Flowing Through Time

Uncovering The Hague's Water Heritage for Awareness and Contemporary Resilience

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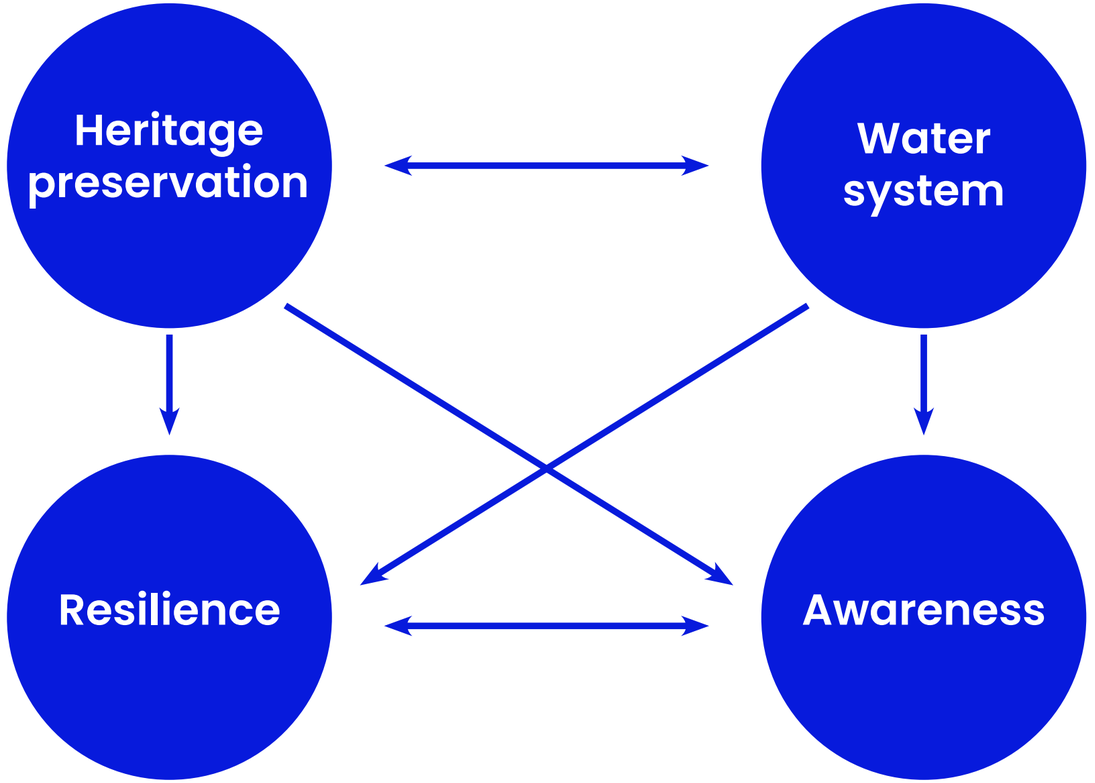
Research aim

The aim of this thesis is to investigate how water heritage can provide new perspectives to strengthen the future water management system and its surroundings to improve resilience and awareness.

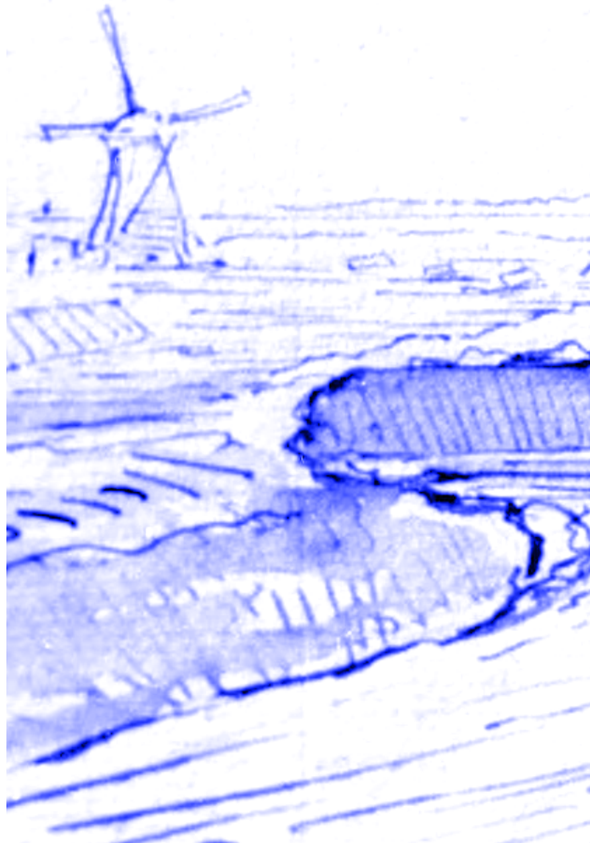


Introduction

(Van Call, ca. 1700)

Transition in water management

- Long-standing tradition of dealing with water
- Trial and error
- Lessons were learned on how to keep water at bay
- Smaller interventions that let humans live with water
- Bigger interventions that could actively control the water
- The prolonged and persistent application of this principle has, in combination with climate change, now resulted in far-reaching consequences



(Gemeente Leidschedam, ca. 1900)

Awareness

NOS Nieuws • Woensdag 29 mei, 06:22

Nog één kletsnatte dag in recordnat mei, daarna maakt zomer een drogere start

Rolf Schuttenhelm
redacteur Klimaat

Nederland heeft vandaag nog een kletsnatte dag voor de boeg, met gemiddeld 10 tot 20 millimeter neerslag. Daarmee is inmiddels al vrijwel zeker dat de meimaand de natste wordt sinds de landelijke metingen startten in 1958.

