



# DISSOLVING DISTINCTION

*Making the city of Rotterdam part of nature*







**AIR QUALITY  
REGULATION**

**SUPPORT FOR  
BIODIVERSITY**

**FLOODING  
REGULATION**



**PHYSICAL HEALTH &  
MENTAL WELLBEING**

**SUPPORT FOR  
HEALTHY SOIL**

# ECOSYSTEM

## ECOSYSTEM COMPONENTS

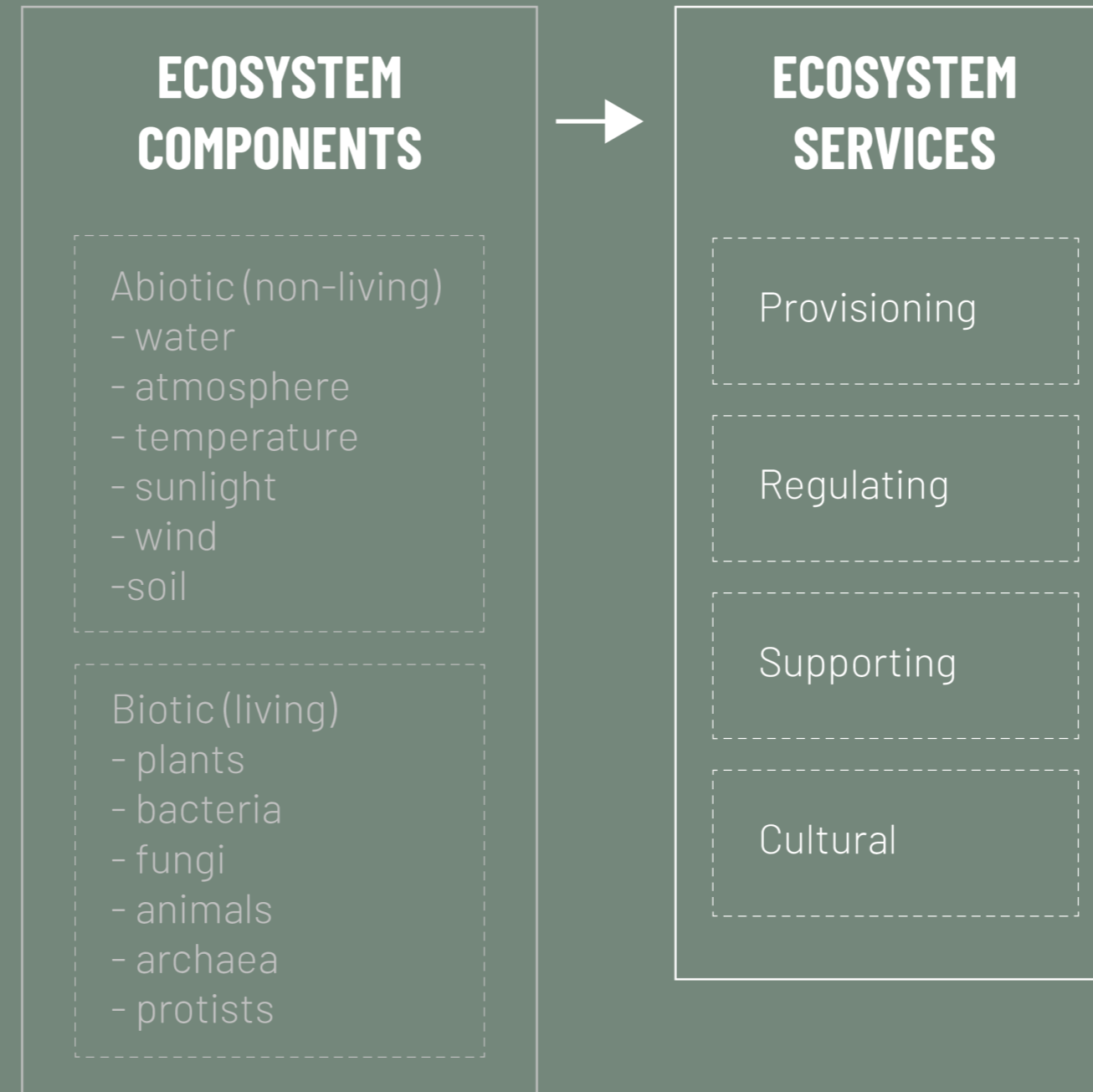
### Abiotic (non-living)

- water
- atmosphere
- temperature
- sunlight
- wind
- soil

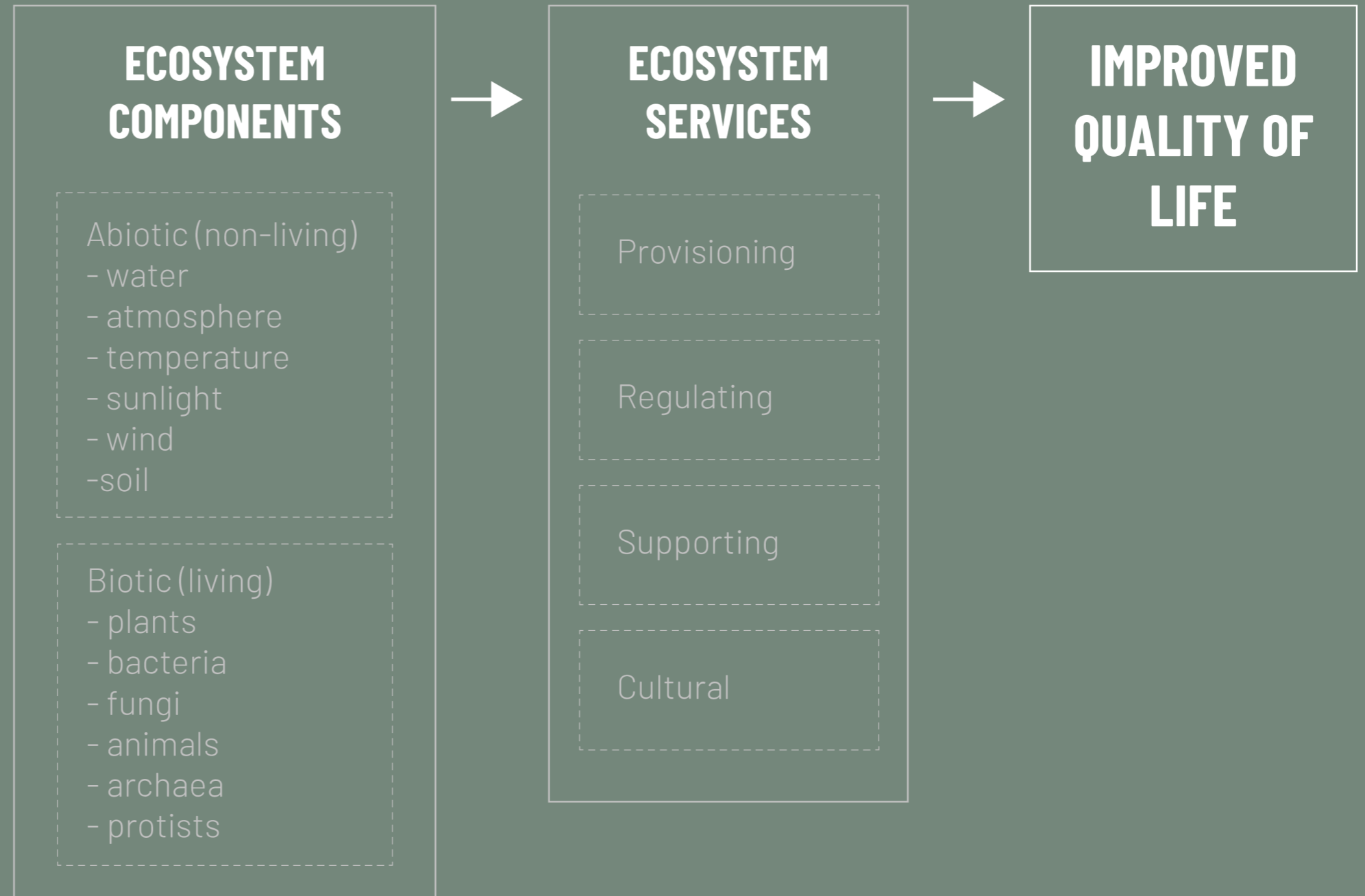
### Biotic (living)

- plants
- bacteria
- fungi
- animals
- archaea
- protists

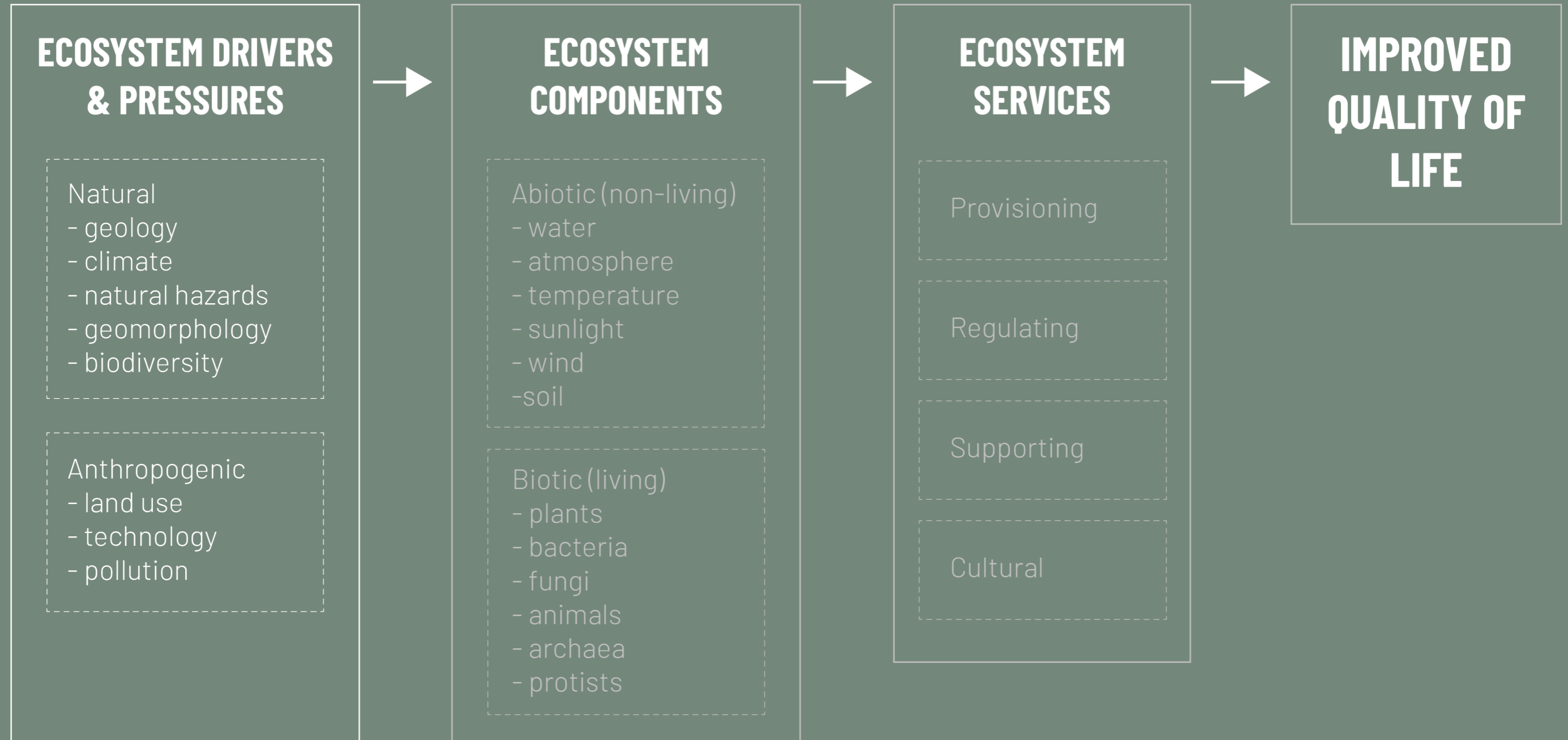
# ECOSYSTEM



# ECOSYSTEM



# ECOSYSTEM



# CHALLENGES



Source: [Lichtvervuiling een onderbelicht probleem], n.d.

*Urbanization*

# CHALLENGES



Urbanization



Global Warming



 **ROTTERDAM**



Brasser, L. (n.d.). Laurenskerk in Rotterdam [Drawing]. IsGeschiedenis. <https://isgeschiedenis.nl/nieuws/rotterdam-van-kleine-handelsstad-tot-grootste-haven-ter-wereld>



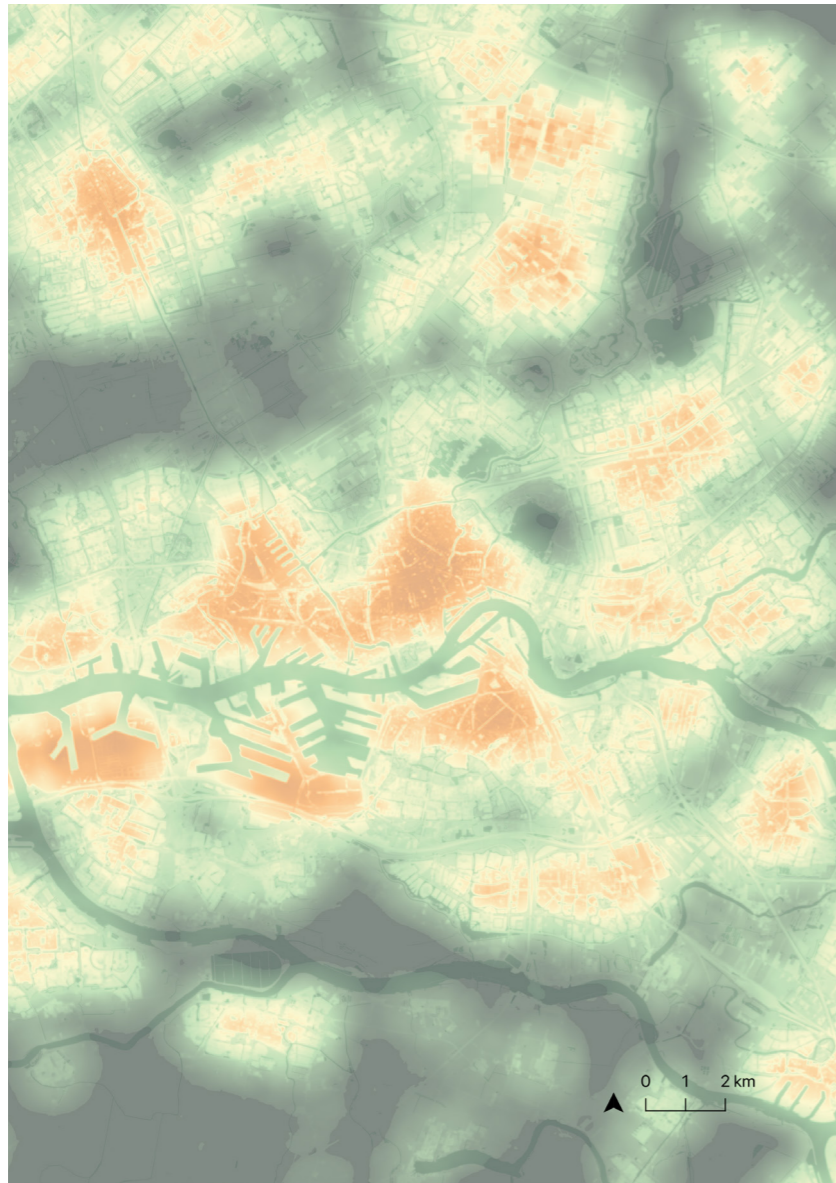
Westersingel en Mauritsweg. (n.d.). [Photograph]. Wikipedia. [https://nl.wikipedia.org/wiki/Westersingel\\_%28Rotterdam%29#/media/Bestand:Westersingel\\_Mauritsweg\\_1904.jpg](https://nl.wikipedia.org/wiki/Westersingel_%28Rotterdam%29#/media/Bestand:Westersingel_Mauritsweg_1904.jpg)



