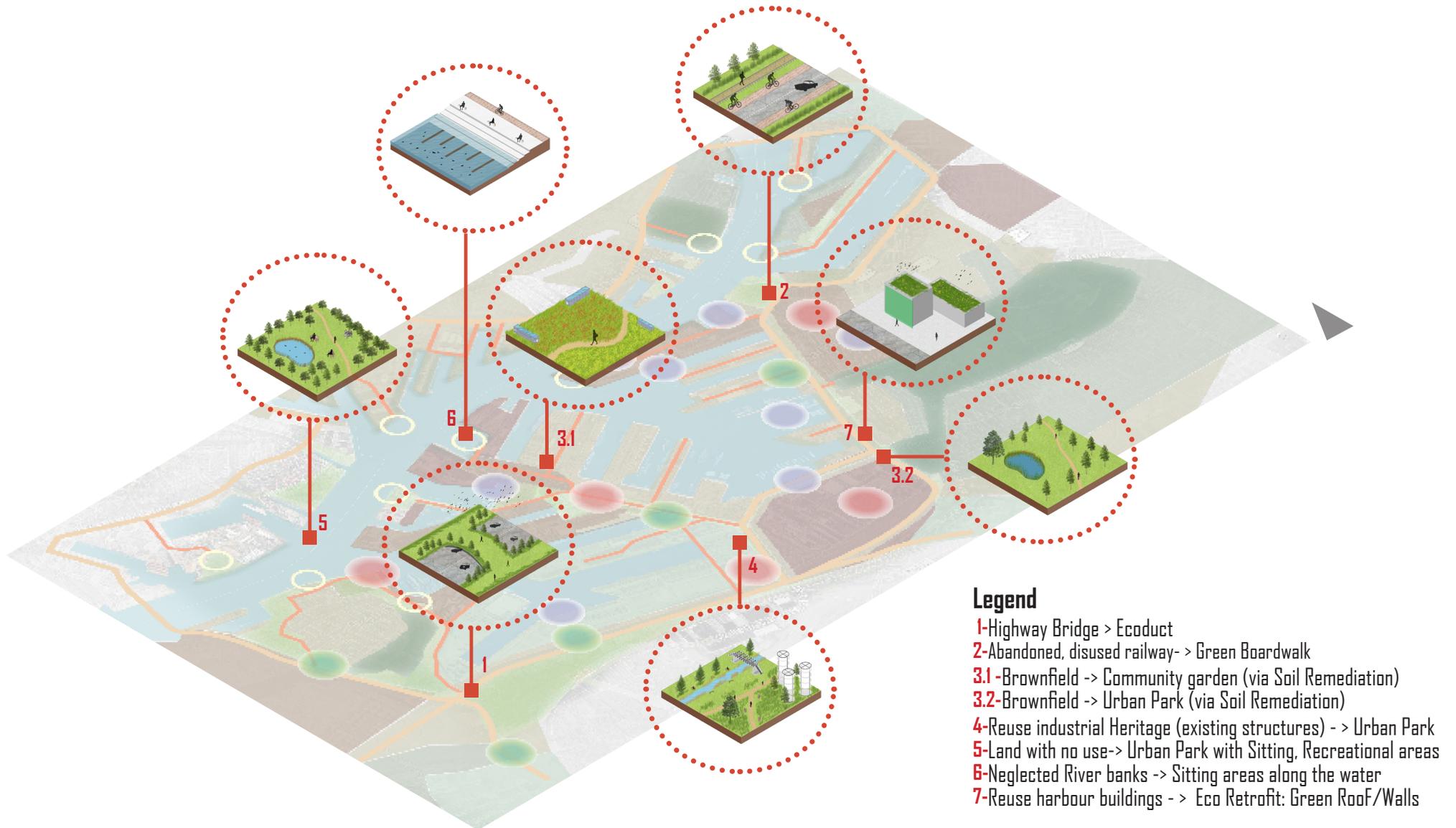
SOIL MAP WITH SITE INTERVENTIONS BY DESIGN ECO-COMPONENTS



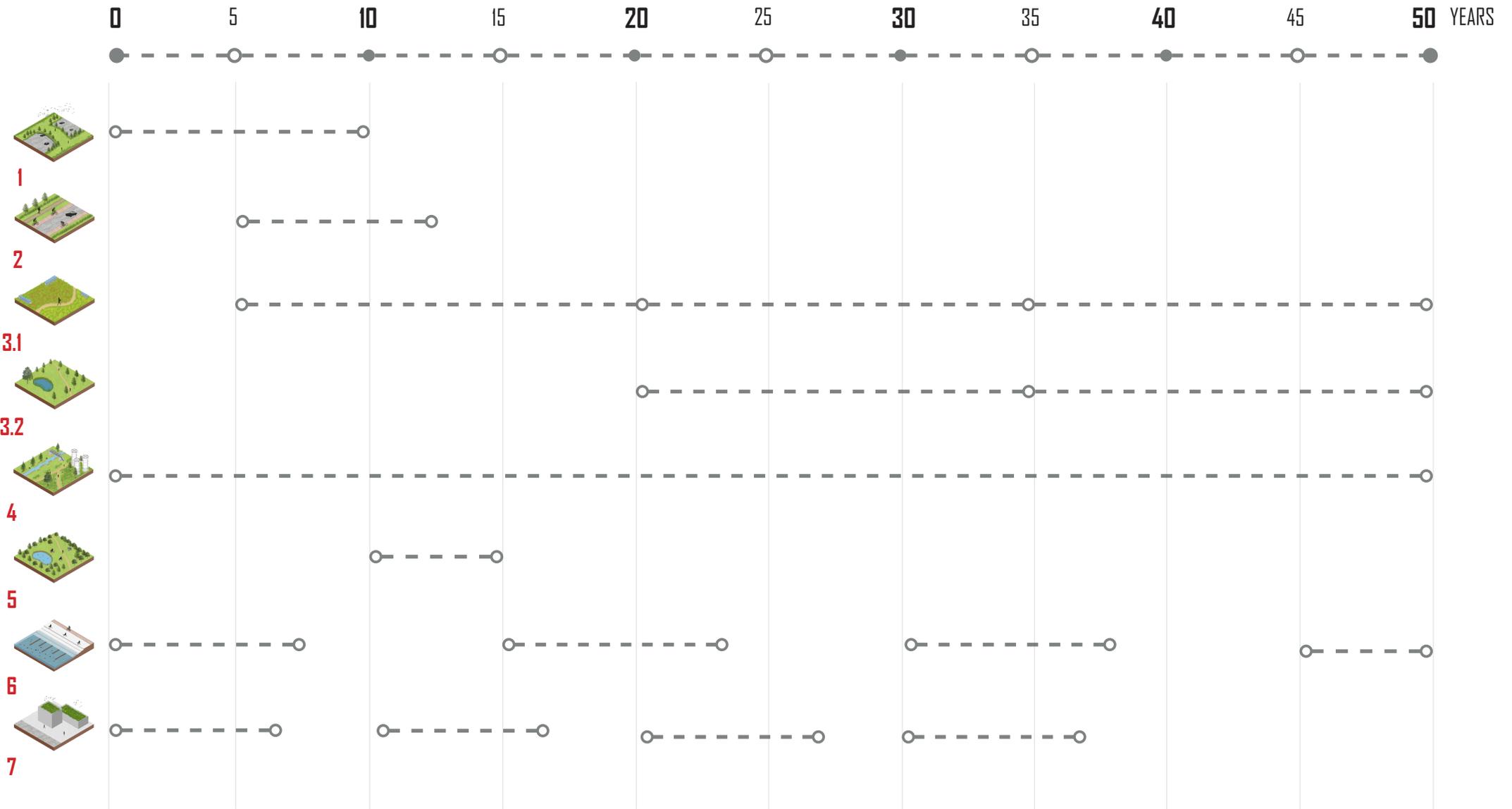
- 1- Highway Bridge -> Ecoduct
- 2- Abandoned, disused railway -> Green Boardwalk
- 3.1- Brownfield -> Community garden (by Soil Remediation)
- 3.2- Brownfield -> Urban Park (by Soil Remediation)
- 4- Reuse industrial Heritage (ex. structures)-> Urban Park
- 5- Land with no use -> Urban Park with Recreational areas
- 6- Neglected River banks -> Sitting areas
- 7- Harbour buildings -> Green Roof/Walls



