ADAPT ME FOR TOMORROW

Towards urban resilience in The Hague by 2050 through public space design

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P5 presentation
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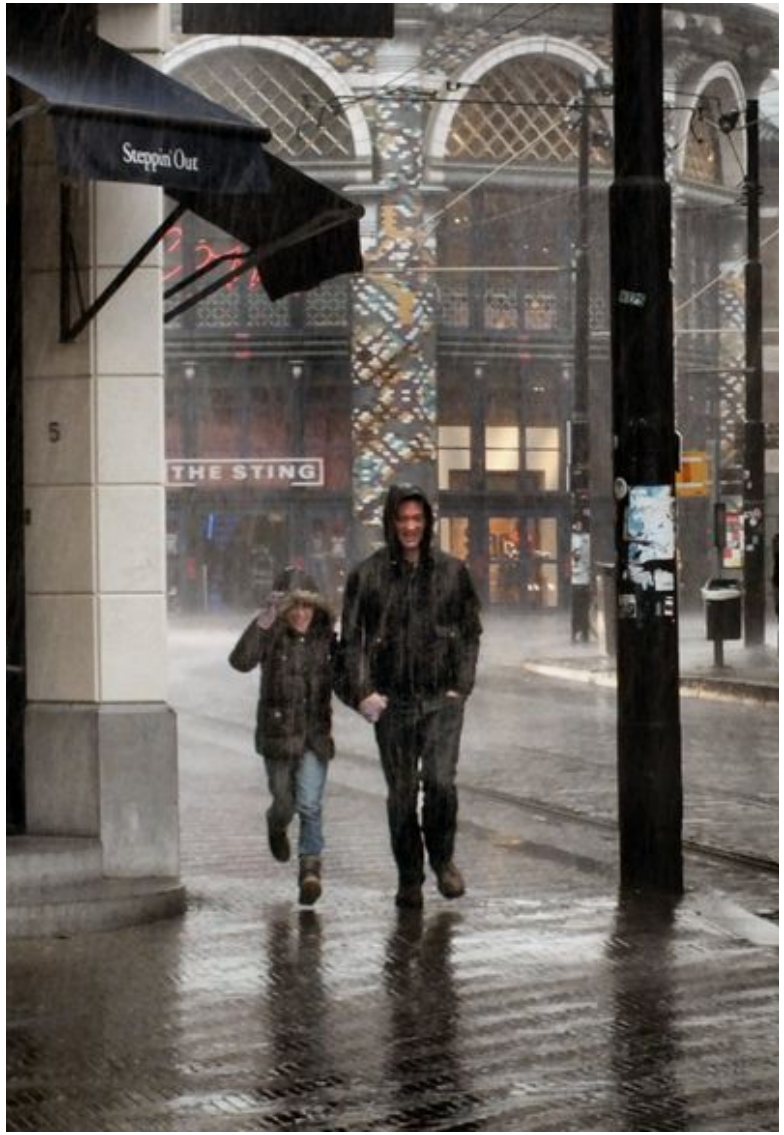
Second mentor: ir. Geert van der Meulen

MSc. Urbanism, TU Delft

A coastal international city...

A historical city...

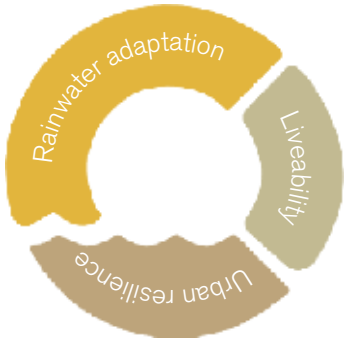
A green city...



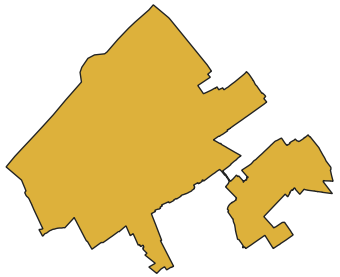
Vulnerable population...

Property at risk...

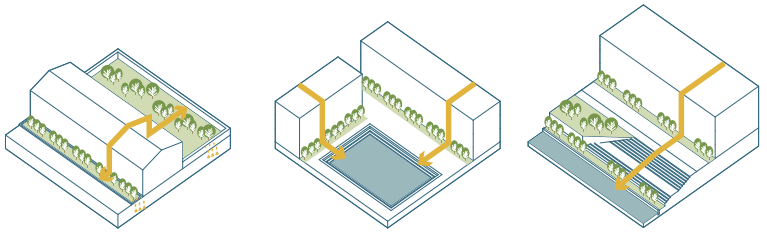
Too much pavement...



Give the values back to



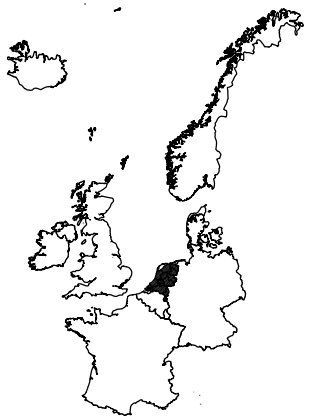
The Hague



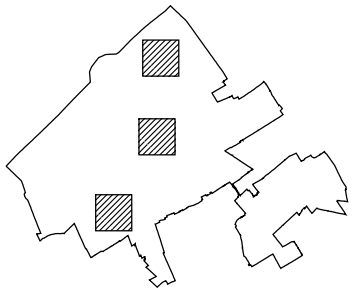
With three water management approaches

Collborating with public space design

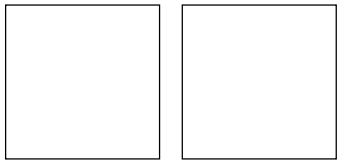
GLOBAL SCALE XL



L STUDIO RESEARCH SCALE
NORTH SEA



M CITY SCALE
THE HAGUE



S LOCAL SCALE
ZOOM-INS

Problem field and problem focus

Multi-scale analysis

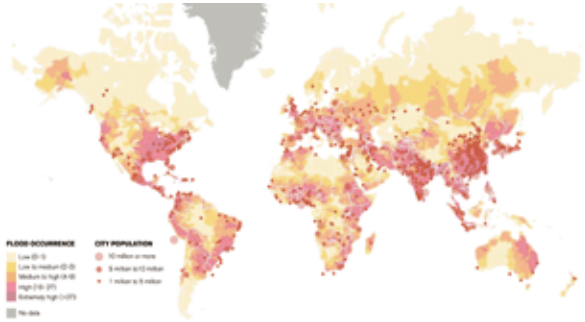
Design and policy-making

1	2	3	4	5	6
What Problem focus	How Method	Where Analysis	How Vision	How Pilot projects	What Conclusion

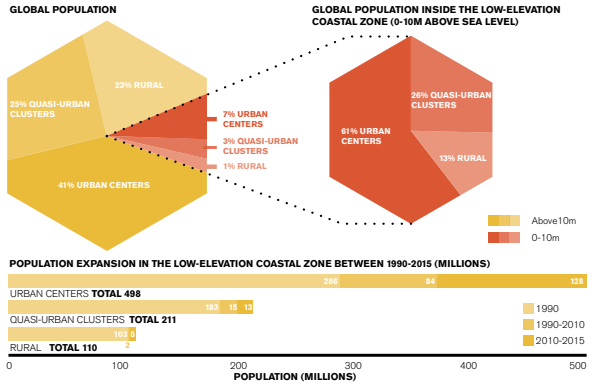
1

What is the risk?

Dual Nature of Externalities

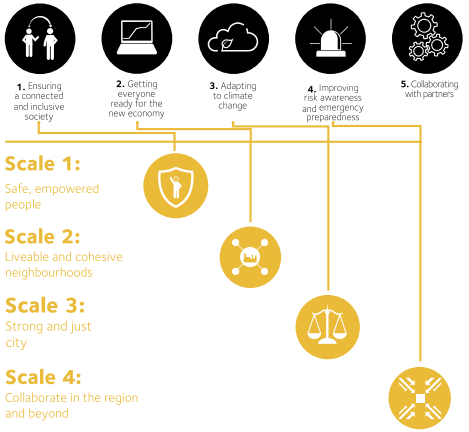


Crisis of Representation

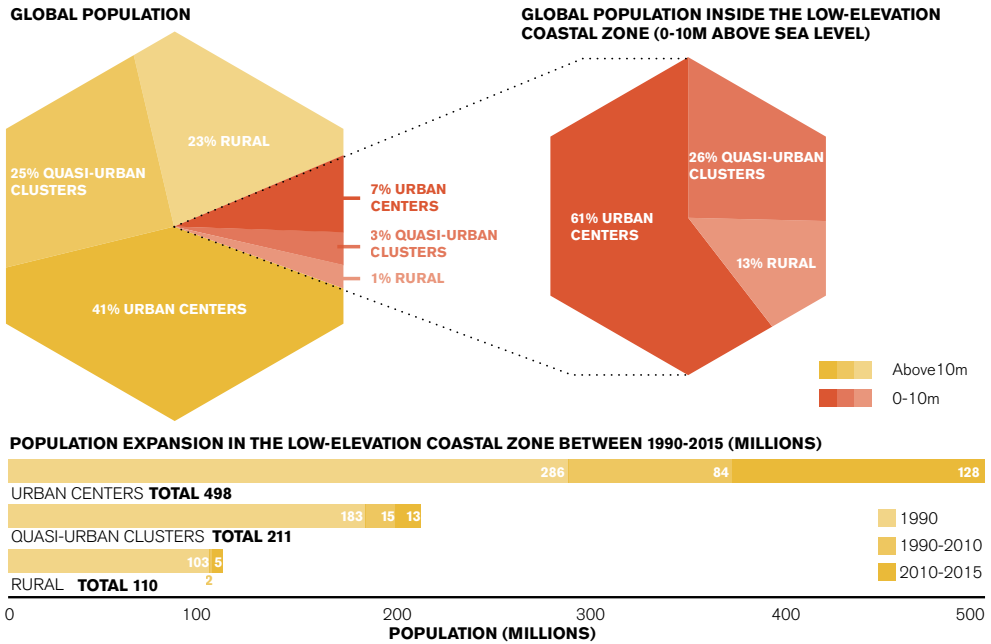


RISKS = HAZARD X VULNERABILITY / REGENERATIVE CAPACITY

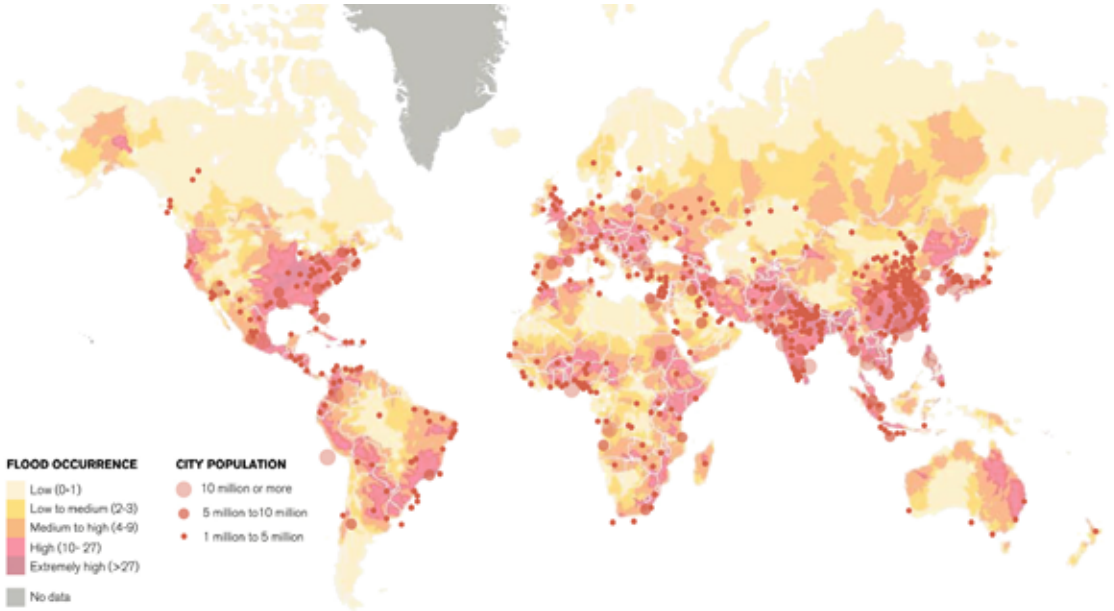
The Hague Conext



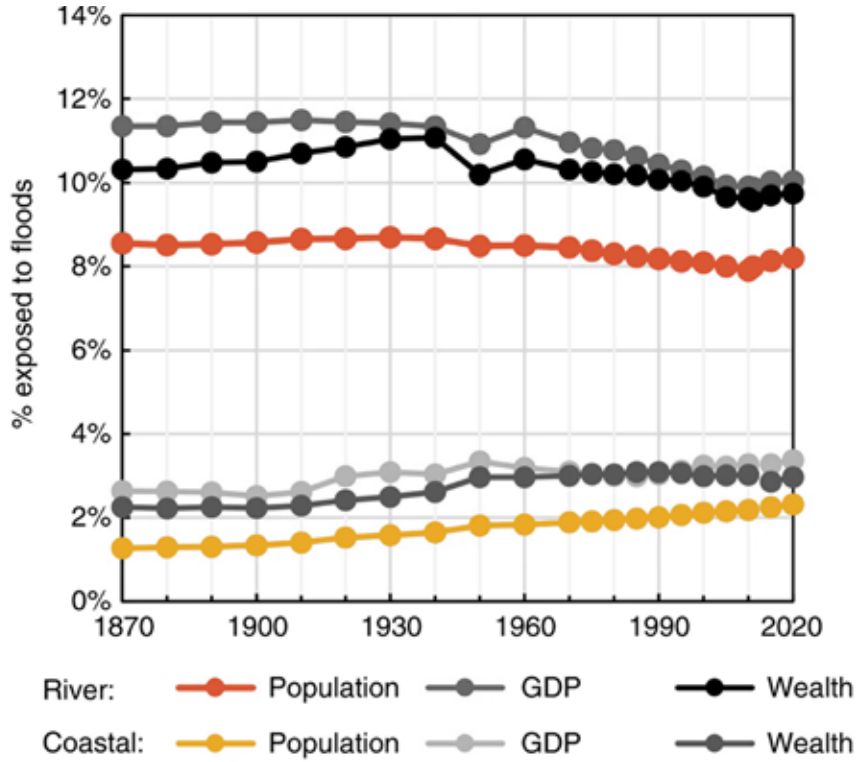
Coastal regions in the global context:
Hotspot of urbanization and economy development



The North Sea Region context:
Crisis in the territories of coastal cities

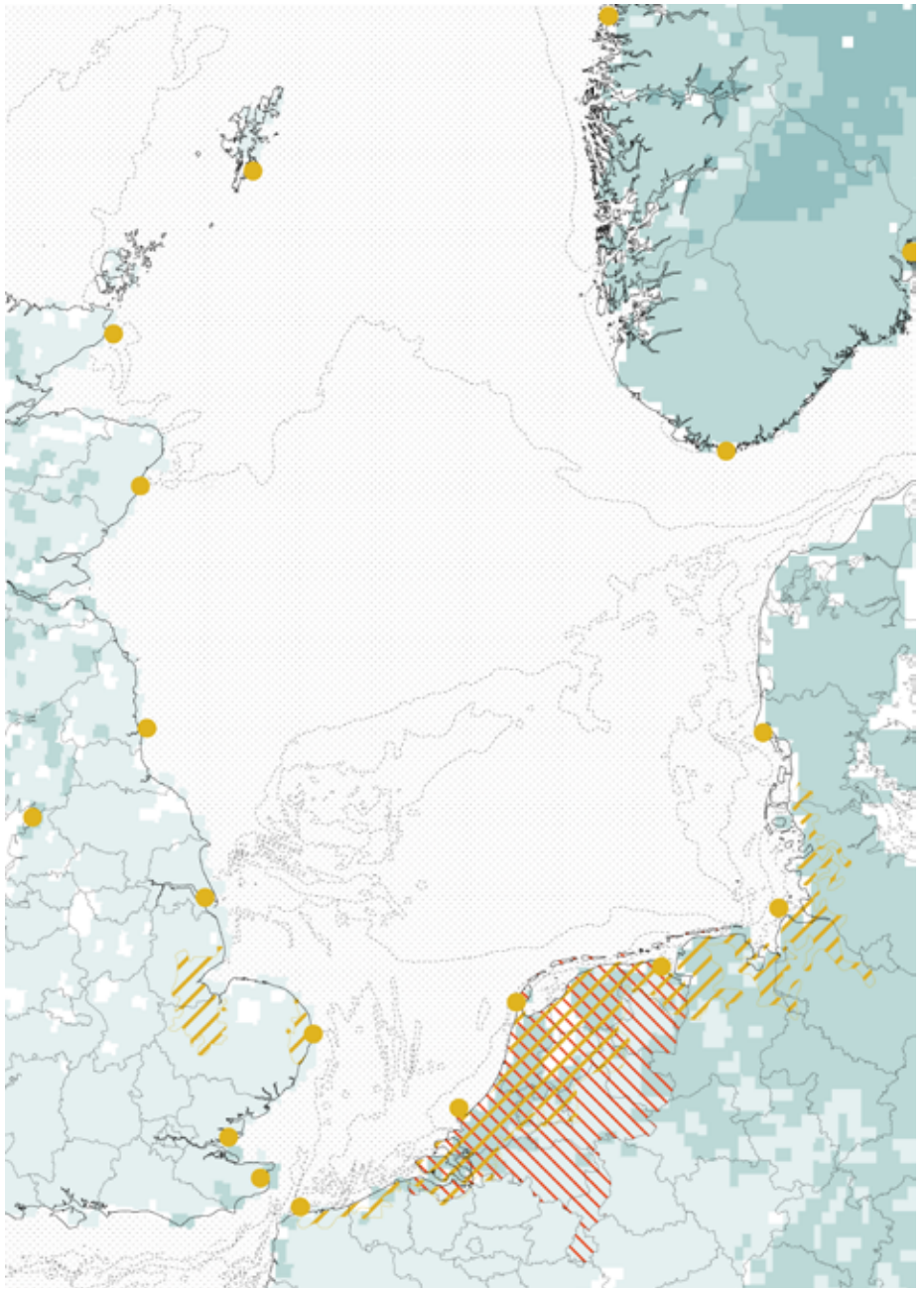


Problem 1:
Climate crisis and water-related issues

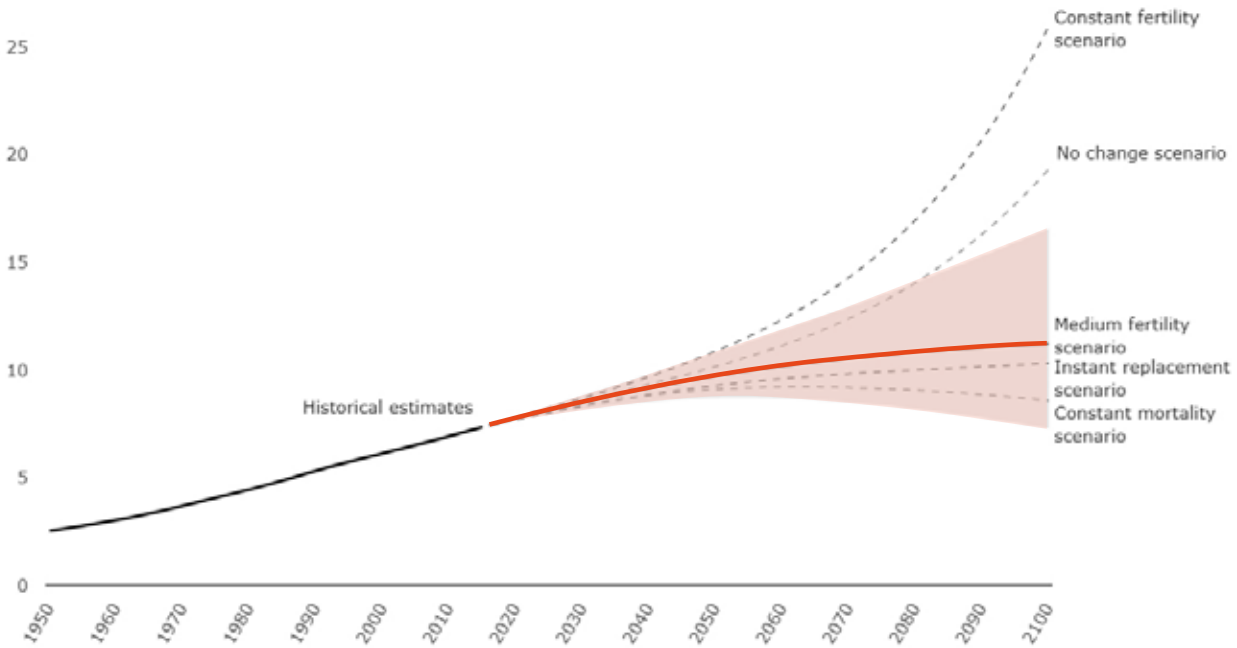


Water-related hazards in North Sea

If the defence infrastructure fails, the sea level rise of 1 meter will flood most of the southern low and subsiding coast of the North Sea region.

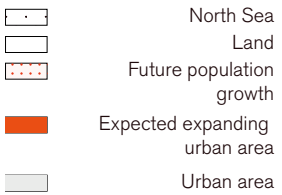


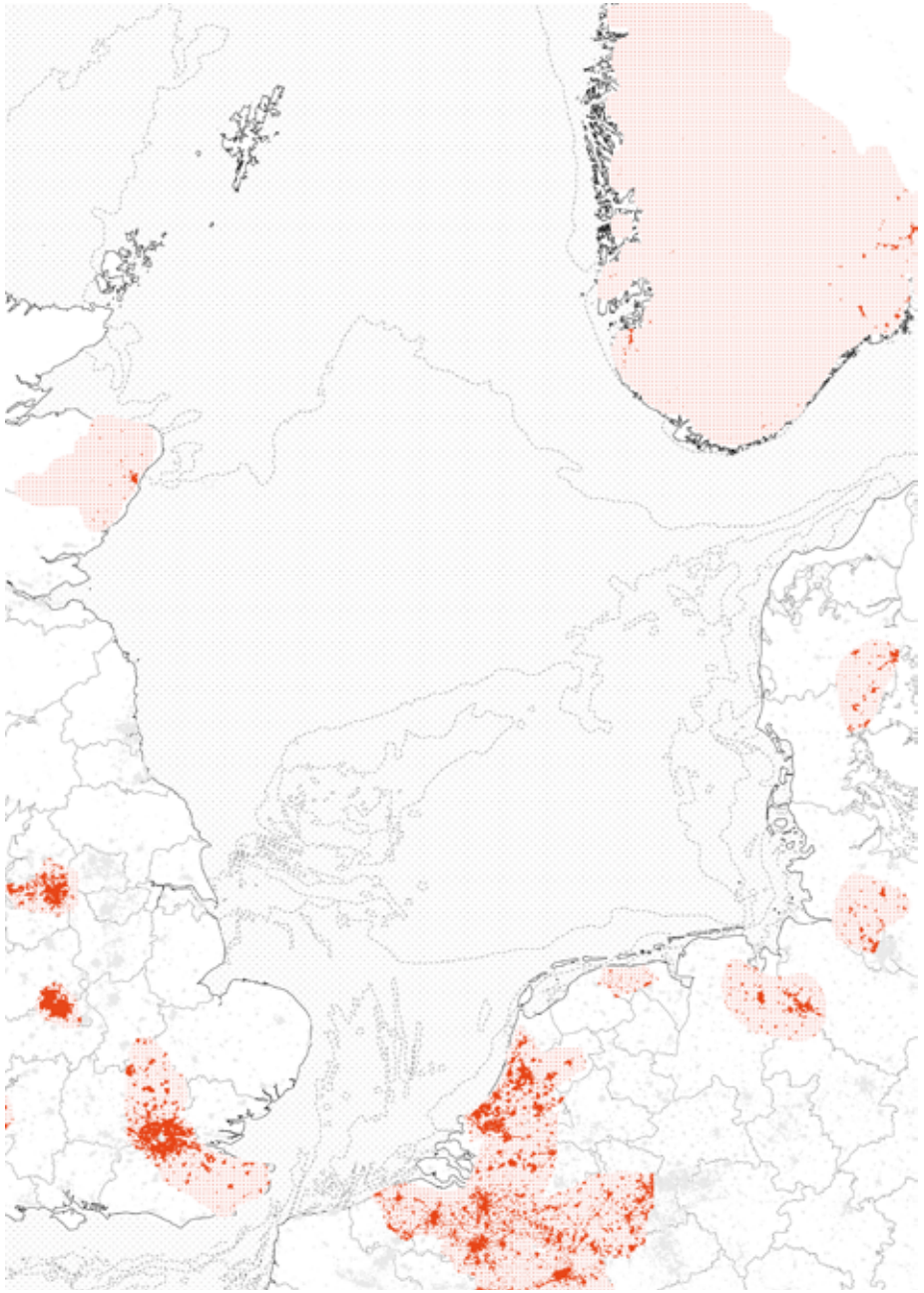
Problem 2:
Population growth, urbanization and crisis of representation



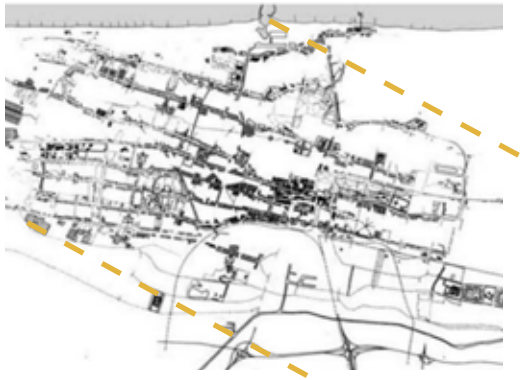
Population growth and urbanization in North Sea

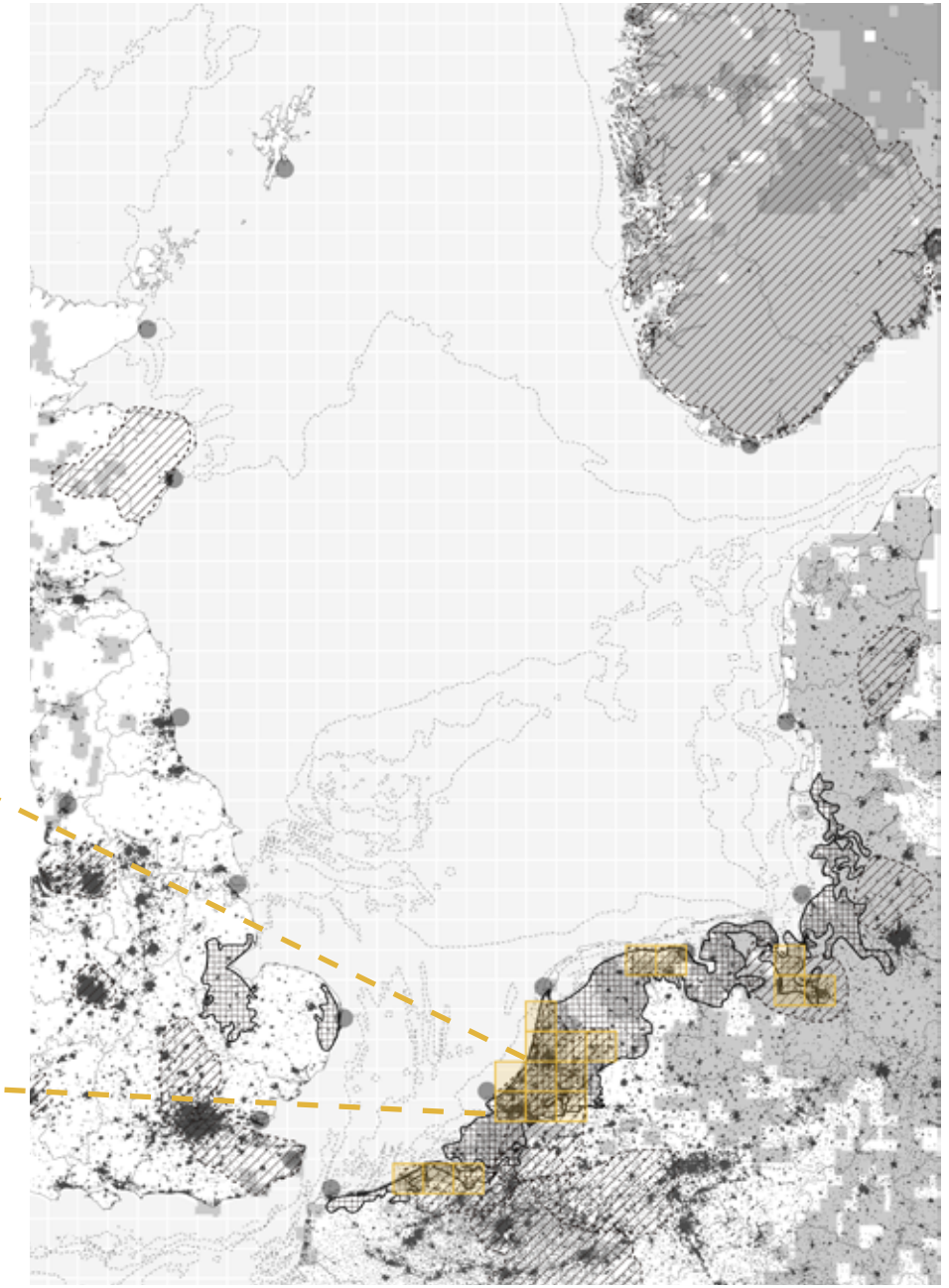
The most densely populated regions lie in the lowlands, which are typified by delta areas and polders. Besides, the most population growth is expected to happen along the coastline.