Gemeente Rotterdam. (n.d.). Vervoer [Photograph]. Rotterdam. <https://www.rotterdam.nl/wonen-leven/vervoer/>



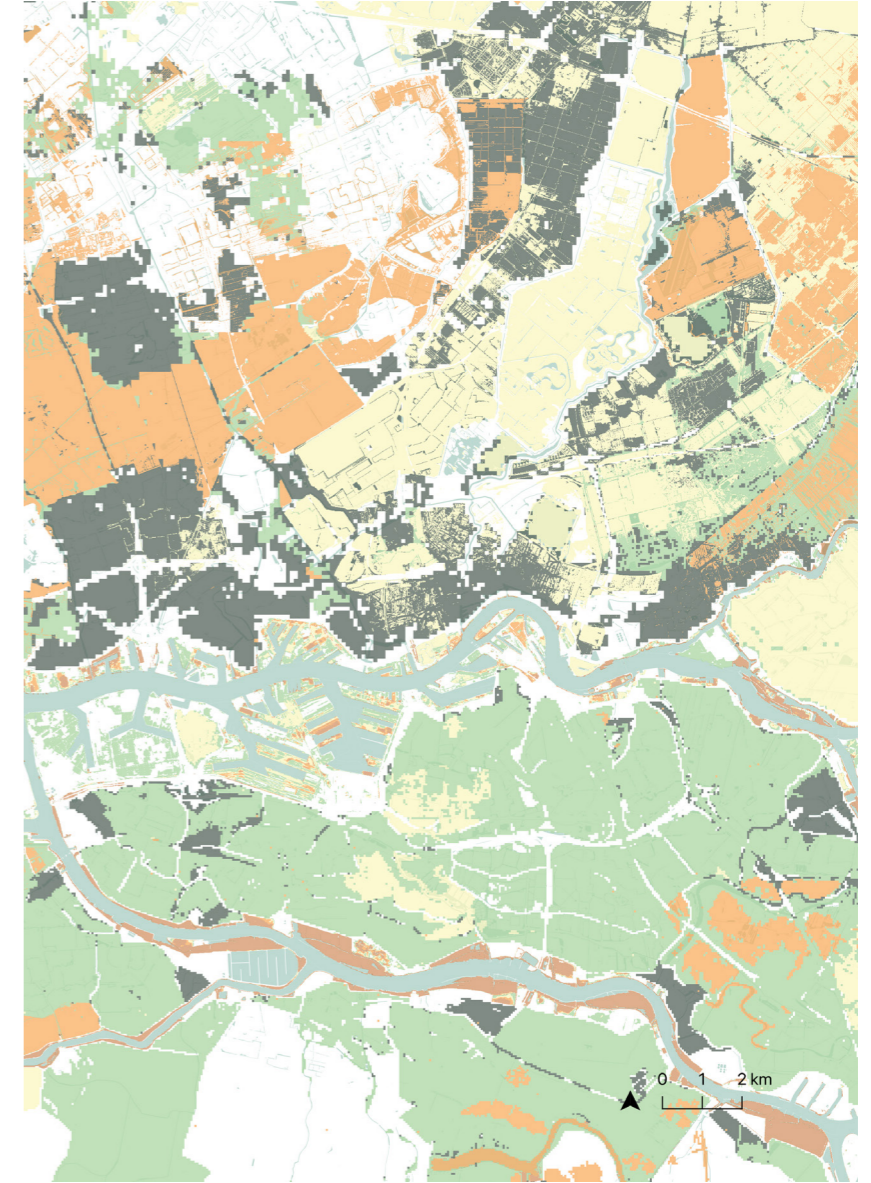
Francissen, E. (2016, July 27). Blaak, Rotterdam, The Netherlands [Photograph].



*Urban Heat Island Effect*



*Water Nuisance*



*Risk of Flooding*

**RISK OF FLOODING**

**DECREASING AIR QUALITY**

**LOSS OF BIODIVERSITY**



**DECREASED PHYSICAL HEALTH & MENTAL WELLBEING**

**SOIL SUBSIDENCE**

**AIR QUALITY  
REGULATION**

**SUPPORT FOR  
BIODIVERSITY**

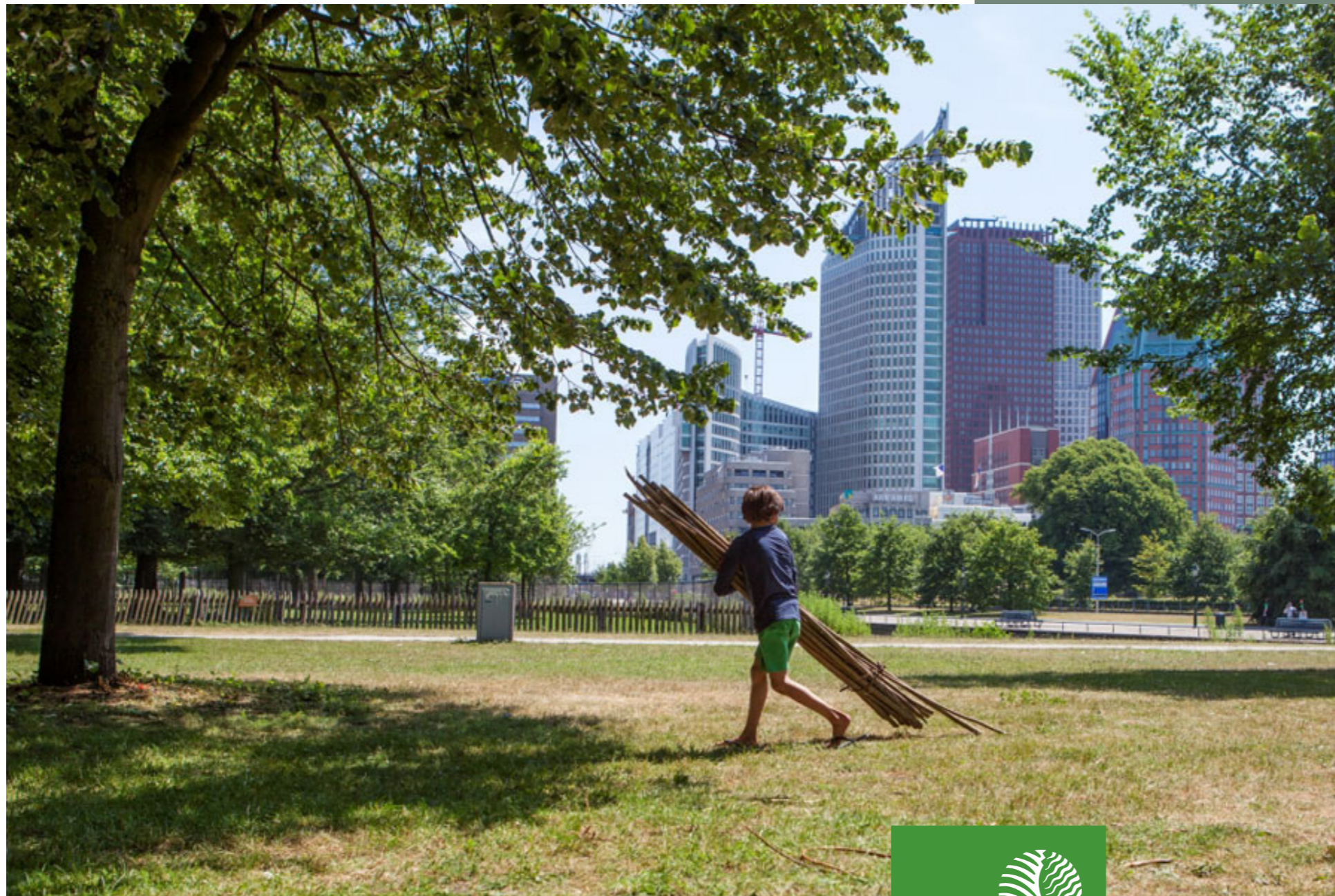
**FLOODING  
REGULATION**



**PHYSICAL HEALTH &  
MENTAL WELLBEING**

**SUPPORT FOR  
HEALTHY SOIL**

# GREEN METROPOLIS



*"A green (nature) and blue (water) network that flows through the whole country, from the city centers to the nature reserves."*

- *Connect every person, to the green network*
- *Improve urban quality of life*





LEGEND

- Water
- Forest
- Grassland



LEGEND

- Water
- Forest
- Grassland
- SBB property

# RESEARCH AIM

*"Create an evidence informed design strategy for the city of Rotterdam, and one specific urban zone in particular: Urban Centre, in which this city is part of nature."*

# A CITY WHERE...



*...the ecosystems are healthy with a rich biodiversity*

**ecological perspective**



*...people are living together with other species*

**human perspective**



*...the effects of climate change in the city are reduced*

**climate perspective**



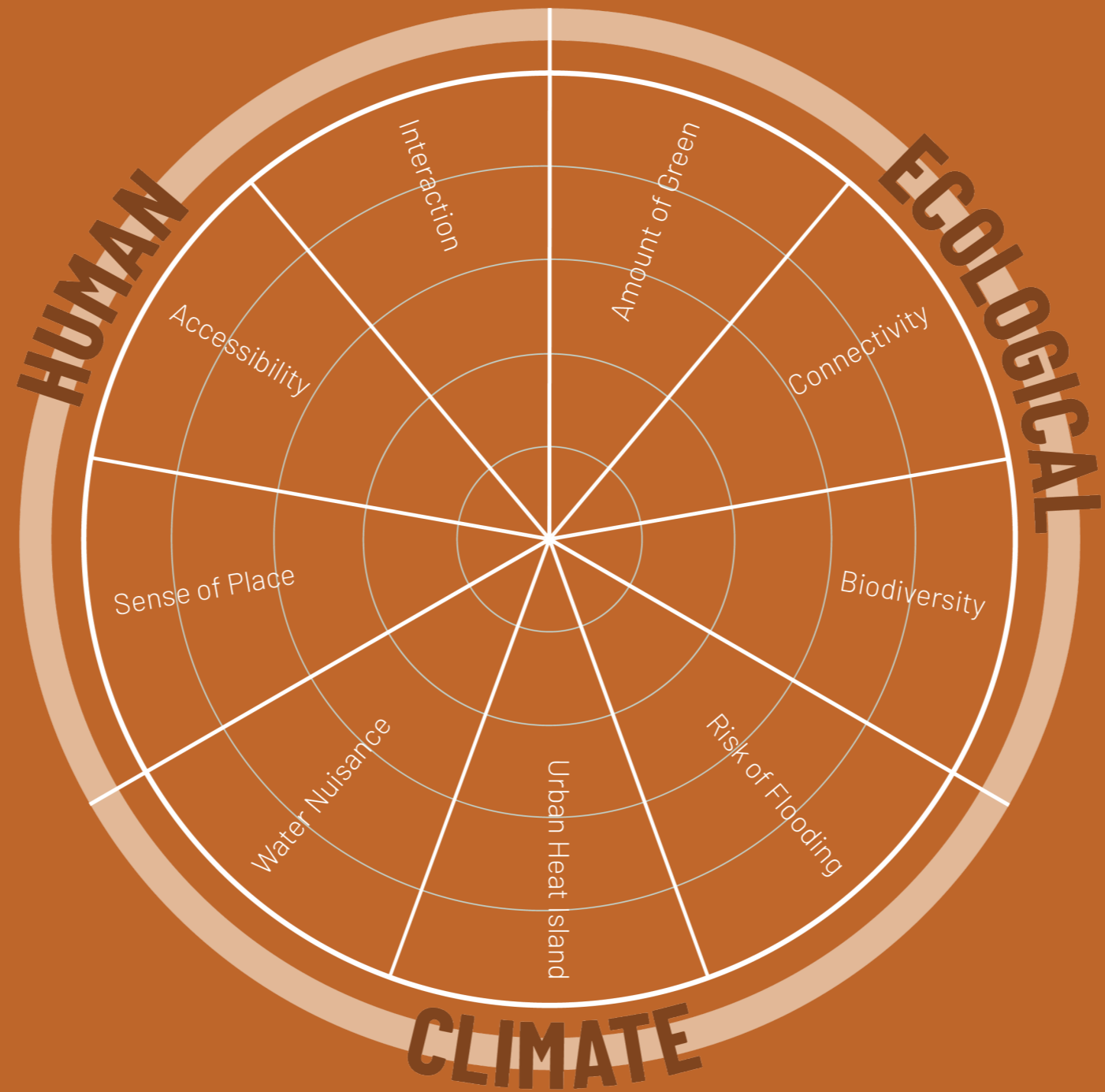
*Biodiversity*  
*Connectivity*  
*Amount of green*



*Interaction*  
*Accessibility*  
*Sense of place*



*Risk of flooding*  
*Urban heat island*  
*Water nuisance*



# 1 CITY AS PART OF NATURE



2 SOCIAL RESILIENCE



3 CLIMATE RESILIENCE



4 ECOLOGICAL RESILIENCE



5 LET IT GROW



6 BIODIVERSE NETWORK



7 GREEN ROUTES



8 EMBRACE THE WATER



9 SPONGE CITY



10 LOCAL SELF-SUFFICIENCY



11 SAFE ENVIRONMENT



12 PEDESTRIAN FIRST



13 INTERACTIVE GREEN SPACE



14 WILDLIFE CORRIDORS



15 TIDAL PARK



16 SHADE PARK



17 BIOSWALE



18 FLOATING SPACE



19 WATER SQUARE



20 URBAN FARM



21 GREEN STREETS



22 SMALL GREEN IN BETWEEN



23 COMMUNITY GARDEN



24 NATURAL PLAYGROUND



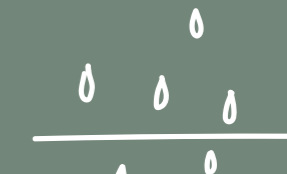
25 GREEN BUILDINGS



26 GREEN ROOFS



27 FACADE GARDENS



28 PERMEABLE PAVEMENT



# 12 PEDESTRIAN FIRST

Promoting slow mobility in the urban environment to improve the quality of public space.



### THEORETICAL BACK-UP

By reducing the car traffic in the urban environment, there could be a shift towards slow mobility. This is beneficial for the urban environment, as slow mobility contributes to road safety and reduces traffic congestion and the level of noise and air pollution (La Rocca, 2010).

### PRACTICAL IMPLICATION

Promoting alternatives for car mobility, by developing an extensive public transport network and creating attractive routes for pedestrians and cyclists by changing the street profiles in a way that pedestrians and cyclists feel safe. Besides, car mobility could be discouraged by reducing the maximum speed and accessible roads for cars.