DESIGN ECO-INTERVENTIONS ON SITE - WAALHAVEN AREA



TIMEFRAME ECO-INTERVENTIONS - WAALHAVEN AREA (TIME SPAN: 50 YEARS)



*The interventions located in areas subject to phytoremediation may undergo some variations in duration.

URBAN QUALITY CRITERIA FOR PUBLIC SPACE - SELECTION

12 Urban Quality Criteria by Gehl Architects : Selection

PROTECTION

PROTECTION
AGAINST TRAFFIC &
ACCIDENTS

PROTECTION
AGAINST
UNPLEASANT
SENSORY
EXPERIENCES

COMFORT

OPPORTUNITIES TO
WALK/CYCLE

OPPORTUNITIES TO
STOP & STAY

OPPORTUNITIES TO
SIT

OPPORTUNITIES TO
SEE

OPPORTUNITIES TO
PLAY & EXERCISE

ENJOYMENT

DIMENSIONED
AT HUMAN SCALE

OPPORTUNITIES TO
ENJOY THE
POSITIVE ASPECTS
OF CLIMATE

AESTHETIC
QUALITIES +
POSITIVE SENSORY
EXPERIENCE

MASTERPLAN (CURRENT SITUATION) - WAALHAVEN AREA



MASTERPLAN (CURRENT SITUATION) - WAALHAVEN AREA



MASTERPLAN (20 YEARS BY NOW) - WAALHAVEN AREA



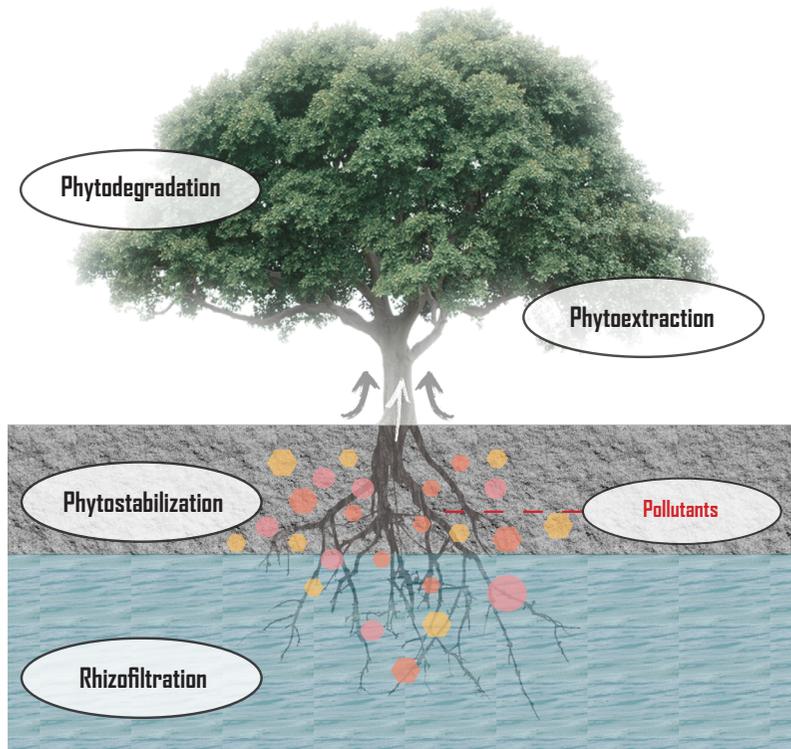
MASTERPLAN (20 YEARS BY NOW) WITH EXPERIMENTAL SITES



PHYTOREMEDIATION - VEGETATION GRADIENT: COMBINATION

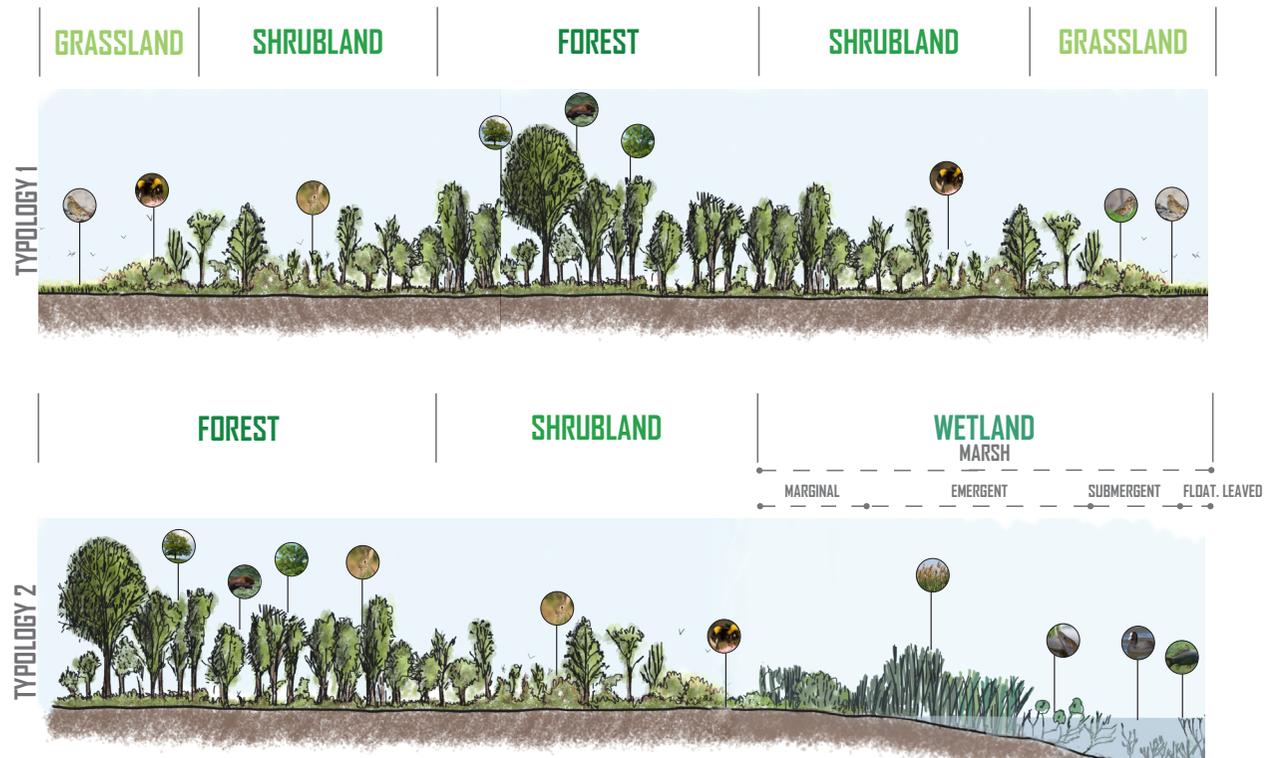
How can certain techniques of Phytoremediation be applied on certain gradients in order to tackle environmental and social issues in the project area?