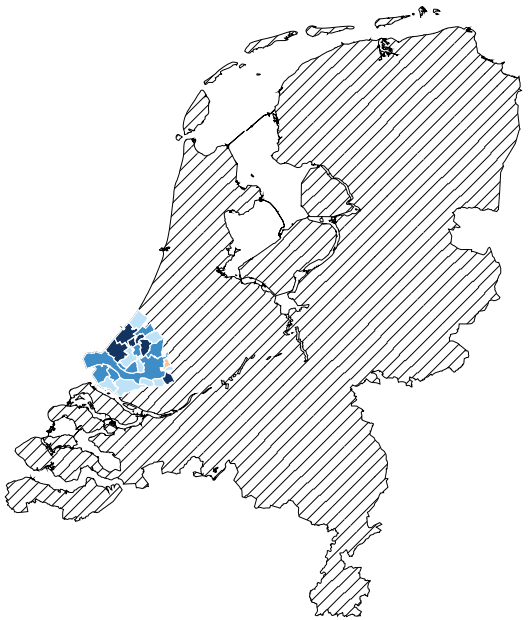
The Hague context:
A unique coastal city in Metropoolregio Rotterdam Den Haag





Urgency of territorial stress and liveability

Population growth 2018



- Less than-5
- -5 to 0
- 0 to 5
- 5 to 10
- 10 or more

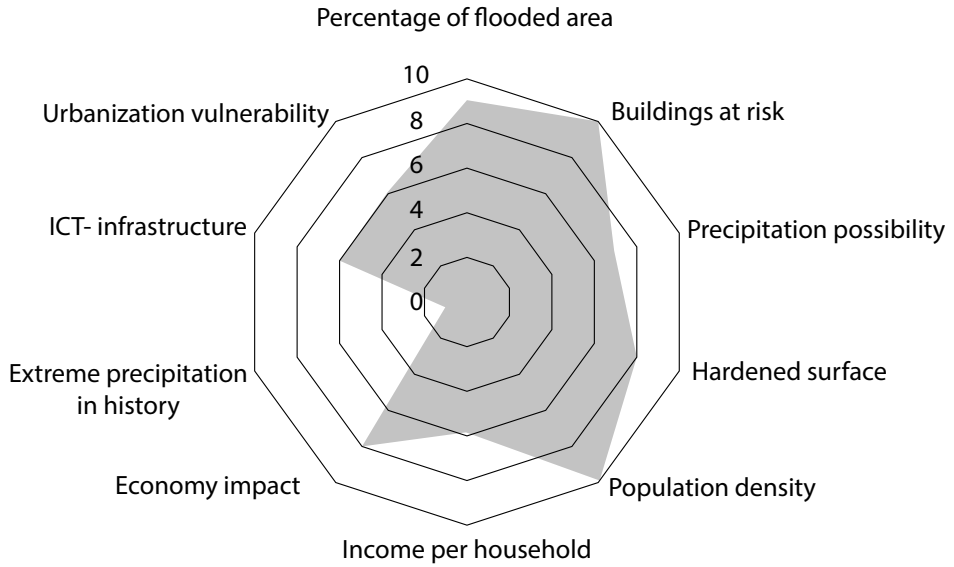
Population growth prediction 2018-2035

- Less than –5,0 (%)
- –5,0 to –2,5 (%)
- –2,5 to 2,5 (%)
- 2,5 to 5 (%)
- 5 to 10 (%)
- 10 or more (%)

Population growth prediction 2035-2050

- Less than –5,0 (%)
- –5,0 to –2,5 (%)
- –2,5 to 2,5 (%)
- 2,5 to 5 (%)
- 5 to 10 (%)
- 10 or more (%)

Uncertainty of the risk of extreme precipitation



The Hague

Risk in 2018 (x1 million/ year)	52.7
Risk in 2050 (x1 million/ year)	112

Utrecht

Risk in 2018 (x1 million/ year)	37.3
Risk in 2050 (x1 million/ year)	76.1

Arnhem

Risk in 2018 (x1 million/ year)	26.7
Risk in 2050 (x1 million/ year)	51.4

Maastricht

Risk in 2018 (x1 million/ year)	15.5
Risk in 2050 (x1 million/ year)	29.2

Leeuwarden

Risk in 2018 (x1 million/ year)	12.1
Risk in 2050 (x1 million/ year)	23.1

Den Bosch

Risk in 2018 (x1 million/ year)	10.8
Risk in 2050 (x1 million/ year)	20.8

Zwolle

Risk in 2018 (x1 million/ year)	10.2
Risk in 2050 (x1 million/ year)	19.7

Groningen

Risk in 2018 (x1 million/ year)	10
Risk in 2050 (x1 million/ year)	17.8

Lelystad

Risk in 2018 (x1 million/ year)	8.5
Risk in 2050 (x1 million/ year)	15.7

Haarlem

Risk in 2018 (x1 million/ year)	7.6
Risk in 2050 (x1 million/ year)	15.1

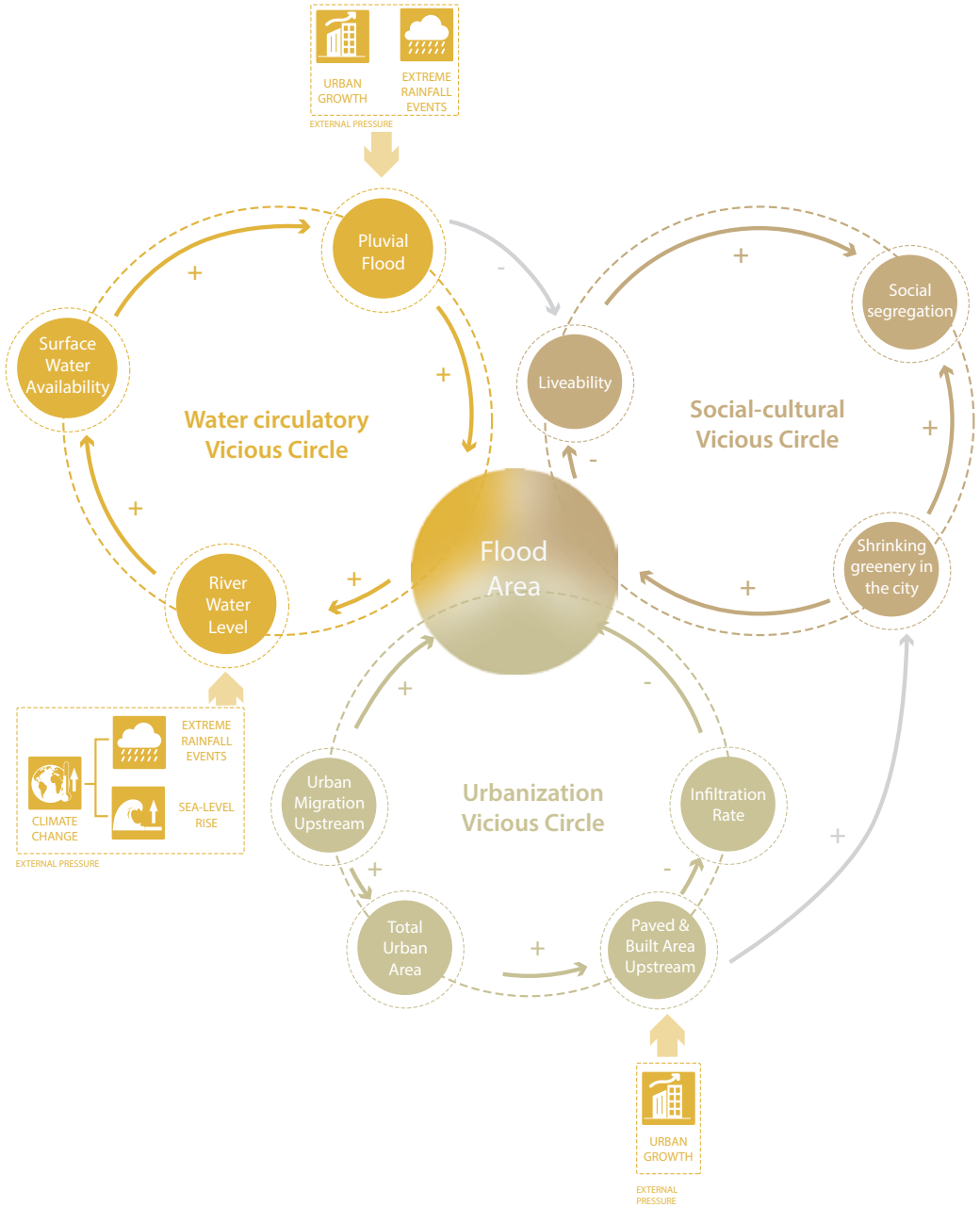
Assen

Risk in 2018 (x1 million/ year)	5.4
Risk in 2050 (x1 million/ year)	10.9

Middelburg

Risk in 2018 (x1 million/ year)	5.3
Risk in 2050 (x1 million/ year)	10

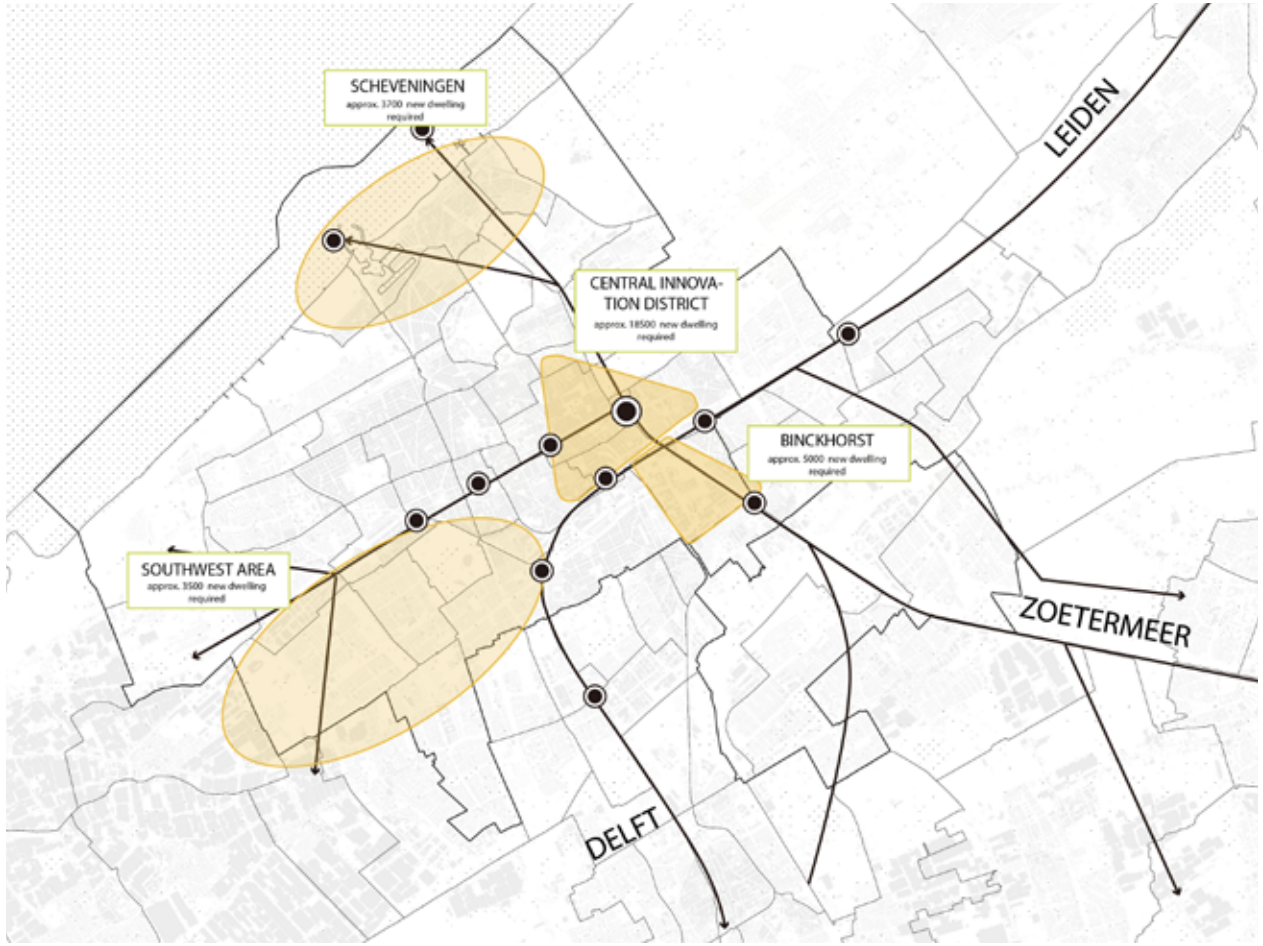
The vicious circle

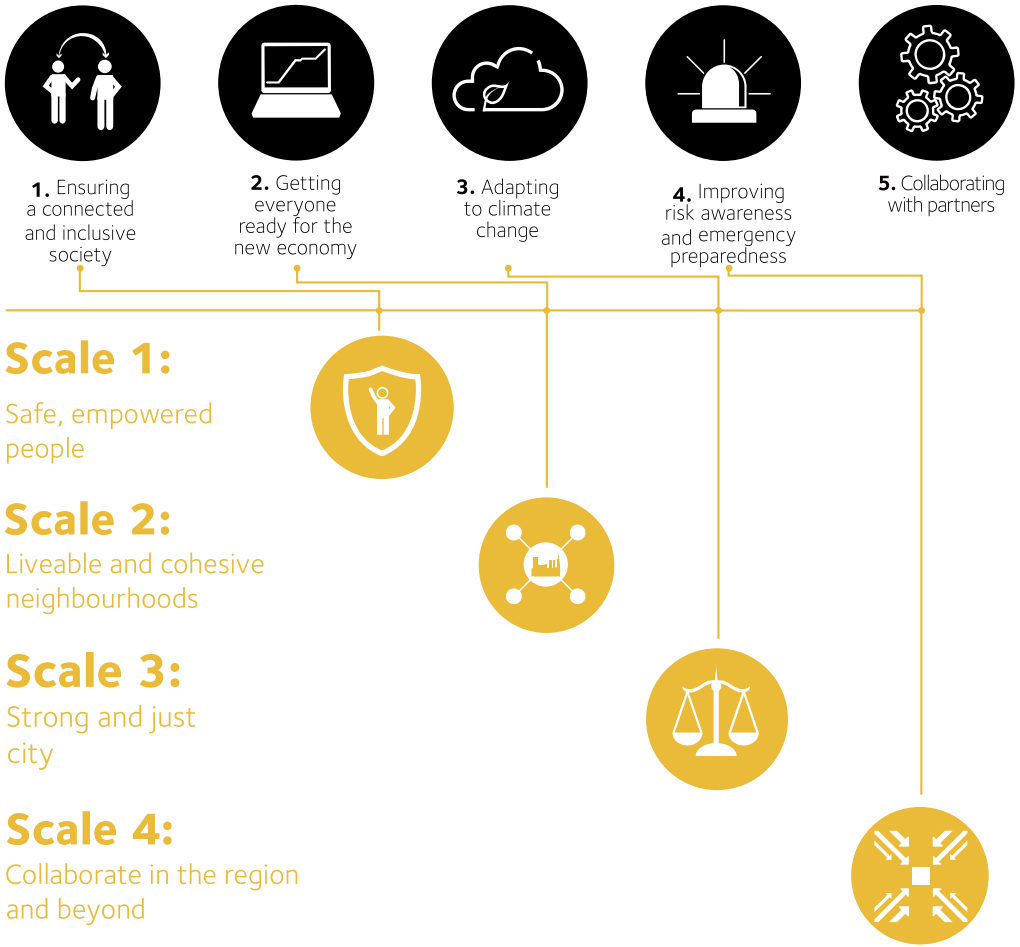


1

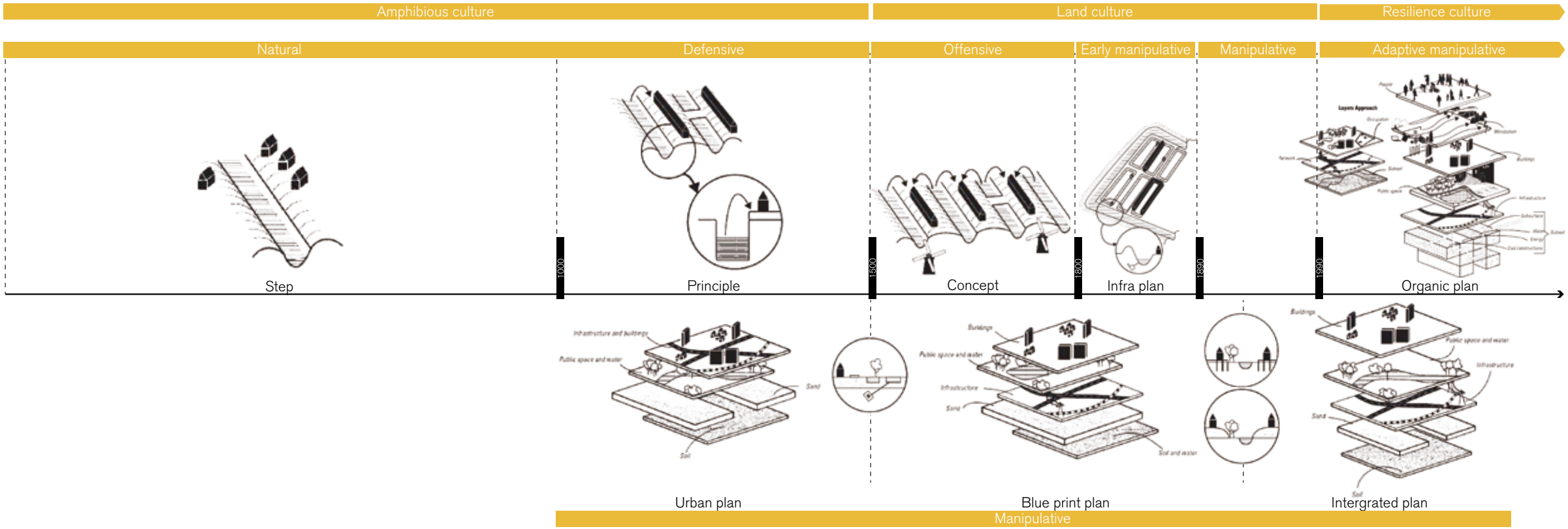
What is the opportunity?

Municipal vision:
A city towards resilience

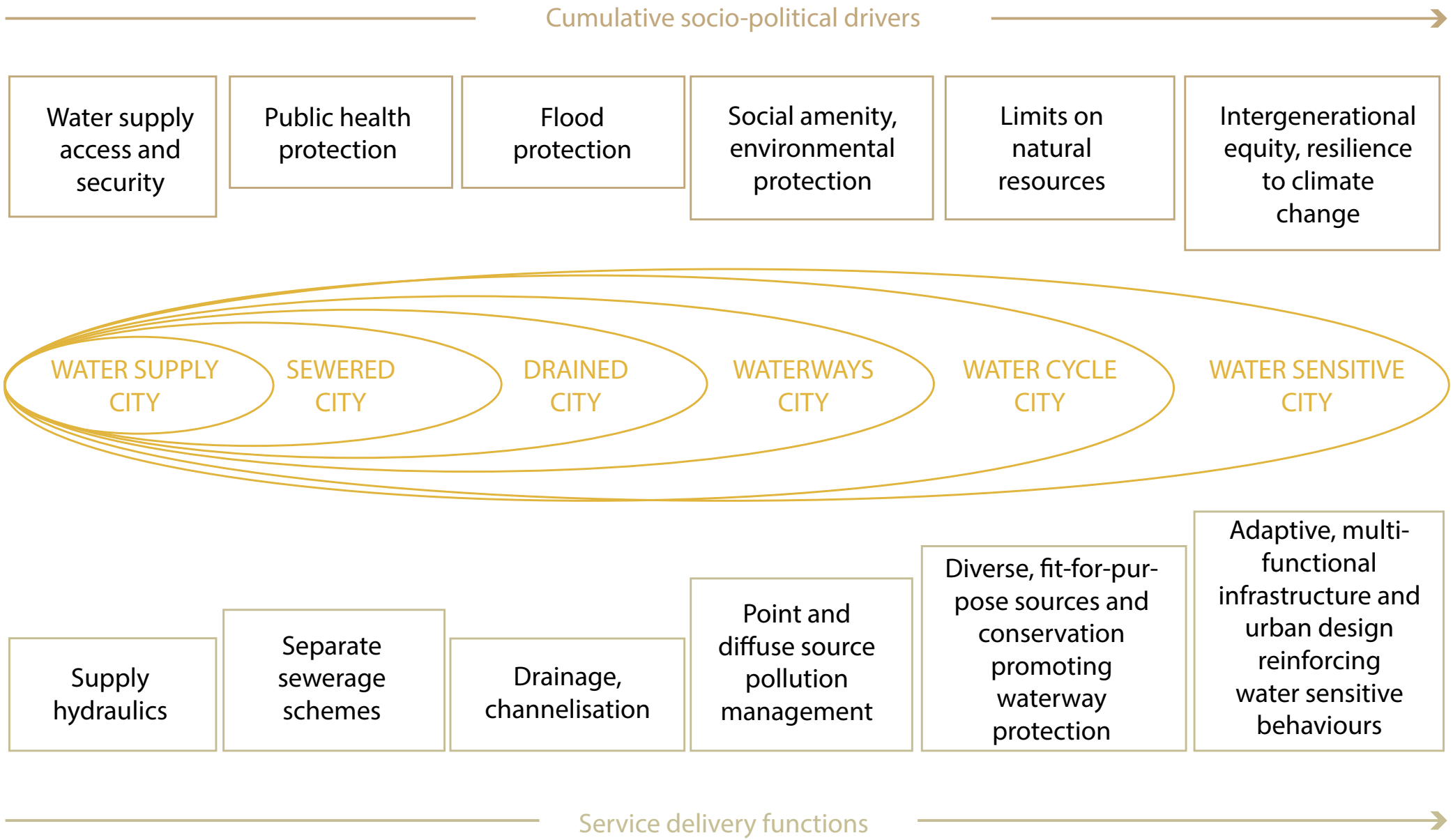




The making of a typical Dutch city



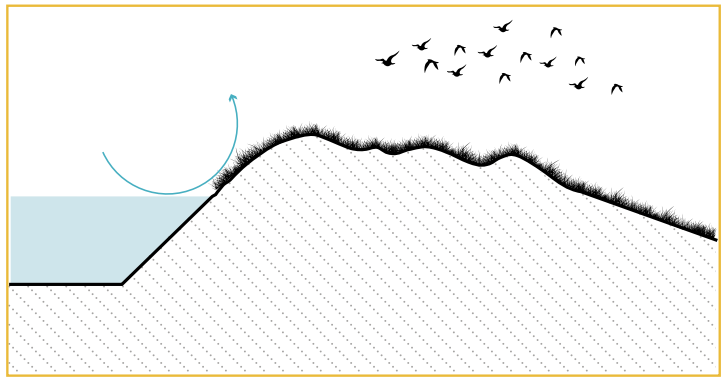
Theoretical background



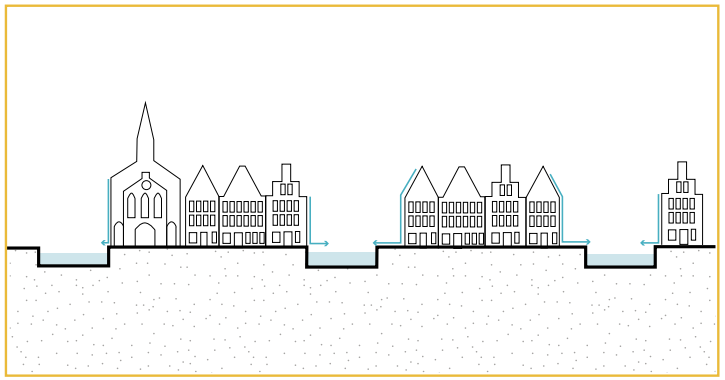
The Hague context:
The making of a typical Dutch city