De meeste neerslag viel in Zuidoost-Brabant en Limburg, met het zuidelijkste

Meeste Limburgers niet goed voorbereid op extreme wateroverlast

H2O ACTUEEL . 02 MEI 2023

Een ruime meerderheid van de Limburgers is volgens een enquête onvoldoende voorbereid op een noodsituatie door extreme wateroverlast, zelfs zij in het verleden hierdoor directe schade hebben geleden. Veel inwoners zijn ontevreden over de informatievoorziening vanuit de overheid.

Dat zijn twee conclusies van een inwonersonderzoek door bureau Enneüs. Meer dan 1.250 Limburgers hebben hierbij een vragenlijst ingevuld. Uit de reacties blijkt dat het waterbewustzijn niet erg groot is

Verzekeraars kijken met argusogen naar ambitieuze bouwplannen in de polder

(Scuttenhelm, 2024), (H2O Actueel, 2023) & (AM, n.d.)

- That the climate is changing can already observed
- Climate related emergencies highlight the lack of preparedness and low water awareness among the Dutch population, as identified by the OECD[1]
- Not only inhabitants

1. OECD (2014). Water Governance in the Netherlands: Fit for the Future?. OECD Studies on Water. OECD Publishing, Paris. https://doi.org/10.1787/9789264102637-en.

Turning the transition around

- Water and heritage advocates want to turn this around
- Using water heritage to do this
- This can improve the resilience of the city (the ability of a city to withstand various shocks and stresses)
- Historic practices no longer directly applicable to modern contexts
- They offer valuable lessons for future water systems that are compatible with natural, social, and cultural frameworks
- Considering the functional aspects of water systems within heritage sites can contribute to better water futures and to promoting water awareness[2]

(Unknown, ca.1900)

2. Hein, C. M. (2023). Toward a Research and Action Agenda on Water and Heritage? A First Attempt at Refining Terminologies. Concepts and Priorities. Blue Papers, 2(1), 22-33. Article 2.

How to design with heritage

- Janssen, Luiten, Renes and Stegmeijer have introduced three approaches to the planning treatment of heritage
- Sector (preserving heritage by isolating it from spatial development)
- Factor (heritage as an asset and stimulus to urban and rural regeneration)
- Vector (heritage determining the direction of spatial projects and developments)
- Actor (prioritizes the central role of people)

Janssen, J., Luiten, E., Renes, H., & Stegmeijer, E. (2017). Heritage as sector, factor and vector: conceptualizing the shifting relationship between heritage management and spatial planning. European Planning Studies, 25(9), 1654-1672.

Research question

What is the water heritage of The Hague?

How does the water management system in The Hague work?

How can **water heritage** strengthen the future **water management system** and its surrounding public space to improve **climate adaptation** and **awareness** in The Hague?

How can landscape design raise awareness, through heritage, of both the challenges and opportunities associated with water?