PHYTOREMEDIATION:
SELECTED 5 TECHNIQUES TO TACKLE (SOIL/AIR/WATER) POLLUTION

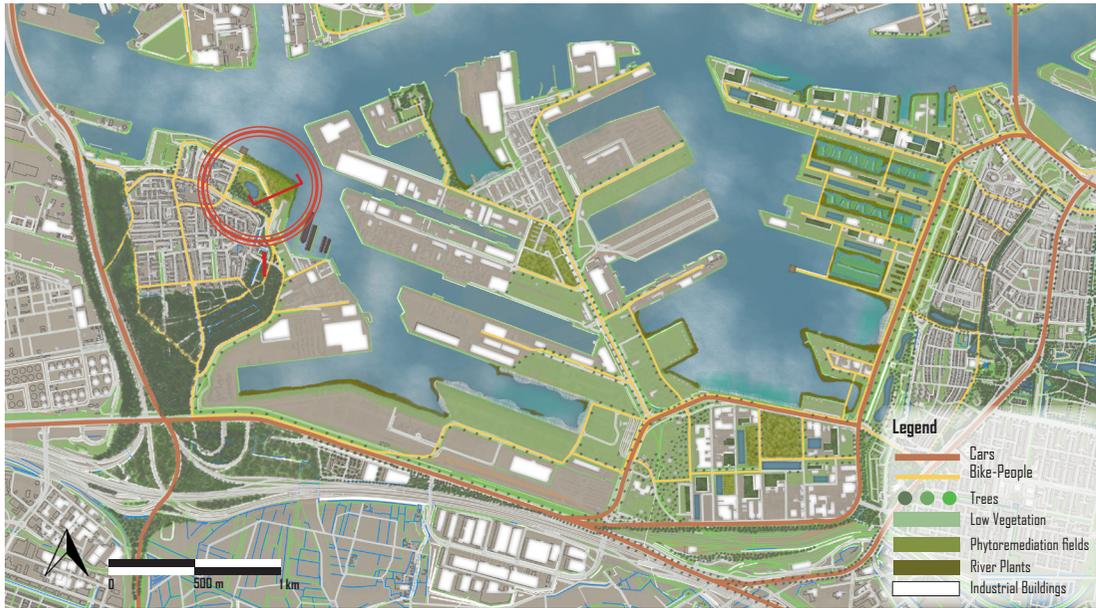


One year <<<< **DURATION** >>>> Several Decades

TYPLOGIES OF GRADIENT WITH SOME SELECTED SPECIES



INTERVENTIONS ON SITE WITH GRADIENTS/PHYTOREMEDIATION - SITE 1



CHOSEN TECHNIQUES: according to the type of Pollutants and the related purifying Plants

- Phytoextraction
- Rhizofiltration

Legend-Soil Quality

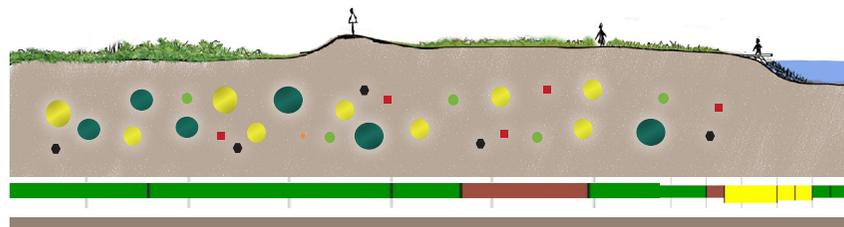
- Clean
- Very lightly contaminated
- Lightly contaminated
- Moderately contaminated
- Strongly contaminated

Legend-Pollutants

- Cd
- Ba
- Cu
- Co
- Hg
- Pb
- Zn
- Ni
- PAH's
- Mineral Oil (various)
- Clay
- Peat
- Sand

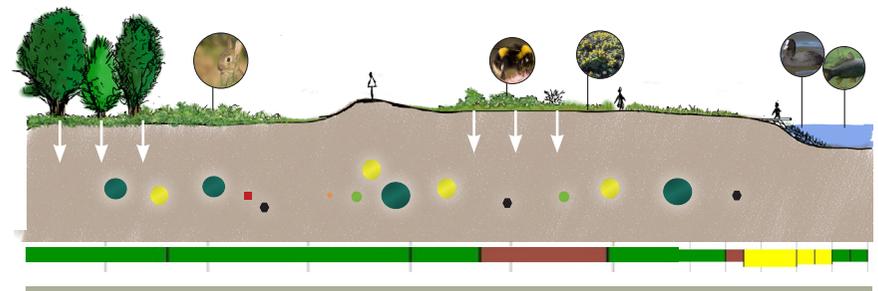
SECTIONS OF INTERVENTIONS: COMBINATION: GRADIENT/PHYTOREMEDIATION (BY 20 YEARS)

Before



Moderately contaminated

After



Lightly contaminated

INTERVENTIONS ON SITE WITH GRADIENTS/PHYTOREMEDIATION - SITE 2



CHOSEN TECHNIQUES: according to the type of Pollutants and the related purifying Plants

- Phytodegradation
- Phytostabilization

Legend-Soil Quality

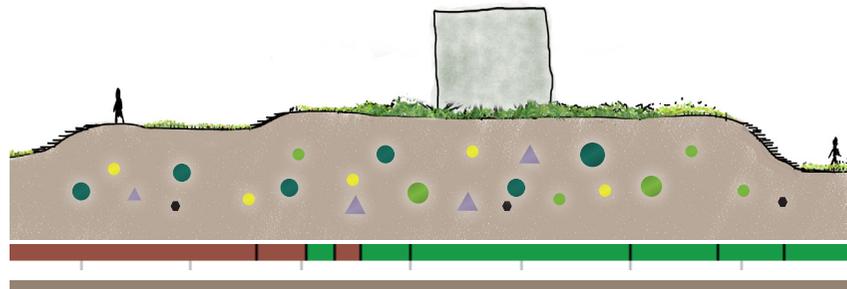
- Clean
- Very lightly contaminated
- Lightly contaminated
- Moderately contaminated
- Strongly contaminated

Legend-Pollutants

- Cd
- Ba
- Cu
- Co
- Hg
- Clay
- Peat
- Pb
- Zn
- Ni
- PAH's
- Mineral Oil (various)
- As

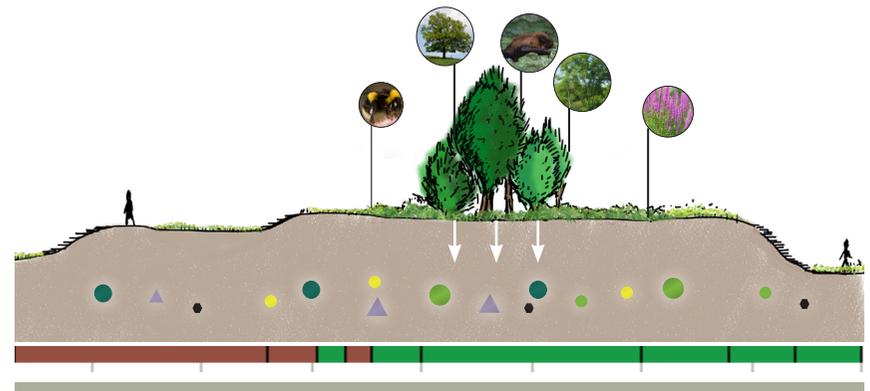
SECTIONS OF INTERVENTIONS: COMBINATION: GRADIENT/PHYTOREMEDIATION (BY 20 YEARS)