A NATURAL CITY

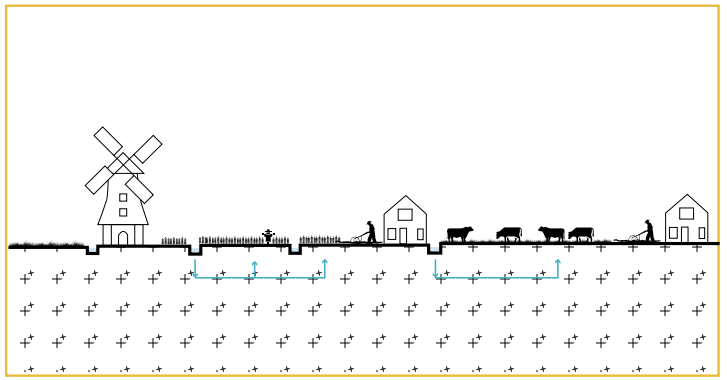
❶ Dune is used as a nature defense of water

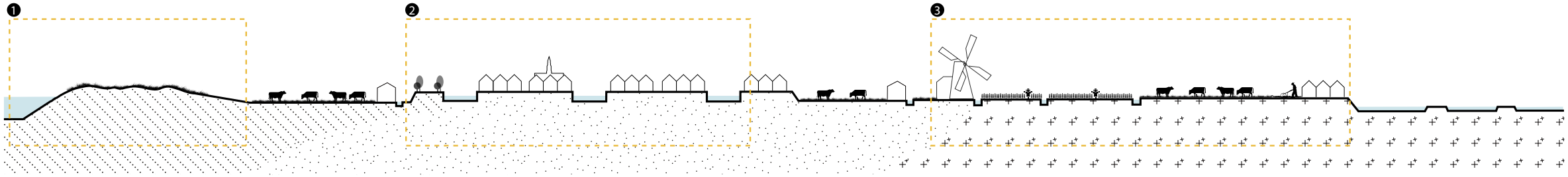


❷ The Hague used to have many small canals in the city and waste water is disposed in the open water



❸ Polder is used as a water management approach and affected urban development and socio-economic activity

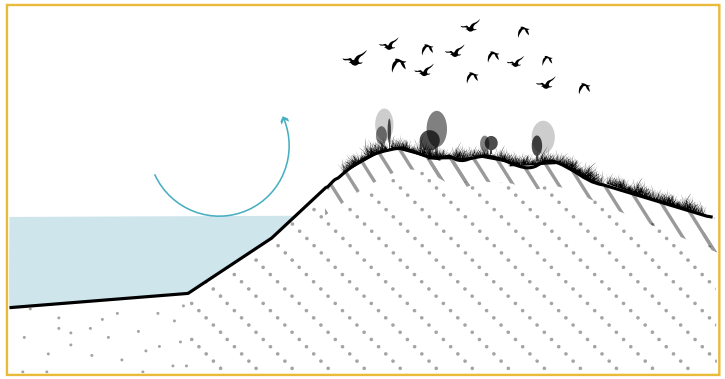




The Hague context:
The making of a typical Dutch city

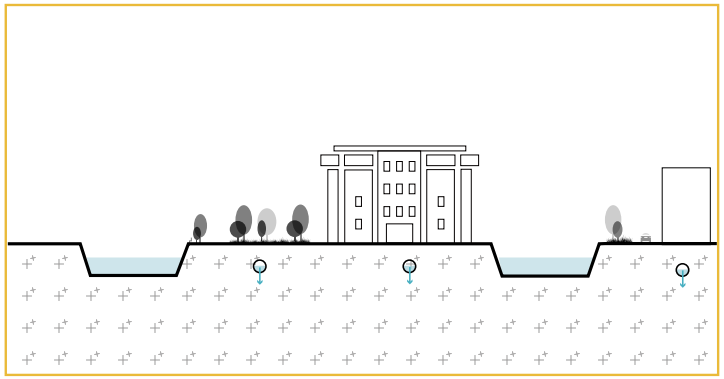
A DRAINING CITY

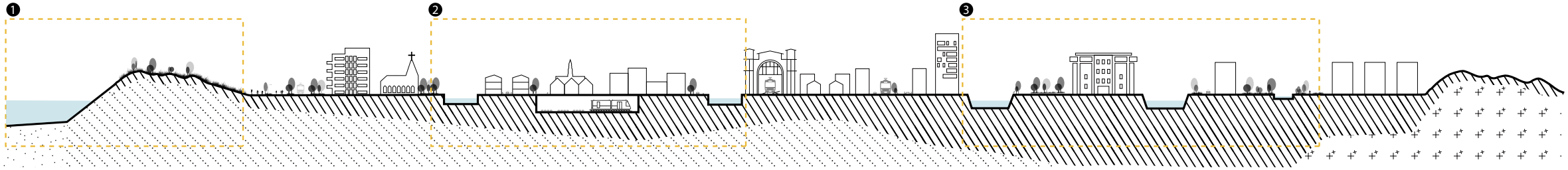
❶ Coastline is faced with the threat of sea-level rise



❷ Canals have disapeared over time and made room for urban development

❸ Most of the surface is paved and the city mainly rely on grey infrastructure drainage to discharge water out of the city

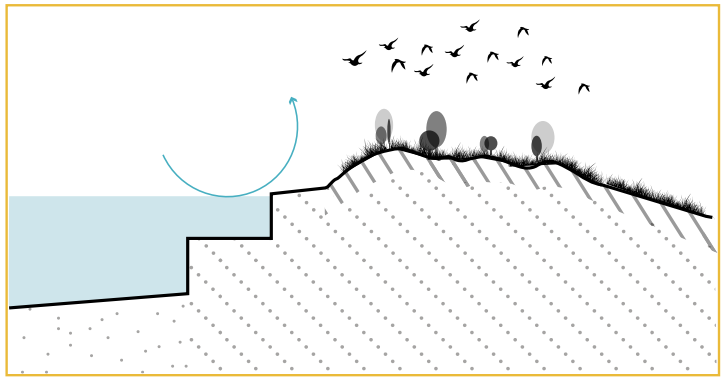




The Hague context:
The making of a typical Dutch city

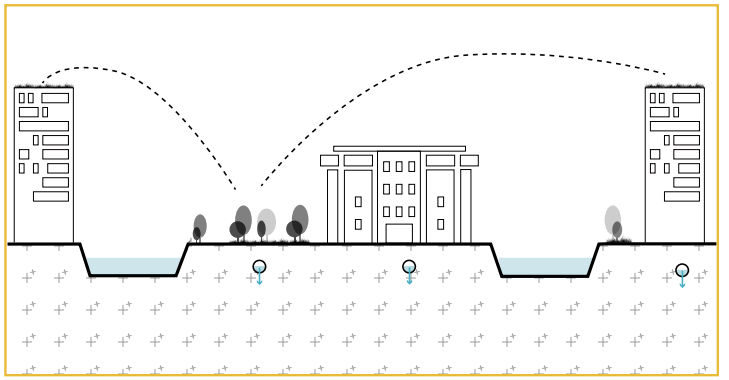
A RESILIENT CITY- WHAT'S NEXT?

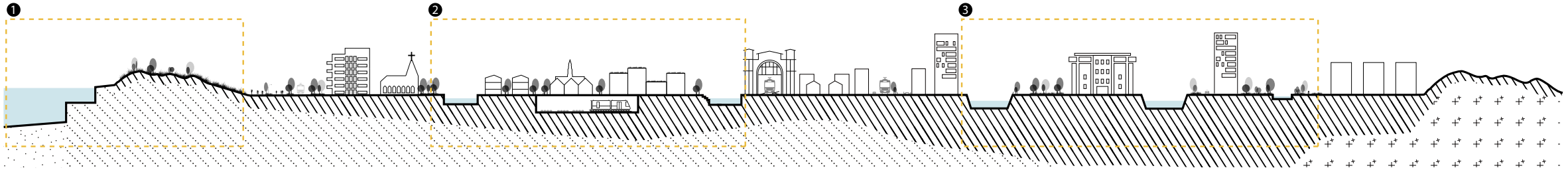
❶ Using nature-based solutions to adapt water-related climate hazards



❷ Making room for green and blue grids in the city to reconnet the built-up environment with nature

❸ Densify for accomodating growing population and ensuring liveable environment and social coherence





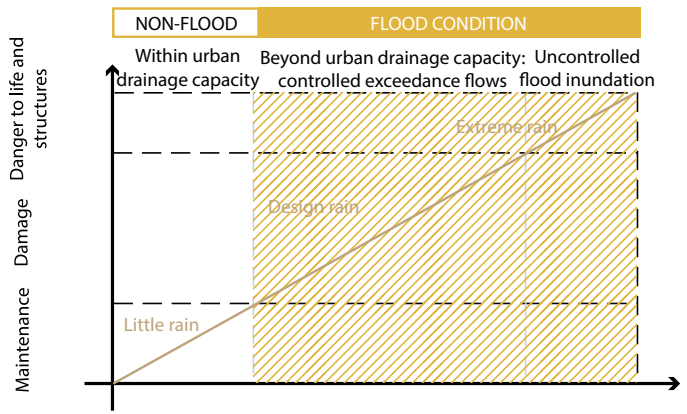
Main research question:

How can public space design contribute to urban resilience in The Hague by 2050 when city is faced with the challenge of extreme precipitation?

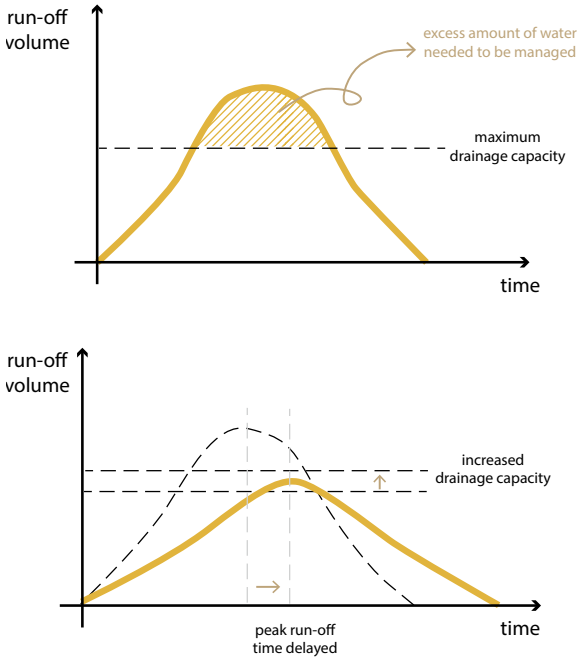
2

How to achieve the aspirations?

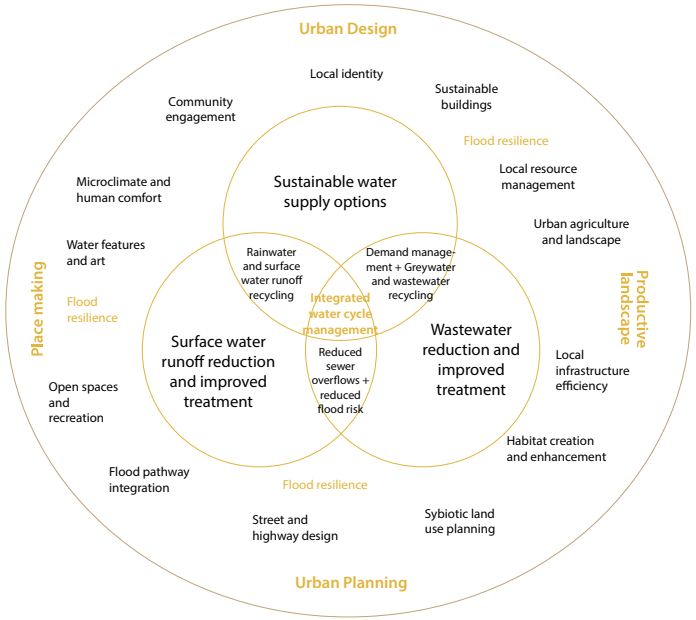
Theoretical background



Green-blue grids in the flood scenario

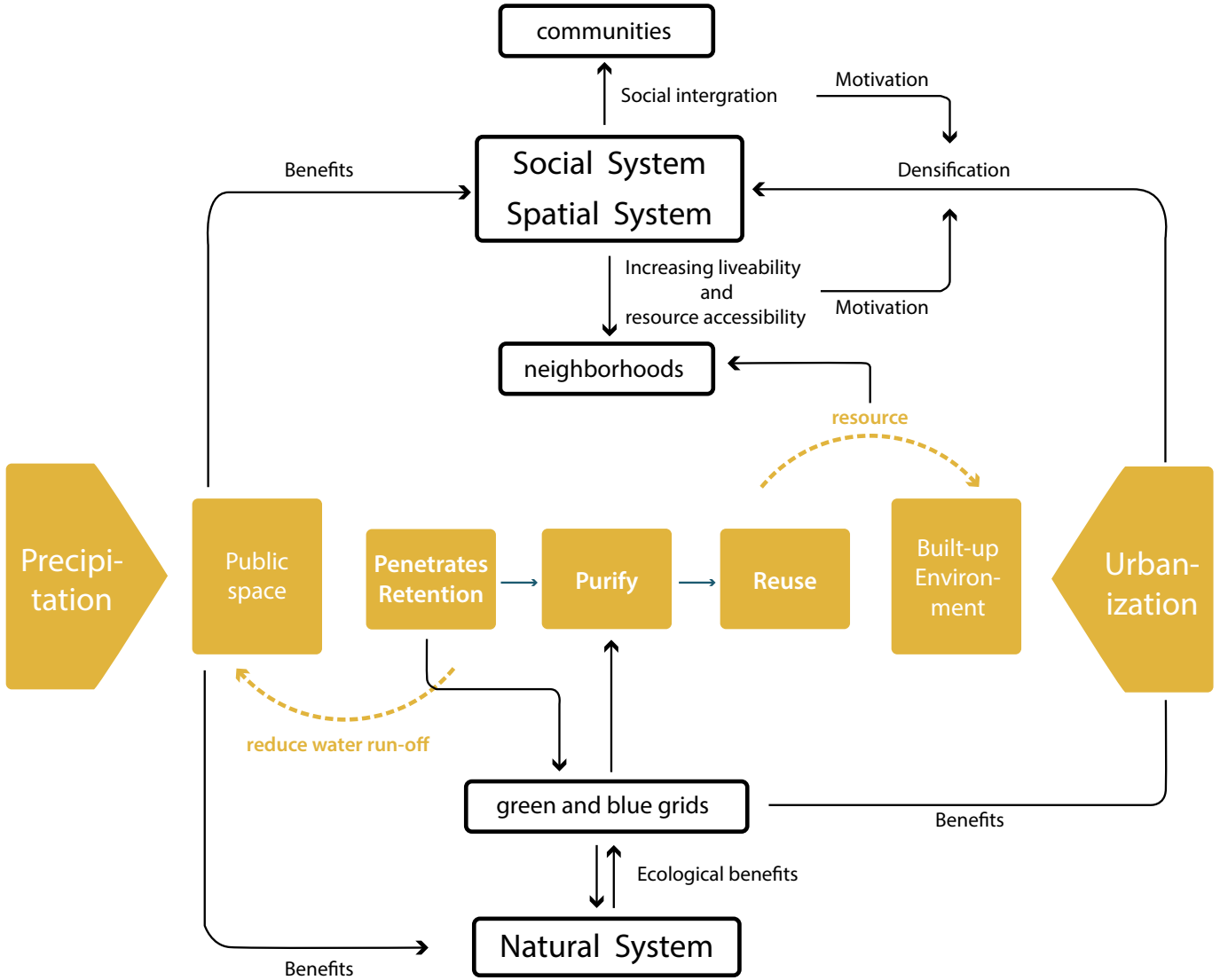


Effort of green-blue grids in flood water mangement

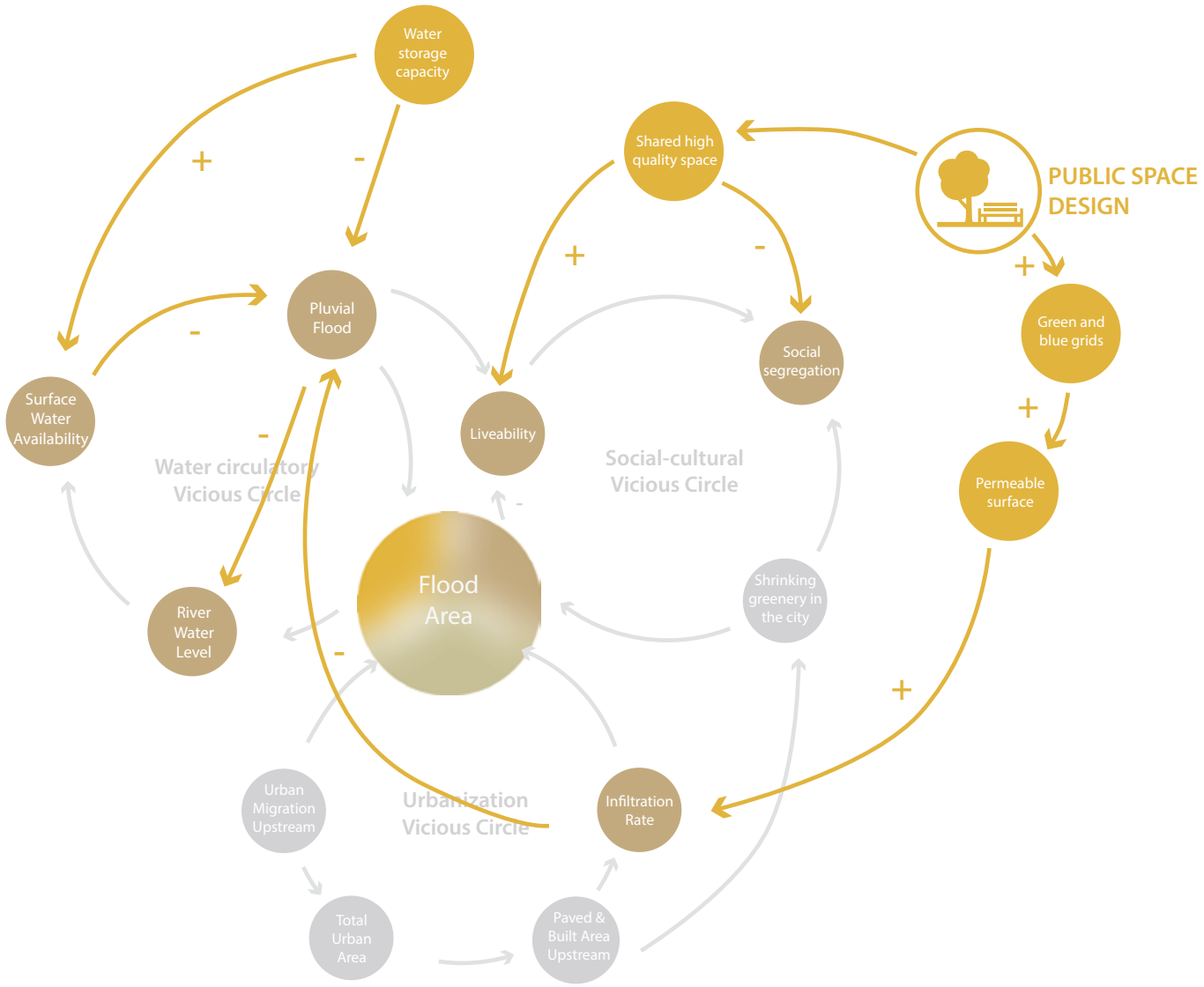


Co-benefits in complex urban systems

Conceptual framework



Breaking the vicious circle



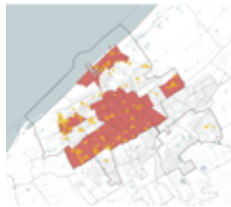
3

Get to know the site more!

Research area: The Hague

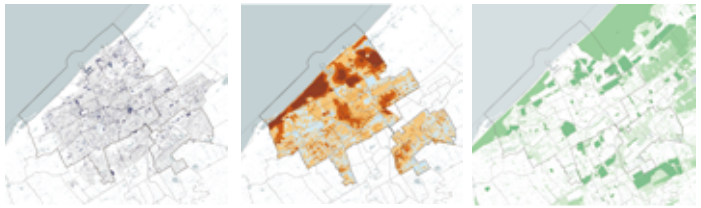
Crisis of Representation

population group



Dual Nature of Externalities

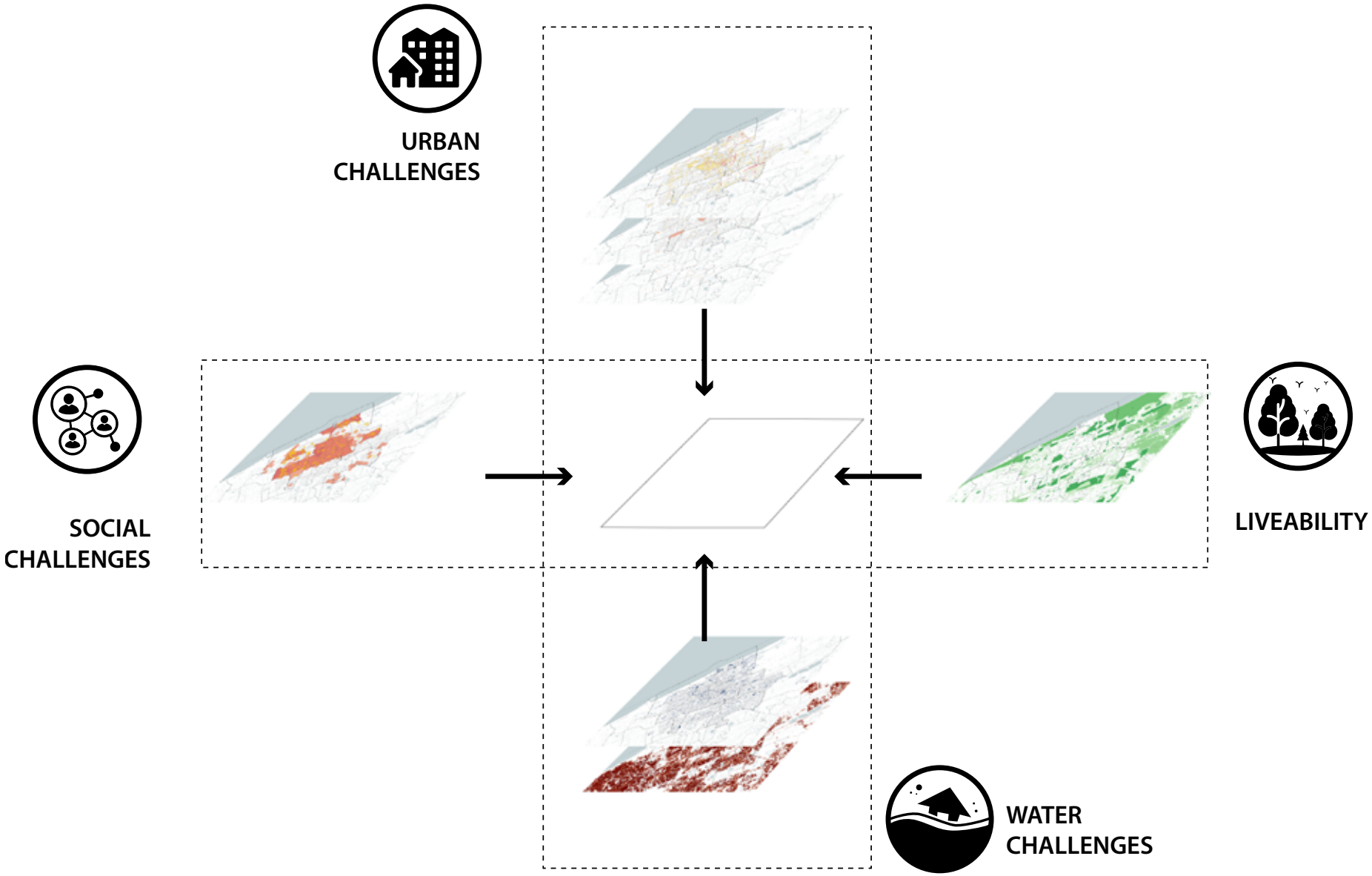
water depth / drought / impermeable surface / greenery



$$\text{RISKS} = \frac{\text{HAZARD} \times \text{VULNERABILITY}}{\text{REGENERATIVE CAPACITY}}$$

The Hague Conext

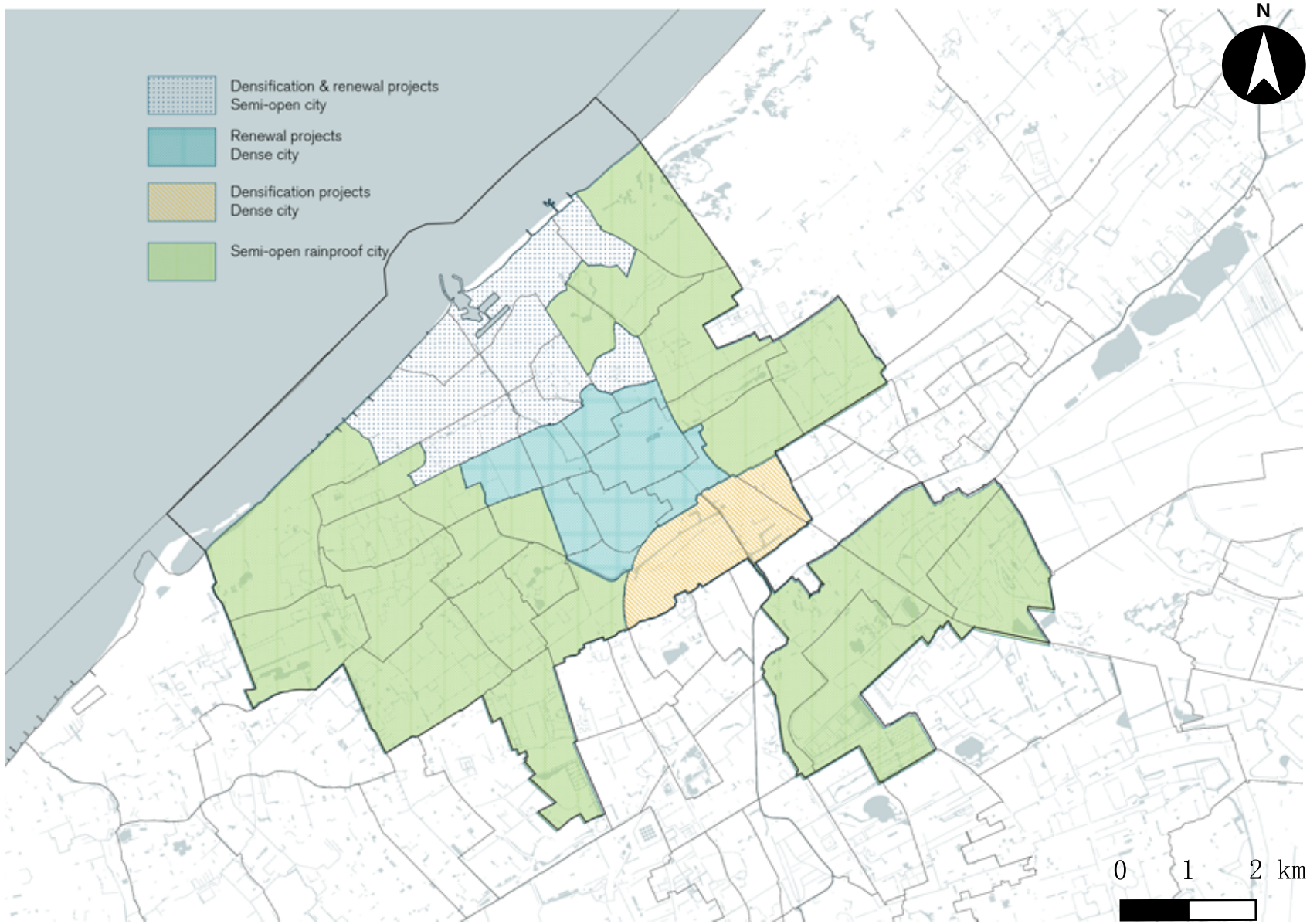
development phase / vulnerable housing typology / vulnerable buildings / water damage on buildings / mobility