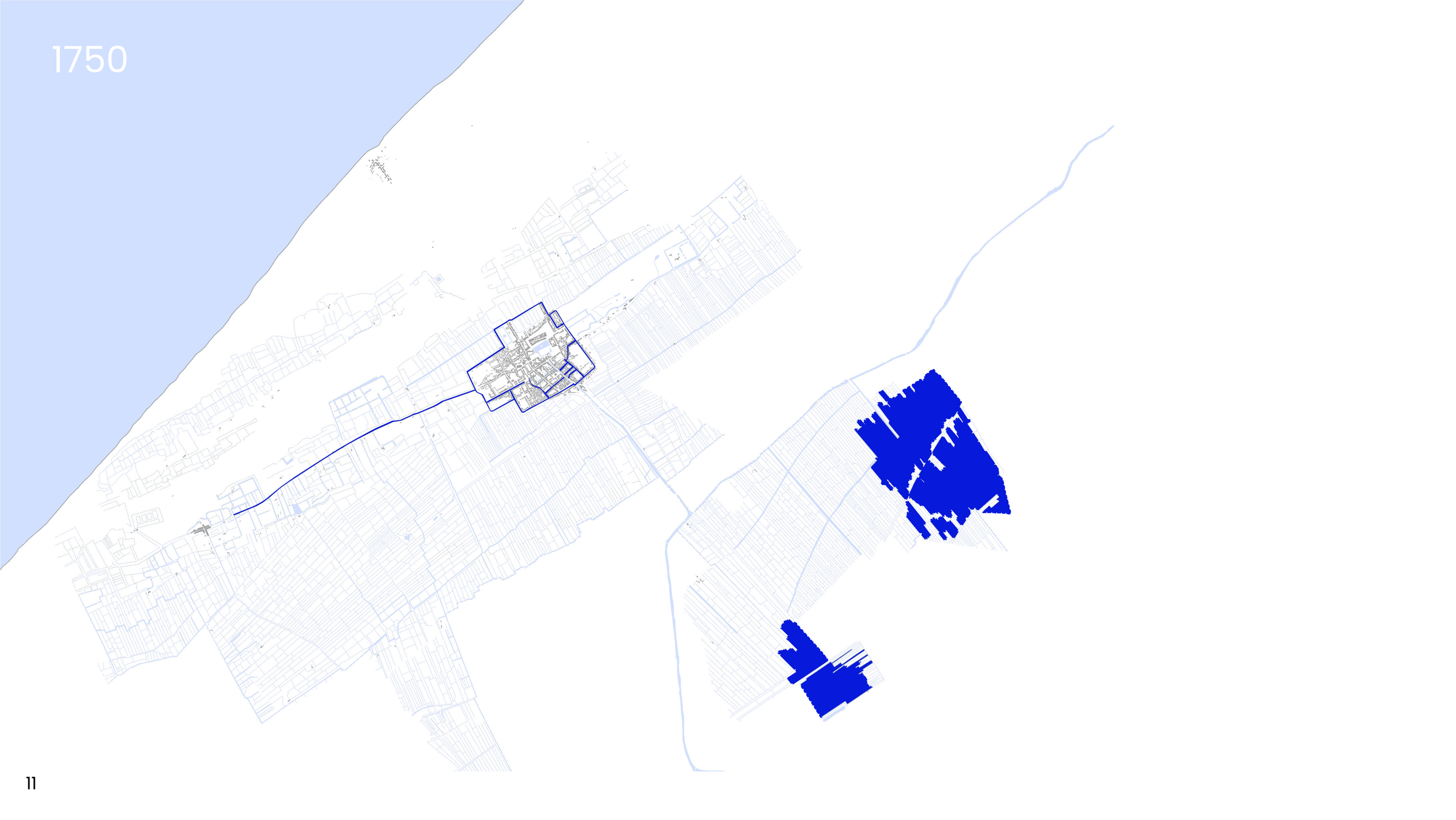
How will climate change impact the water system in The Hague, and what