### SOURCES

La Rocca, R. (2010). Soft Mobility and Urban Transformation. TeMA - Journal of Land Use, Mobility and Environment, 2. <https://doi.org/10.6092/1970-9870/125>



**EMBEDDED IN**  
Safe Environments

**CONTAINS**  
Green Routes



*Strengthening the ecosystems*

ecological perspective



*Connecting people to nature*

human perspective



*Developing a climate adaptive city*

climate perspective



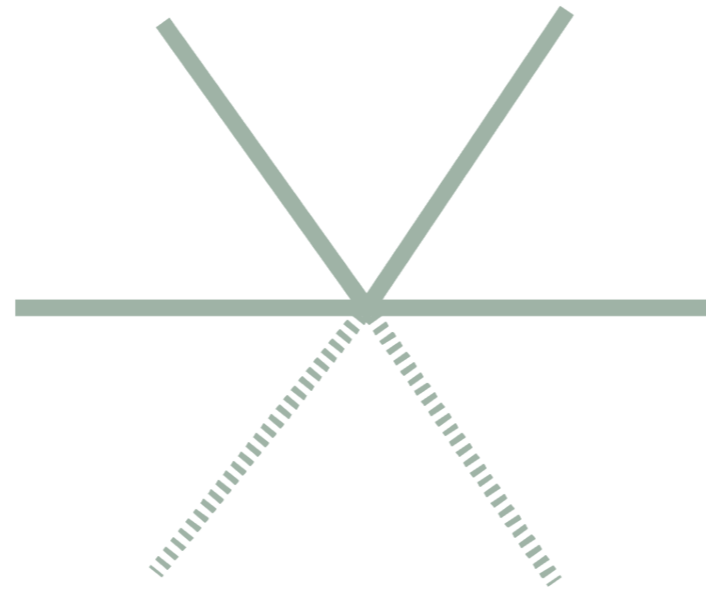
# STRENGTHENING THE ECOSYSTEMS

*Rotterdam South*



+

*Rotterdam North*



=

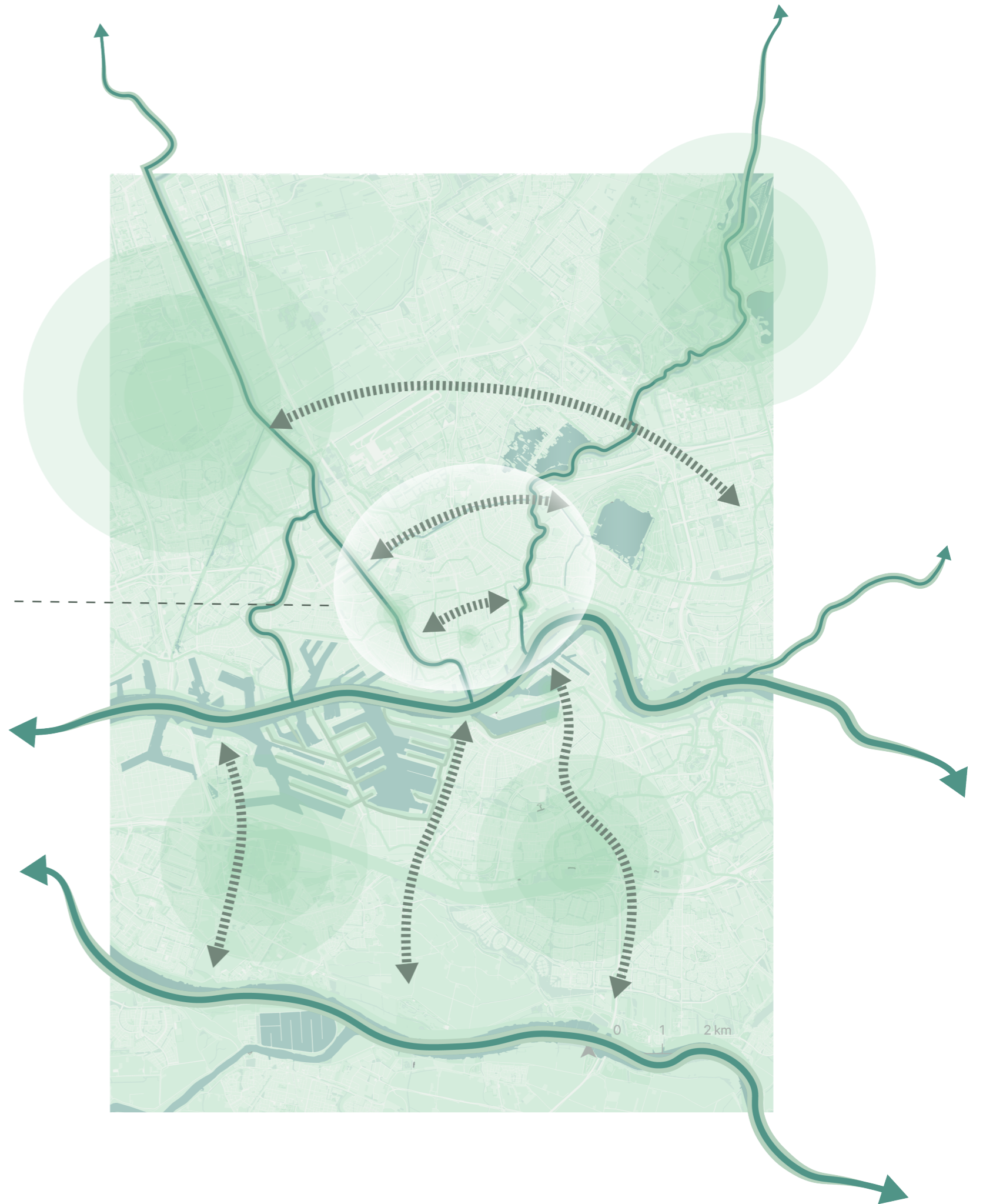
*Rotterdam Vision*





# URBAN CENTER

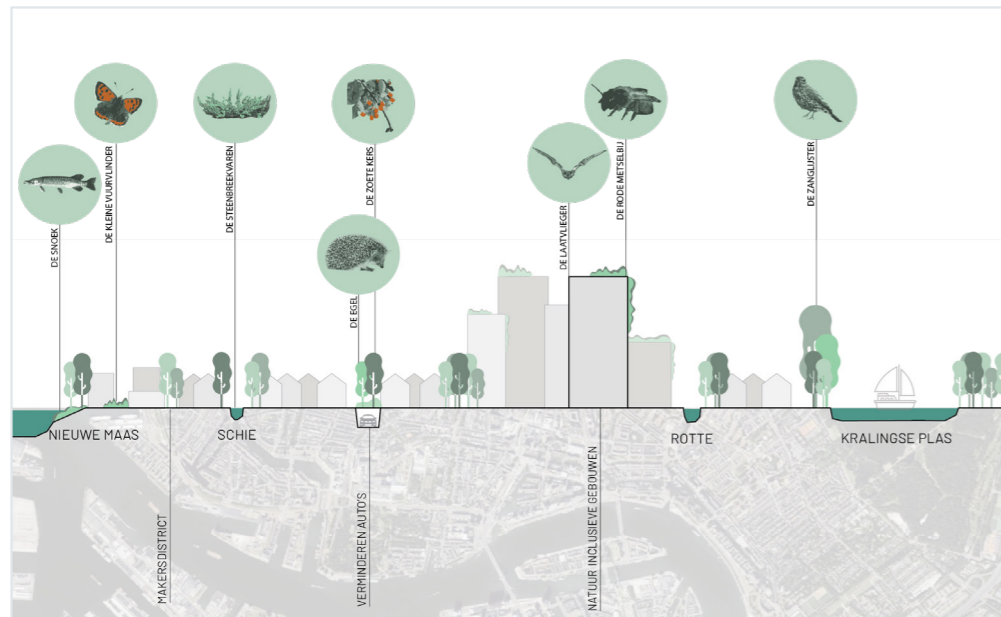
*Schie to Rotte*





# STRENGTHENING THE ECOSYSTEMS

Biodiversity



Amount of green



Connectivity



4 ECOLOGICAL RESILIENCE



5 LET IT GROW



6 BIODIVERSE NETWORK



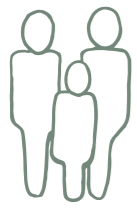
7 GREEN ROUTES



14 WILDLIFE CORRIDORS



22 SMALL GREEN IN BETWEEN



# CONNECTING PEOPLE TO NATURE

Accessibility



Interaction



Sense of Place