Before



Moderately contaminated

After



Lightly contaminated

RESEARCH PLAN

1st Phase: P1-P2

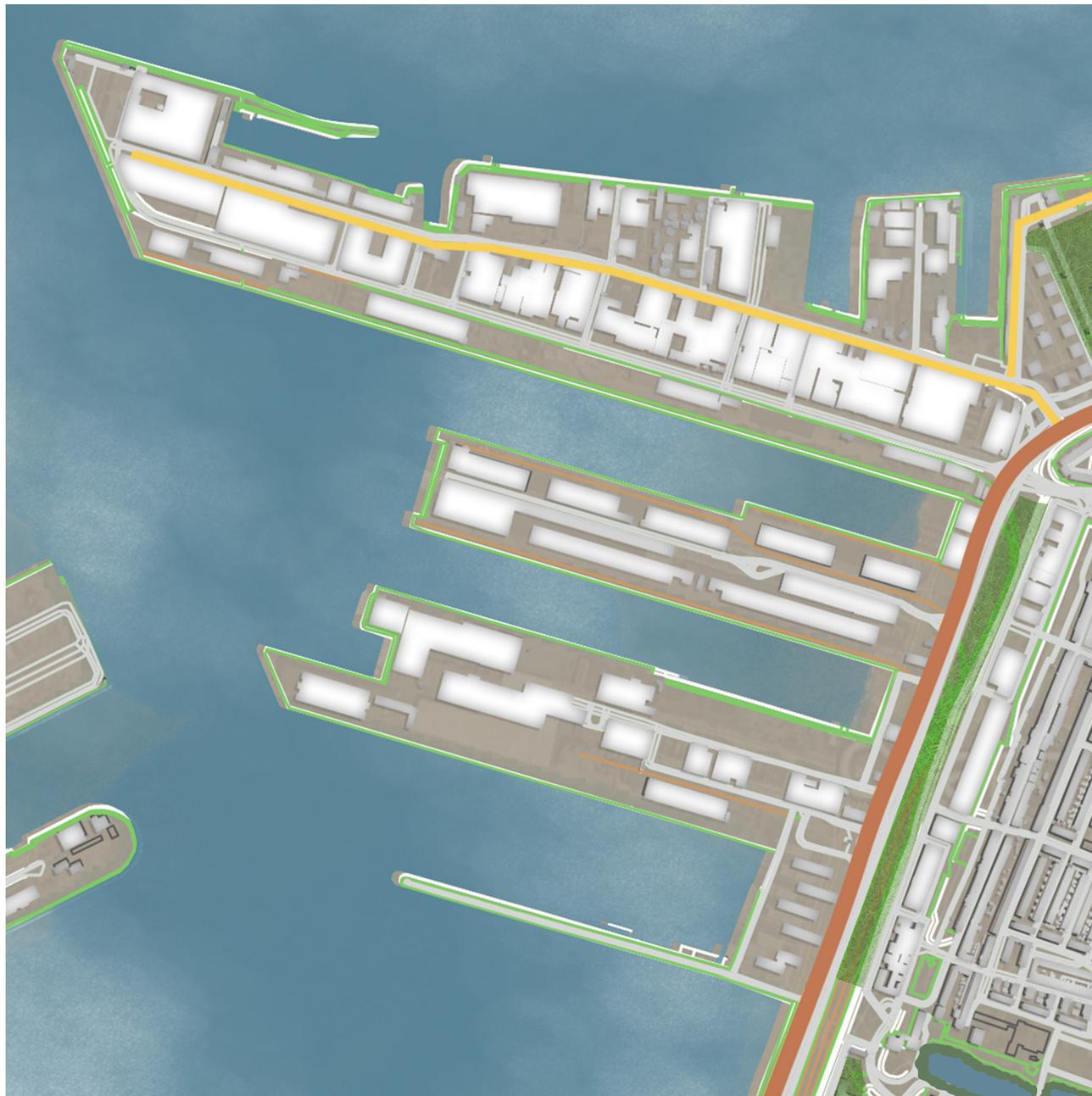
2nd Phase: P2

3rd Phase: P2-P3

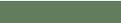
4th Phase: P4-P5



OLD CHARLOIS - CURRENT SITUATION



Legend

-  Bike - Cars - People
-  Bike-Cars
-  Parks (Trees)
-  Low Vegetation (Grass, Shrubs)
-  Industrial Buildings

0 100 m 200 m



OLD CHARLOIS - CURRENT SITUATION - INTERVENTION

- REMOVAL OF OBSTRUCTING BUILDINGS



Legend

-  Bike - Cars - People
-  Bike-Cars
-  Parks (Trees)
-  Low Vegetation (Grass, Shrubs)
-  Removed Industrial Buildings
-  Industrial Buildings
-  Unused Spaces
-  Views



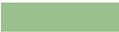
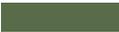
0 100 m 200 m

OLD CHARLOIS - PROPOSAL (BY 20 YEARS)