URBAN
CHALLENGES
SOCIAL
CHALLENGES
LIVEABILITY
WATER
CHALLENGES

Conclusion


A Flood risk
B Urbanization stress
C Social challenge
Concentration area
Vulnerable area under flood risk
Urbanization area
Dunes
Public green
Semi-public green
Green around the city
Avenue of trees
N
0 1 2 km

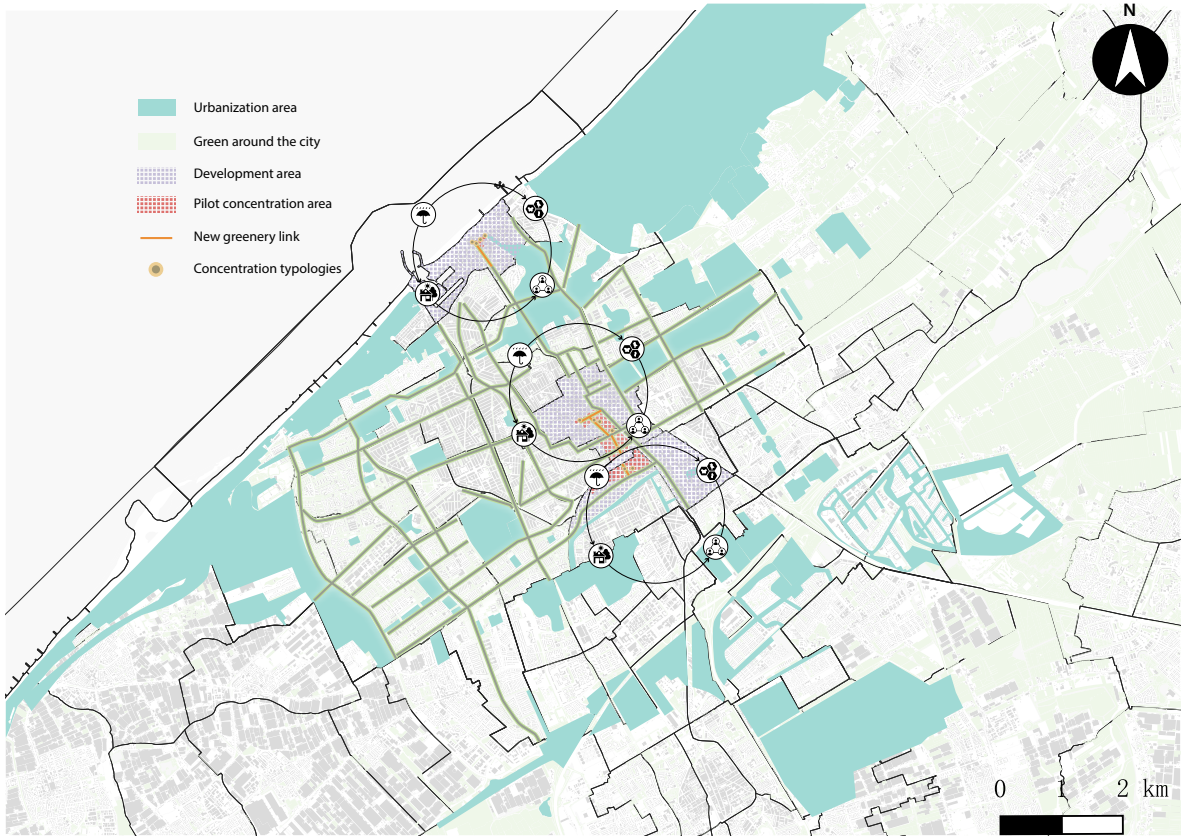
Four neighborhood typologies



4

Formulating the strategies...

Vision



In 2050 the city of The Hague will become a more resilient city with adaptive living environments and empowered and cohesive communities through the investment of public space.

Spatial management

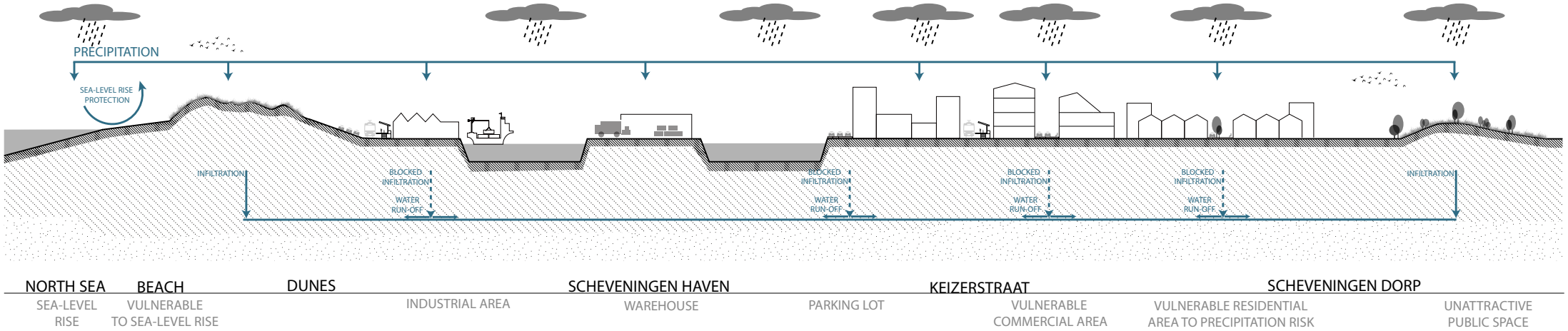
Governance management

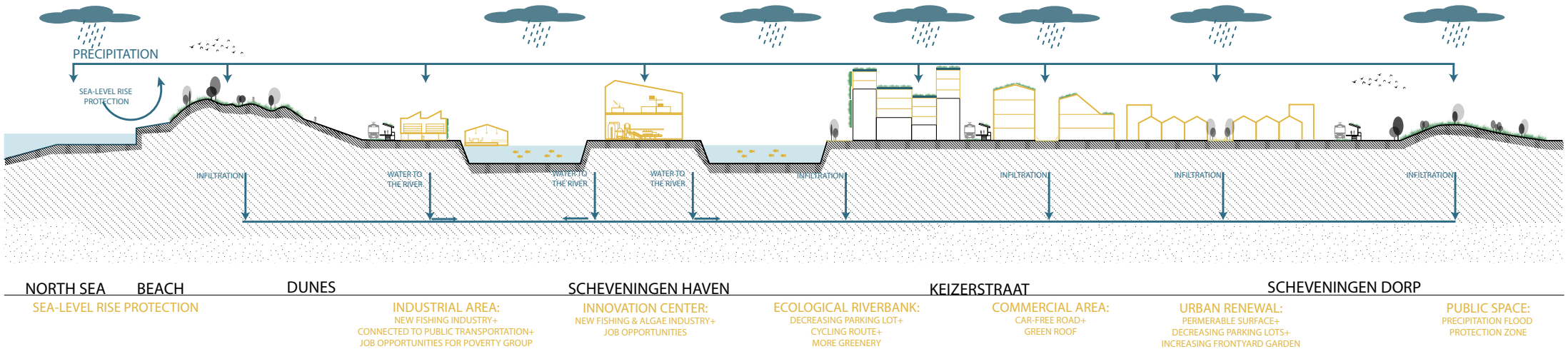
Stakeholder collaboration

Designing principle

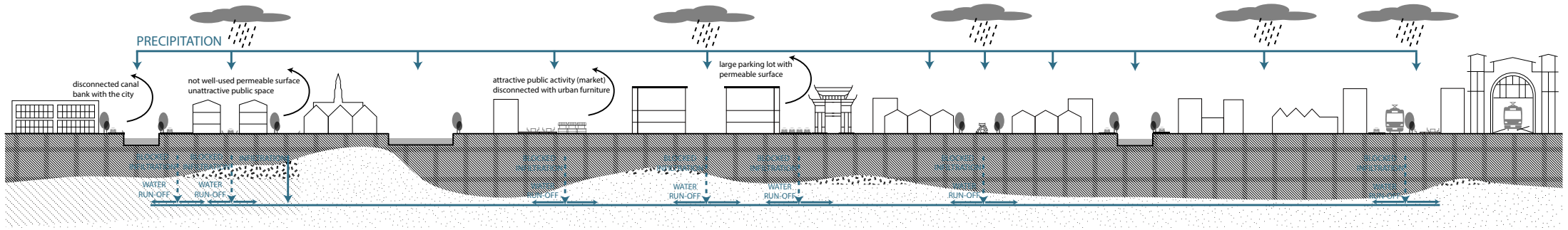
	Public space		Densification		Major water and public space management approach		
	Urban and public space configuration		Housing typology	Target resident group	Infiltration	Retention	Conveyance
Typology 1 : Representative area Scheveningen	Waterfront area Residential area			Elderly	Renewal front yard and back yard for rainwater infiltration		
Typology 2: Representative area Centrum						Redesign public space as water square for rainwater retention	
Typology 3: Representative area Laakhaven				Student Starter			Canal bank management as public space and for rainwater conveyance
Typology 4: Representative area Southwest					Using central green space as biological rainwater pond		

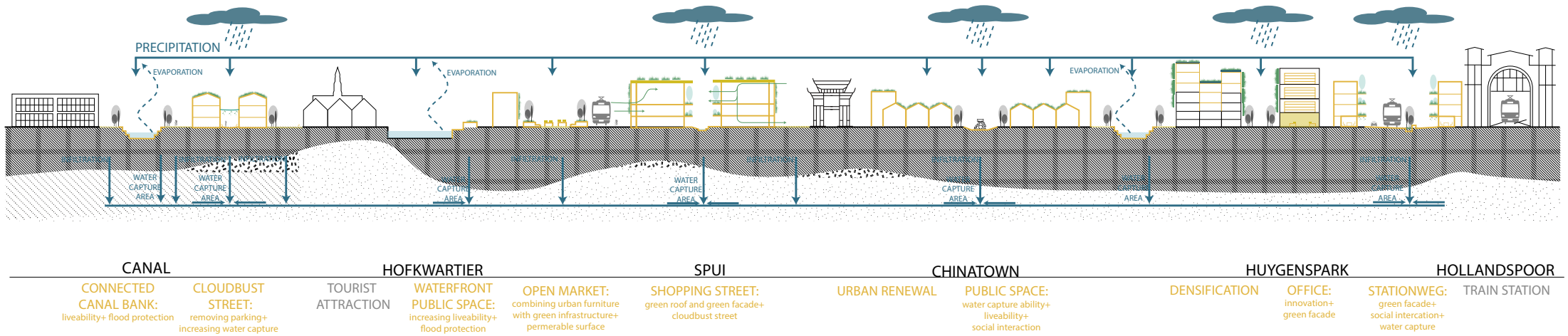
Typology 1


PRECIPITATION
SEA-LEVEL RISE PROTECTION
INFILTRATION
BLOCKED INFILTRATION
WATER RUN-OFF
BLOCKED INFILTRATION
WATER RUN-OFF
BLOCKED INFILTRATION
WATER RUN-OFF
INFILTRATION
NORTH SEA
SEA-LEVEL RISE
BEACH
VULNERABLE TO SEA-LEVEL RISE
DUNES
INDUSTRIAL AREA
SCHEVENINGEN HAVEN
WAREHOUSE
PARKING LOT
KEIZERSTRAAT
VULNERABLE COMMERCIAL AREA
SCHEVENINGEN DORP
VULNERABLE RESIDENTIAL AREA TO PRECIPITATION RISK
UNATTRACTIVE PUBLIC SPACE

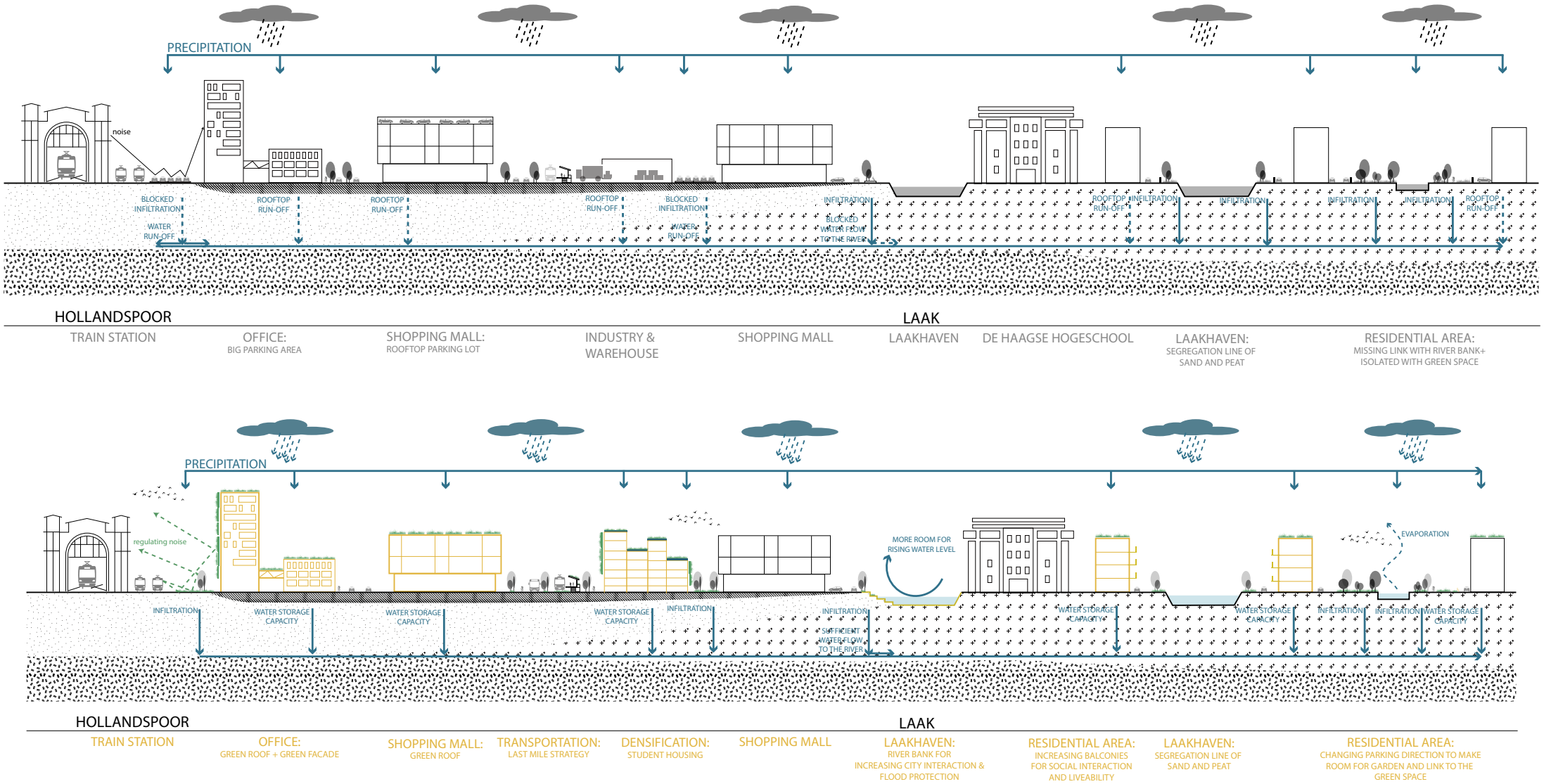

PRECIPITATION
SEA-LEVEL RISE PROTECTION
INFILTRATION
WATER TO THE RIVER
WATER TO THE RIVER
WATER TO THE RIVER
INFILTRATION
INFILTRATION
INFILTRATION
INFILTRATION
NORTH SEA
SEA-LEVEL RISE PROTECTION
BEACH
DUNES
INDUSTRIAL AREA:
NEW FISHING INDUSTRY+
CONNECTED TO PUBLIC TRANSPORTATION+
JOB OPPORTUNITIES FOR POVERTY GROUP
SCHEVENINGEN HAVEN
INNOVATION CENTER:
NEW FISHING & ALGAE INDUSTRY+
JOB OPPORTUNITIES
ECOLOGICAL RIVERBANK:
DECREASING PARKING LOT+
CYCLING ROUTE+
MORE GREENERY
KEIZERSTRAAT
COMMERCIAL AREA:
CAR-FREE ROAD+
GREEN ROOF
SCHEVENINGEN DORP
URBAN RENEWAL:
PERMERABLE SURFACE+
DECREASING PARKING LOTS+
INCREASING FRONTYARD GARDEN
PUBLIC SPACE:
PRECIPITATION FLOOD PROTECTION ZONE

Typology 2

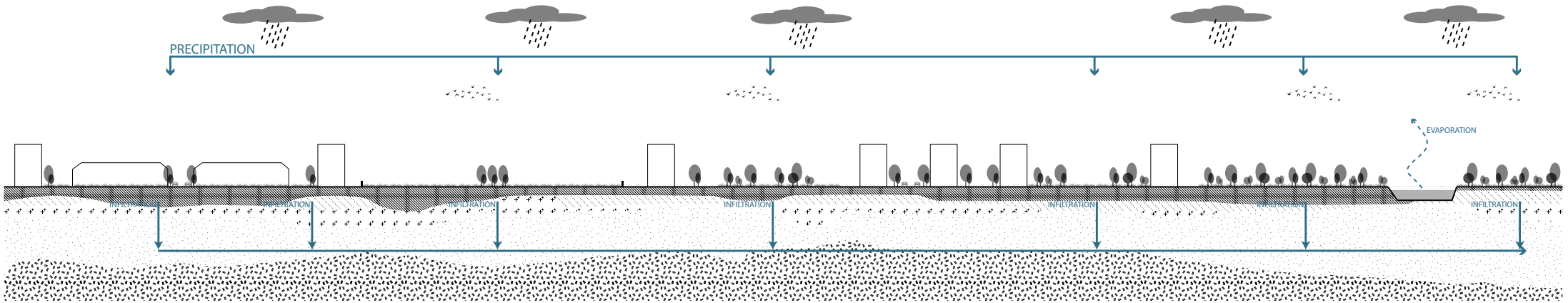

PRECIPITATION
disconnected canal bank with the city
not well-used permeable surface unattractive public space
attractive public activity (market) disconnected with urban furniture
large parking lot with permeable surface
WATER RUN-OFF
CANAL
HOFKWARTIER
SPUI
CHINATOWN
HUYGENSPARK
HOLLANDSPOOR
DICONNECTED CANAL BANK
VULNERABLE SHOPPING STREET
TOURIST ATTRACTION
WATERFRONT PUBLIC SPACE
OPEN MARKET
SHOPPING STREET
VULNERABLE BUILDING TO PRECIPITATION RISK
UNATTRACTIVE PUBLIC SPACE
RESIDENTIAL BUILDING
OFFICE
STATIONWEG
TRAIN STATION


PRECIPITATION
EVAPORATION
WATER CAPTURE AREA
CANAL
HOFKWARTIER
SPUI
CHINATOWN
HUYGENSPARK
HOLLANDSPOOR
CONNECTED CANAL BANK: liveability+ flood protection
CLOUDBUST STREET: removing parking+ increasing water capture
TOURIST ATTRACTION
WATERFRONT PUBLIC SPACE: increasing liveability+ flood protection
OPEN MARKET: combining urban furniture with green infrastructure+ permerable surface
SHOPPING STREET: green roof and green facade+ cloudbust street
URBAN RENEWAL
PUBLIC SPACE: water capture ability+ liveability+ social interaction
DENSIFICATION
OFFICE: innovation+ green facade
STATIONWEG: green facade+ social intercation+ water capture
TRAIN STATION

Typology 3


PRECIPITATION
noise
BLOCKED INFILTRATION
WATER RUN-OFF
ROOFTOP RUN-OFF
ROOFTOP RUN-OFF
ROOFTOP RUN-OFF
BLOCKED INFILTRATION
WATER RUN-OFF
INFILTRATION
BLOCKED WATER FLOW TO THE RIVER
ROOFTOP RUN-OFF
INFILTRATION
INFILTRATION
INFILTRATION
INFILTRATION
ROOFTOP RUN-OFF
HOLLANDSPOOR
LAAK
TRAIN STATION
OFFICE:
BIG PARKING AREA
SHOPPING MALL:
ROOFTOP PARKING LOT
INDUSTRY & WAREHOUSE
SHOPPING MALL
LAAKHAVEN
DE HAAGSE HOGESCHOOL
LAAKHAVEN:
SEGREGATION LINE OF SAND AND PEAT
RESIDENTIAL AREA:
MISSING LINK WITH RIVER BANK+ ISOLATED WITH GREEN SPACE
PRECIPITATION
regulating noise
INFILTRATION
WATER STORAGE CAPACITY
WATER STORAGE CAPACITY
WATER STORAGE CAPACITY
INFILTRATION
INFILTRATION
SUFFICIENT WATER FLOW TO THE RIVER
MORE ROOM FOR RISING WATER LEVEL
WATER STORAGE CAPACITY
WATER STORAGE CAPACITY
EVAPORATION
INFILTRATION
INFILTRATION
WATER STORAGE CAPACITY
HOLLANDSPOOR
LAAK
TRAIN STATION
OFFICE:
GREEN ROOF + GREEN FACADE
SHOPPING MALL:
GREEN ROOF
TRANSPORTATION:
LAST MILE STRATEGY
DENSIFICATION:
STUDENT HOUSING
SHOPPING MALL
LAAKHAVEN:
RIVER BANK FOR INCREASING CITY INTERACTION & FLOOD PROTECTION
RESIDENTIAL AREA:
INCREASING BALCONIES FOR SOCIAL INTERACTION AND LIVEABILITY
LAAKHAVEN:
SEGREGATION LINE OF SAND AND PEAT
RESIDENTIAL AREA:
CHANGING PARKING DIRECTION TO MAKE ROOM FOR GARDEN AND LINK TO THE GREEN SPACE

Typology 4



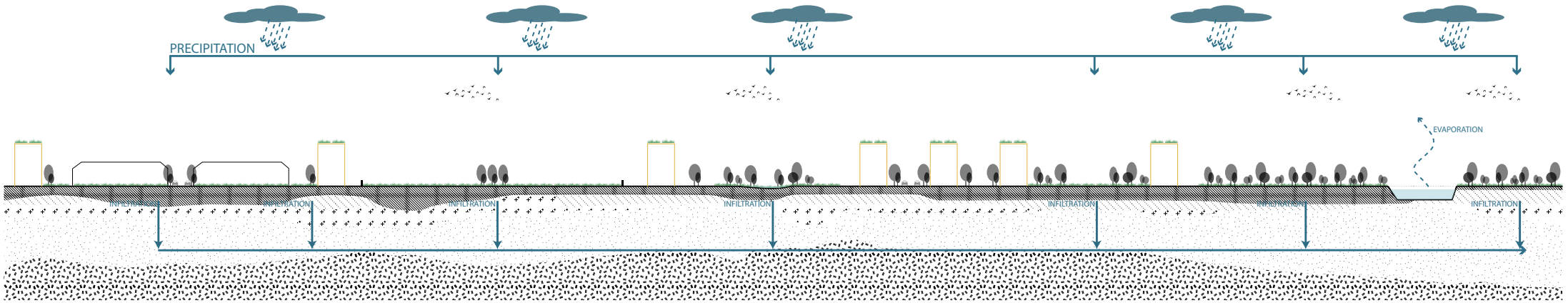
SOUTHWEST AREA

GARDEN CITY HOUSING TYPOLOGY:
OPEN BUILDING BLOCKS WITH GREENERY

FOOTBALL FIELD

GARDEN CITY HOUSING TYPOLOGY:
OPEN BUILDING BLOCKS WITH GREENERY

ZUIDERPARK



SOUTHWEST AREA

GARDEN CITY HOUSING TYPOLOGY:
OPEN BUILDING BLOCKS WITH GREENERY
+ GREEN ROOF

FOOTBALL FIELD:
ADD RAINWATER STORAGE
BENEATH THE FIELD

GARDEN CITY HOUSING TYPOLOGY:
TRANSFORMING PUBLIC GREEN SPACE TO
TEMPORARY RAINWATER BUFFERS

GARDEN CITY HOUSING TYPOLOGY:
OPEN BUILDING BLOCKS WITH GREENERY
+ GREEN ROOF

ZUIDERPARK:
NATURAL SPONGE FOR ABSORBING RAINWATER

Adapting in vulnerable areas: an intergrated system

coastal area
Scheveningen

historical urban core
Centrum

densification area
Laakhaven

INFILTRATION

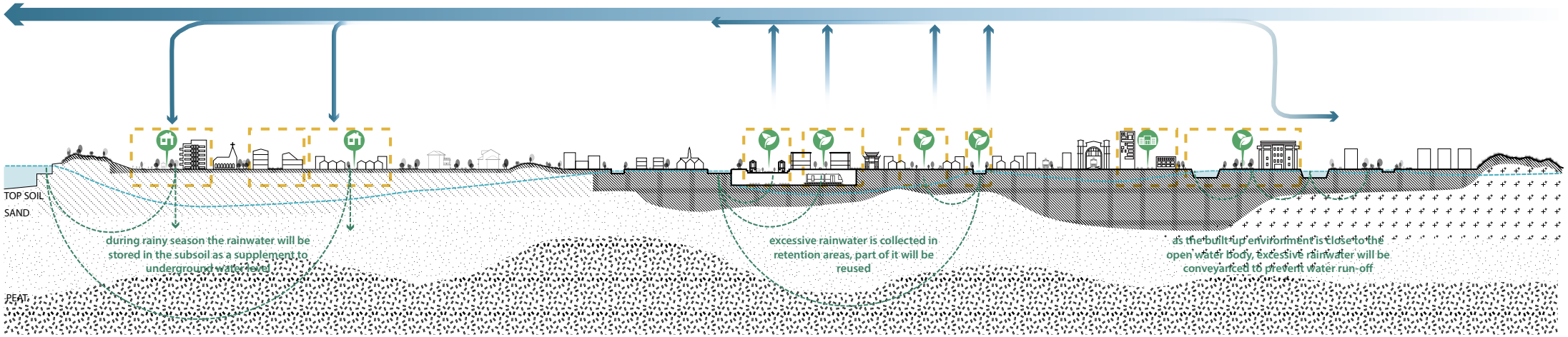
- natural barriers
- renewed residential area