2 SOCIAL RESILIENCE



10 LOCAL SELF-SUFFICIENCY



11 SAFE ENVIRONMENT



12 PEDESTRIAN FIRST



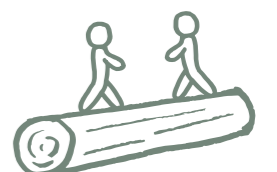
13 INTERACTIVE GREEN SPACE



20 URBAN FARM



23 COMMUNITY GARDEN



24 NATURAL PLAYGROUND

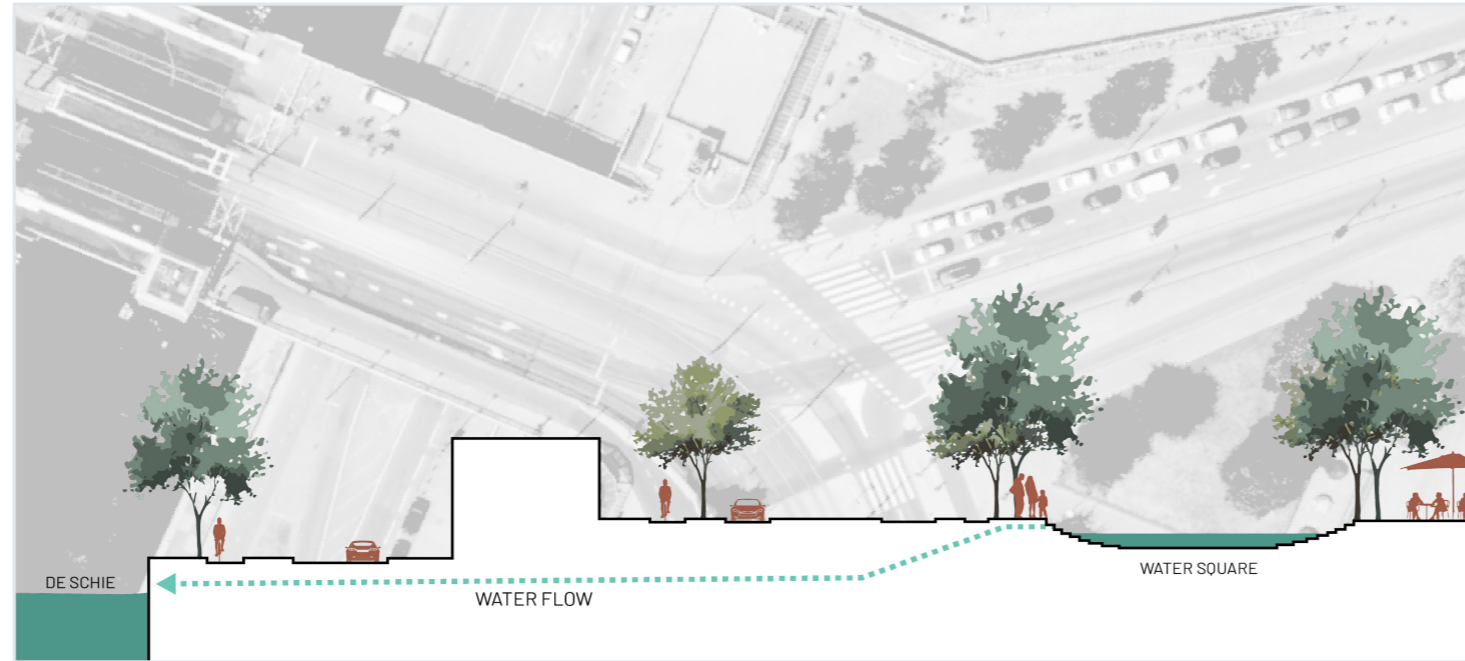


# DEVELOPING A CLIMATE ADAPTIVE CITY

UHI



Water nuisance



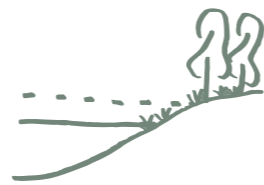
Risk of flooding



8 EMBRACE THE WATER



9 SPONGE CITY



15 TIDAL PARK



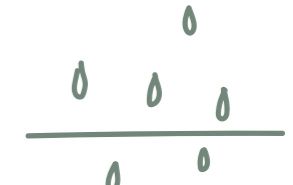
16 SHADE PARK



17 BIOSWALE



19 WATER SQUARE



28 PERMEABLE PAVEMENT

# URBAN CENTER

*From Schie to Rotte*



*Climate Perspective*

+



*Human Perspective*

+



*Ecological Perspective*

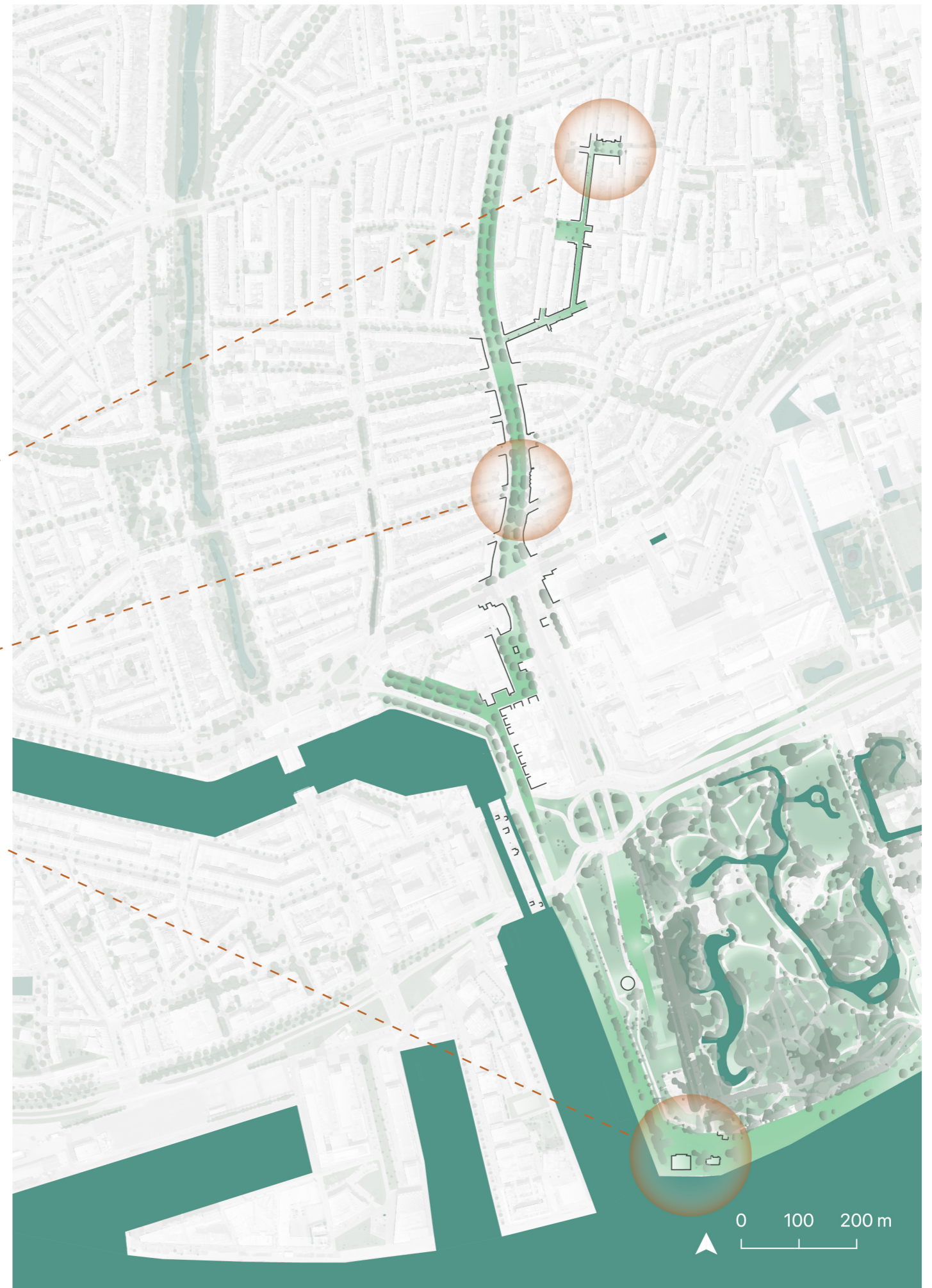
# URBAN CENTER

*From front door to park*

**STREET**

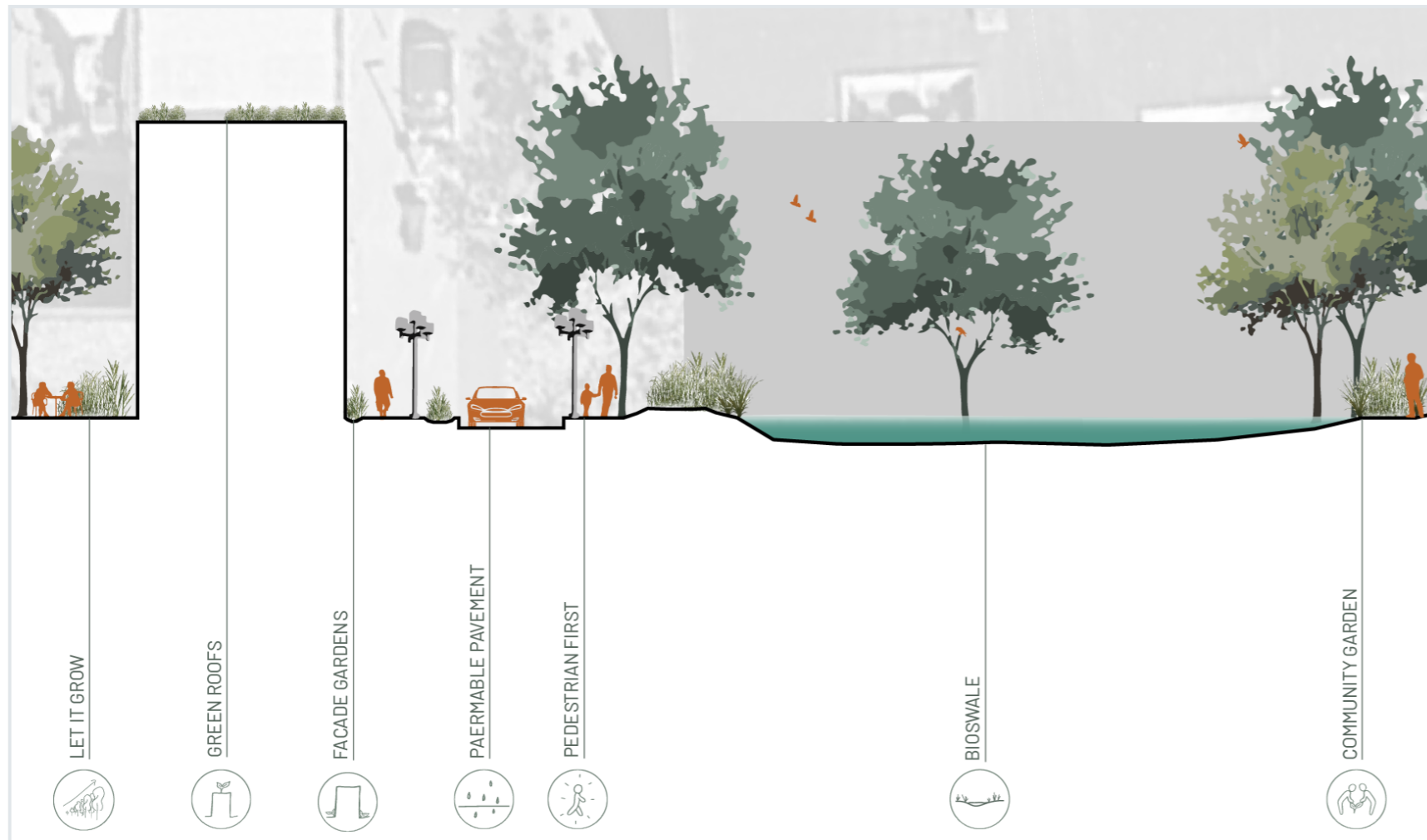
**BOULEVARD**

**PARK**



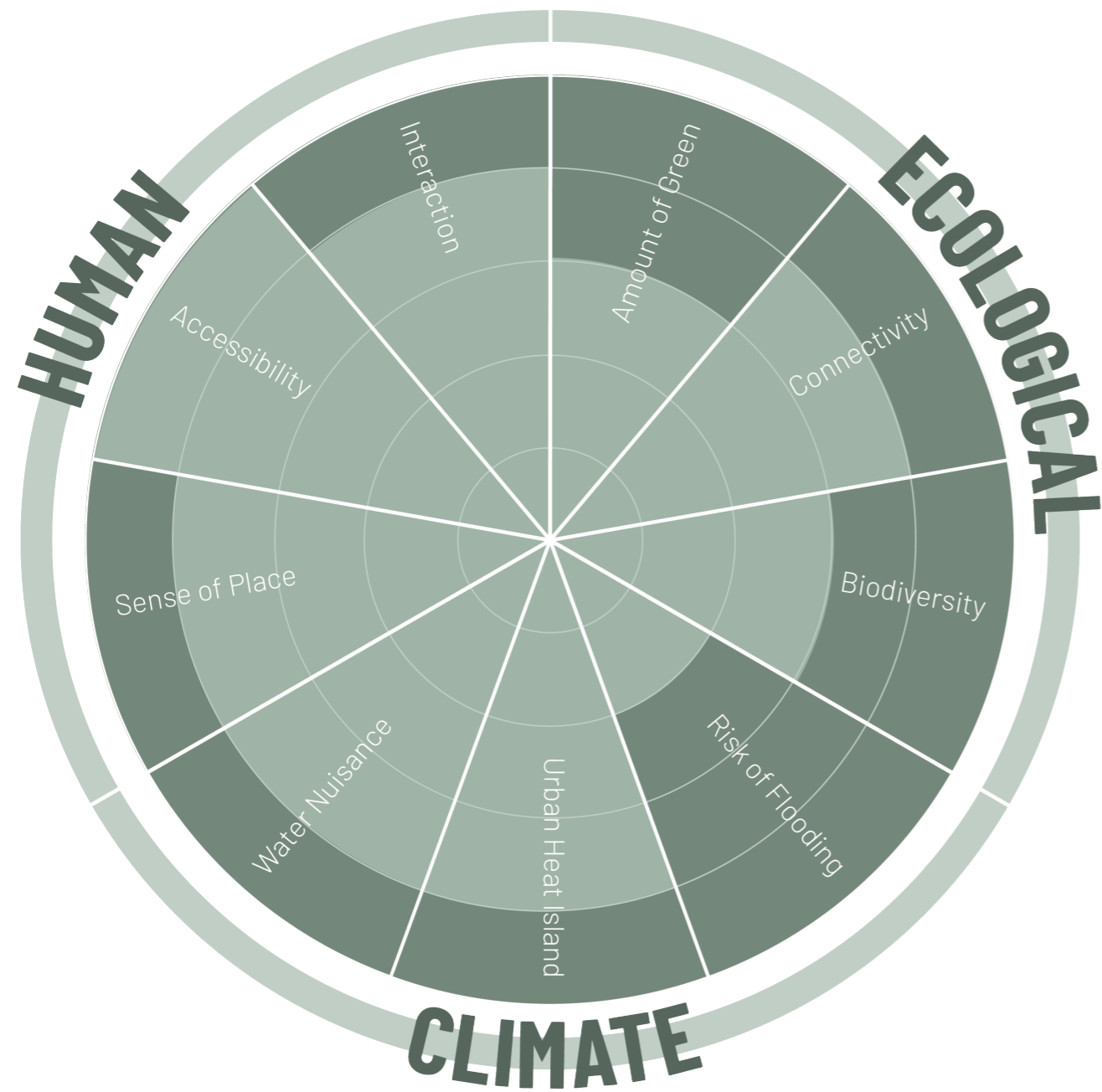
# STREET

From front door to park - Urban Center



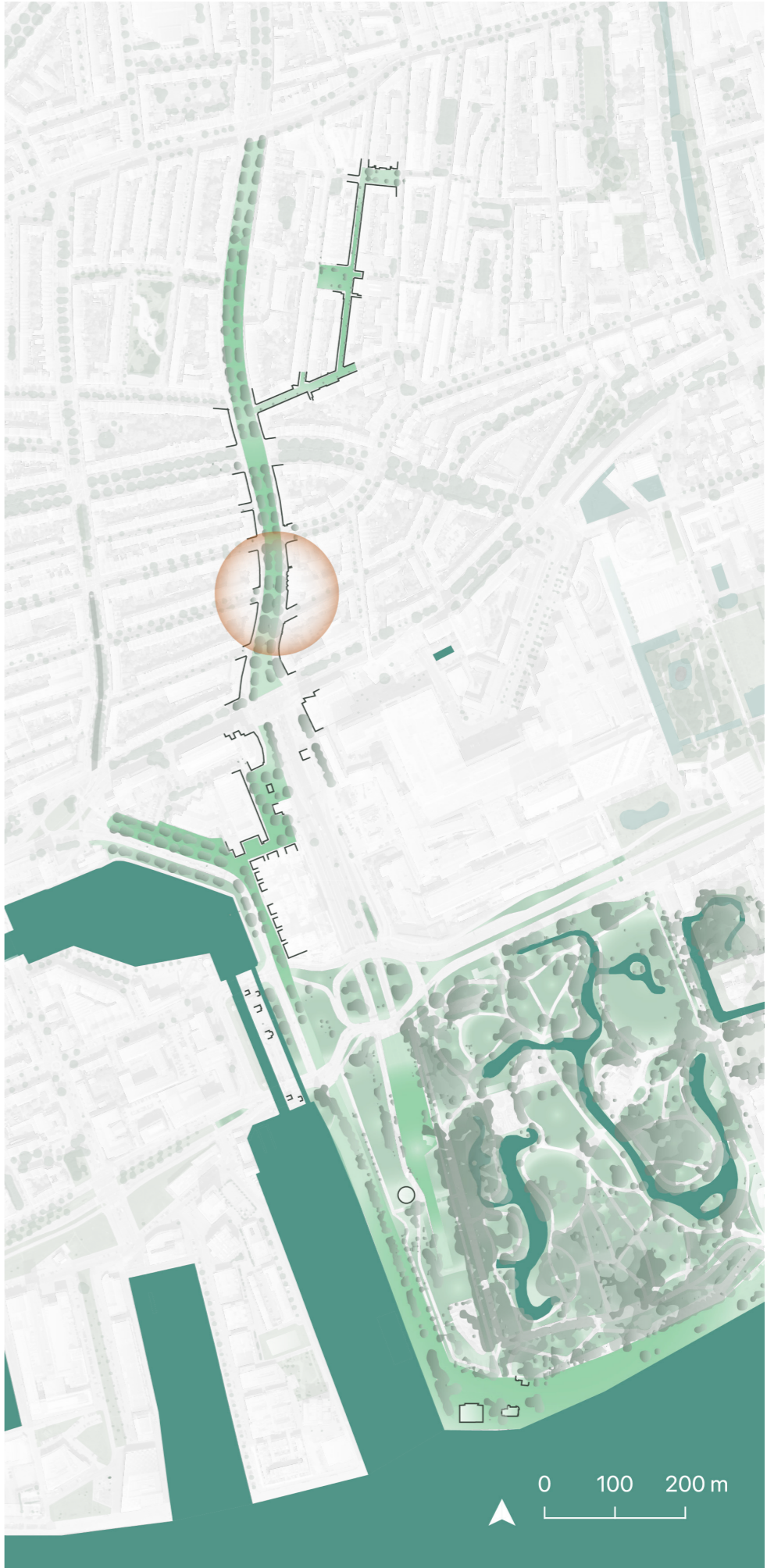
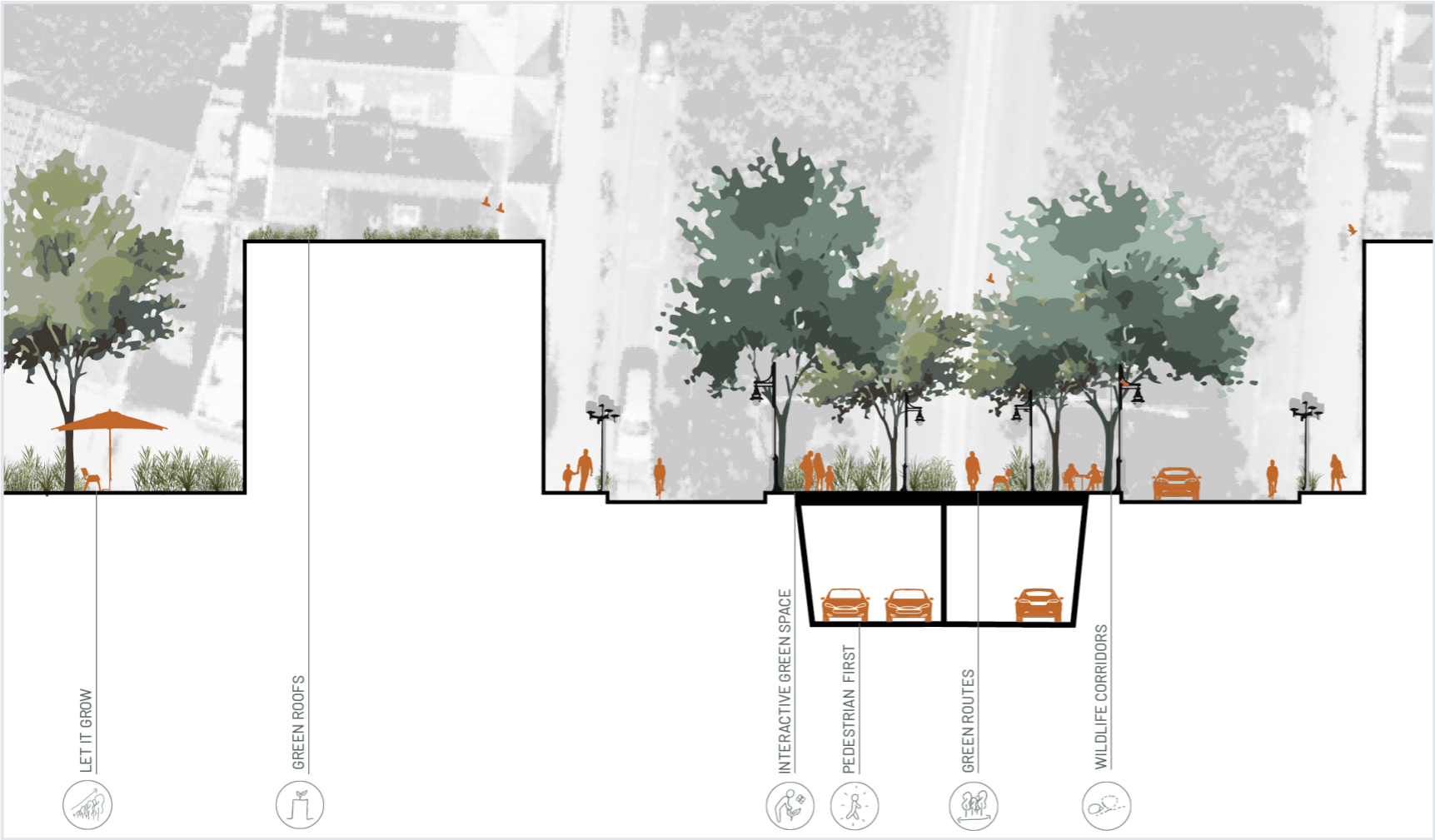
# STREET