- TRANSFORMATION OF REMAINING BUILDINGS INTO ECO-STRUCTURES

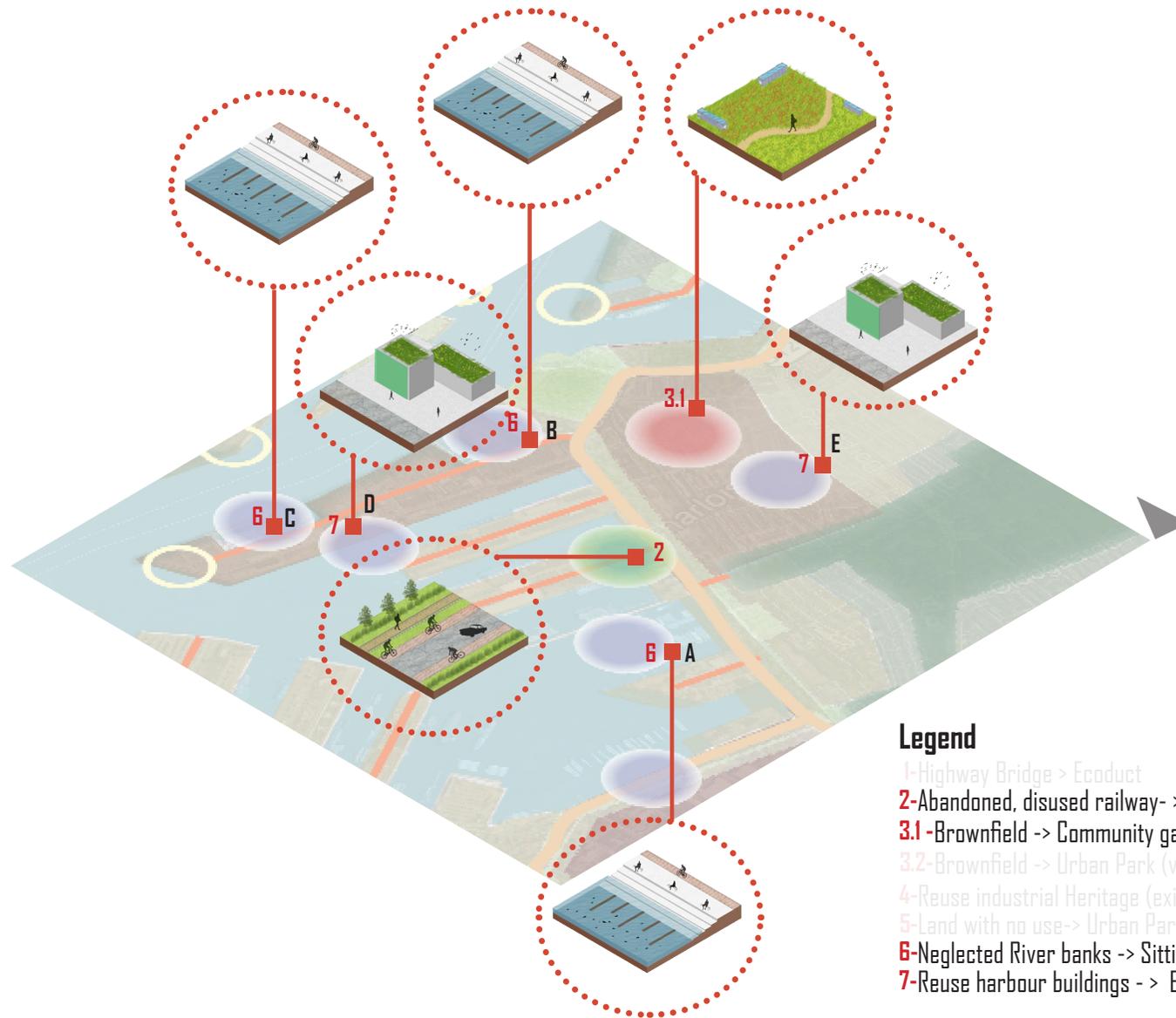


Legend

-  Cars
-  Bike-People
-  Trees (*Quercus Robur*, *Salix Nigra*, *Populus x Canescens*)
-  Low Vegetation (Grass, Shrubs)
-  Phytoremediation fields
-  River Plants (*Phragmites australis*)
-  Floating plants (*Stratiotes aloides*, *Ceratophyllum demersum*, *Eichhornia crassipes*)
-  Green Roof/Wall
-  Water Storage
-  Rainwater
-  Purified water (Clean)
-  Inlet
-  Outlet
-  Ind. /Res. Buildings



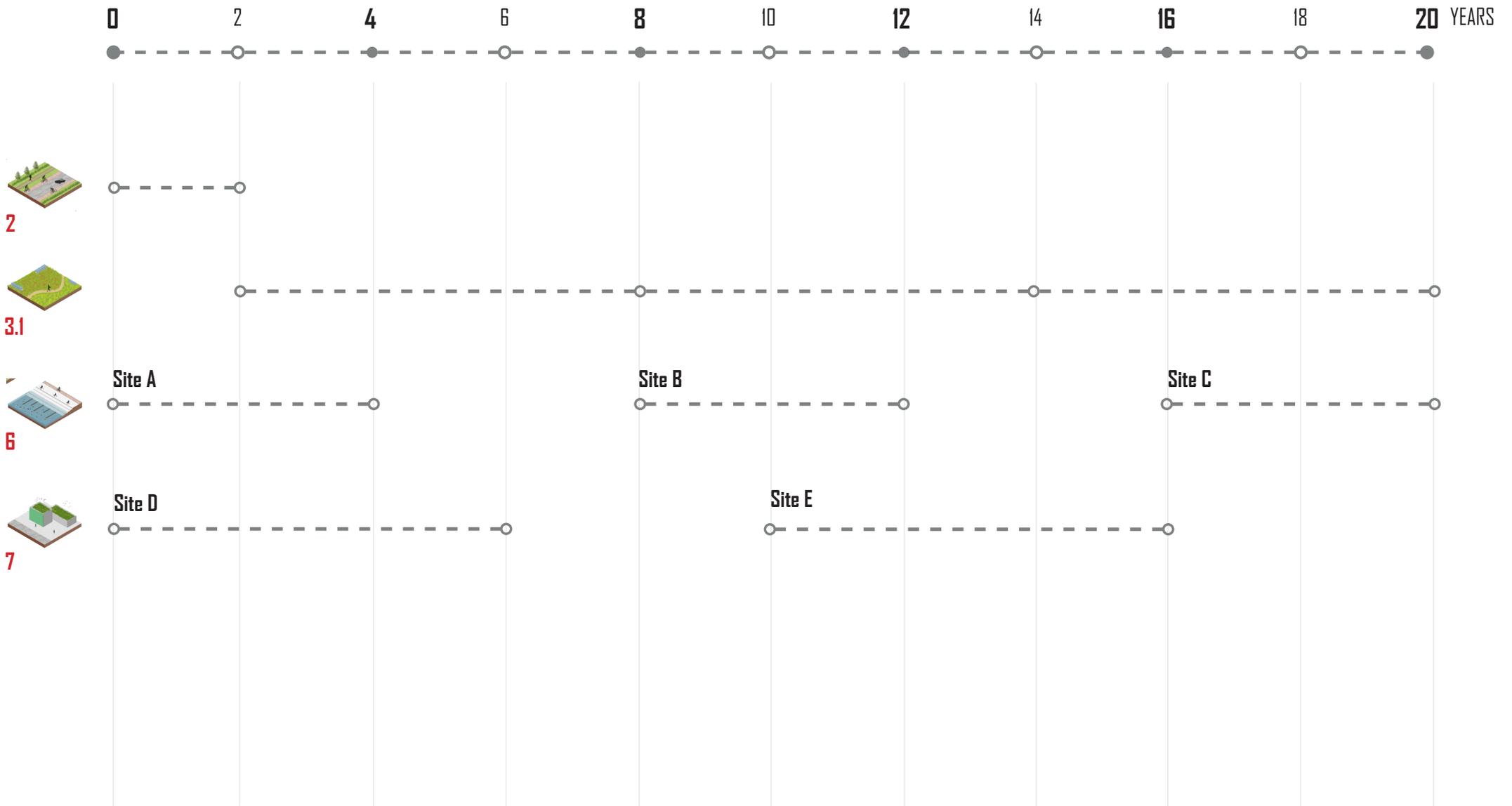
DESIGN ECO-INTERVENTIONS ON SITE - OUD CHARLOIS