changes are anticipated in the future?

Analysis

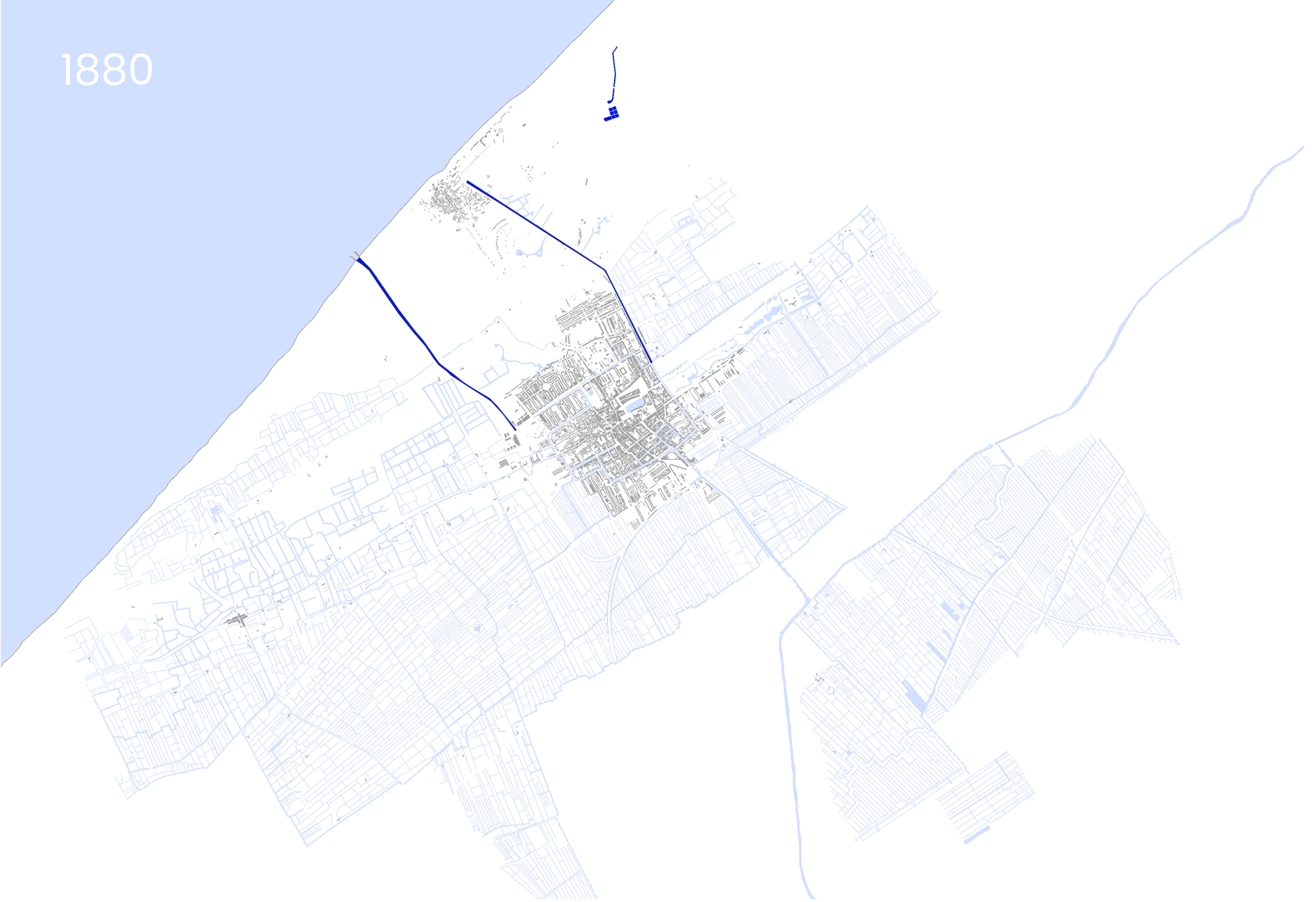
(Unknown, ca. 1844)