RETENTION

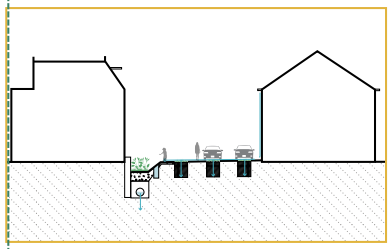
- more room of green and blue
- more integrated neighborhood

CONVEYANCE

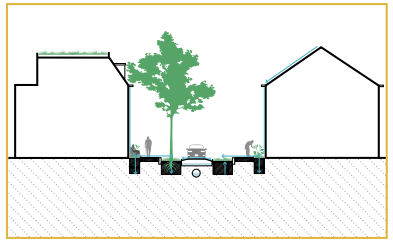
- densification and new housing
- more room of green and blue



INFILTRATION

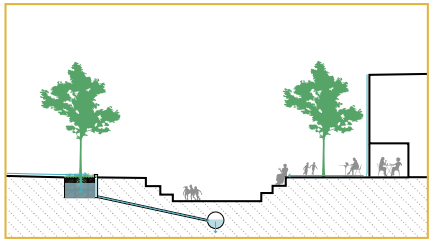


Intervention in parking lot:
Bio parking lot

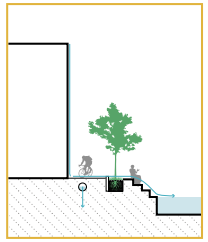


Intervention in collective street:
Facade garden

RETENTION

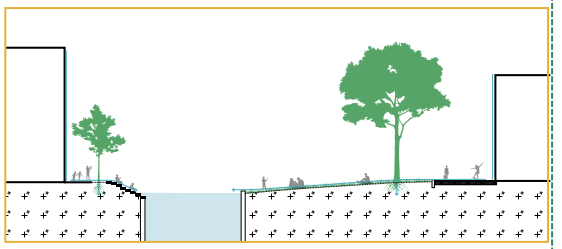


Intervention in public square:
Water square



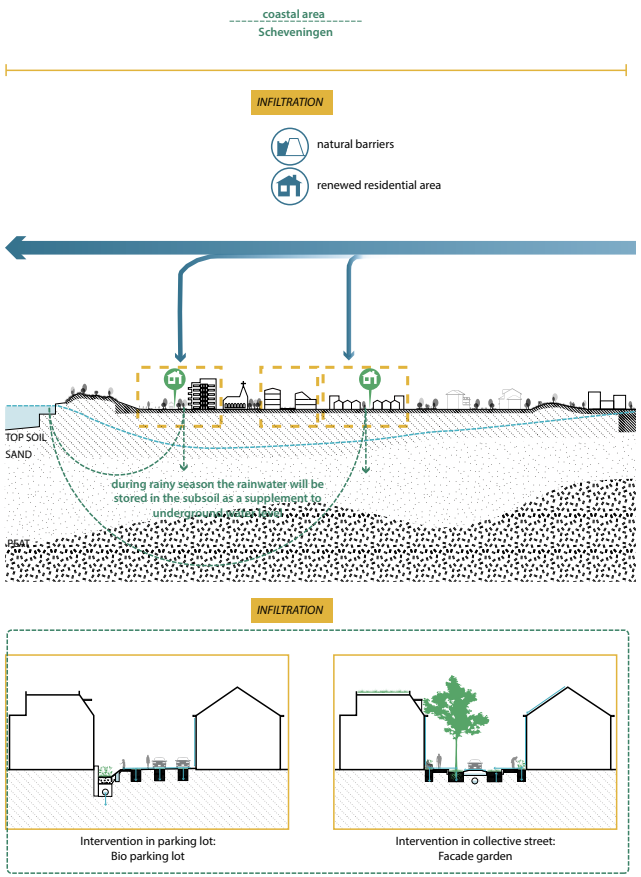
Intervention in canal:
Stepping canal edge

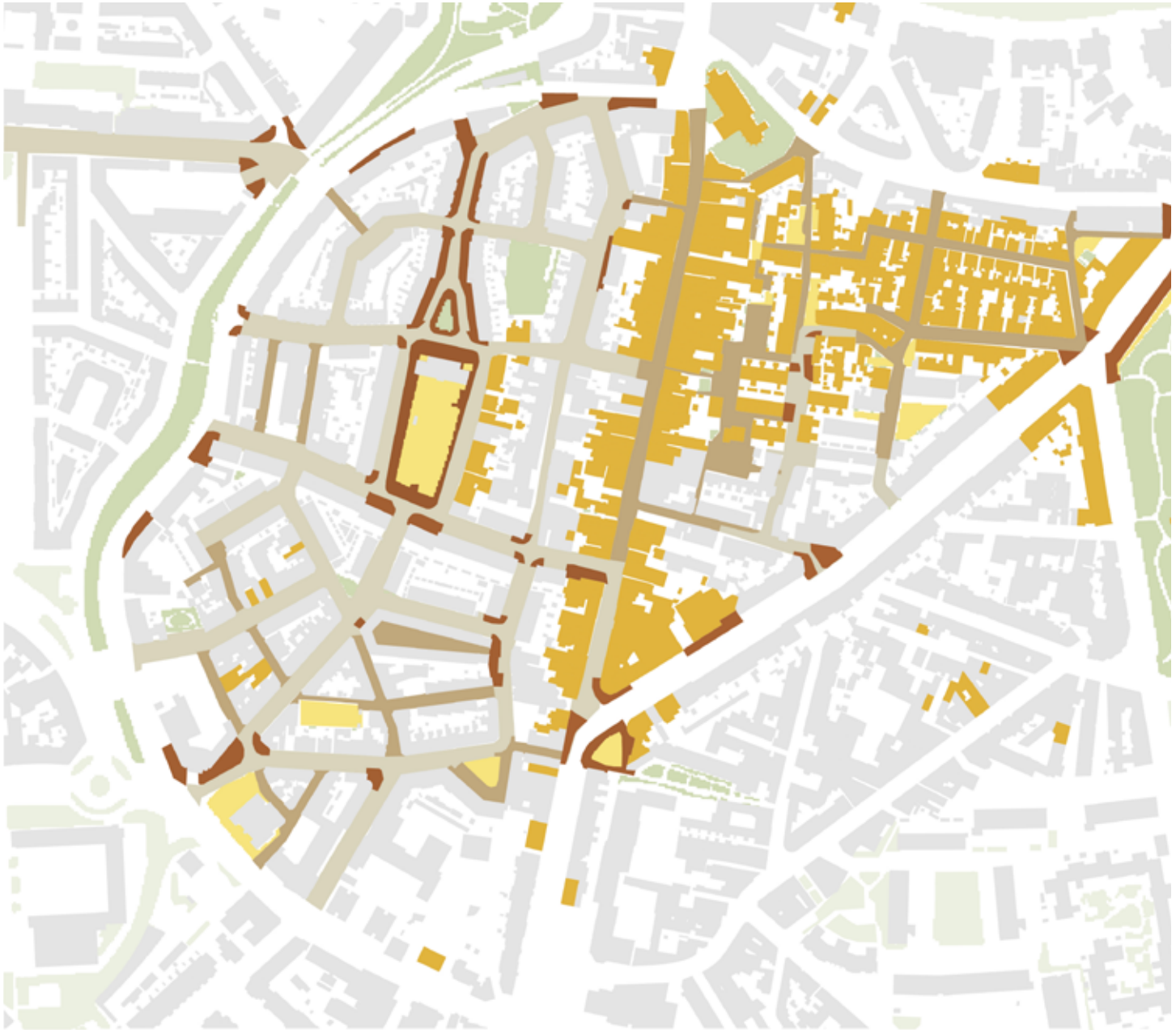
CONVEYANCE



Intervention in open water body:
Green canal

Area 1: Scheveningen Dorp





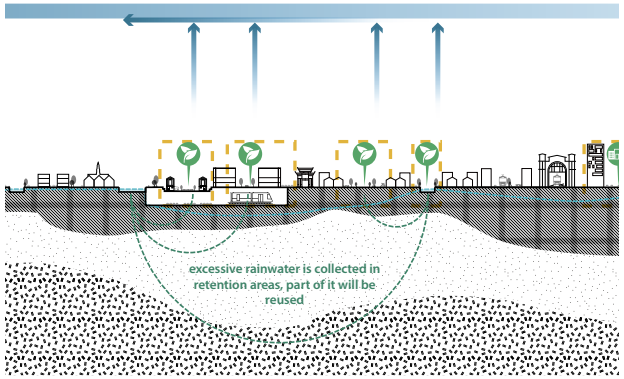
Area 2: Centrum

historical urban core
Centrum

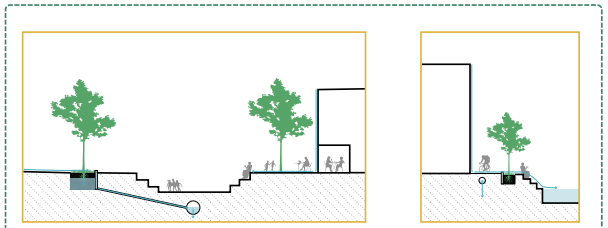
RETENTION

more room of green and blue

more integrated neighborhood



RETENTION



Intervention in public square:
Water square

Intervention in canal:
Stepping canal edge

Legend

- Central sponge green space
- Cloudburst road
- De Kern Gezond
- Slow traffic connection
- Vulnerable buildings
- Public space redesign area
- Building
- Water

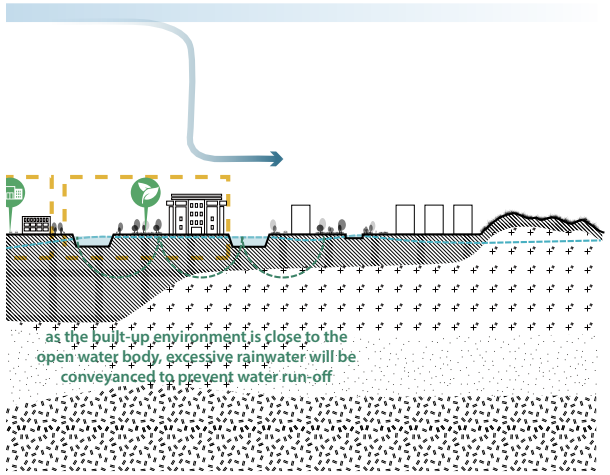
Area 3: Laakhaven

densification area
Laakhaven

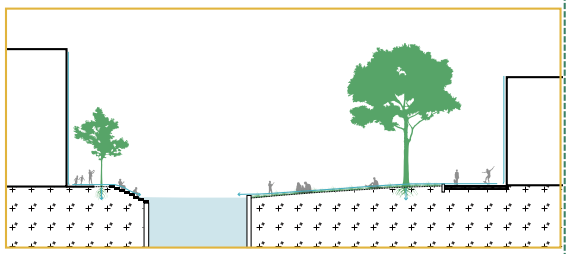
CONVEYANCE

densification and new housing

more room of green and blue



CONVEYANCE

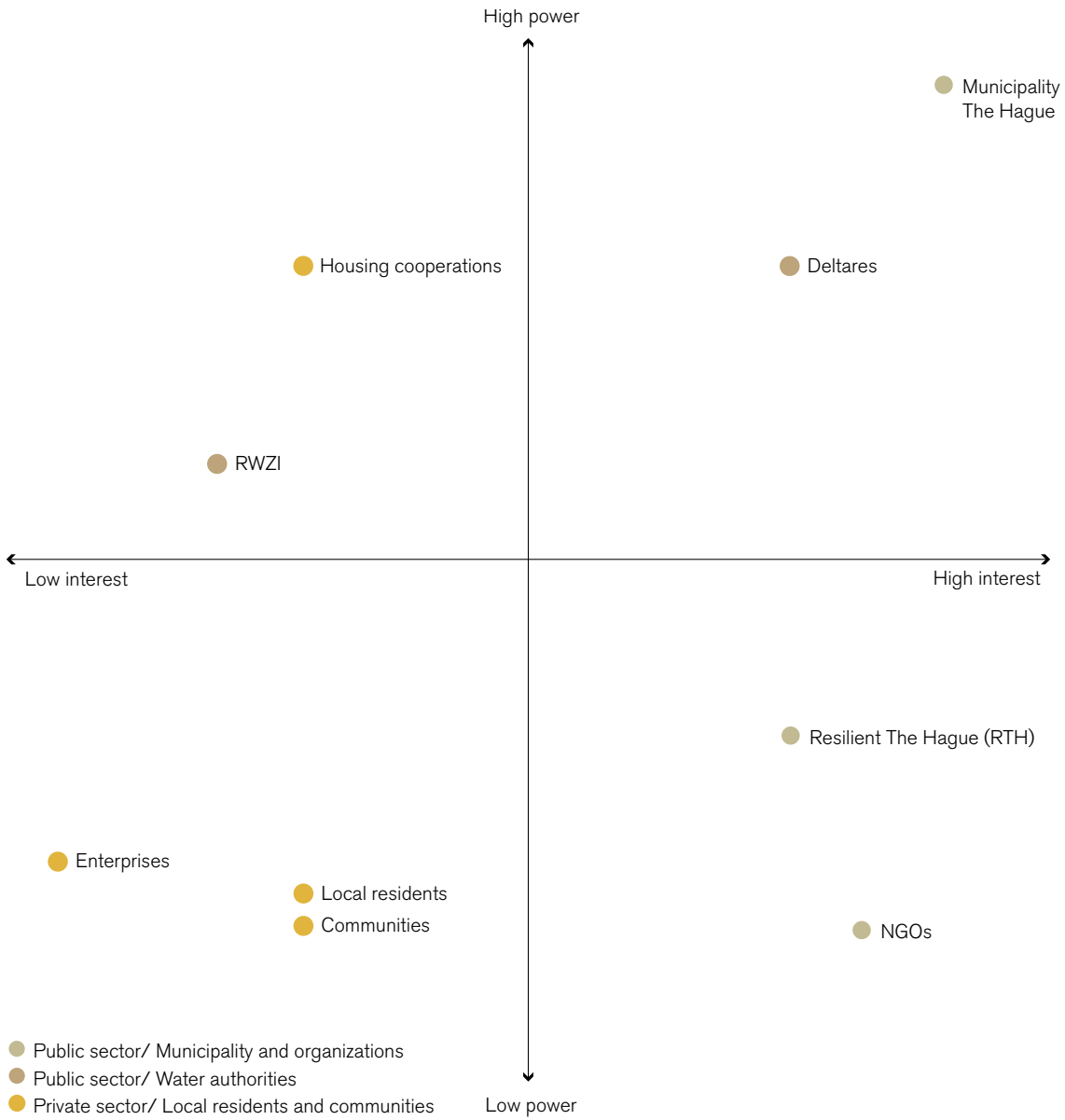


Intervention in open water body:
Green canal

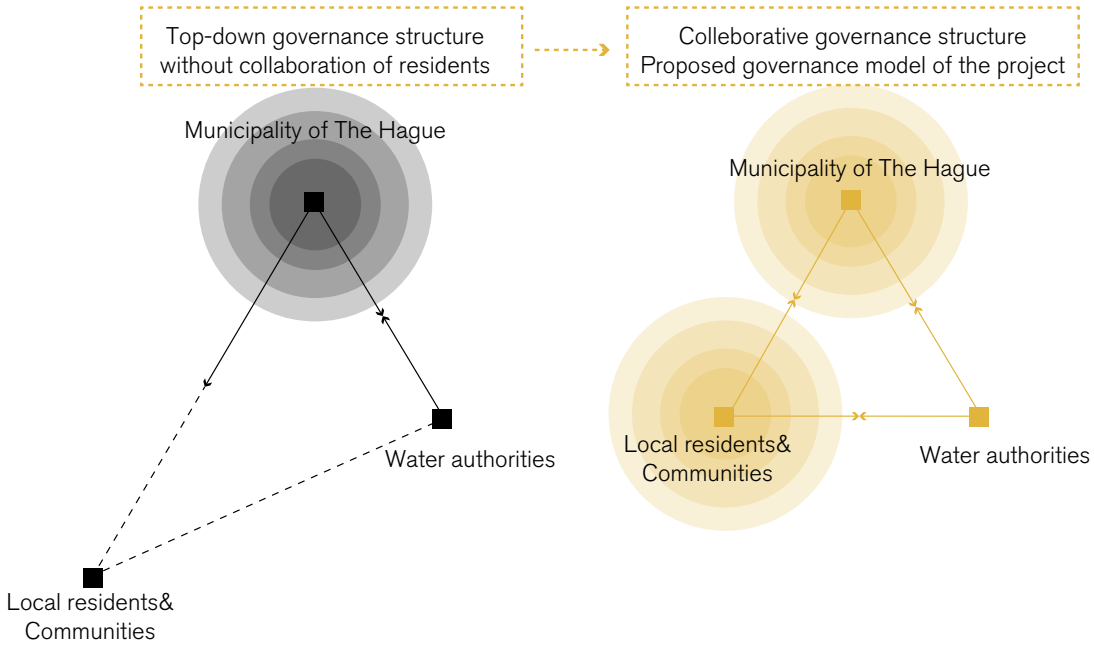
Legend

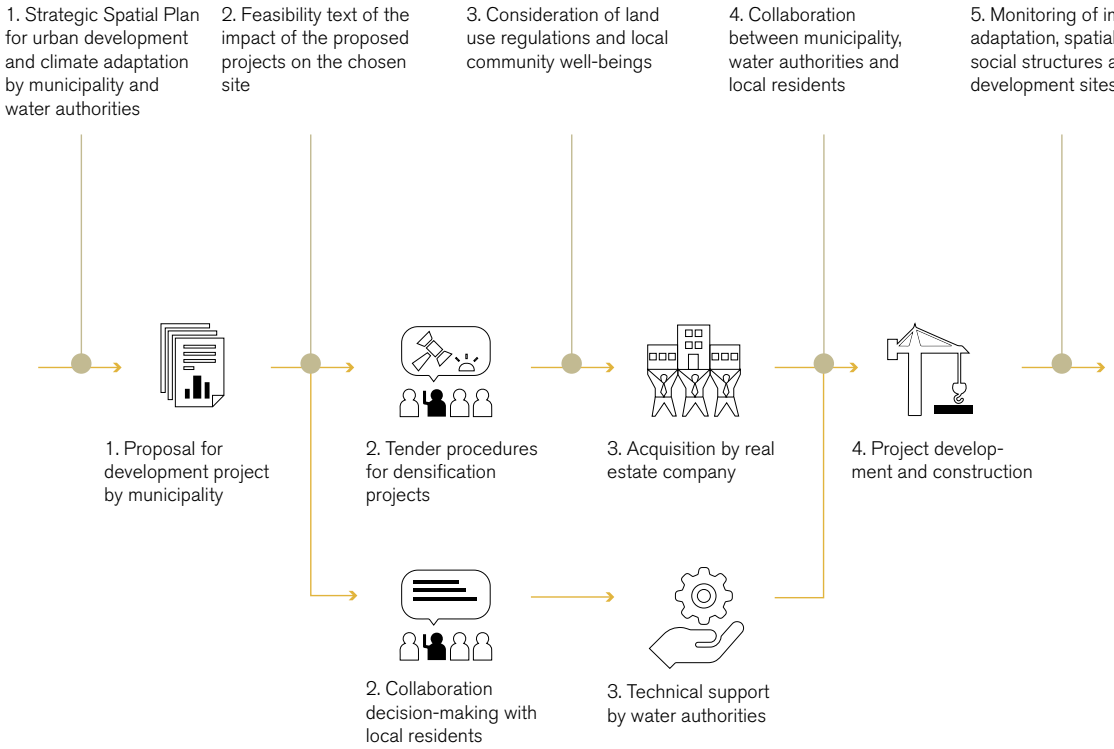
- Central sponge green space
- Public space redesign
- Cycling line
- Slow traffic connection
- Renewal buildings
- Active facade
- Building
- Water

Stakeholder analysis



Governance structure





Collaboration in development approaches

Division of roles	Construction of pilot projects	Community education	Participatory exercise	Construction of shared space in private properties	Conduct duties	Local benefits
Infiltration	MH SRH DSB IbDH 3Di HHD D UD	RTH MH DPZ DE CI PO HC LR	MH RTH PmDH DPZ UD	UD CI PO HC LR	MH DSB IbDH 3Di UD CI PO HC LR	MH RTH SKI LR	PO LR
Retention	MH SRH DSB IbDH 3Di HHD D UD	RTH MH DPZ DE CI PO HC LR	MH RTH PmDH DPZ UD	UD CI PO HC LR	MH DSB IbDH 3Di UD CI PO HC LR	MH RTH SKI LR	PO LR
Conveyance	MH SRH DSB IbDH 3Di HHD D UD	RTH MH DPZ DE CI PO HC LR	MH RTH PmDH DPZ UD	UD CI PO HC LR	MH DSB IbDH 3Di UD CI PO HC LR	MH RTH SKI LR	PO LR

The flow highlights the events with participation of local communities, while simultaneously showcasing how the stakeholders of municipality and water authorities could contribute to the participatory management process.

Municipal associations

- RTH Resilient The Hague
- SRH Safety Region Haaglanden
- MH Municipality of The Hague
- DSB Department of City Management
- IbDH Engineering Agency The Hague (IbDH)
- DPZ Department of Civilian Affairs
- PmDH Department of Project Mangement of The Hague
- SKI Strategy, Framework Development, Purchase

Water authorities

- D Dunea
- HHD District Water Control Board of Delfland
- DE Deltares
- 3Di Municipality of The Hague: 3Di

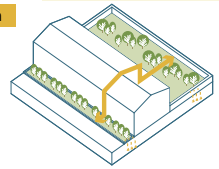
Private institutions and local communities

- CI Community initiatives
- PO Property owners
- HC Housing cooperations
- UD Urban designers

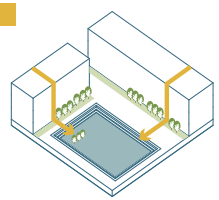
Individual

- LR Local residents

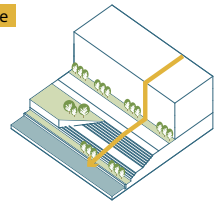
Main management proposal



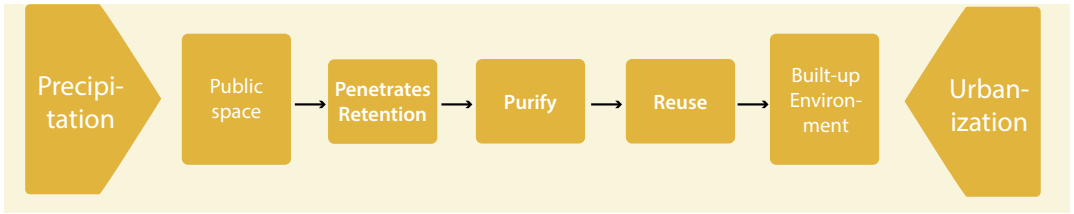
Infiltration

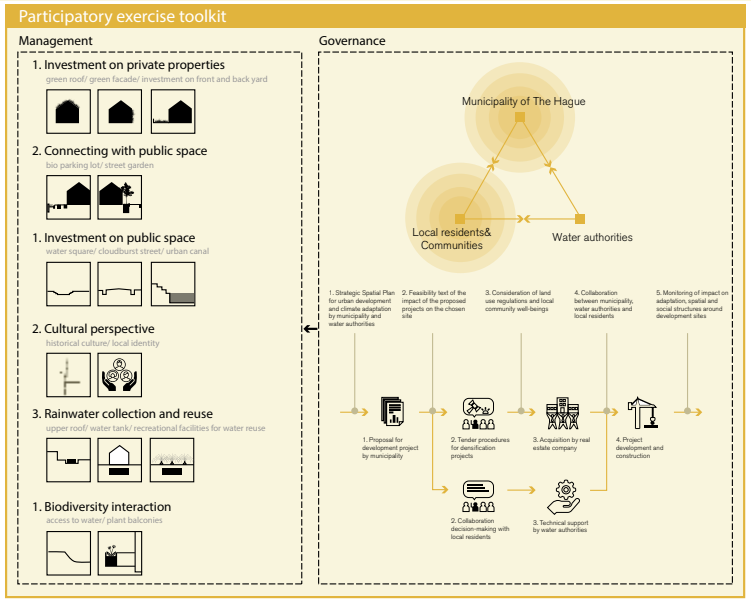


Retention



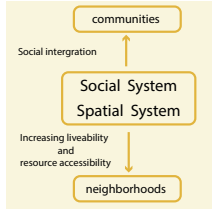
Conveyance





Conduct duties

1. Maintenance in private properties
2. Maintenance in community gardens



Local benefits

5

Adapting the strategies spatially...

Pilot zoom in area: Centrum

De Kern Gezond 1987

De Kern Bijzonder 2016

Future?