Legend

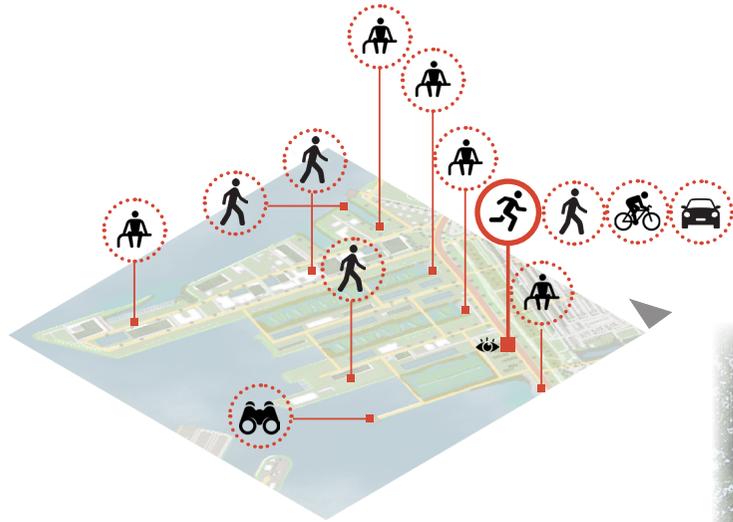
- 1-Highway Bridge > Ecoduct
- 2-Abandoned, disused railway- > Green Boardwalk
- 3.1-Brownfield -> Community garden (via Soil Remediation)
- 3.2-Brownfield -> Urban Park (via Soil Remediation)
- 4-Reuse industrial Heritage (existing structures) - > Urban Park
- 5-Land with no use-> Urban Park with Sitting, Recreational areas
- 6-Neglected River banks -> Sitting areas along the water
- 7-Reuse harbour buildings - > Eco Retrofit: Green Roof/Walls

TIMEFRAME OF DESIGN ECO-INTERVENTIONS - OUD CHARLOIS (TIME SPAN: 20 YEARS)



*The interventions located in areas subject to phytoremediation may undergo some variations in duration.

HUMAN ACTIVITIES ON SITE - OUD CHARLOIS



Legend

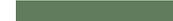
-  Walking
-  Sitting
-  Running
-  Cycling
-  Driving
-  Birdwatching



OLD CHARLOIS - SECTIONS

CURRENT SITUATION

Legend

-  Bike - Cars - People
-  Bike-Cars
-  Parks (Trees)
-  Low Vegetation (Grass, Shrubs)
-  Industrial Buildings



0 100 m 200 m

SECTION A-A'



SECTION B-B'

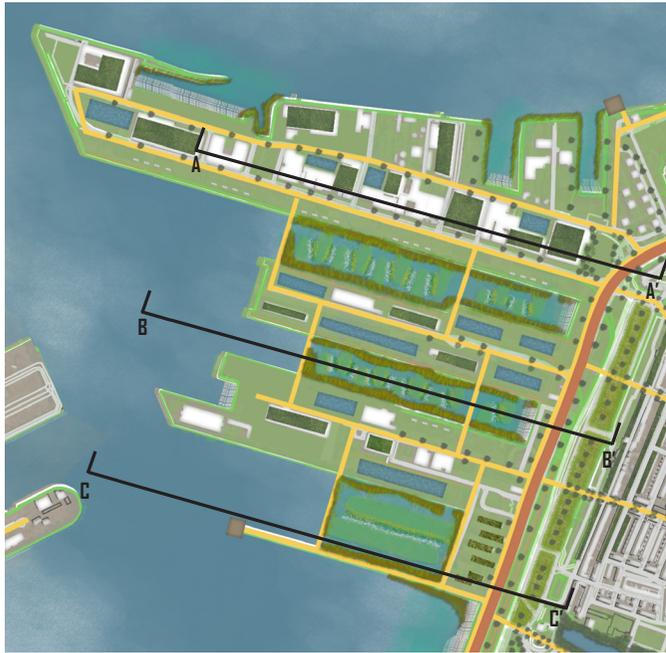


SECTION C-C'



OLD CHARLOIS - SECTIONS

PROPOSAL (BY 20 YEARS)



Legend

-  Cars
-  Bike-People
-  Trees
-  Low Vegetation (Grass, Shrubs)
-  Phytoremediation fields
-  River Plants
-  Floating plants (purifying)
-  Green Roof/Wall
-  Water Storage
-  Ind. /Res. Buildings



SECTION A-A'



SECTION B-B'

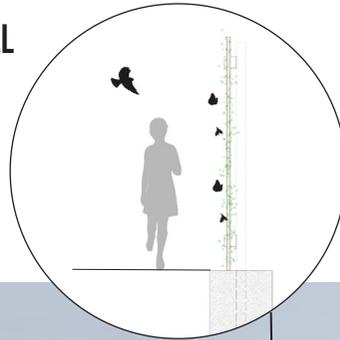


SECTION C-C'

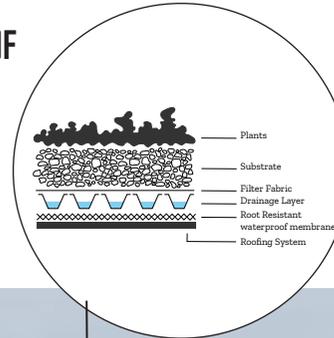


SECTION B-B': DESIGN DETAILS

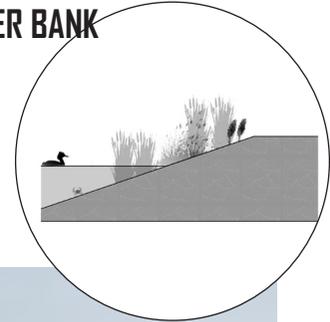
1. GREEN WALL



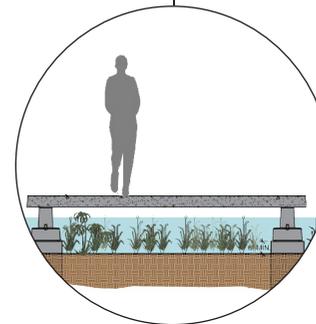
2. GREEN ROOF



3. ECO- RIVER BANK



4. WATER BOARDWALK



5. FAUNA PASSAGE



* Source images 3.5: "Twenty ideas for integrating biodiversity in urban planning and development", Gemeente Amsterdam
4: <https://greatriversgreenway.org/design-guidelines/trail-design/boardwalk/>

OLD CHARLOIS - PROPOSAL (BY 40 YEARS)



DEVELOPMENTS:

- Increase of Purifying plants (River Banks, Floating Gardens, Slope)
- Increase of Green Roof Structures
- Transformation of Green Roof/Wall Buildings into Water Storage areas or vice versa

Legend

- Cars
- Bike-People
- Trees (*Quercus Robur*, *Salix Nigra*, *Populus x Canescens*)
- Low Vegetation (Grass, Shrubs)
- Phytoremediation fields
- River Plants (*Phragmites australis*)
- Floating plants (*Stratiotes aloides*, *Ceratophyllum demersum*, *Eichhornia crassipes*)
- Green Roof/Wall
- Water Storage
- Rainwater
- Purified water (Clean)
- Inlet
- Outlet
- Ind. /Res. Buildings



0 100 m 200 m

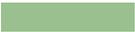
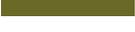
OLD CHARLOIS - PROPOSAL (BY 60 YEARS)



DEVELOPMENTS:

- Increase of Purifying plants (River Banks, Floating Gardens)
- Increase of Green Roof Structures and Water Storage pools
- Removal of a few buildings and conversion of other ones into Green Roof/Wall Structures