1550

1750

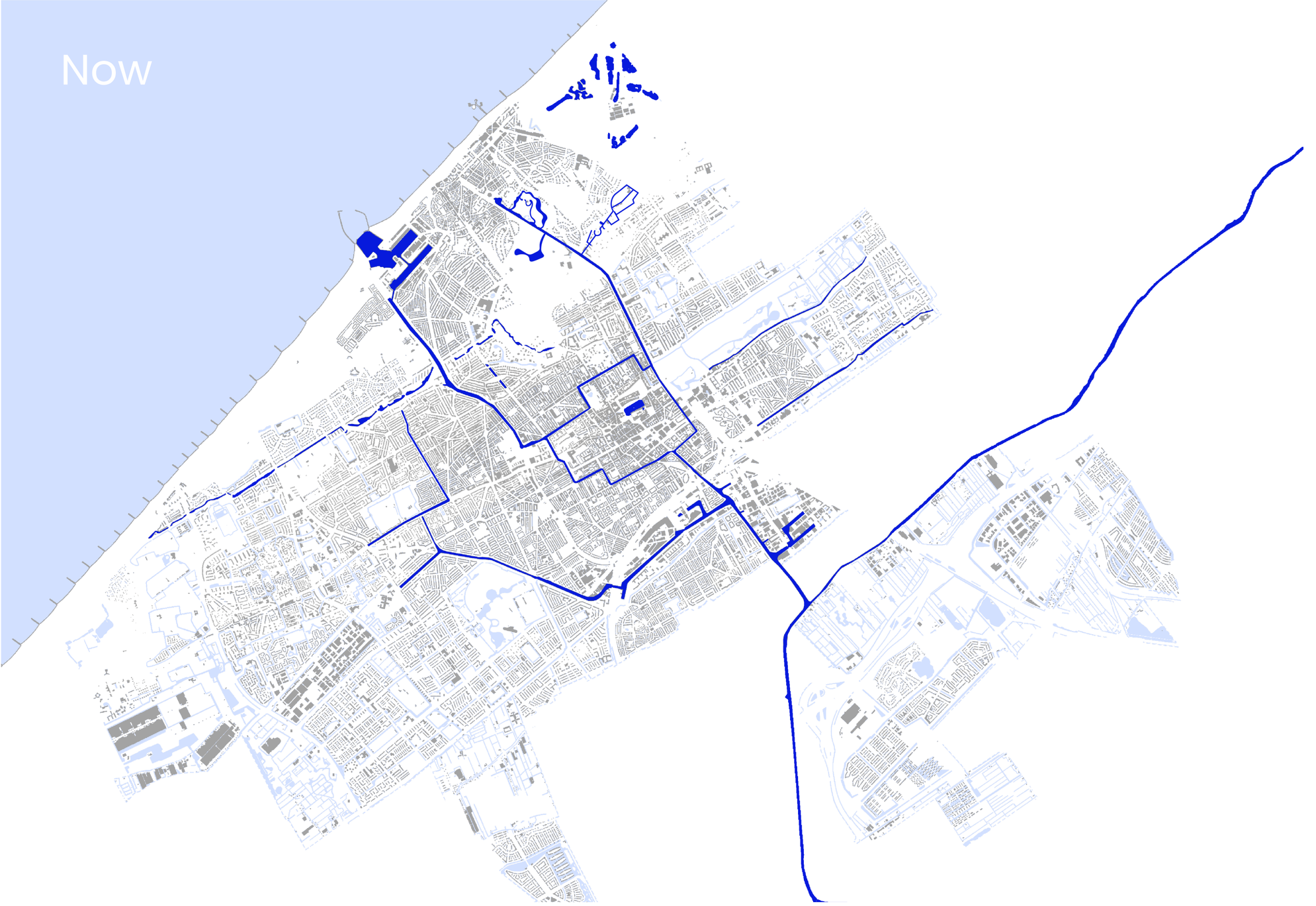


1880



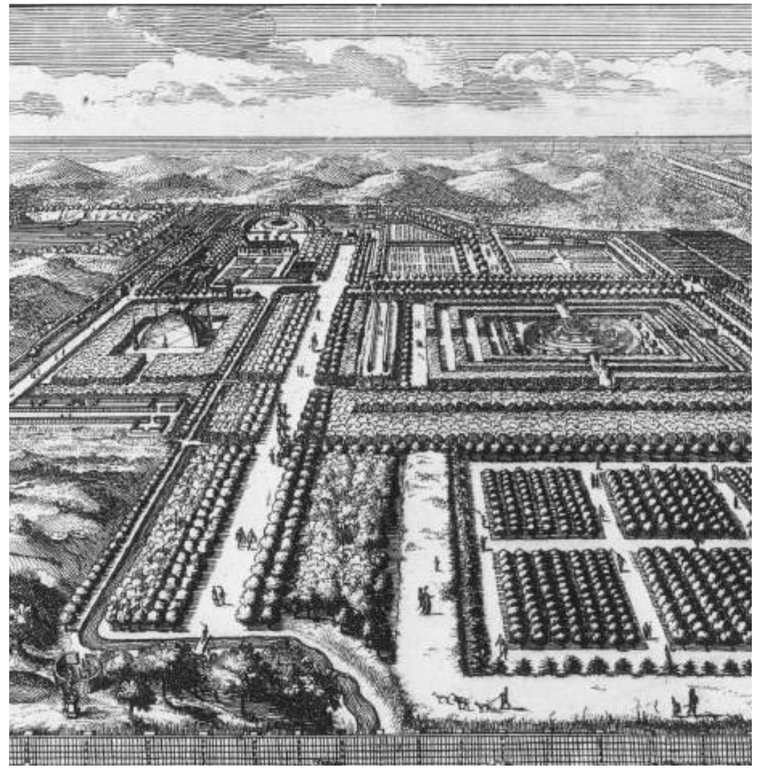
1950

Now



- While the city has gained an intricate network of waterways over time
- It has also experienced the loss of crucial connections