From front door to park - Urban Center



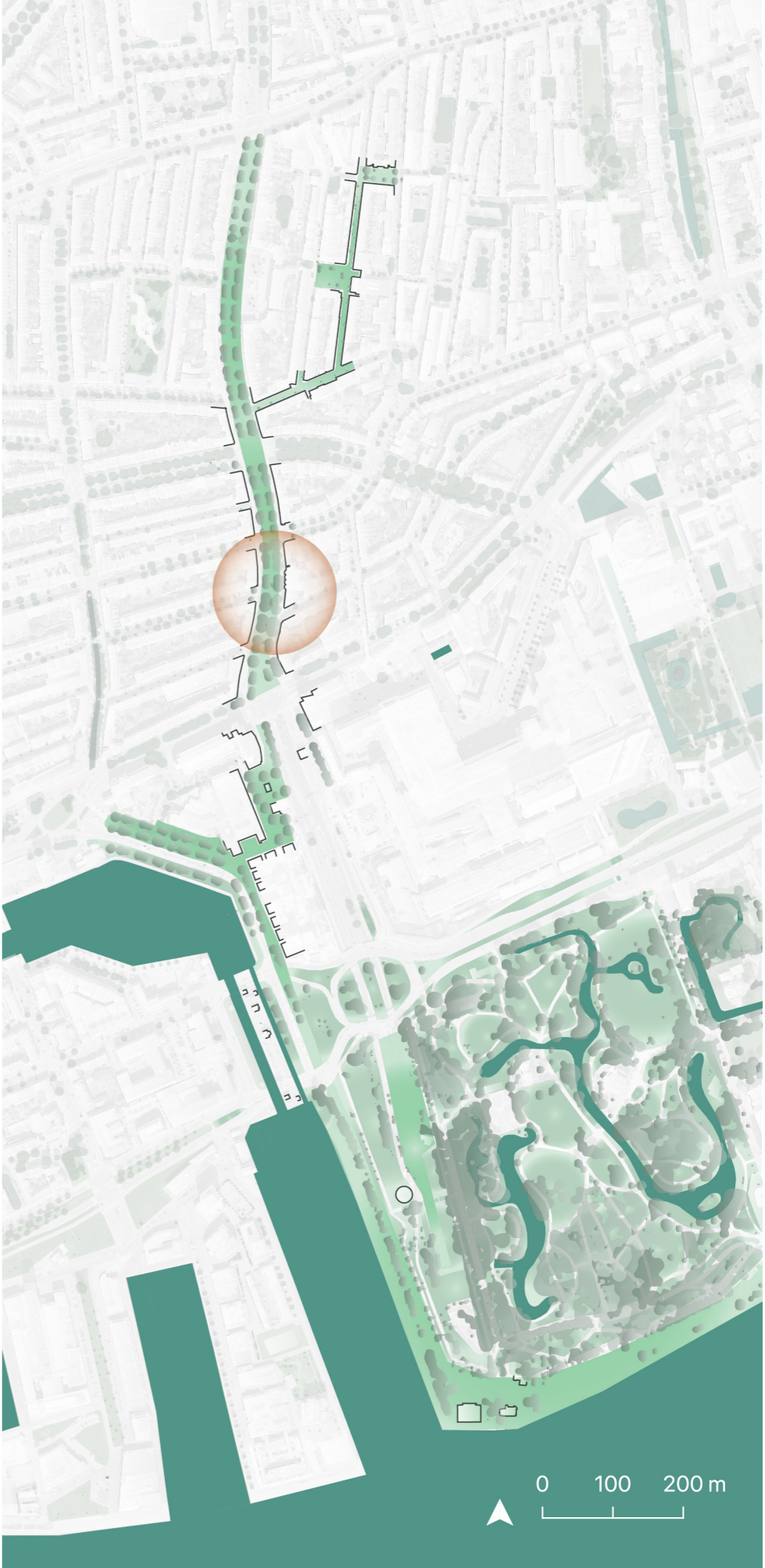
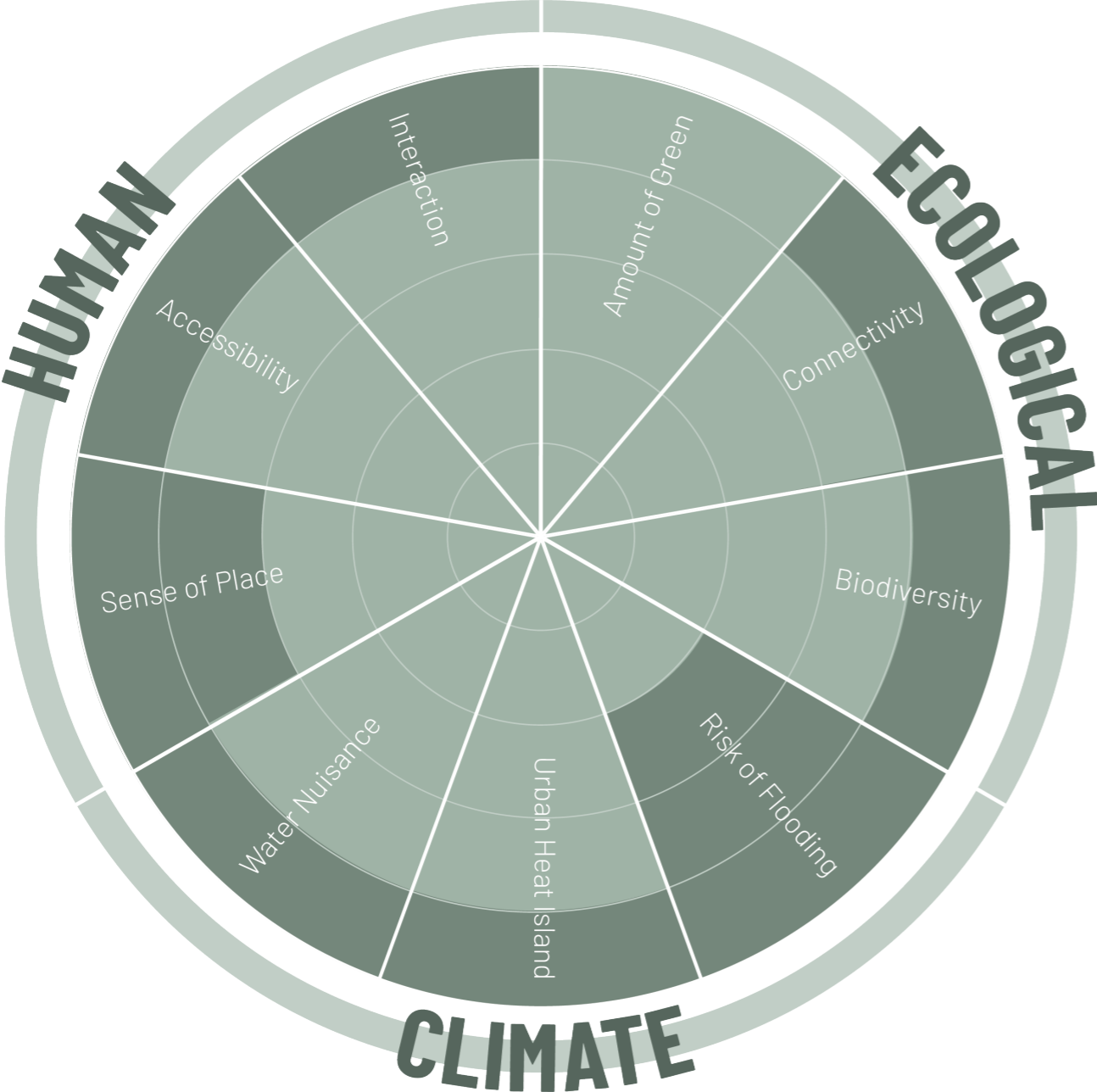
# BOULEVARD