Grote Markt

Bijenkorf

Bierkade

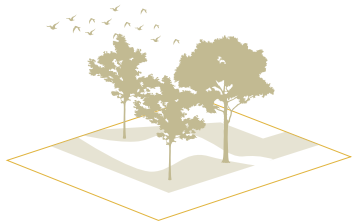
Rabbijn Maarsenplein

Rabbijn Maarsenplein

Stationsweg

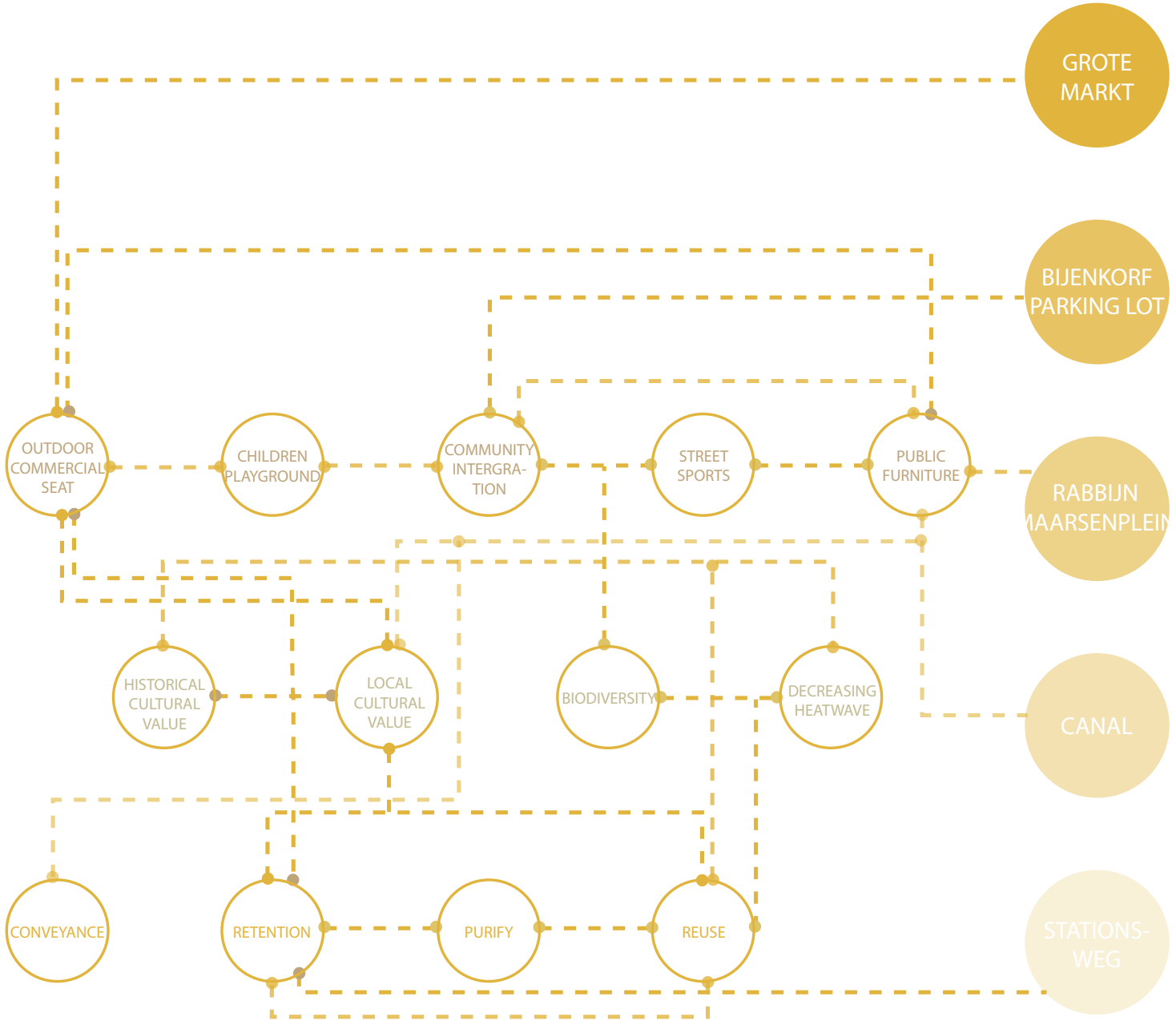
Development toolkits

SOCIAL SYSTEM



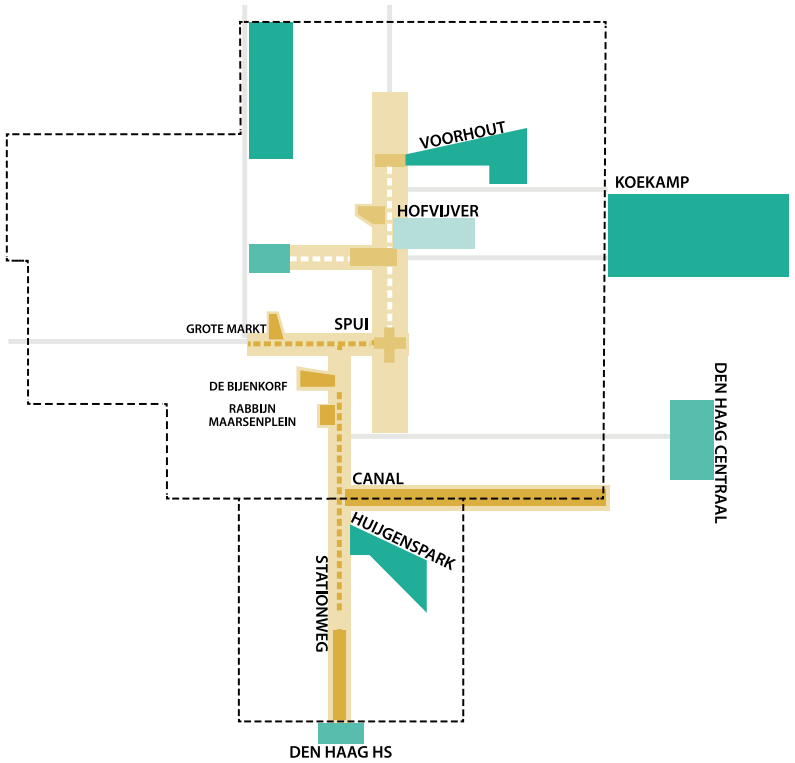
NATURAL SYSTEM

TECHNICAL SYSTEM

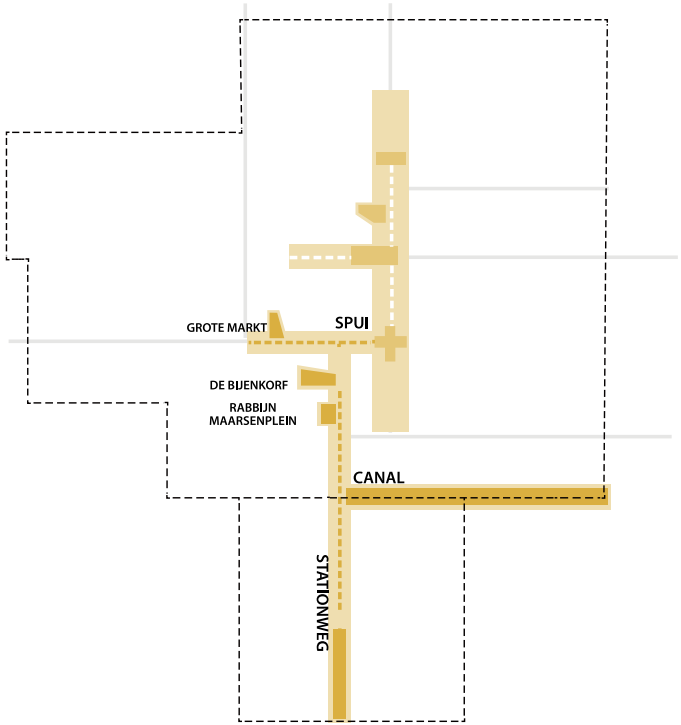


Pilot projects

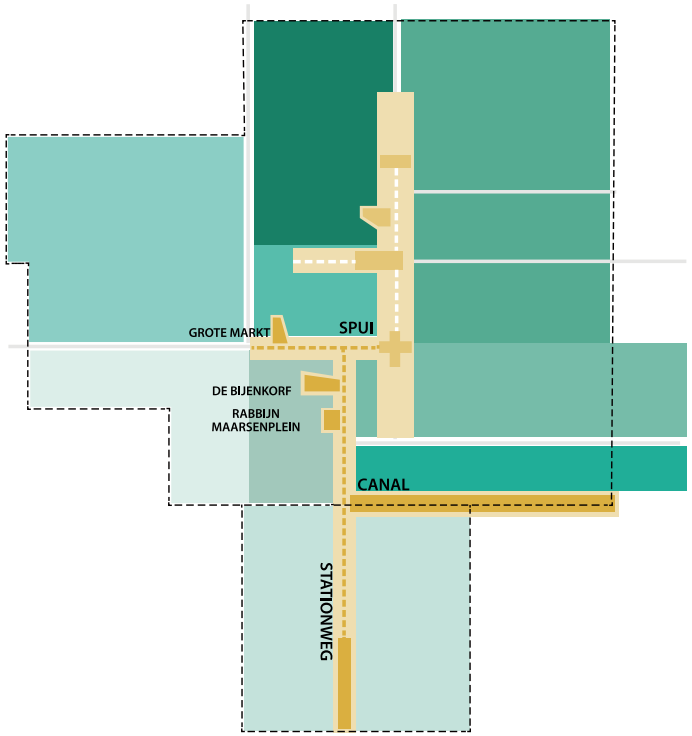
Co-benefits



Healthy living



Socio-cultural enhancement



Equal accessbility to public space

A visit in 2050...

Stationsweg

Bierkade

Rabbijn Maarsenplein

Bijenkorf

Grote Markt

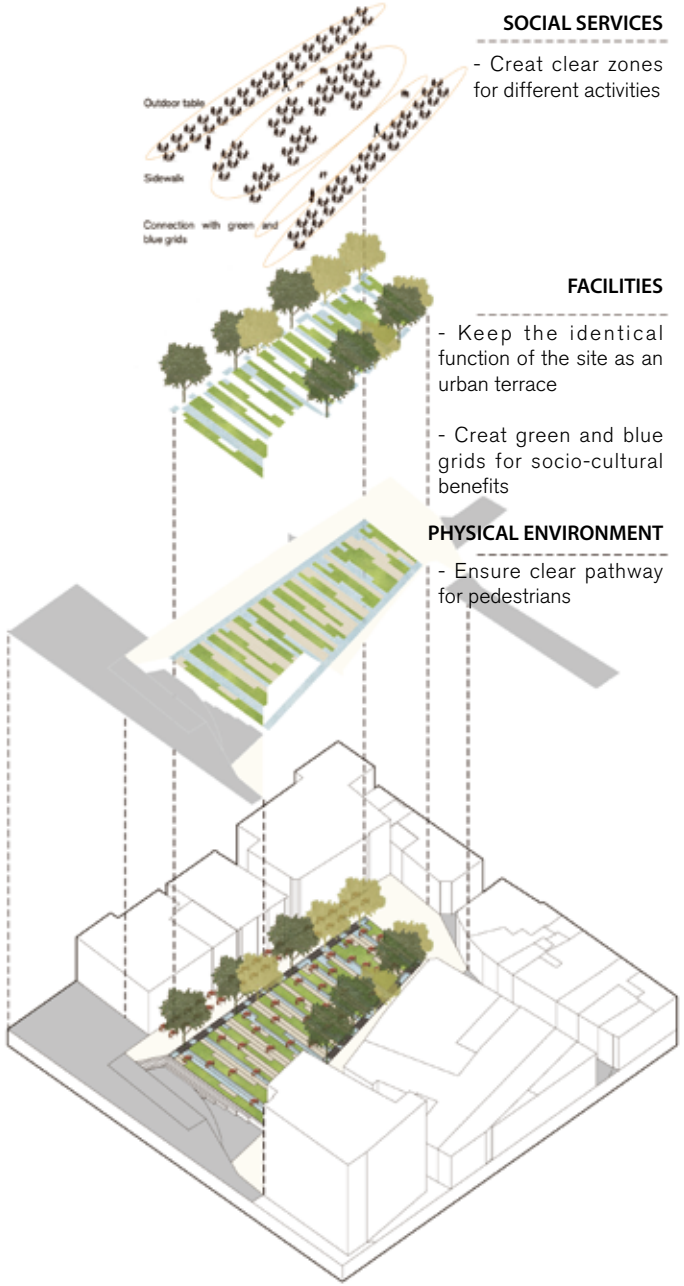
How to achieve the visions...

Grote Markt

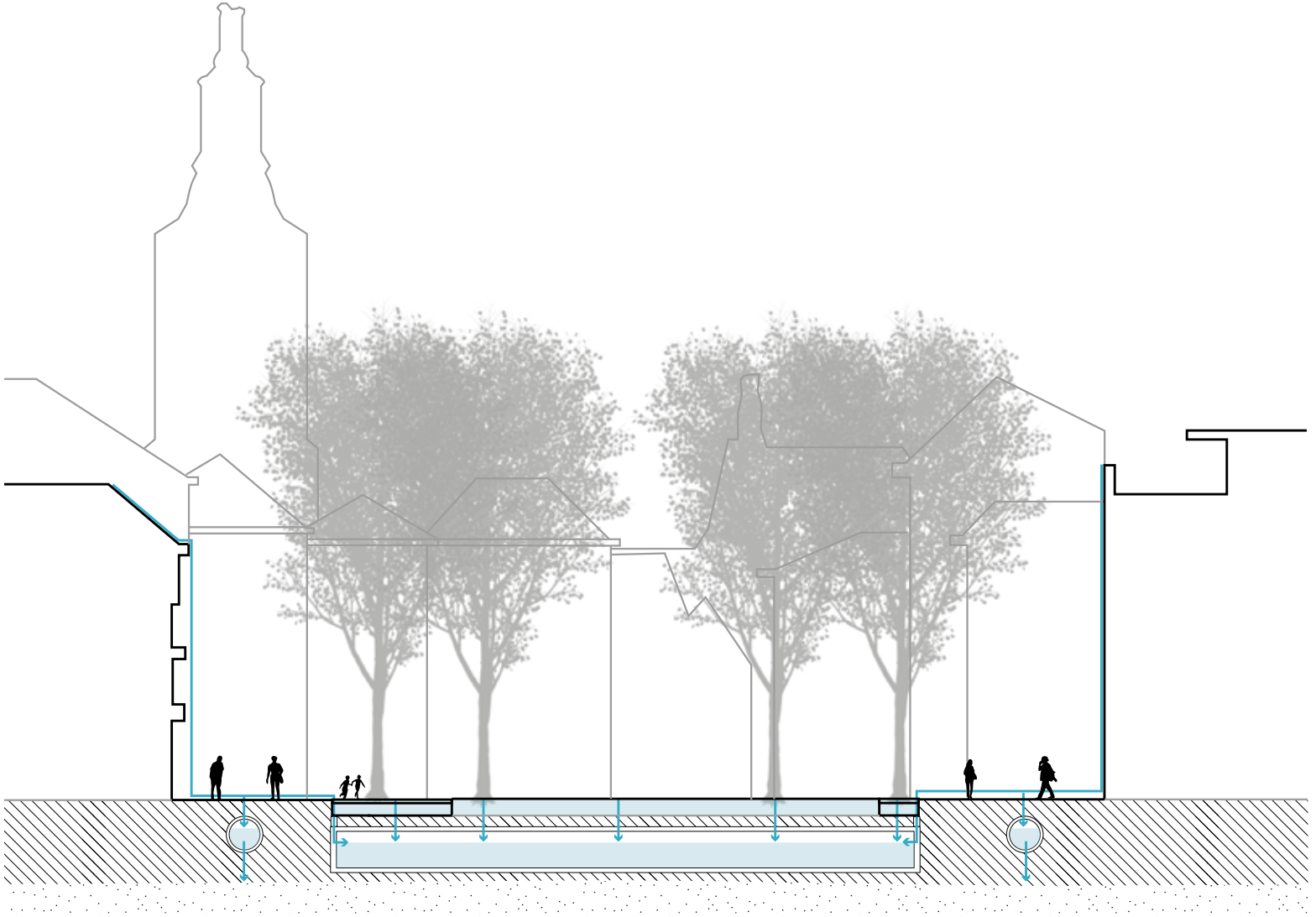

sidewalks
entrance from the resturants
resturant
transporatation
city terrace
tree

Grote Markt: Masterplan

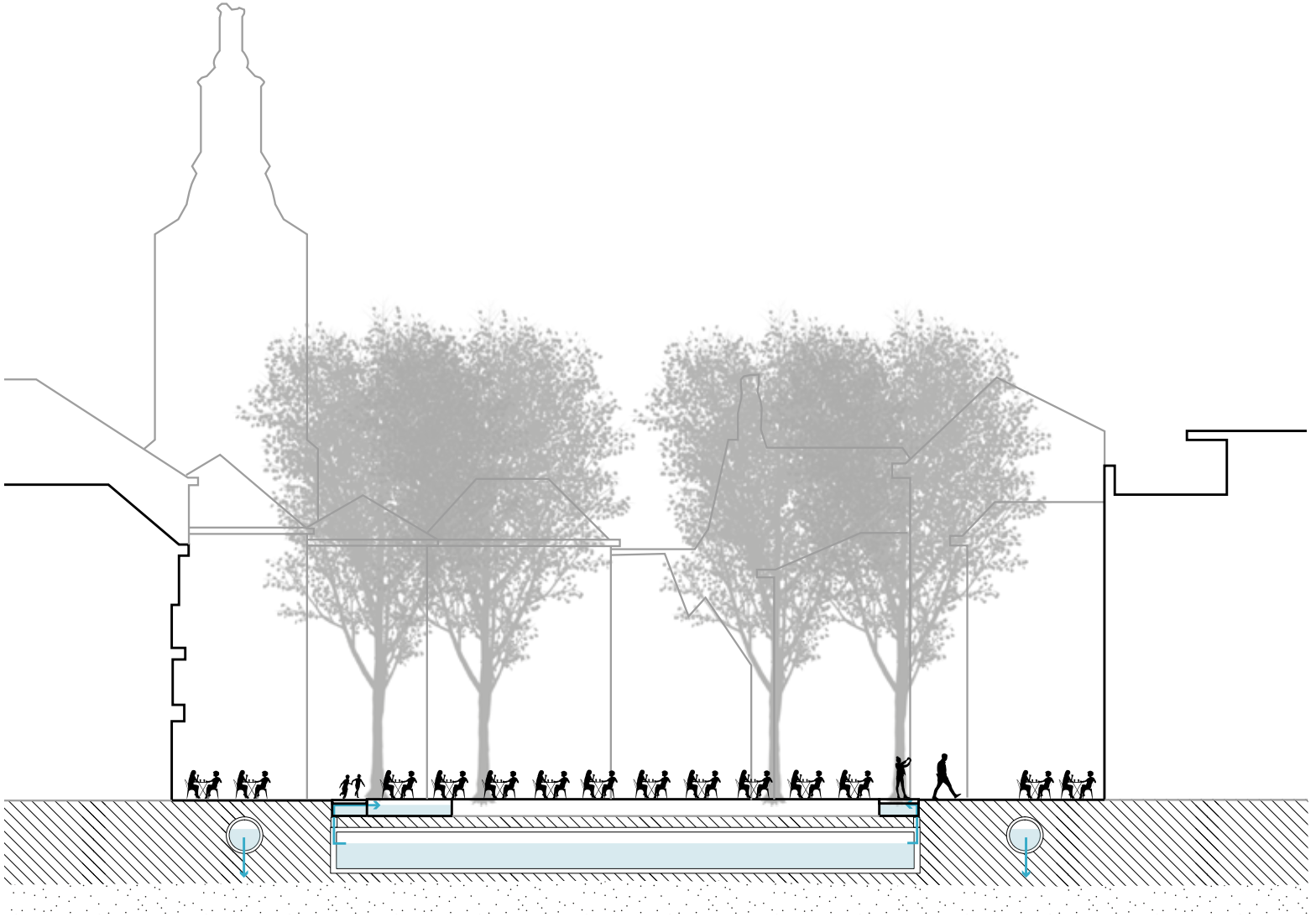
1. Urban water channel
2. Urban terrace



Grote Markt: Technical management approach



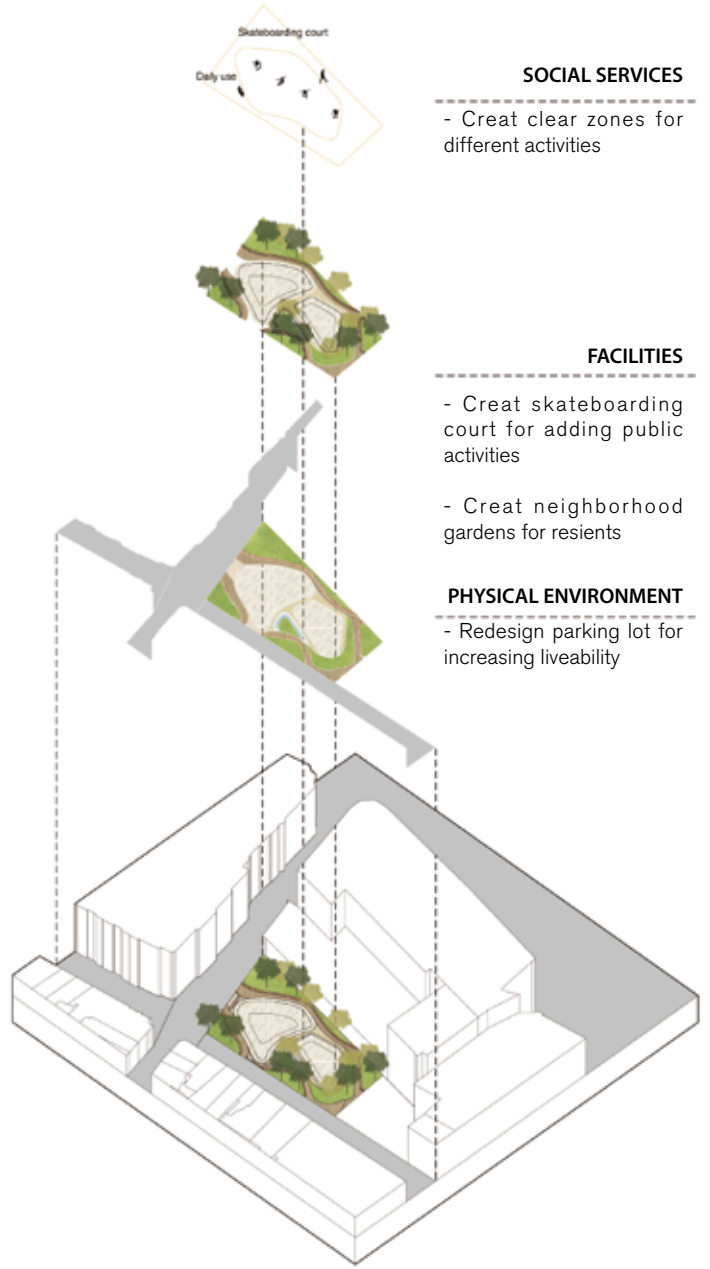
Grote Markt: Technical management approach



Bijenkorf parking lot

Bijenkorf parking lot: Spatial management approach

1. Community garden
2. Public seat
3. Skateboarding court
4. Urban water wall



SOCIAL SERVICES

- Creat clear zones for different activities

FACILITIES

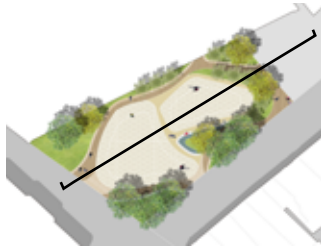
- Creat skateboarding court for adding public activities

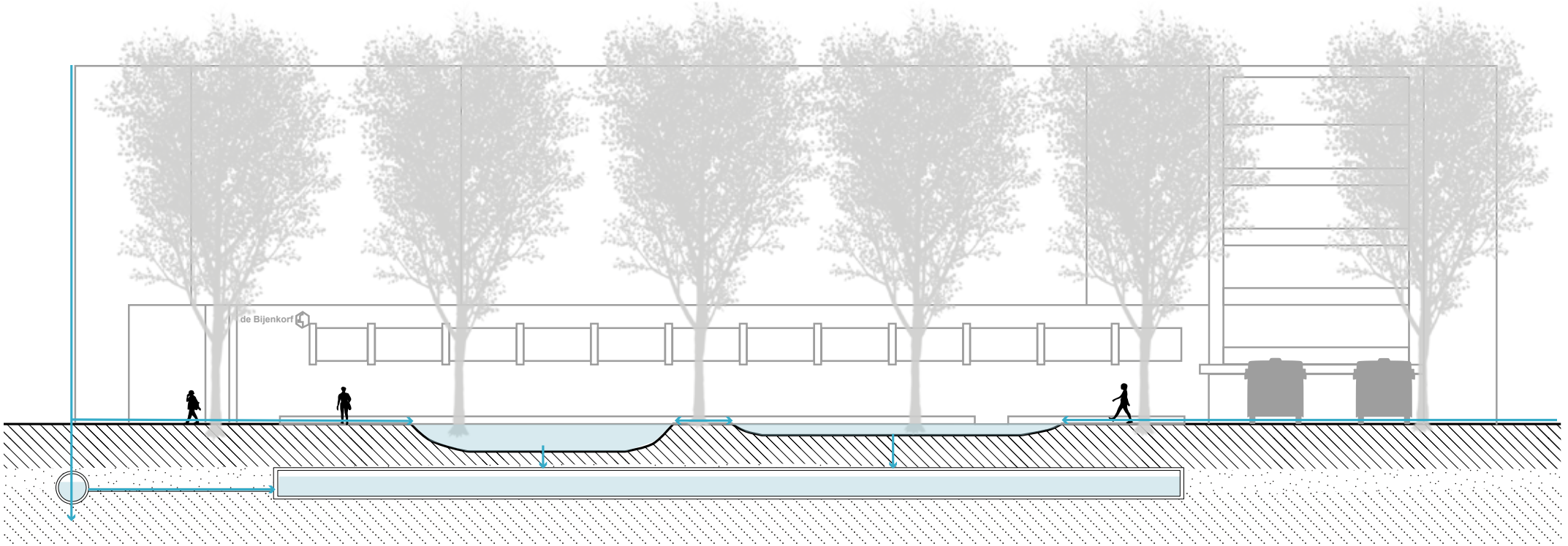
- Creat neighborhood gardens for resients

PHYSICAL ENVIRONMENT

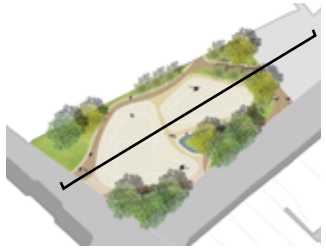
- Redesign parking lot for increasing liveability