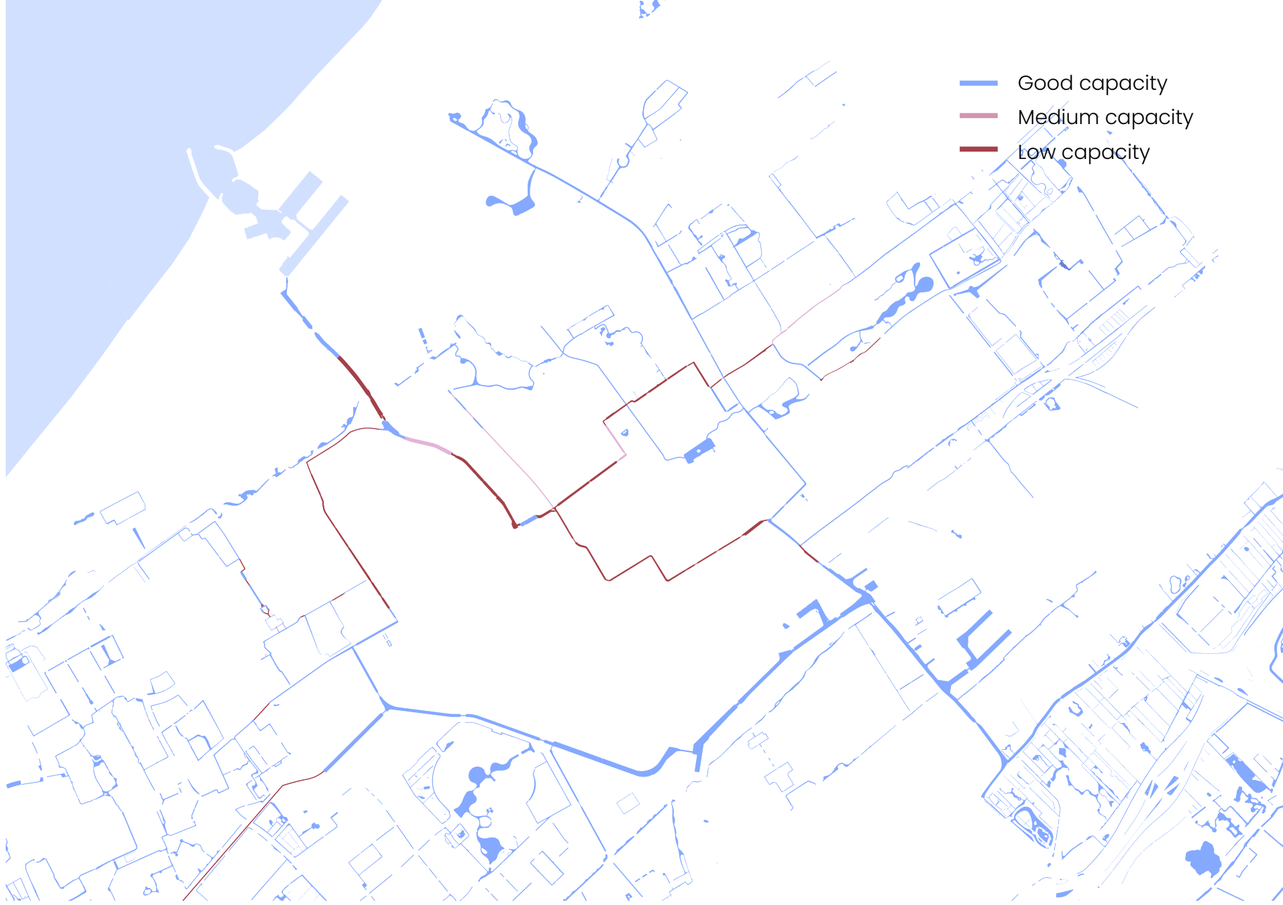
Importance of water



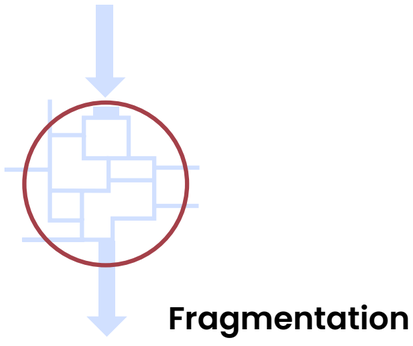
(Visscher, ca. 1636), (Howen. ca. 1825) & (Aveele, 1690)

The boezem system

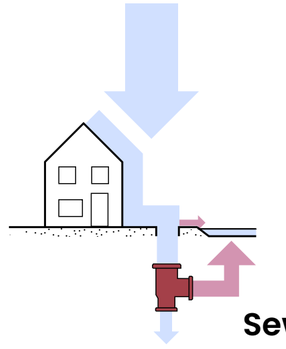
- Not enough storage (in city center)
- Branches out quickly
- Can lead to waterlogging
- And water has a hard time reaching the pumping system
- Numerous overflows from combined sewer system drain into the boezem



(P. Strohschein, personal communication, February 26, 2024)



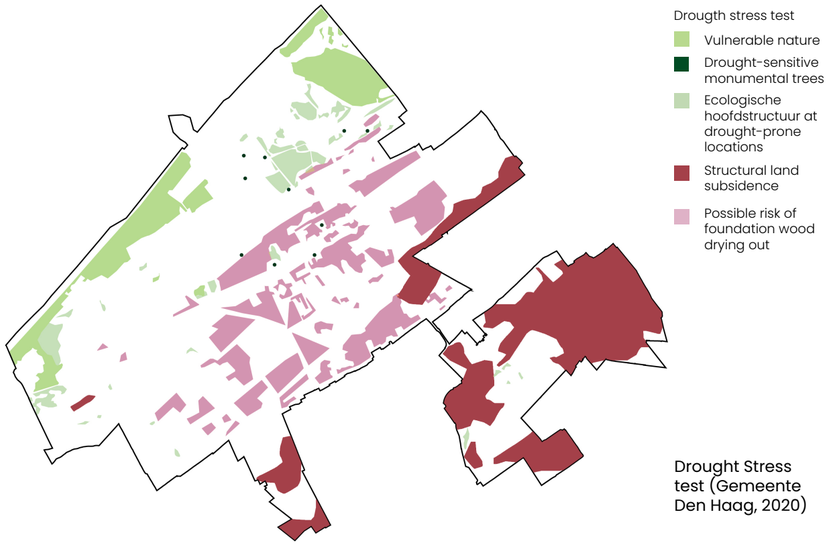
Fragmentation



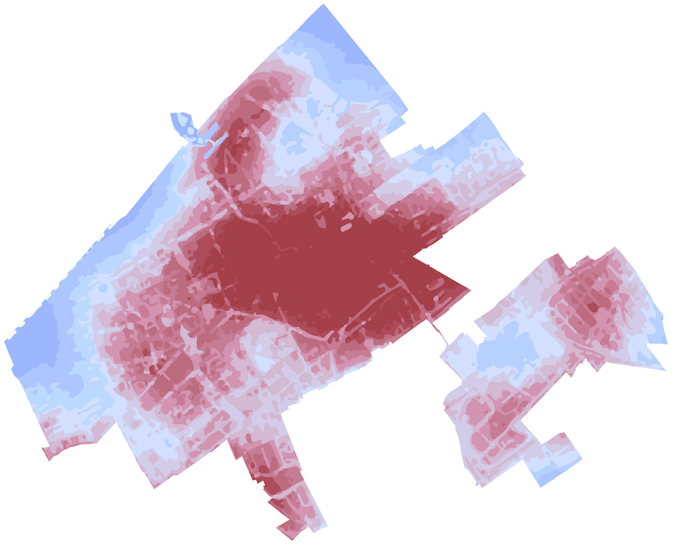
Sewage overflow

Climate change

Water depth during heavy rainfall (Klimaateffectatlas, n.d.)