From front door to park - Urban Center



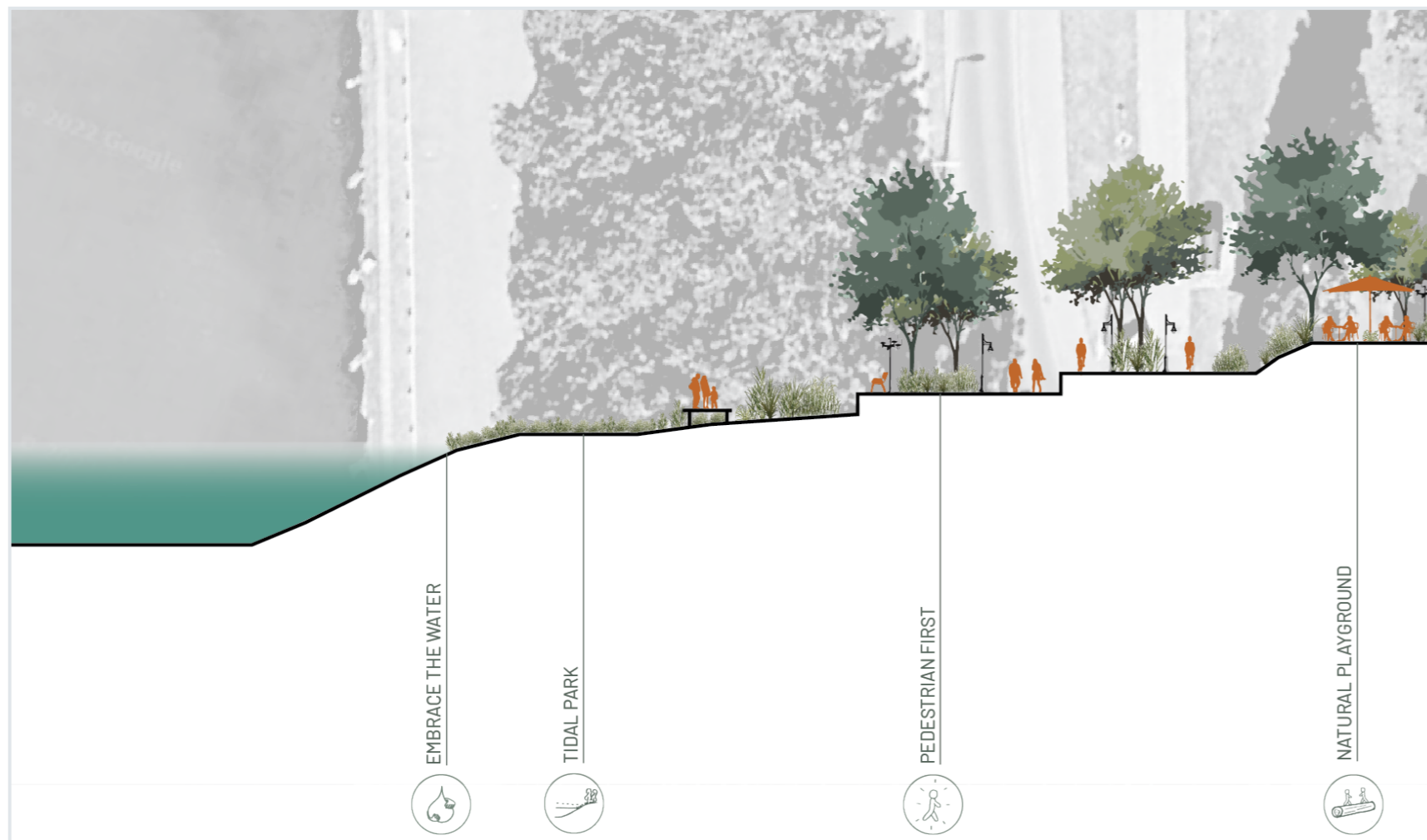
# BOULEVARD

From front door to park - Urban Center



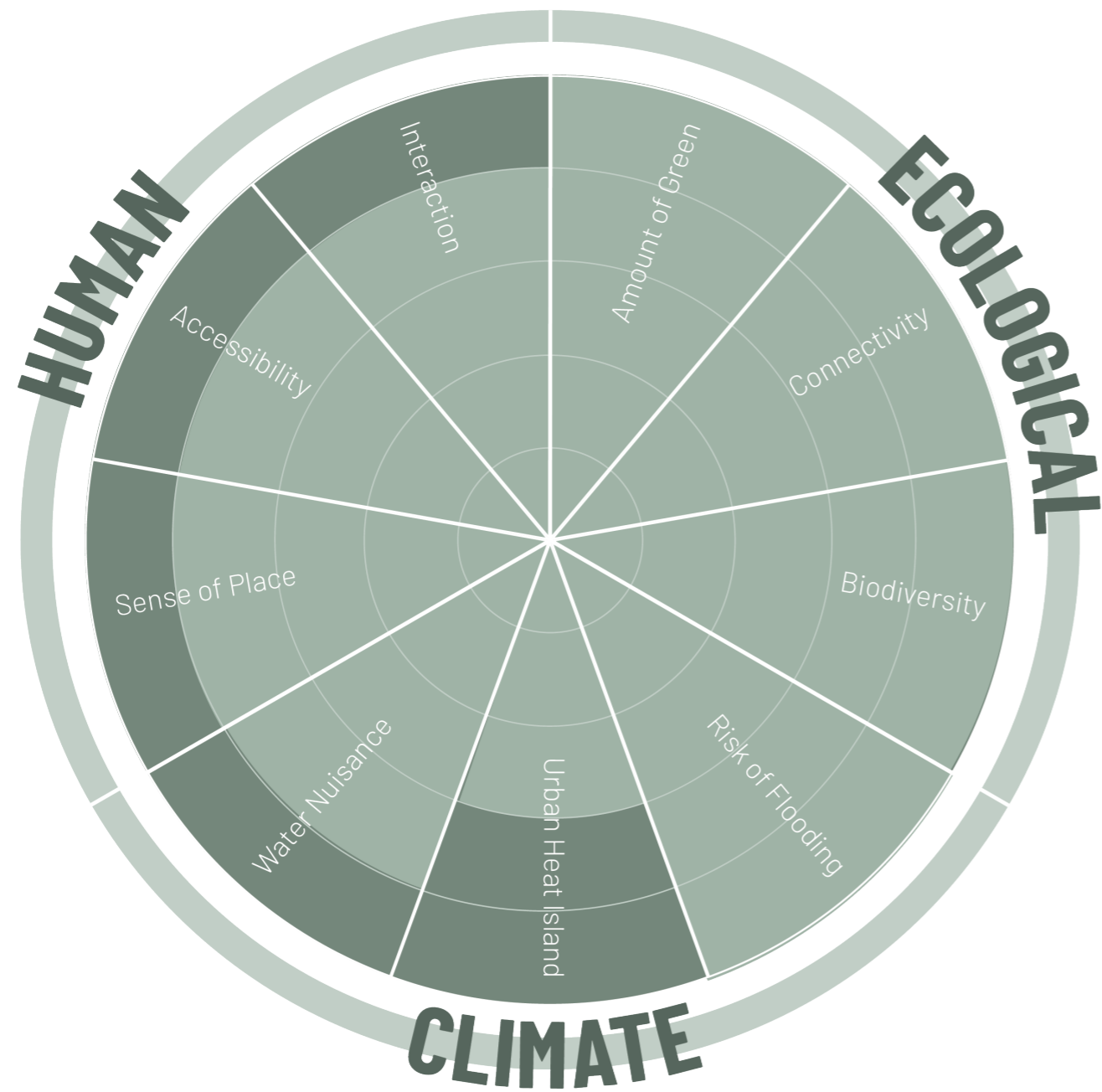
# TIDAL PARK

From front door to park - Urban Center

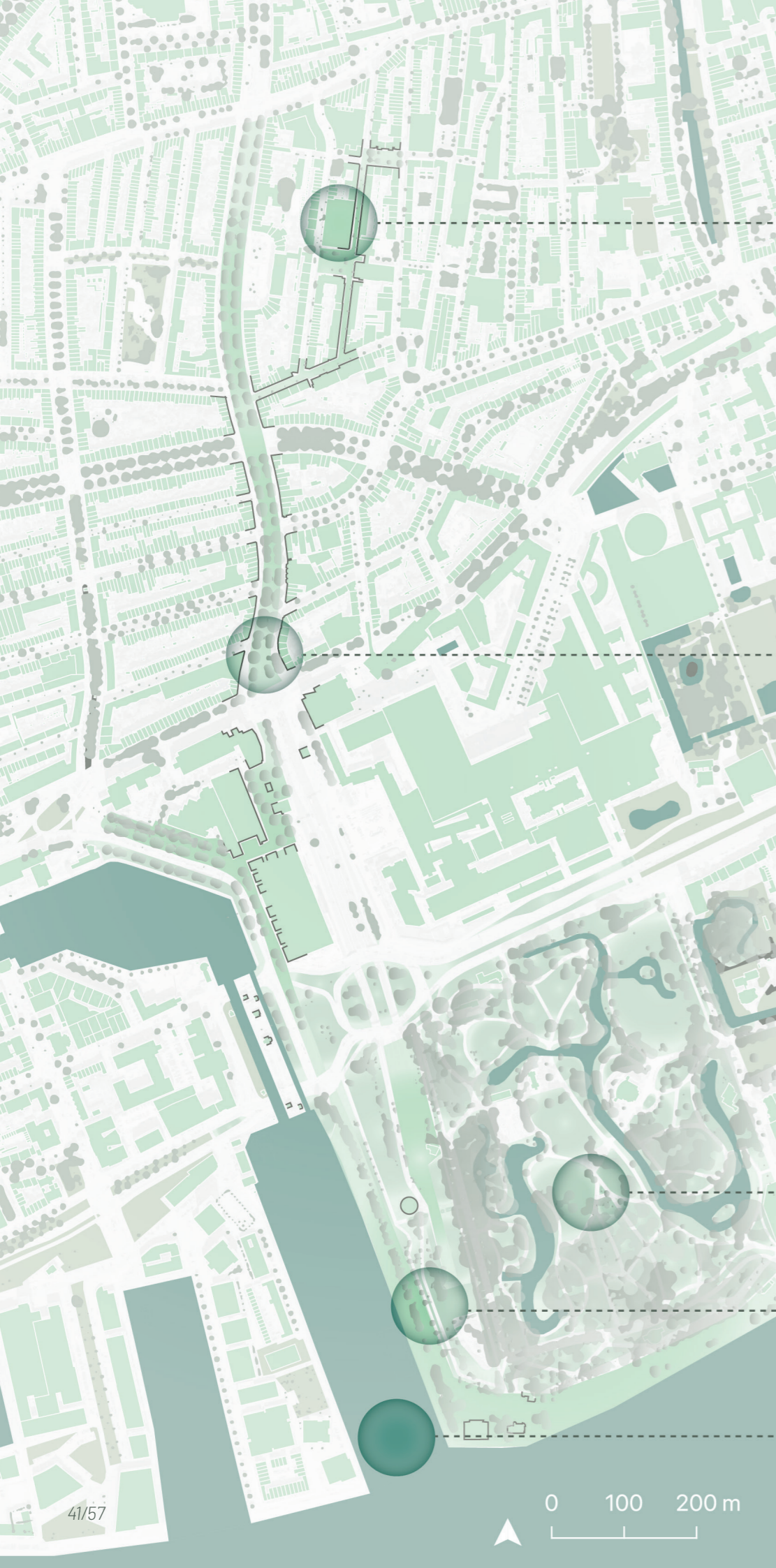


# TIDAL PARK

From front door to park - Urban Center



# HABITATS



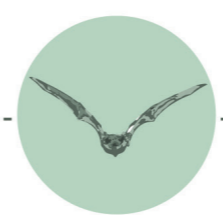
## ROOFTOP HABITAT

grass



## LINEAR PARK HABITAT

grass - forest



## URBAN PARK HABITAT

grass - forest - water



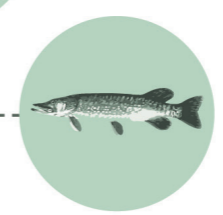
## RIPARIAN HABITAT

forest - water



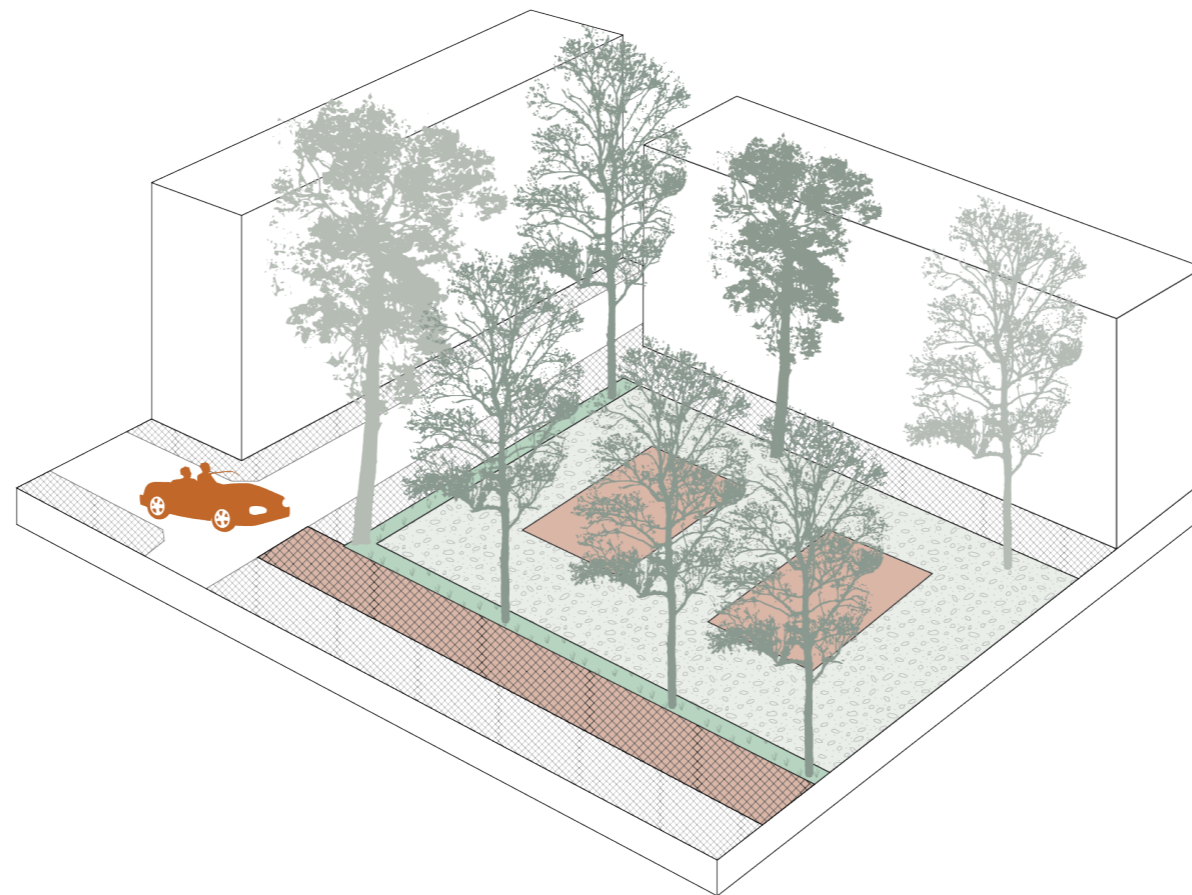
## RIVER HABITAT

water



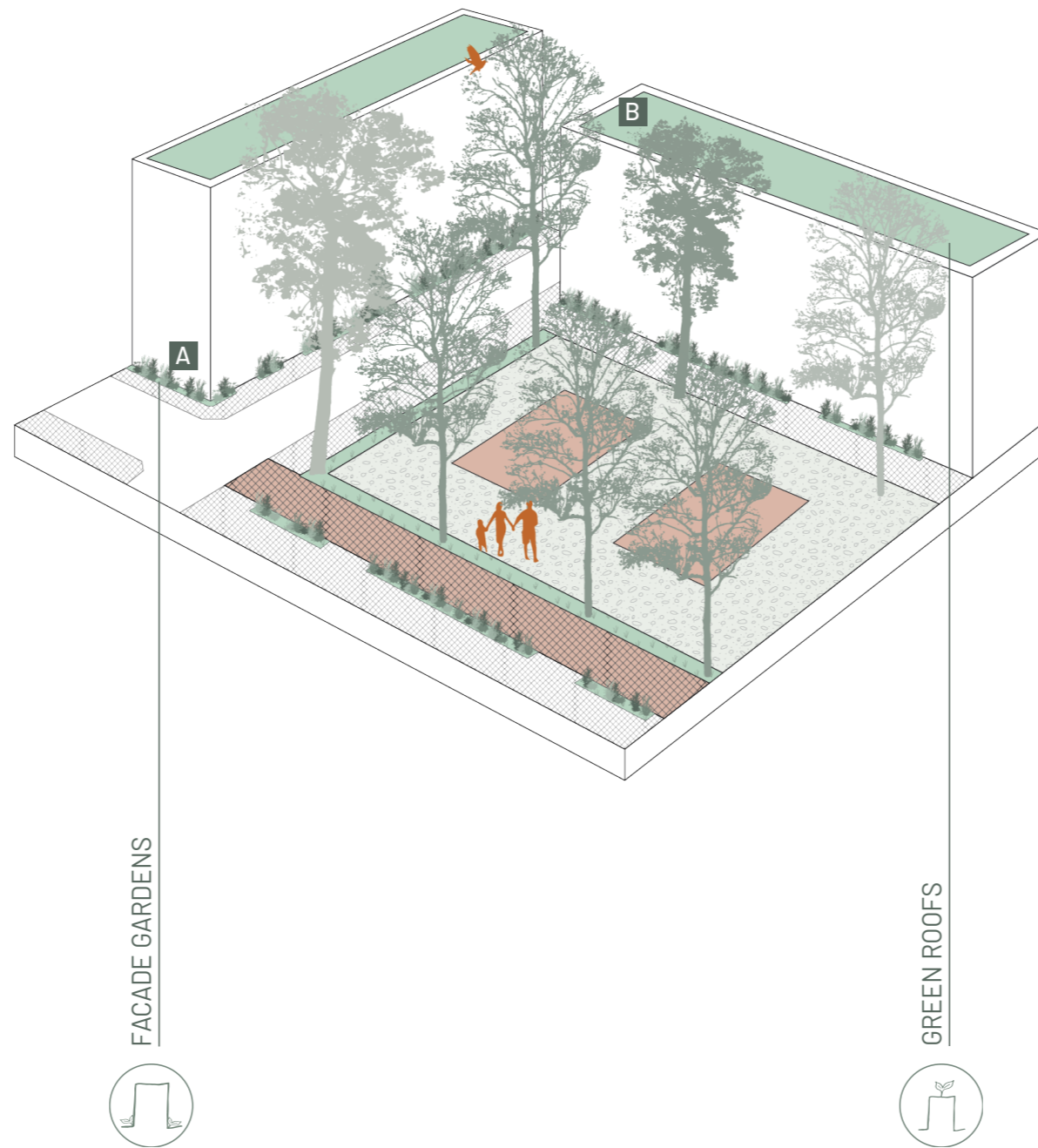
# PHASING | CURRENT SITUATION

Strategy Urban Center



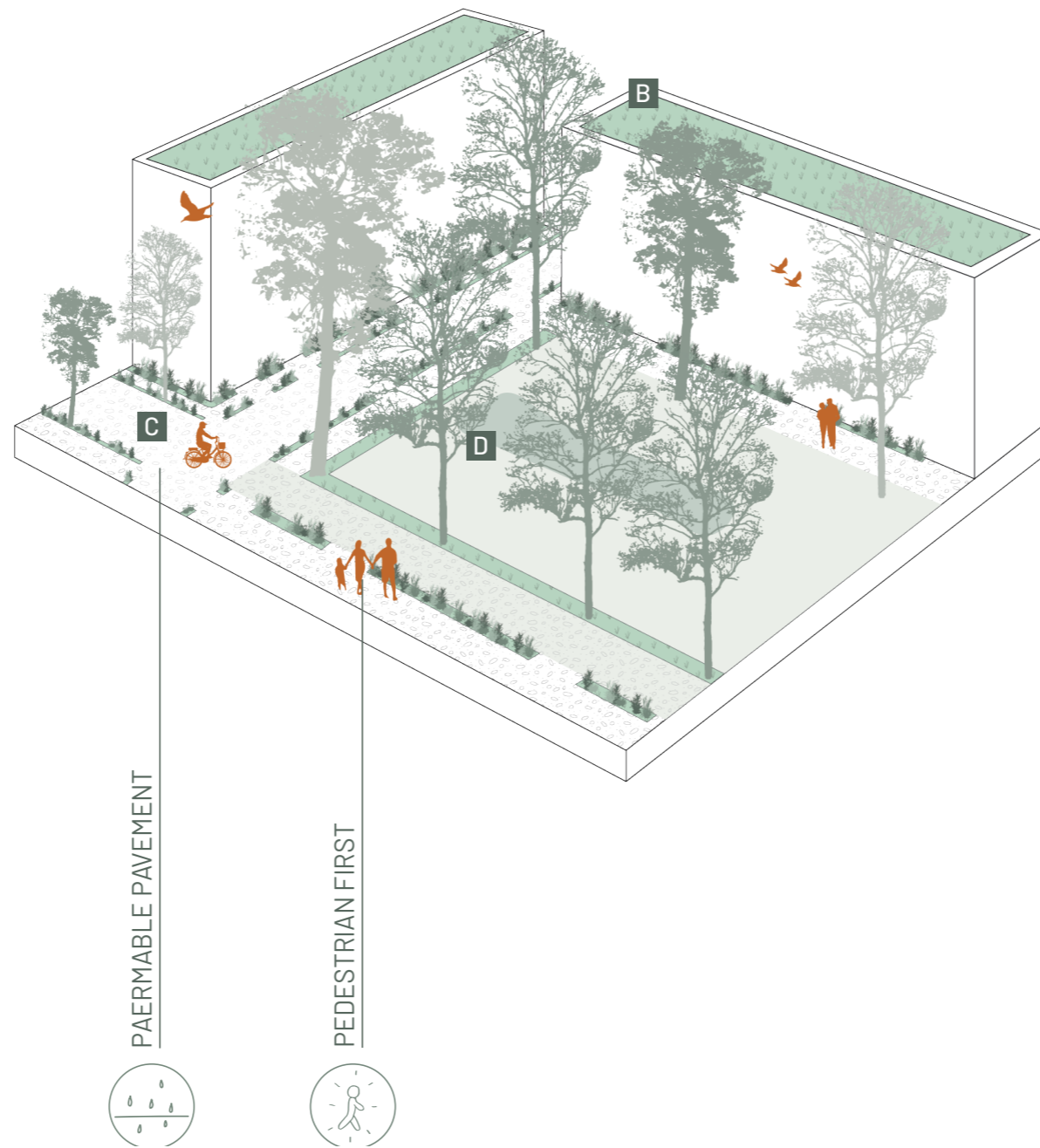
# PHASING | YEAR 1

Strategy Urban Center



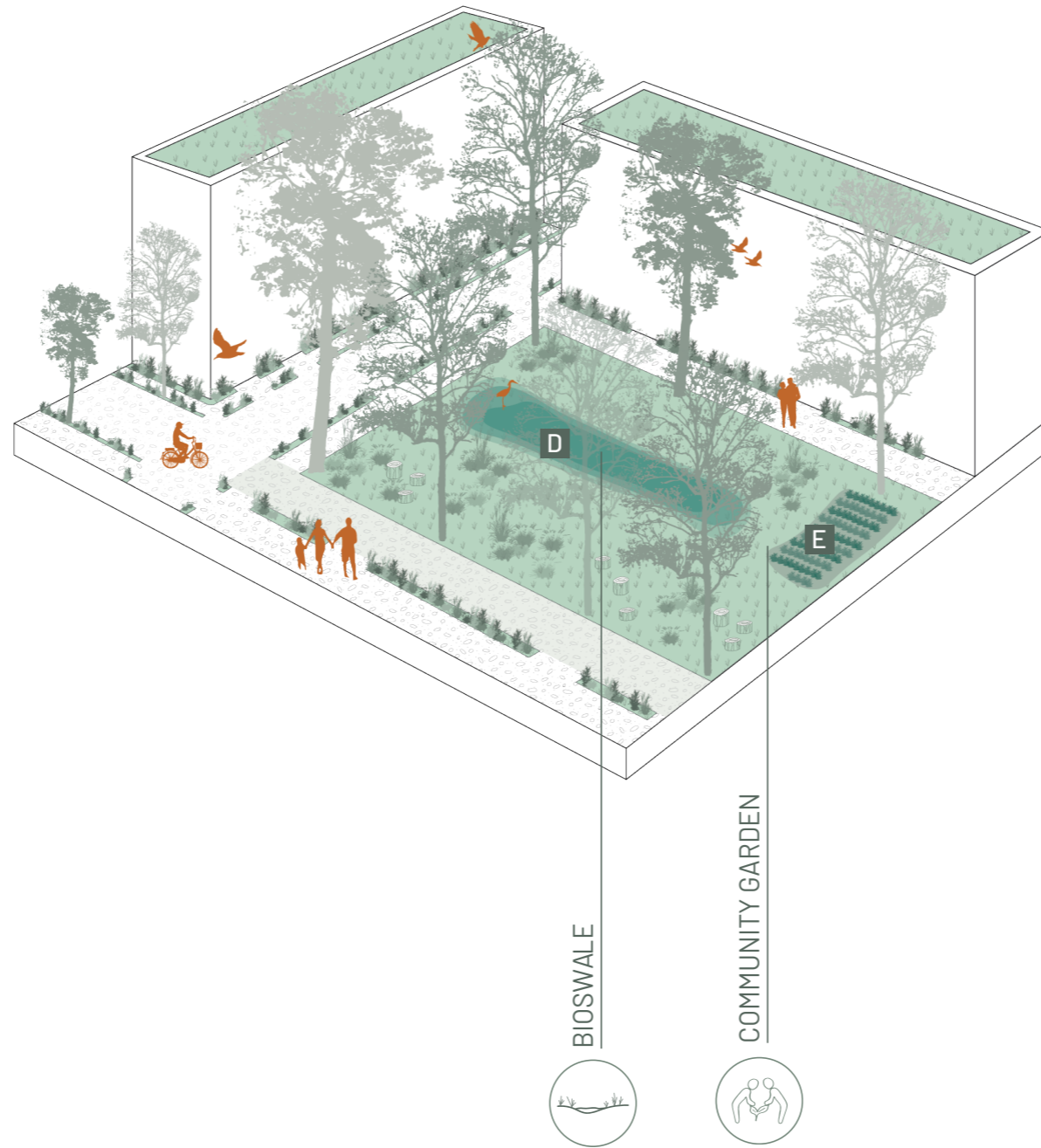
# PHASING | YEAR 2

Strategy Urban Center



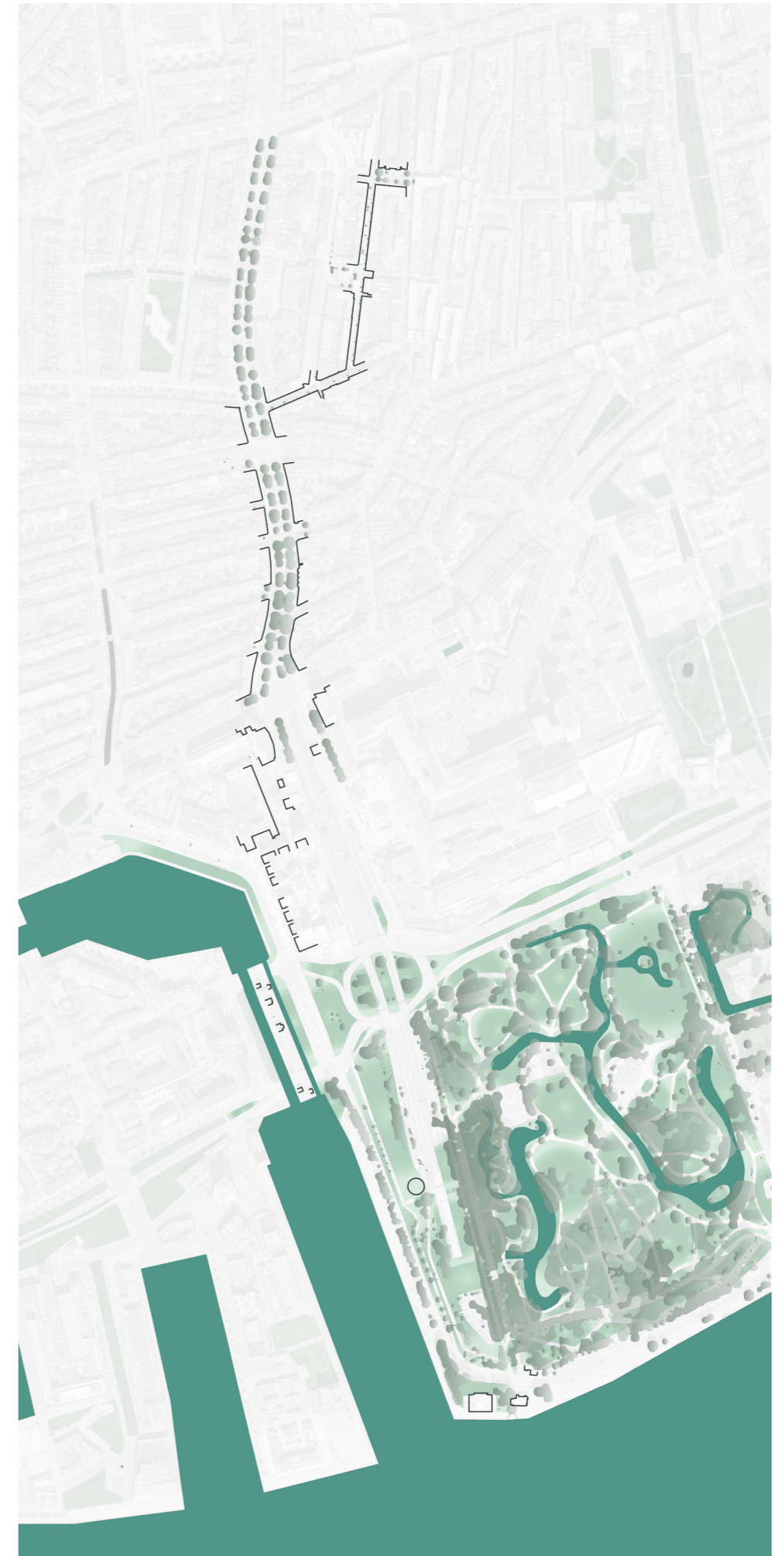
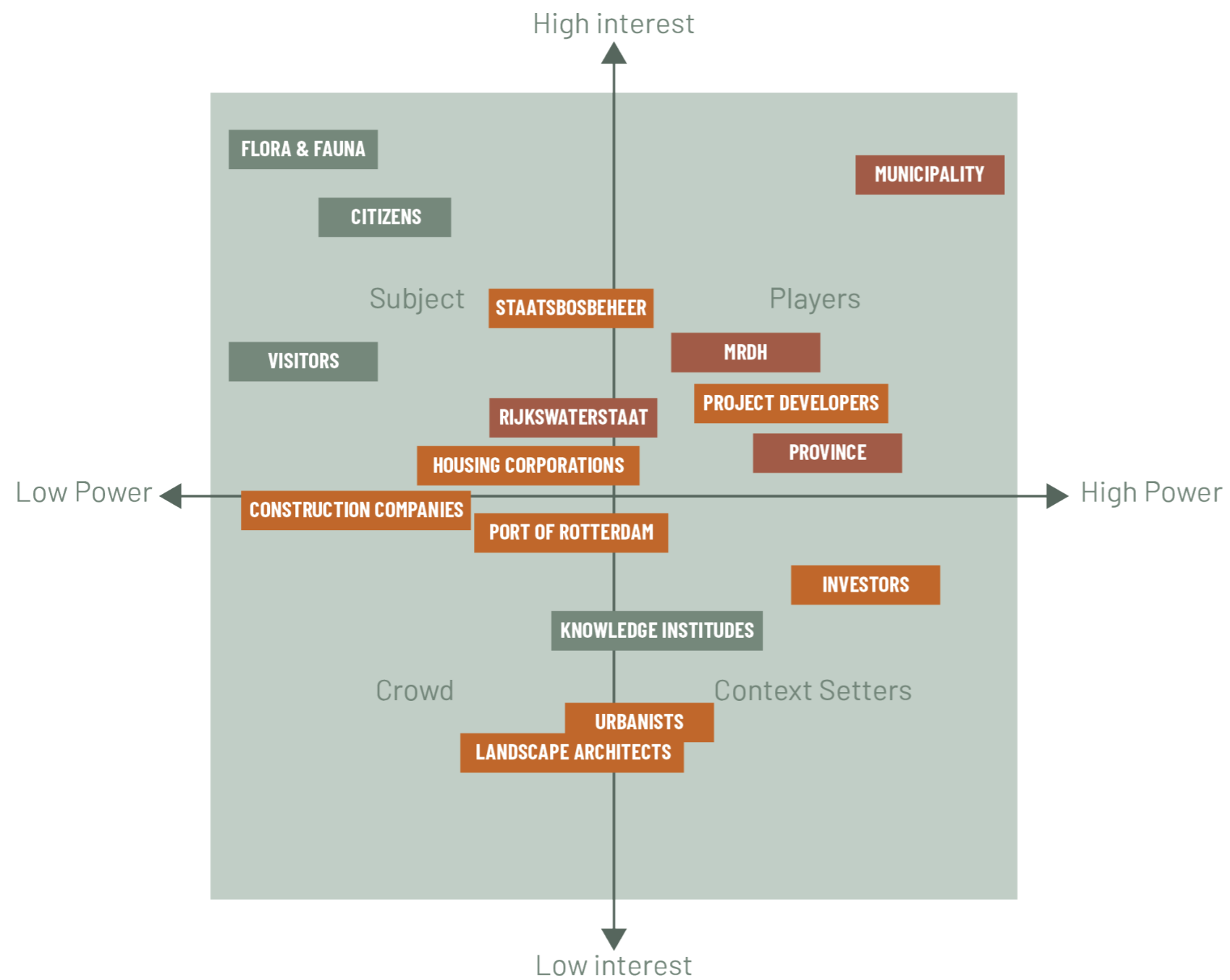
# PHASING | YEAR 3

Strategy Urban Center



# STRATEGY

## Urban Center



# PHASE I: 2022-2030

Strategy Urban Center

## STREET

- Engaging residents + facilitate initiatives
- Start greenifying roofs
- Changing street profile: adding green, permeable pavement, space for pedestrians
- Constructing bioswale
- Constructing community garden

## BOULEVARD 'S GRAVENDIJKWAL

- Involving and engaging stakeholders
- Redirecting car mobility

## TIDAL PARK

- Start creation waterfront route
- Redirecting car mobility



# PHASE II: 2030-2040

Strategy Urban Center

## STREET

- Expansion green streets

## BOULEVARD 'S GRAVENDIJKWAL

- Start covering 's Gravendijkwal
- Greenifying surrounding buildings
- Expansion green corridors

## TIDAL PARK

- Start construction tidal park: transforming quay
- Expansion of the waterfront route



# PHASE III: 2040-2050

Strategy Urban Center

## STREET

- Maintaining

## BOULEVARD 'S GRAVENDIJKWAL

- Start constructing park on tunnel: planting vegetation
- Construct educational green route
- Host activities

## TIDAL PARK

- Construction tidal park: planting vegetation
- Adding program: cafés and natural playground
- Adding floating space: housing/museum