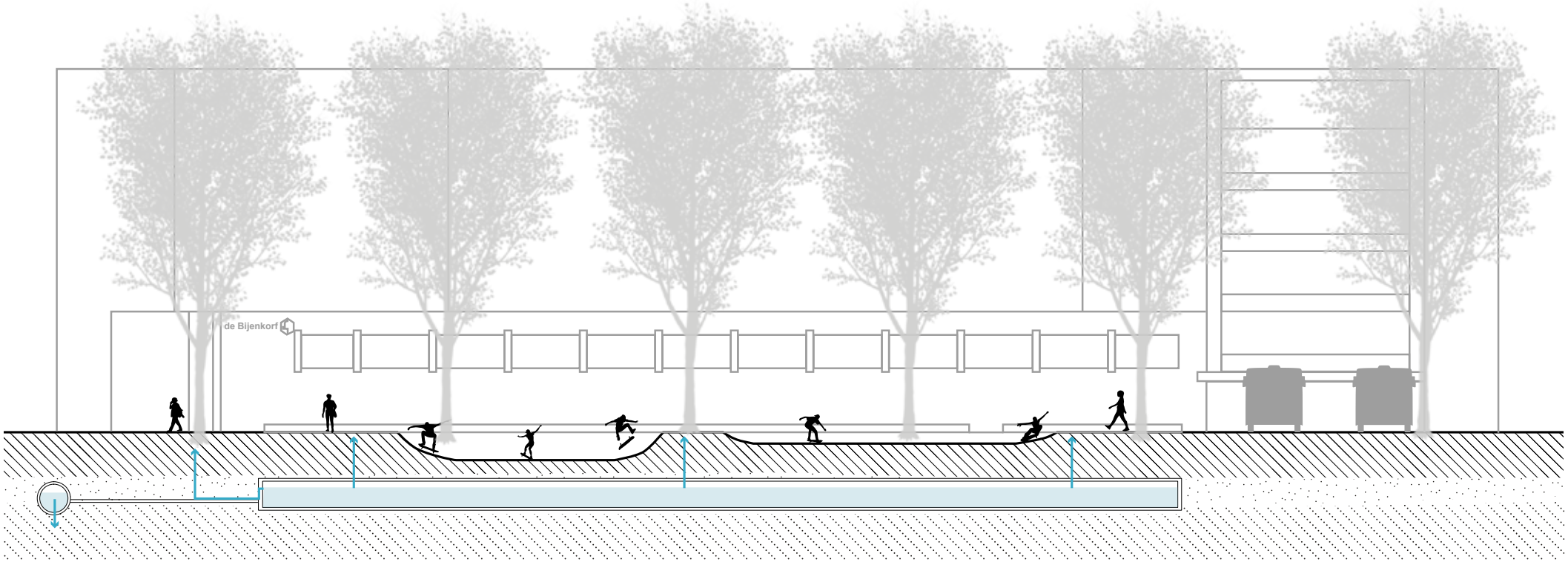
Bijenkorf parking lot: Technical management approach



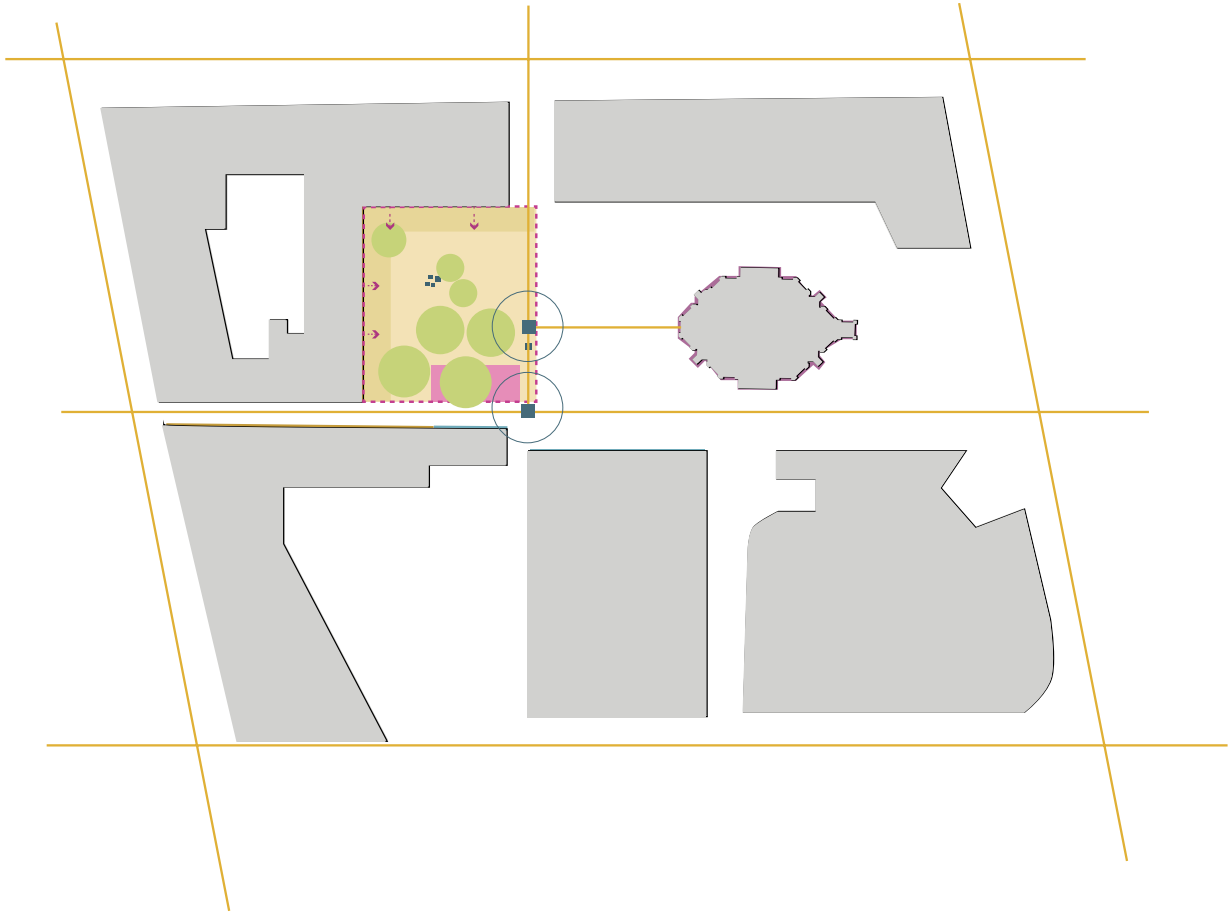


Bijenkorf parking lot: Technical management approach



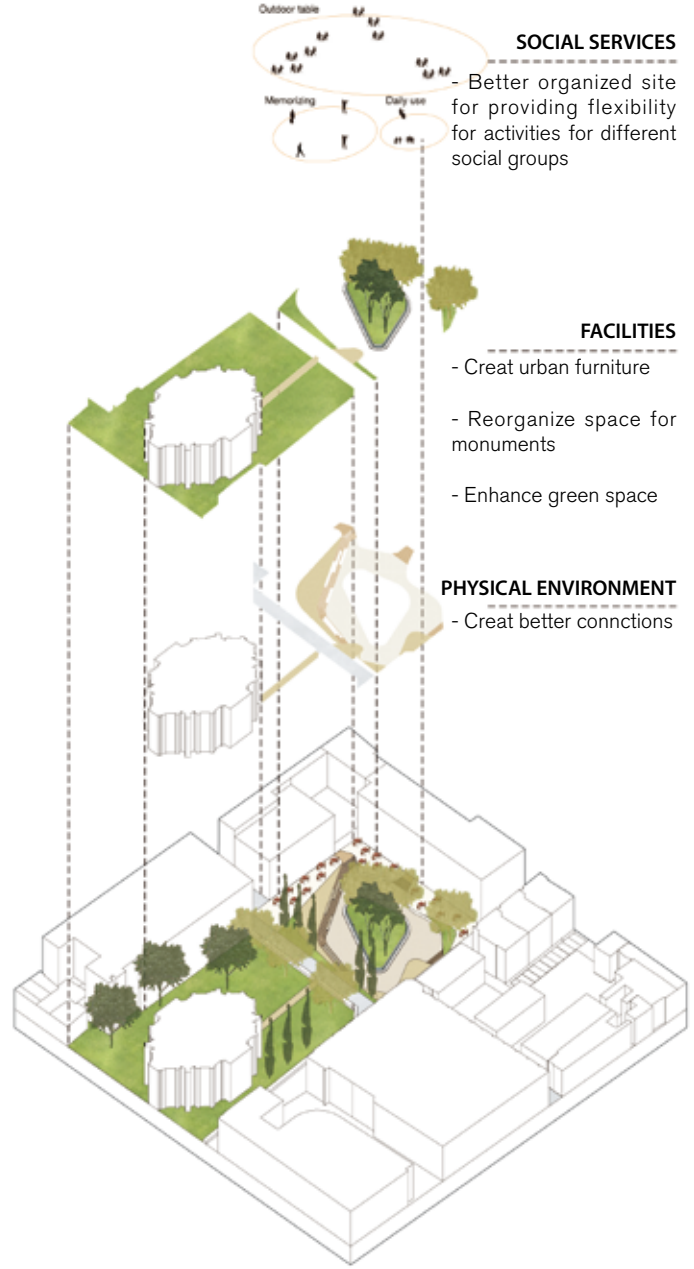


Rabbijn Maarsenplein

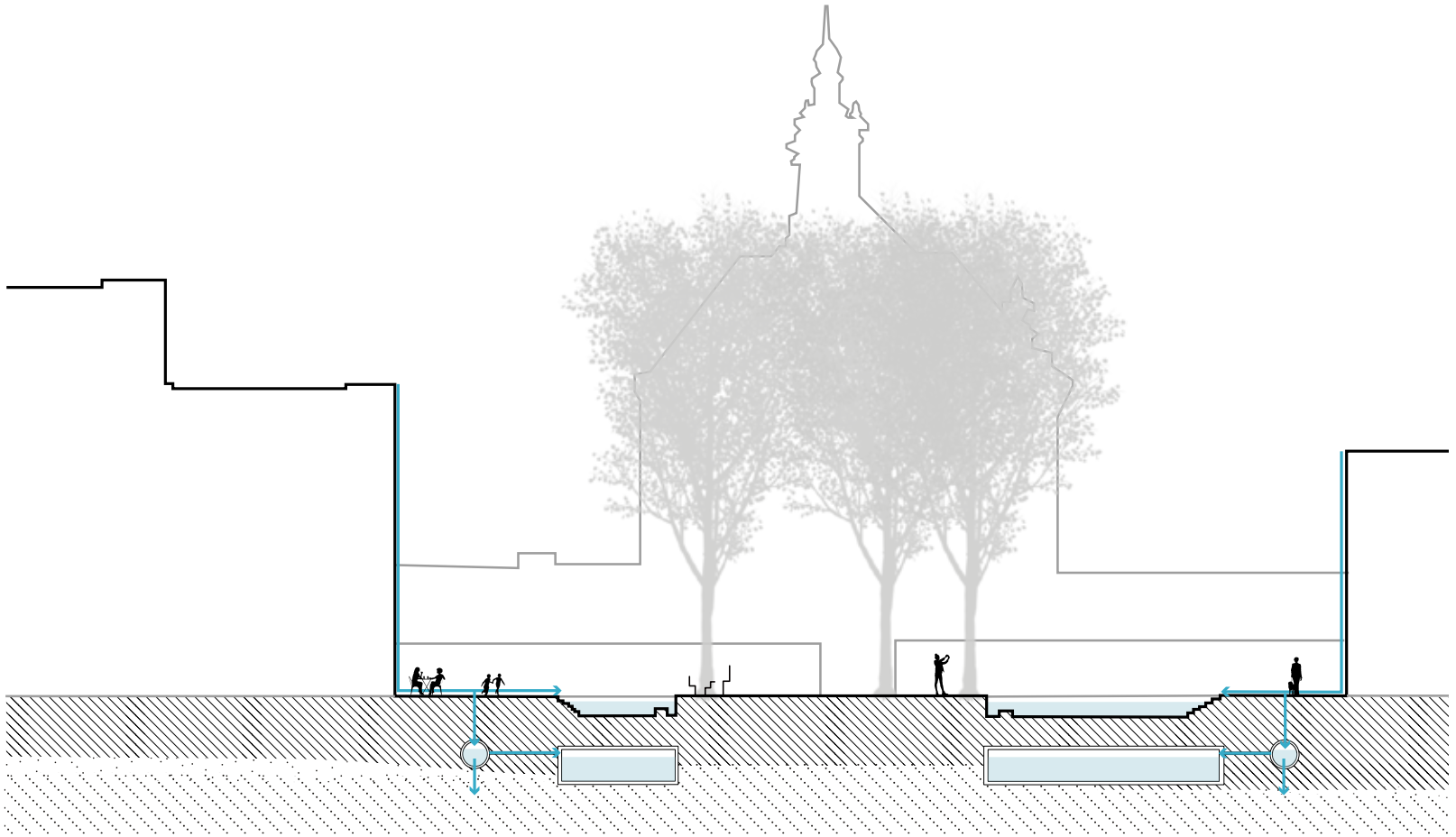


Rabbijn Maarsenplein: Spatial management approach

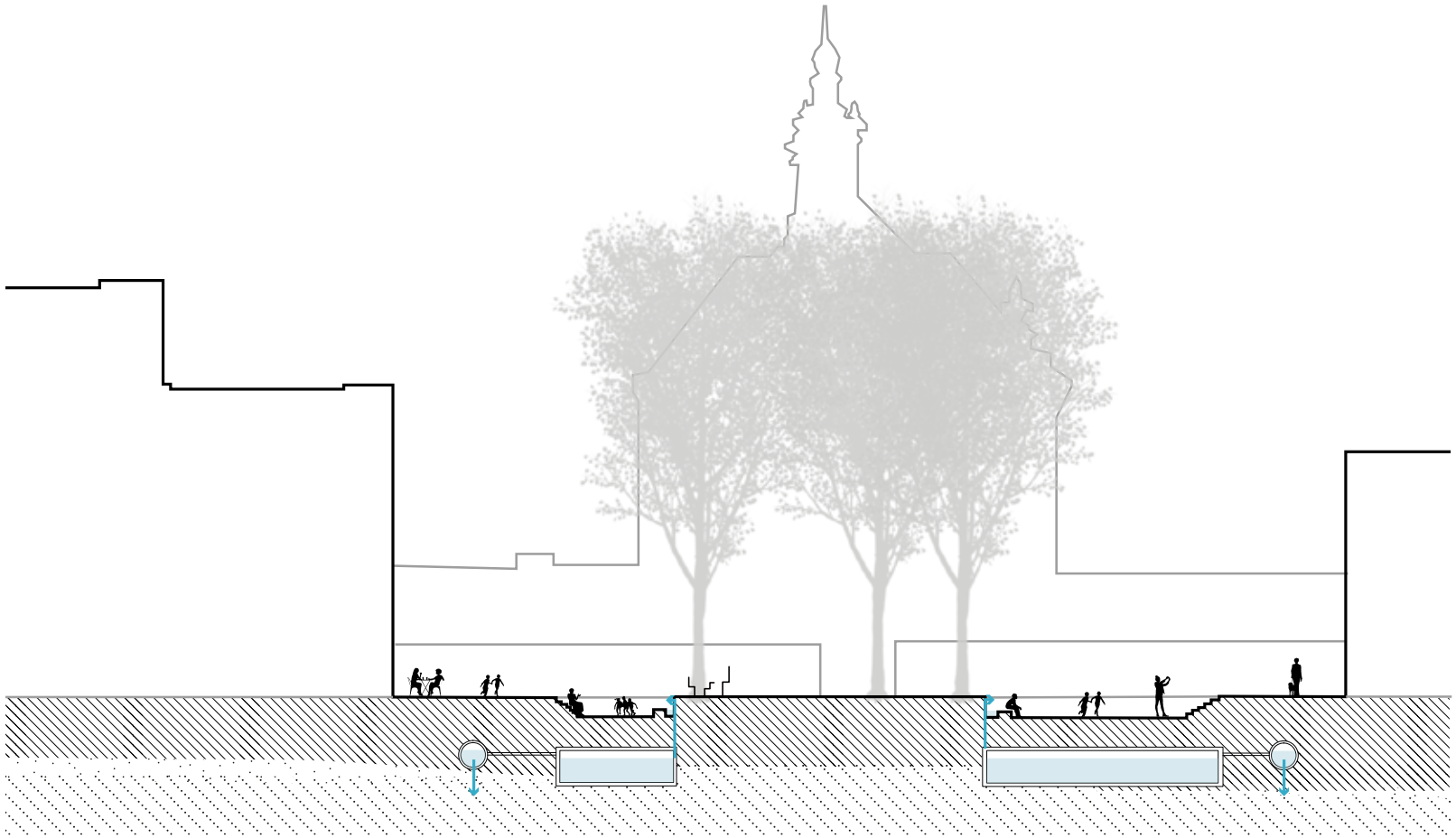
1. Monument island
2. Outdoor commercial tables
3. Public seats
4. Water square
5. Community garden
5. Water wall with public seats



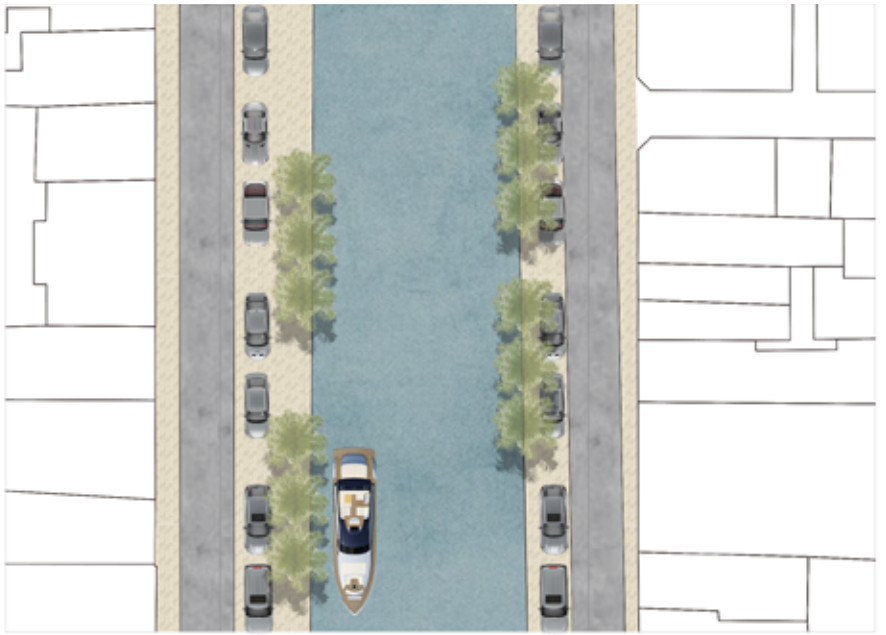
Rabbijn Maarsenplein: Technical management approach