Drought Stress test (Gemeente Den Haag, 2020)



Urban Heat Island Effect (Rijksinstituut voor Volksgezondheid en Milieu, 2020)

Quality surface water (Stowa, 2018)

Strategy

(Tholen, ca. 1900)

Design goals

Water management

Increase water storage in the center

Improve the drainage capacity

Improve circulation to prevent excessive heating of the water

Prevent sewage overflow

Awareness

Create awareness

- Making history visible again
- Giving sites an educational function
- Giving sites a recreational function
- Using the historic narratives

Climate adaptation

Reduce the impact of climate change

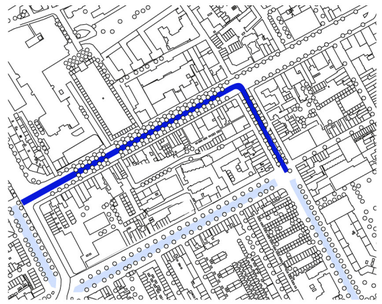
- Prevent waterlogging
- Decrease the effects of drought
- Decrease the Urban Heat Island effect

(Unknown, 1711-1729)

Water management

Toolbox

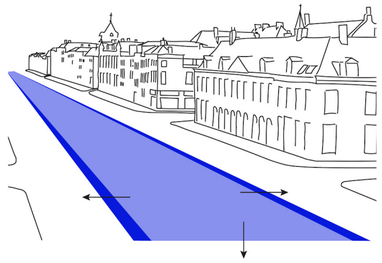
B1. New connection



Increasing the pumping capacity is only possible if the main drainage system is enlarged. This can be done by making new waterways which reduce vulnerability and increase storage.

Awareness	●	●	○
Water management	●	●	●
Climate change			
Rainwater	●	●	○
Heat	●	○	○
Drought	○	○	○

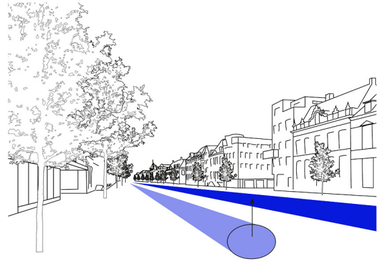
B2. Expanding waterways



Increasing the pumping capacity is only possible if the main drainage system is also enlarged. Another way to do this is by widening or deepening existing waterways.

Awareness	○	○	○
Water management	●	●	●
Climate change			
Rainwater	●	●	○
Heat	●	○	○
Drought	○	○	○

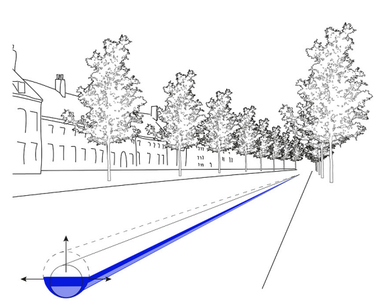
B3. Digging up culverts



From the analysis of the boezem system it was found that many waterways now lie underground as culverts. Digging these up can increase the drainage capacity.

Awareness	●	●	○
Water management	●	●	●
Climate change			
Rainwater	●	●	○
Heat	●	○	○
Drought	○	○	○

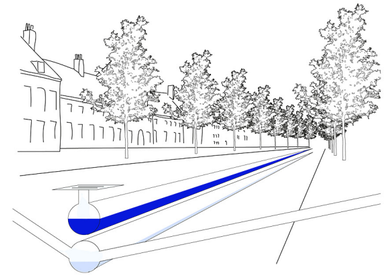
B4. Increasing sewer capacity



Increasing the capacity of the sewer system of The Hague will mean that there is more storage for rainwater, which will prevent waterlogging.

Awareness	○	○	○
Water management	●	●	○
Climate change			
Rainwater	●	●	○
Heat	○	○	○
Drought	○	○	○

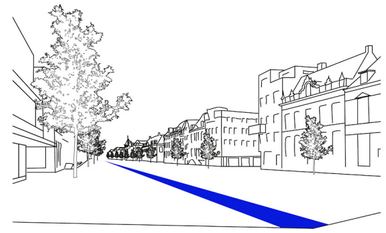
B5. Rainwater sewer



A separated sewer system increases rainwater storage and prevents relatively clean water from mixing with wastewater. Discharge to surface water is less harmful to water quality.

Awareness	○	○	○
Water management	●	●	○
Climate change			
Rainwater	●	●	○
Heat	○	○	○
Drought	○	○	○

B6. Incliantion of road



A gutter or the inclination of a road can make sure that rainwater does not go directly into the sewer system and thus provide more storage during heavy rainfall.

Awareness	●	●	○
Water management	●	●	●
Climate change			
Rainwater	●	●	●
Heat	○	○	○
Drought	○	○	○

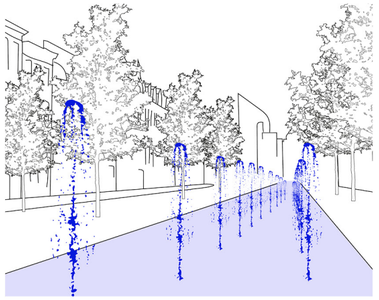
Awareness

A1. Signs

Signs can display the history and other information about a historical location, such as the risk of flooding or water logging.