# EXPANSION

*Strategy Urban Center*

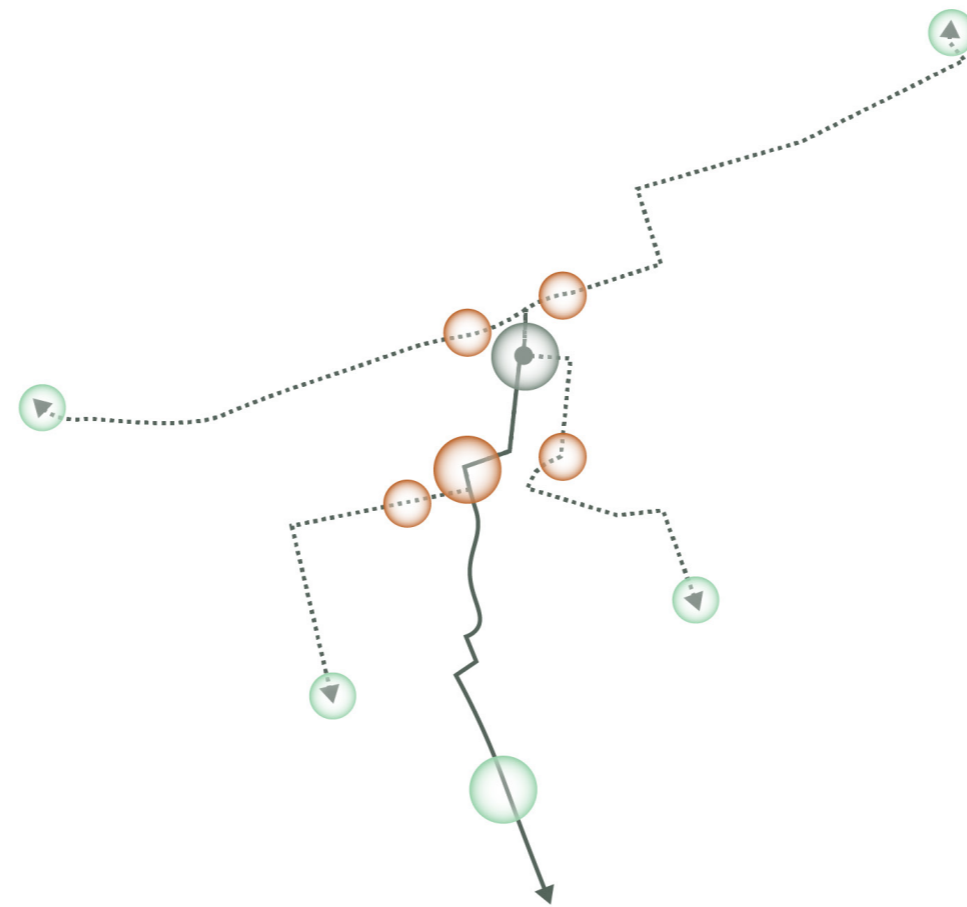
## LEGEND

- Street
- Boulevard
- Park
- ↙ Route



# EXPANSION

Strategy Urban Center



## LEGEND

- Street
- Boulevard
- Park
- Route

# EXPANSION

Strategy Urban Center



## LEGEND

- Street
- Boulevard
- Park
- Route

# EXPANSION

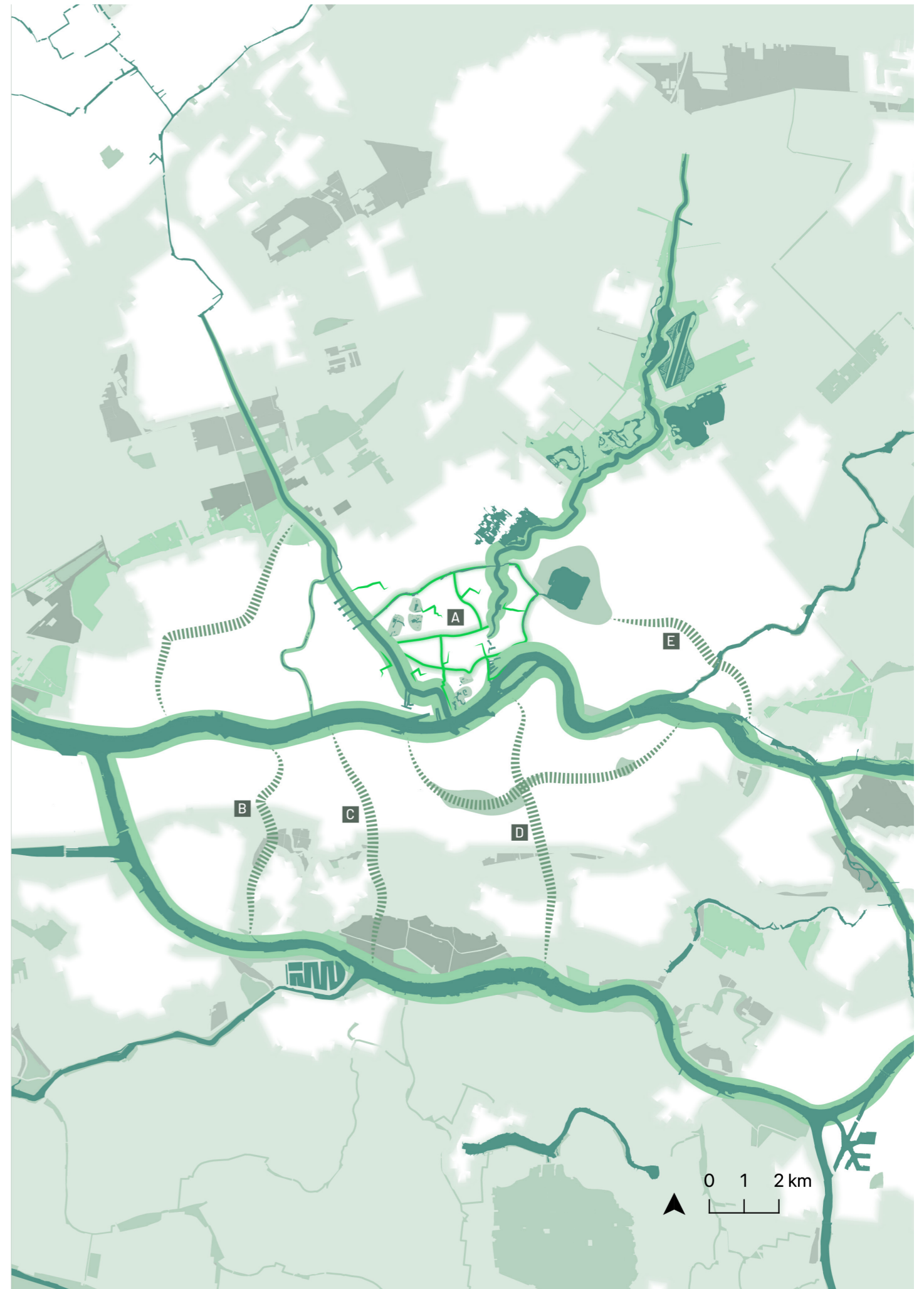
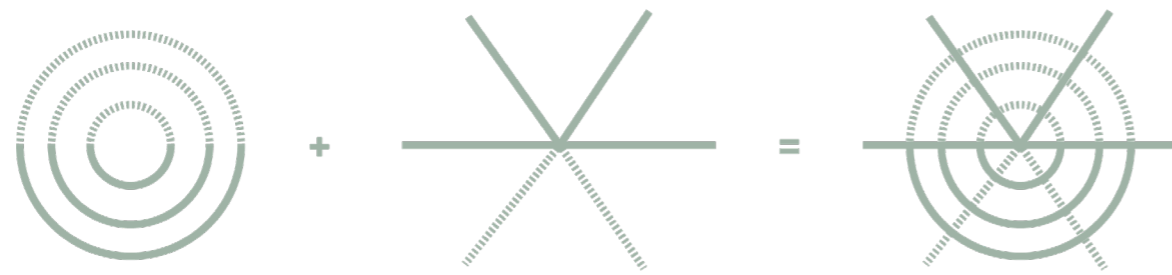
Strategy Urban Center



## LEGEND

- Street
- Boulevard
- Park

# EXPANSION



# RECOMMENDATIONS

## *Complementing city structure*

- *Develop strategy for zones B, C, D and E*

## *Feasibility study*

- *Political aspect*
- *Economical aspect*

## *Ecology study*

- *In dept study on ecological values*

# CONCLUSION & REFLECTION

*"How could the citizens of Rotterdam be reconnected to nature, while improving the urban ecosystems, creating a resilient city?"*

*Social relevance:*

- *Quality of life*
- *Green Metropolis*

*Scientific relevance:*

- *Changing circumstances affecting the urban environment*
- *Strategic approach*

*Transferability:*

- *Relevant for Dutch (and non-Dutch) cities*
- *Pattern Language*



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# PROBLEM STATEMENT

*"The city of Rotterdam has lost its connection with nature as the city expanded over the years. As a result the ecological values of the city environments are low, as well as the awareness among citizens on the values and importance of nature. Besides this, the changing climate causes negative effects and future treats for the urban environment."*

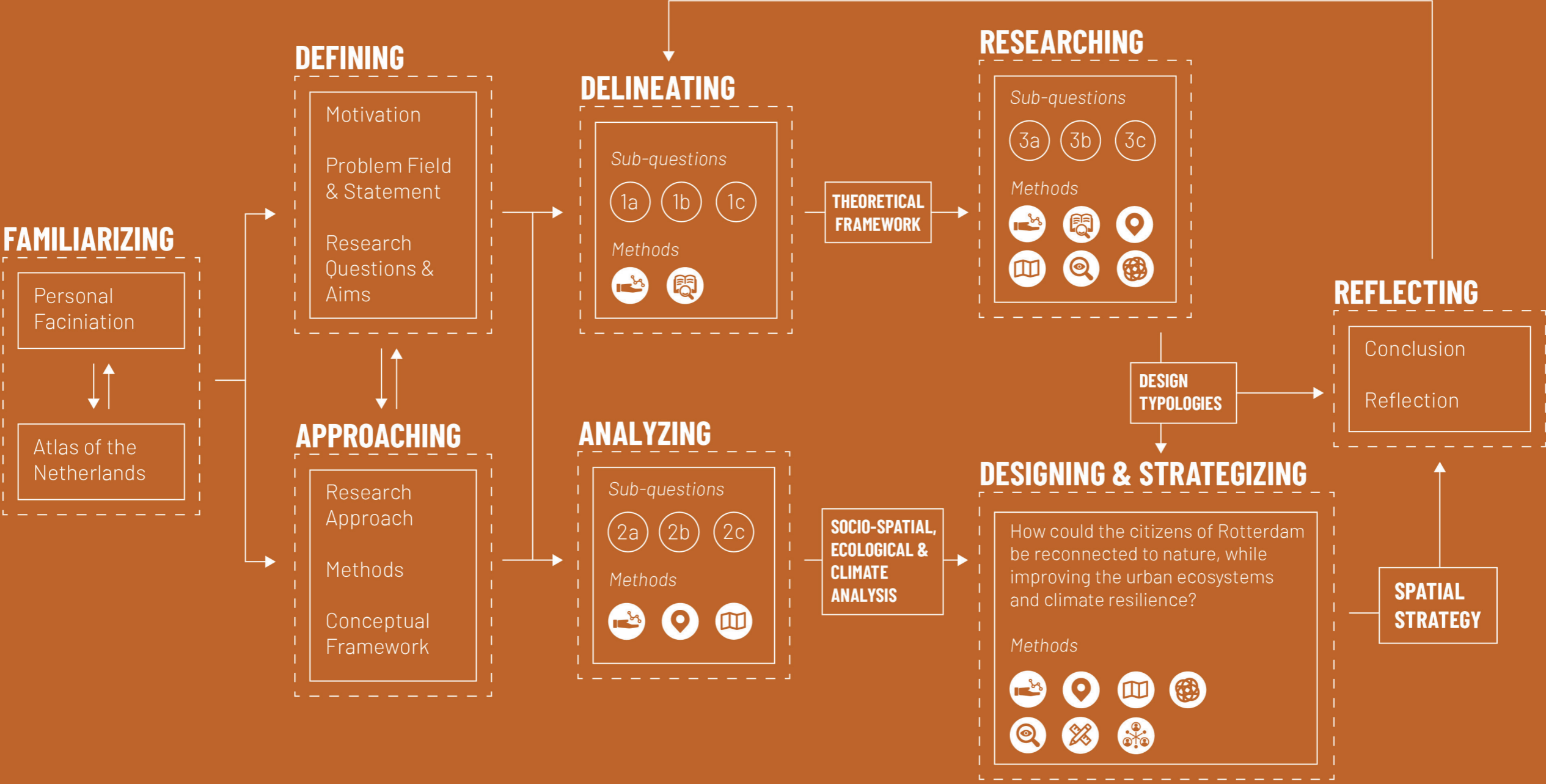
## RESEARCH QUESTION

How could the citizens of Rotterdam be reconnected to nature, while improving the urban ecosystems and climate resilience?

## SUB-QUESTIONS

|                              | <br><b>ECOLOGICAL</b> | <br><b>HUMAN</b> | <br><b>CLIMATE</b> |
|------------------------------|--|---|---|
| <b>DELINEATING</b>           | 1a What makes good ecological performance of urban ecosystems?   | 1b What makes people feel connected to nature?  | 1c What makes a climate resilient city?   |
| <b>ANALYSIS</b>              | 2a What is the current state of the Rotterdam ecosystems?  | 2b How well are the citizens of Rotterdam connected to nature right now?                            | 2c How climate resilient is the city of Rotterdam?  |
| <b>RESEARCH &amp; DESIGN</b> | 3a How could the ecological performance of the Rotterdam ecosystems be improved?                       | 3b How could awareness on the values of nature be created among the citizens of Rotterdam?          | 3c How could the climate resilience of Rotterdam be improved?   |

# PROJECT APPROACH



# VISION

## Healthy Ecosystems

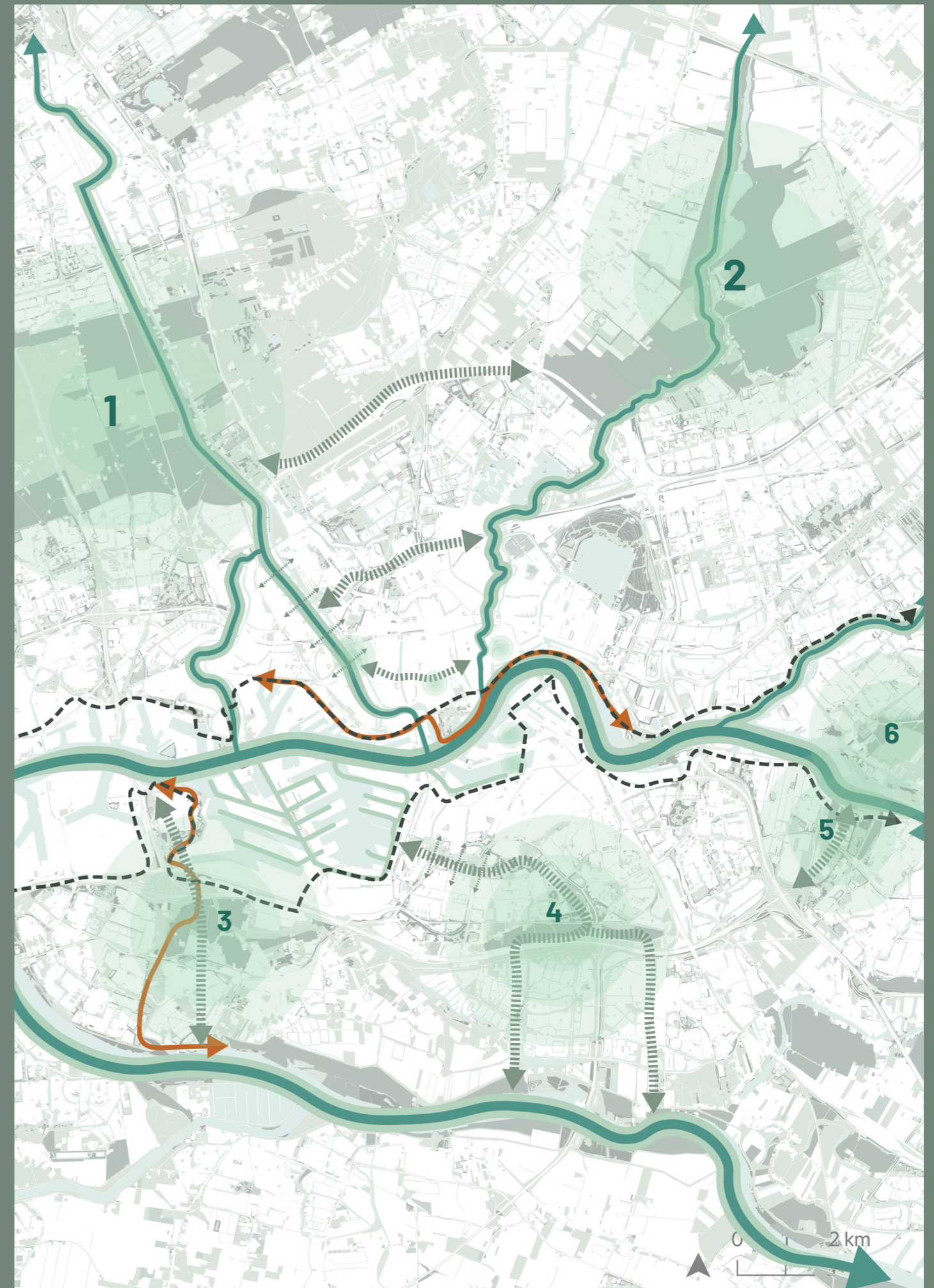
- improving ecological connectivity
- increasing the amount of green and biodiversity

## Human Connection with Nature

- provide accessible green
- create a sense of place and interaction with nature

## Climate Resilience

- reduce UHI, water nuisance and risk of flooding
- adaptive urban landscape



Rotterdam



Including the whole region of Rotterdam



# QUALITY OF LIFE

## HEALTH

*clean air,  
water and land*

## WELLBEING

*comfort, self  
fulfillment*

## ECONOMICAL

*job  
opportunities,  
affordable  
living*

## SOCIAL

*safety,  
equality, social  
cohesion*

## FUTURE PERSPECTIVE

*resource management*