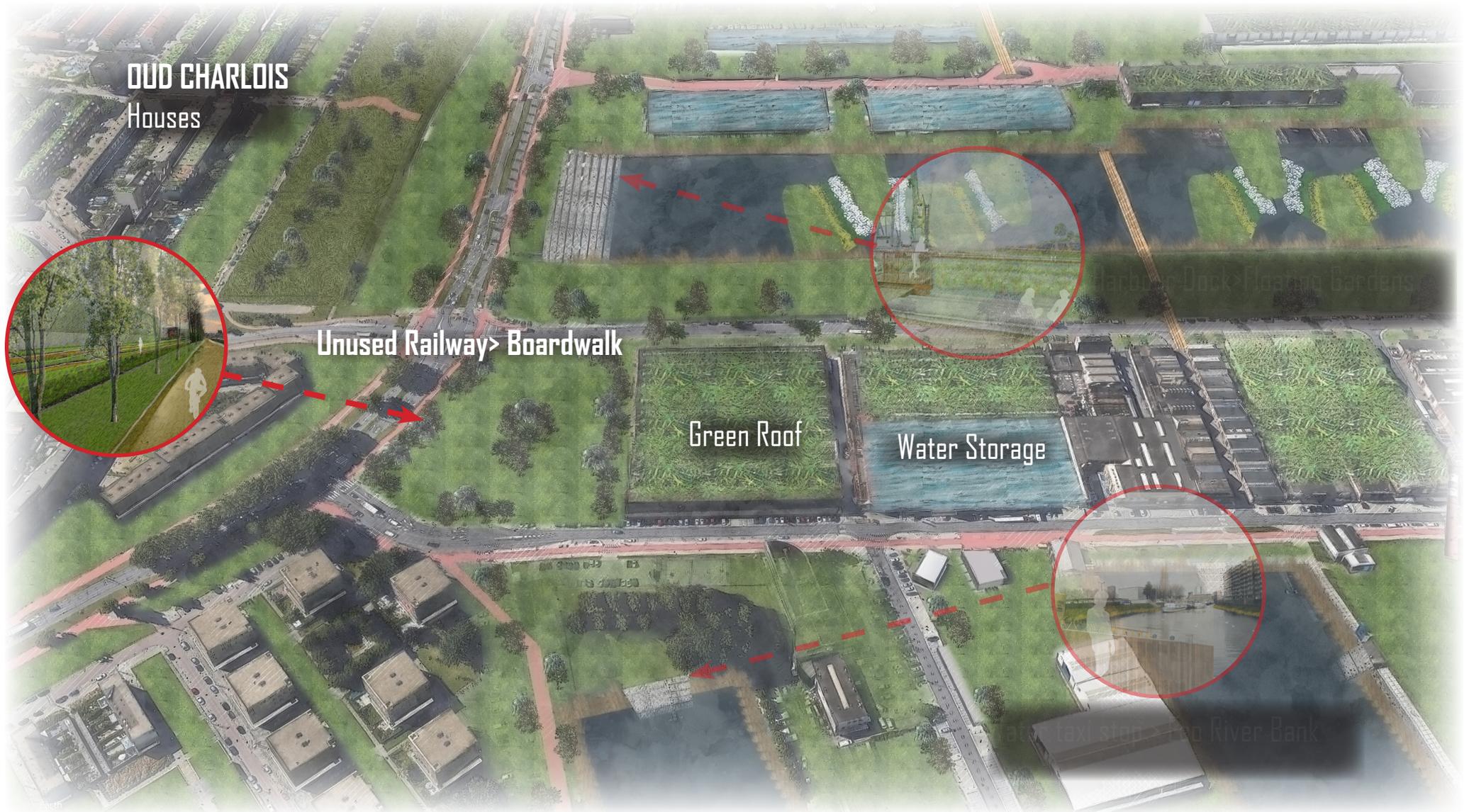
Legend

-  Cars
-  Bike-People
-  Trees (*Quercus Robur*, *Salix Nigra*, *Populus x Canescens*)
-  Low Vegetation (Grass, Shrubs)
-  Phytoremediation fields
-  River Plants (*Phragmites australis*)
-  Floating plants (*Stratiotes aloides*, *Ceratophyllum demersum*, *Eichhornia crassipes*)
-  Green Roof/Wall
-  Water Storage
-  Rainwater
-  Purified water (Clean)
-  Inlet
-  Outlet
-  Ind. /Res. Buildings



0 100 m 200 m

ODD CHARLOIS - BIRD VIEW (BY 20 YEARS)



OLD CHARLOIS -VIEW EYE LEVEL



ODD CHARLOIS - BIRD VIEW (BY 20 YEARS)



ODD CHARLOIS
Houses

Green Roof

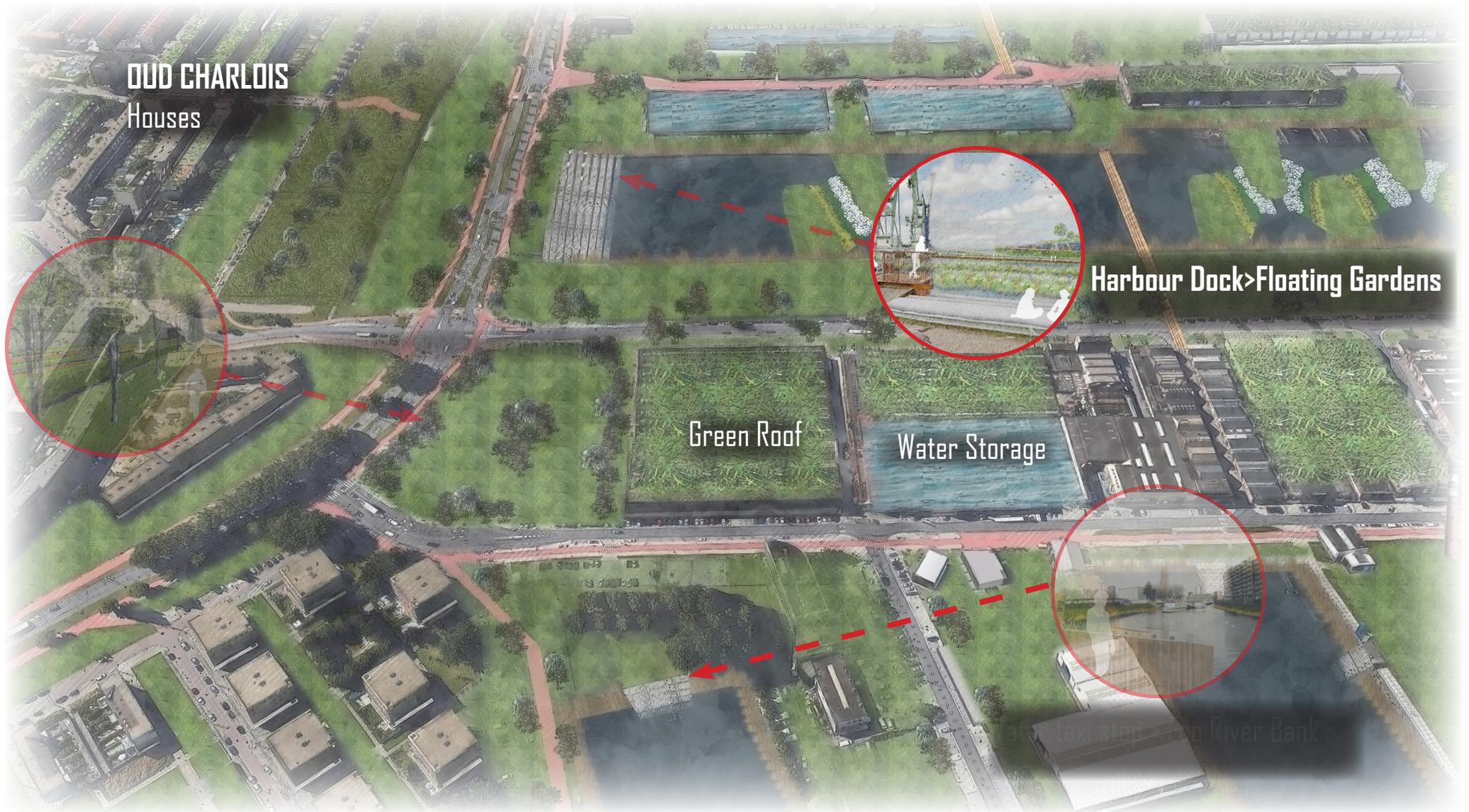
Water Storage

Water taxi stop > Eco River Bank

OLD CHARLOIS - VIEW EYE LEVEL



ODD CHARLOIS - BIRD VIEW (BY 20 YEARS)



OLD CHARLOIS -VIEW EYE LEVEL



FOUR CRITICAL AREAS - FEATURES



- Dunal Landscape
- Absence of Living areas
- Main Prevalence of Industrial settlements

2.