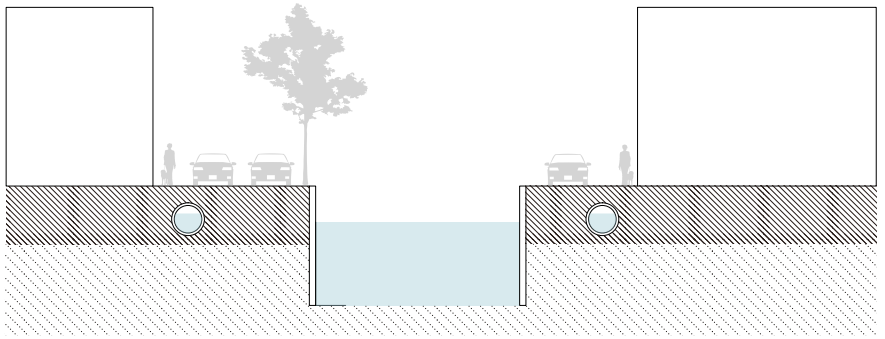


Rabbijn Maarsenplein: Technical management approach



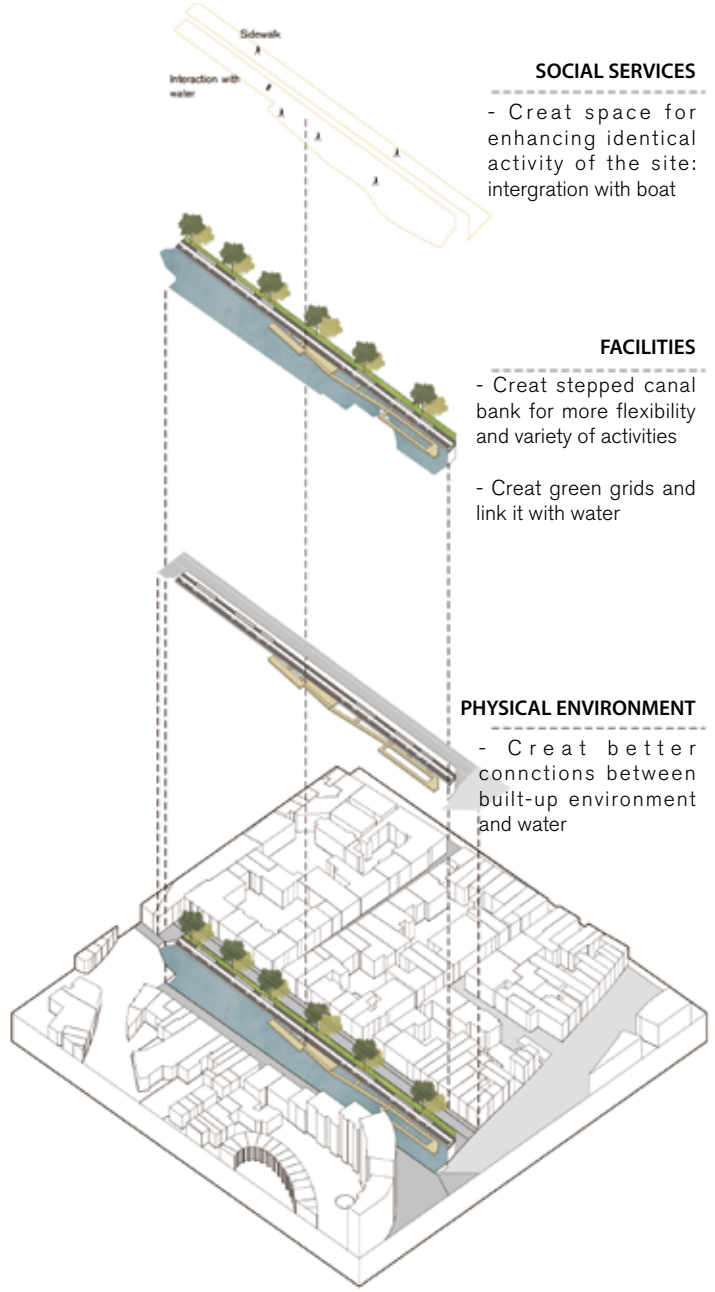
Bierkade



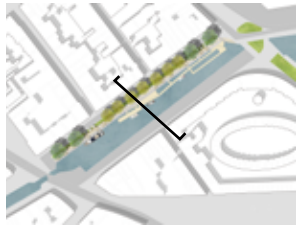


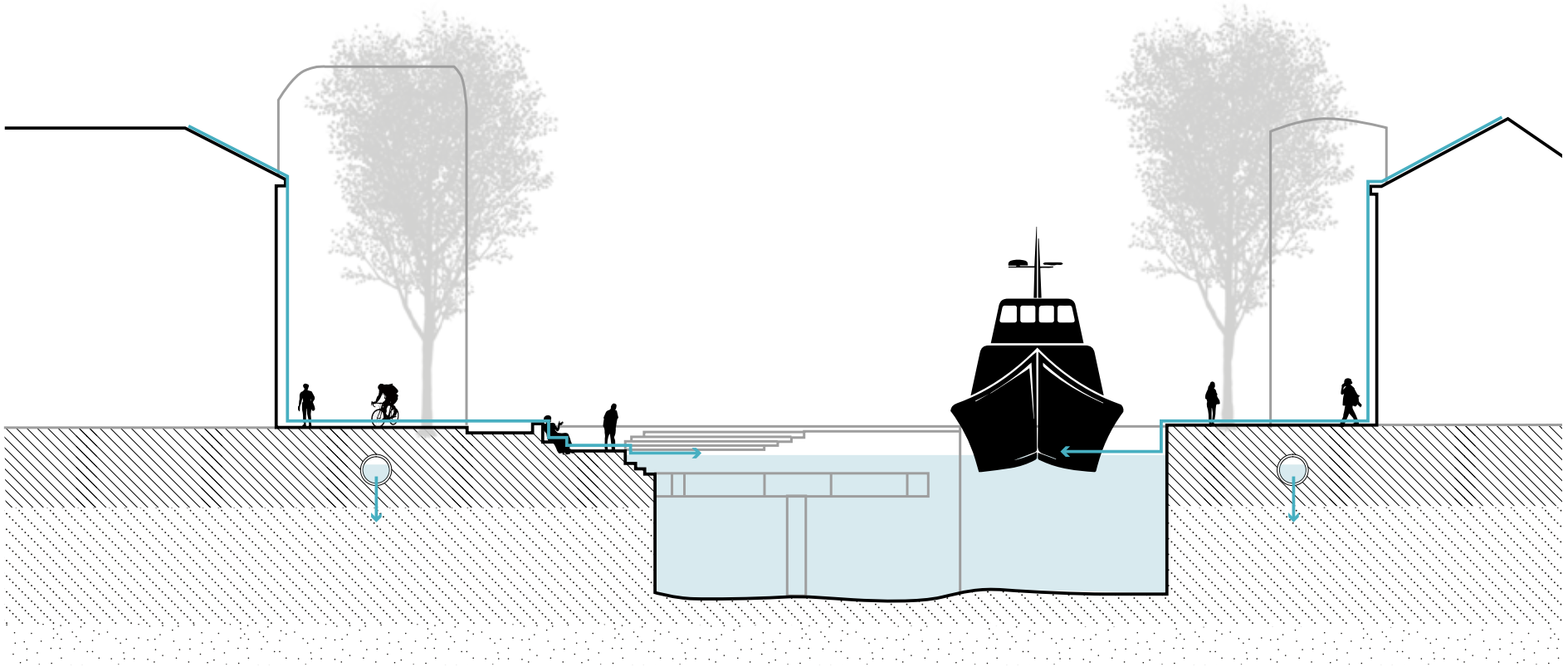
Bierkade: Spatial management approach

1. Green belt
2. Stepped canal bank and public seats
3. Platform

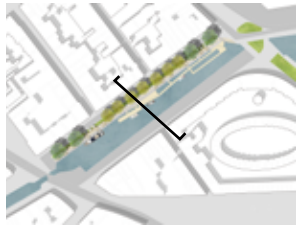


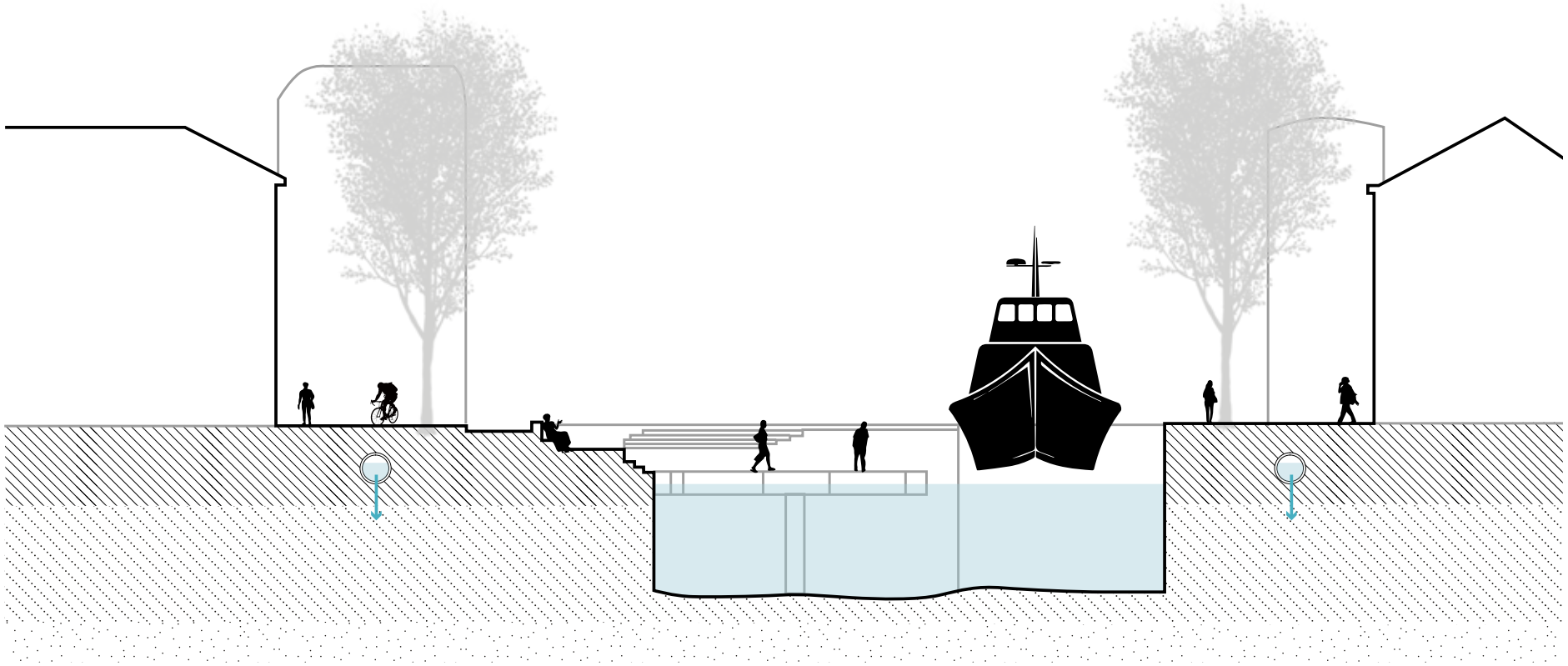
Bierkade: Water management



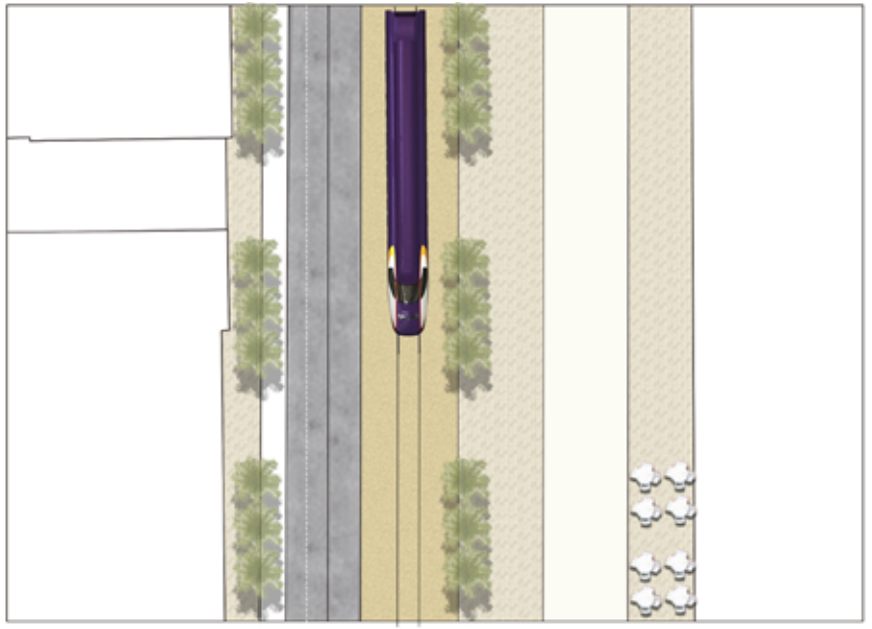


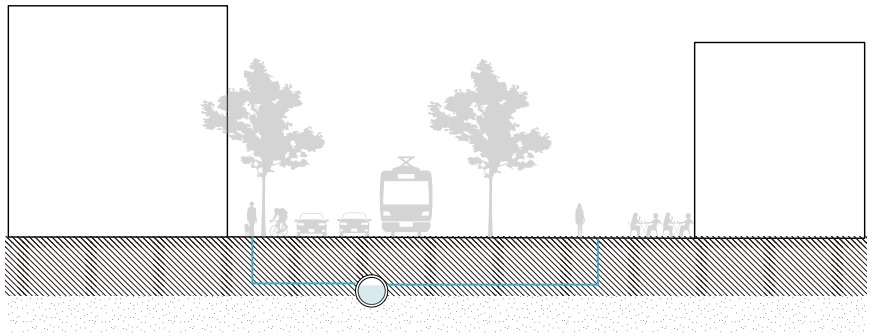
Bierkade: Water management





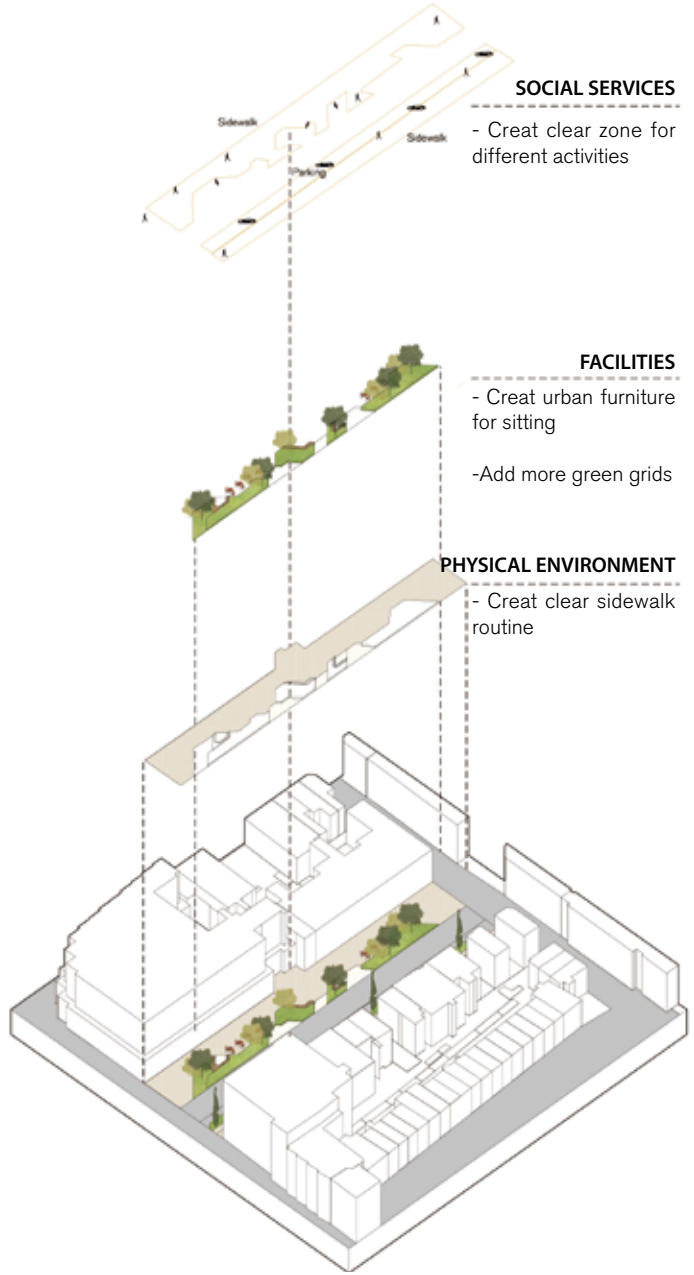
Stationsweg



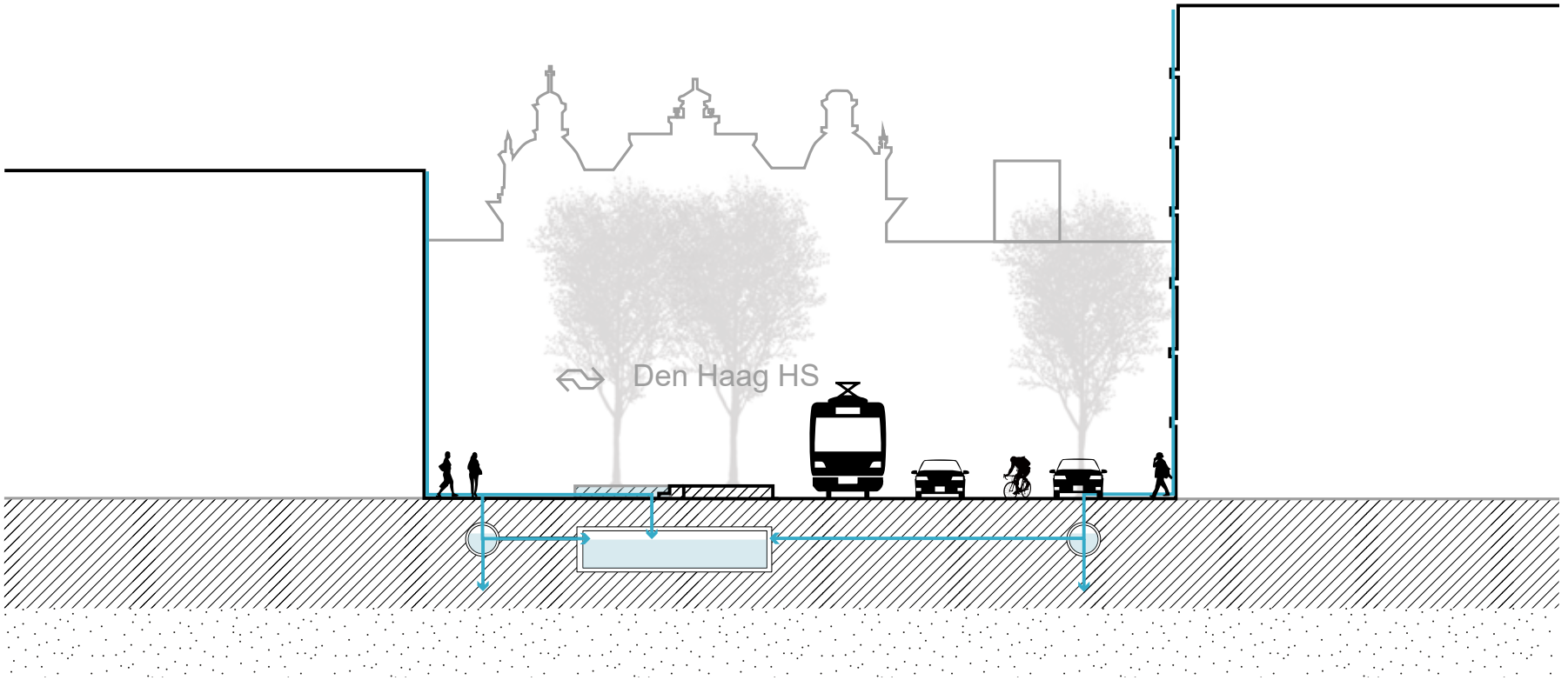


Stationsweg: Masterplan

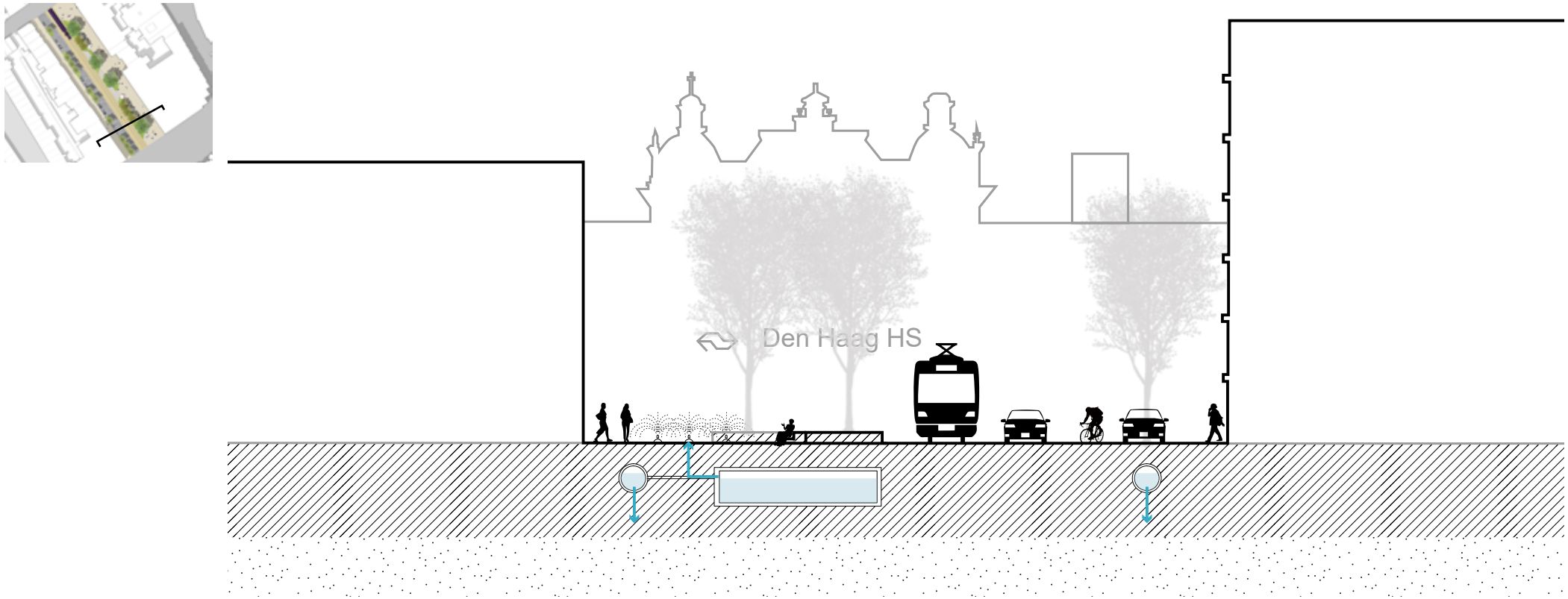
1. Cloudburst road
2. Outdoor commercial table
3. Public seats
4. Urban water fountain



Stationsweg: Water mangement



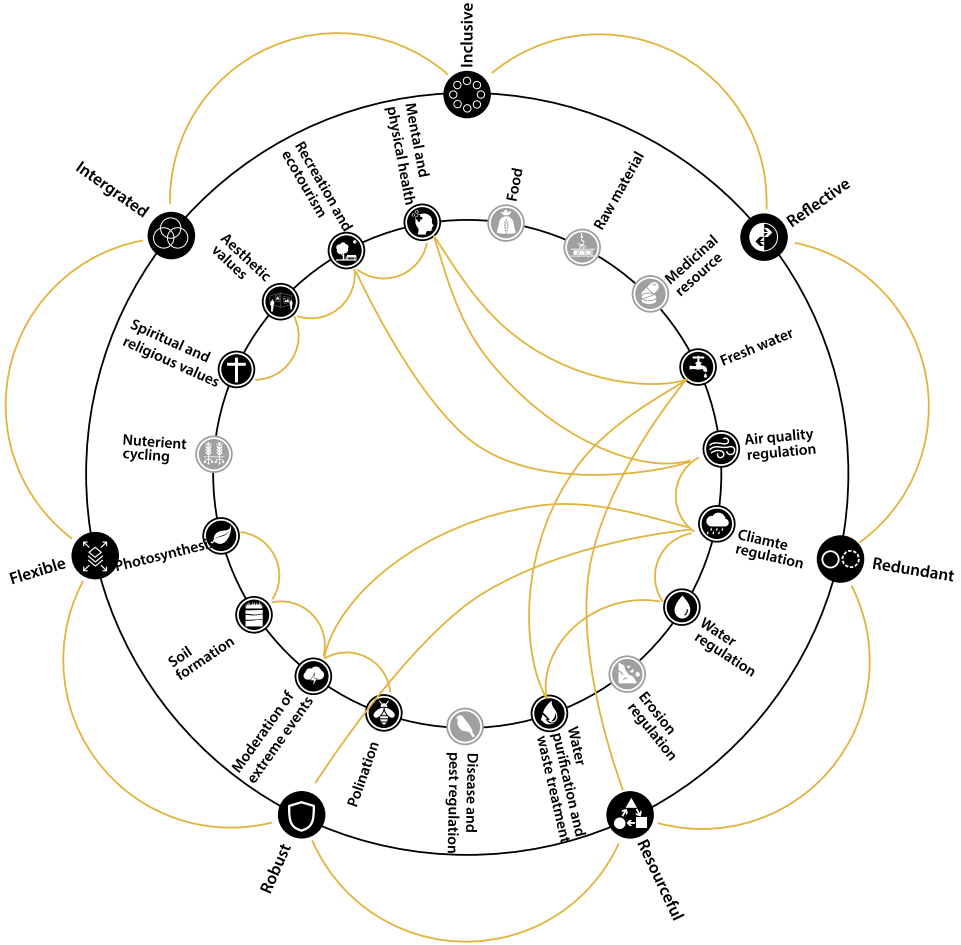
Stationsweg: Water mangement



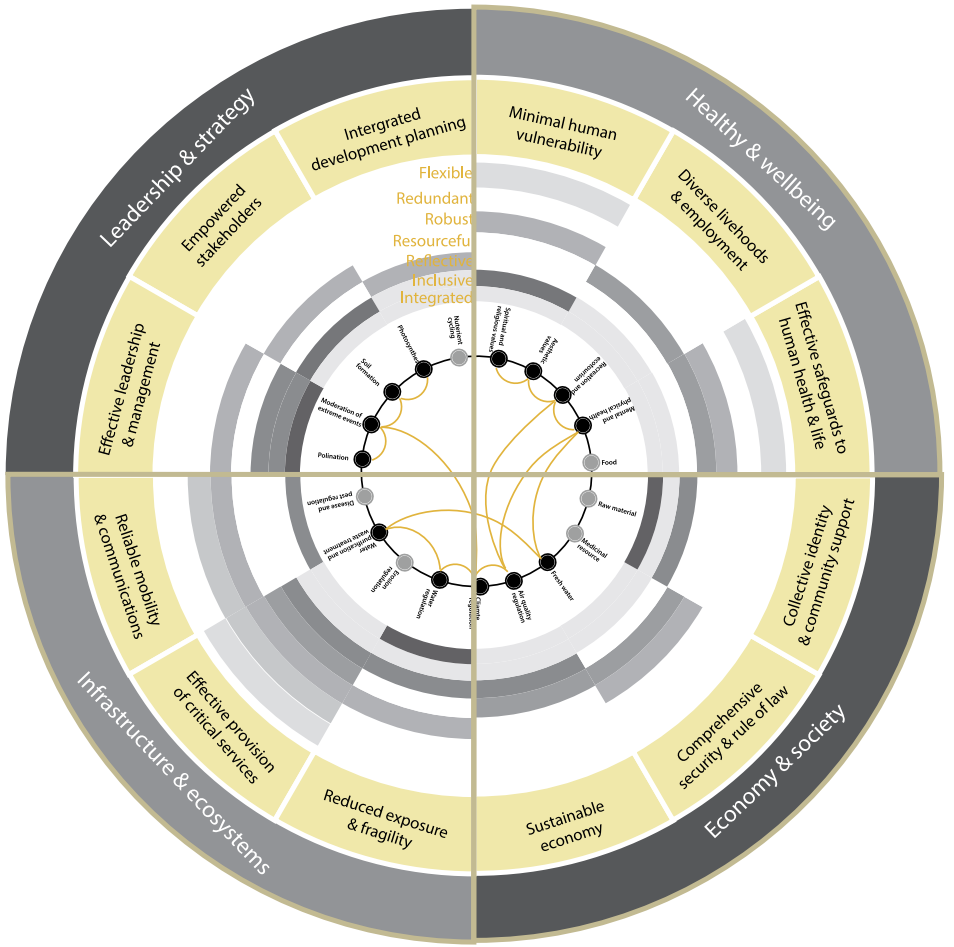
6

Conclusion

Aspect 1: From proposed values to urban resilience values

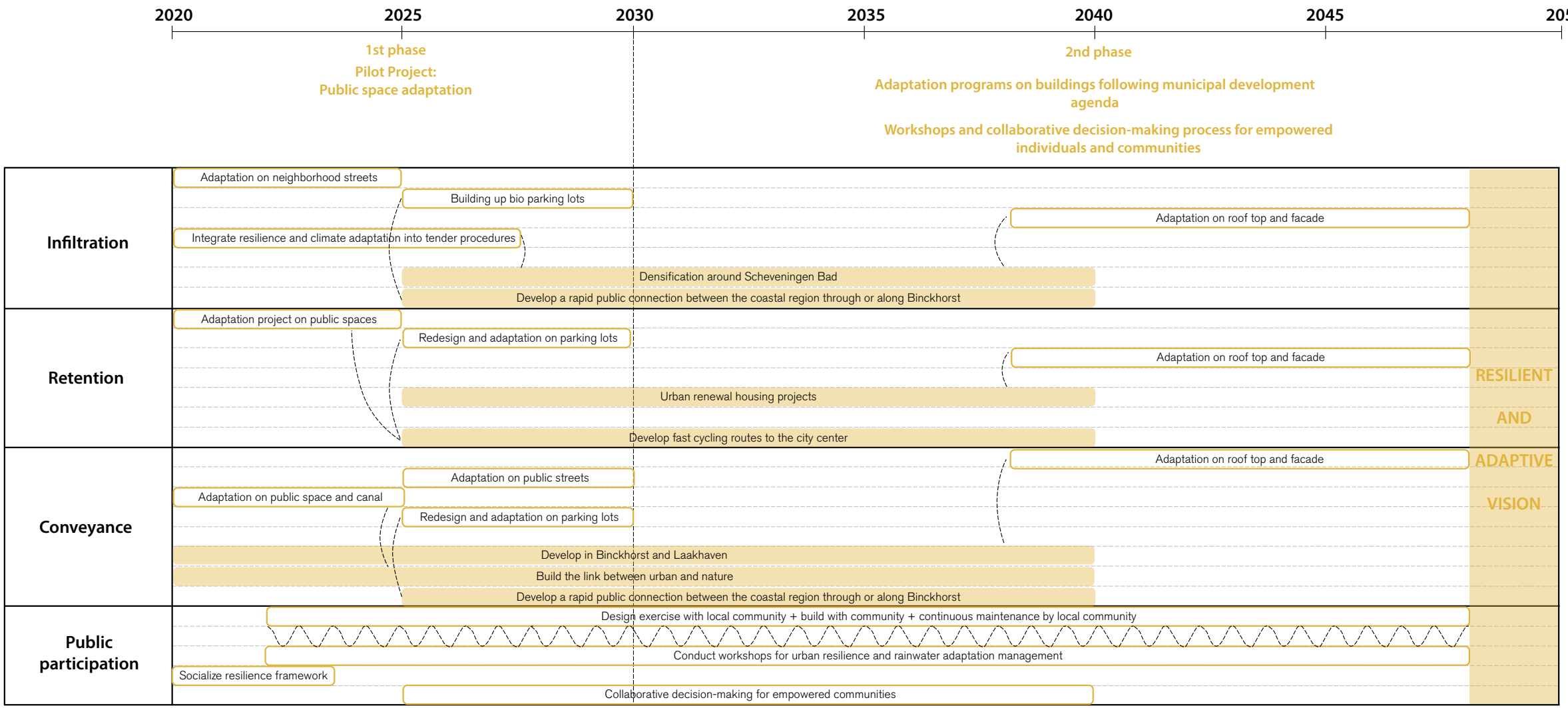


Additional values



Urban resilience values

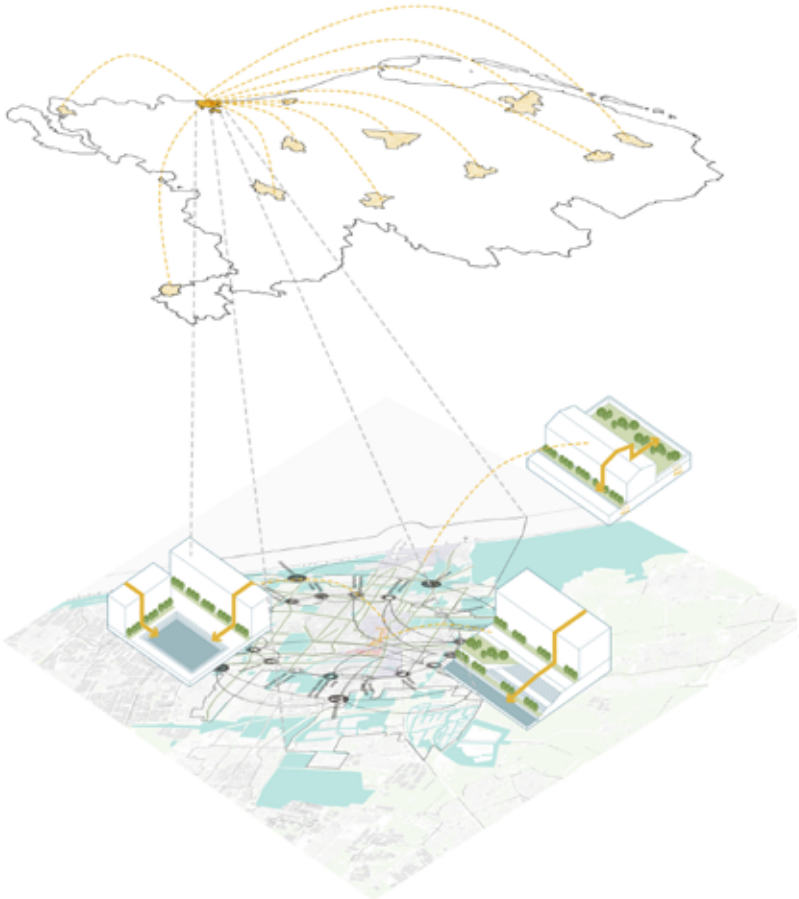
Aspect 2: Collaborating adaptation approaches with municipal development approahces



Aspect 3: Transferability

Scale 1: from pilot projects to the city

Scale 2: from the city to the capital cities



Scale 3: from the city to 100RC cities

How can public space design contribute to urban resilience in The Hague by 2050 when city is faced with the challenge of extreme precipitation?

Reduced exposure and fragility

Integrated development planning

Empowered stakeholders

Minimal human vulnerability

Thank you !