- Urban Landscape
- Still Prevaence of Industrial areas
- Presence of a few Living areas

3.



- Rural Landscape
- Balance of Living and Industrial Areas
- Minor presence of Industrial areas

COMPARISON AND CONCLUSION

DESIGN ECO-COMPONENTS

	HIGHWAY BRIDGE -> ECDUCT	DISUSED RAILWAY -> GREEN BOARDWALK	BROWNFIELD -> COMMUNITY GARDEN	BROWNFIELD -> URBAN PARK	REUSE INDUSTRIAL HERITAGE -> URBAN PARK	LAND WITH NO USE -> URBAN PARK WITH RECREATIONAL AREAS	NEGLECTED RIVER BANKS -> SITTING AREAS	HARBOUR BUILDINGS -> GREEN ROOF/WALLS
1.				✓	✓	✓		
2.		✓	✓	✓			✓	✓
3.		✓					✓	✓

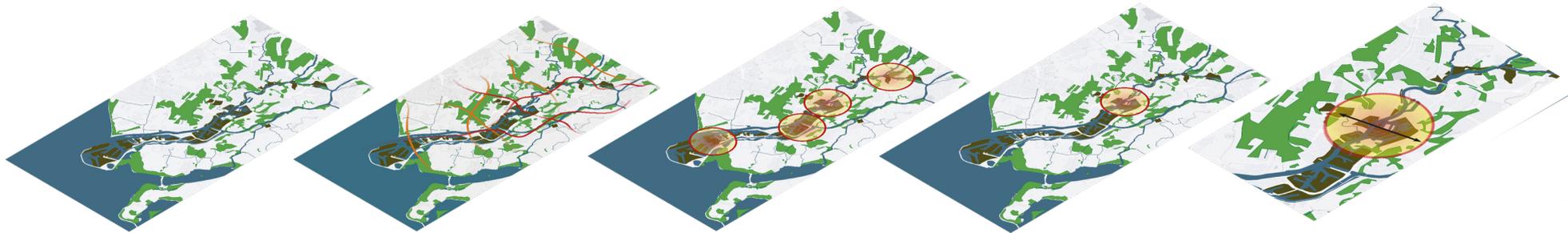
The comparison of the four critical areas identified in Rotterdam led to the formulation of the following statements::

- Different physical conditions and area extensions require some solutions instead of others. It is not possible to apply all the design solutions in any of the other 3 areas.
- The area number 2 can be a subsequent intervention area after that of Waalhaven, given the need for more design interventions.
- The areas 1 and 3 they seem to require fewer design interventions, perhaps others different from those introduced in Waalhaven.

PROJECT RE-CAP

PROBLEM STATEMENT

Due to an economic process of “urban pressure”, the majority of the old industrial, harbour areas, buildings are demolished and replaced by new structures with different functions, forms ‘erasing’ the memory of the past urban structures. Some lands instead are used and then abandoned or even never used and left untouched.



- SELECTION OF AN AREA OF INTERVENTION (FROM LARGE SCALE TO MEDIUM ONE)

- FORMULATION OF PROBLEM STATEMENT AND RESEARCH QUESTION

PROJECT RE-CAP

RESEARCH QUESTION

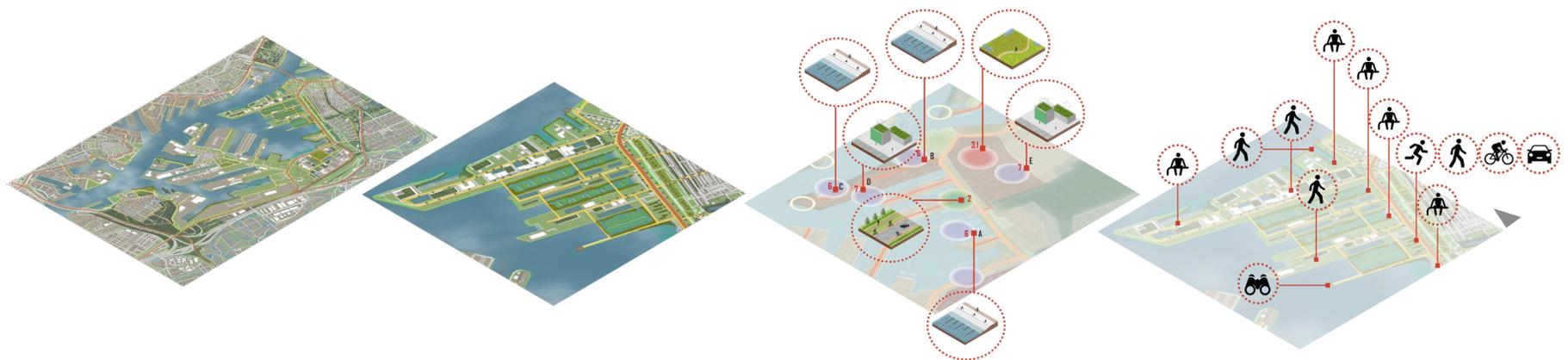
What spatial framework can guide the transition of Wastescapes in Rotterdam into ecological valuable spaces which can foster biodiversity, and improve the quality of people and species' life aspects on small, medium or large scale?



- SELECTION OF AN AREA OF INTERVENTION (FROM MEDIUM SCALE TO SMALL ONE)

- FORMULATION OF A CONCEPT + DESIGN FRAMERWORK

PROJECT RE-CAP



- PRACTICAL APPLICATION OF THE DESIGN FRAMERWORK

- PROJECT DEVELOPMENT + CONCLUSION (ANSWER TO RESEARCH QUESTION)

CONCLUSION

- Encouraging the citizens of Rotterdam to start appreciating and giving **importance to the abandoned spaces and structures** in the city.
- The reuse and regeneration of wasted places can offer great potential for **urban biodiversity** and also for the **improvement of socialization**.
- The **sense of belonging** to a place is fundamental and it can be discovered again via urban landscape design. A space can represent a **place of experience** and a point of **integration** and be perceived with its **own identity**.
- **Resilient, circular, sustainable, regenerative system** that show the potential of the Wastescapes, flexible urban elements to promote biodiversity, addressing climate change, ease urban fragmentations, improve species and citizens' quality of life over time.

TRANSFORMATION OF A WASTESCAPE (BEFORE) - OUD CHARLOIS



TRANSFORMATION OF A WASTESCAPE (AFTER) - OUD CHARLOIS