Awareness	●	●	○
Water management	○	○	○
Climate change			
Rainwater	○	○	○
Heat	○	○	○
Drought	○	○	○

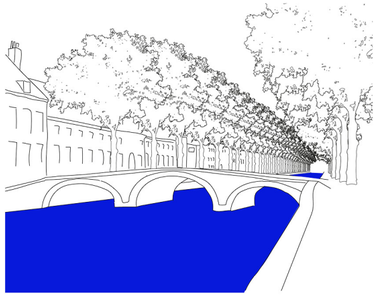
A2. Fountains



Fountains contain water, which evaporates and cools the air. Placing these in a location where water once existed pays homage to the old situation.

Awareness	●	●	○
Water management	○	○	○
Climate change			
Rainwater	○	○	○
Heat	●	○	○
Drought	○	○	○

A3. Restore old situation



In the past, there were more waterways in The Hague, restoring them the way they were before shows the history of the city and restores the old water system.

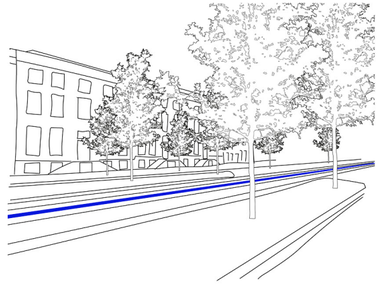
Awareness	●	●	●
Water management	●	●	○
Climate change			
Rainwater	●	●	○
Heat	●	●	○
Drought	○	○	○

A4. Water in different form

Another way to reintroduce water is by designing it in a different form. This way, you still reference the water, but it's not exactly as it was.

Awareness	●	●	○
Water management	●	●	○
Climate change			
Rainwater	●	●	○
Heat	●	○	○
Drought	○	○	○

A5. Gutter



A gutter recalls a past where water was present while also ensuring that rainwater does not directly enter the sewer system.

Awareness	●	●	○
Water management	●	●	●
Climate change			
Rainwater	●	●	●
Heat	○	○	○
Drought	○	○	○

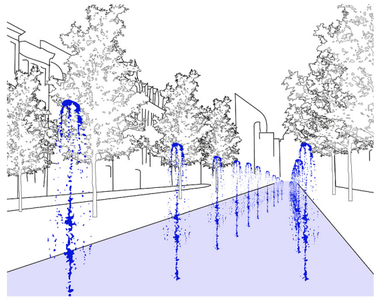
A6. Materialization

With a certain materialization, reference can be made to the old situation. For example, with pavement or a landscaping plan.

Awareness	●	○	○
Water management	○	○	○
Climate change			
Rainwater	○	○	○
Heat	○	○	○
Drought	○	○	○

Climate change - heat

C1. Water elements



Fountains contain water, which evaporates and cools the air. Smaller fountains in the streets wet the surface locally and invite play.

Awareness	● ● ○
Water management	○ ○ ○
Climate change	
Rainwater	○ ○ ○
Heat	● ○ ○
Drought	○ ○ ○

C2. Shade elements

The placement of shade elements such as canvas cloths or pergolas provides flexible shading solutions, primarily resulting in a decrease in perceived temperature.

Awareness	○ ○ ○
Water management	○ ○ ○
Climate change	
Rainwater	○ ○ ○
Heat	● ● ○
Drought	○ ○ ○

C3. Trees

Trees cool by providing shade and evaporating groundwater. The size, tree species, and location are strongly influential. Some precipitation remains on the leaves.

Awareness	○ ○ ○
Water management	○ ○ ○
Climate change	
Rainwater	● ○ ○
Heat	● ● ●
Drought	○ ○ ○

Climate change - drought

C4. Removing pavement

Water falling on non-paved surfaces infiltrates the soil, thus combating drought. During heavy rain, water doesn't have time to infiltrate the soil.

Awareness	○ ○ ○
Water management	○ ○ ○
Climate change	
Rainwater	○ ○ ○
Heat	○ ○ ○
Drought	● ○ ○

C5. Infiltration basin

A wadi or other unpaved infiltration basin can provide storage for rainwater. Depending on its size, more or less water can be stored in the ground.

Awareness	● ○ ○
Water management	● ● ○
Climate change	
Rainwater	● ● ○
Heat	○ ○ ○
Drought	● ● ○

C6. Permeable paving

Permeable paving can let through water, infiltrating the soil, thus combating drought.

Awareness	○ ○ ○
Water management	○ ○ ○
Climate change	
Rainwater	○ ○ ○
Heat	○ ○ ○
Drought	● ○ ○

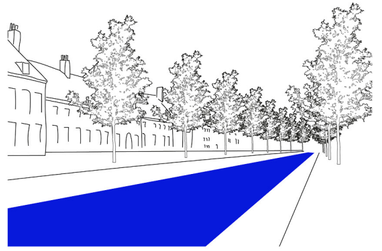
Climate change - water

C7. Infiltration basin

A wadi or other unpaved infiltration basin can provide storage for rainwater. Depending on its size, more or less water can be stored in the ground

Awareness	●○○
Water management	●●○
Climate change	
Rainwater	●●○
Heat	○○○
Drought	●●○

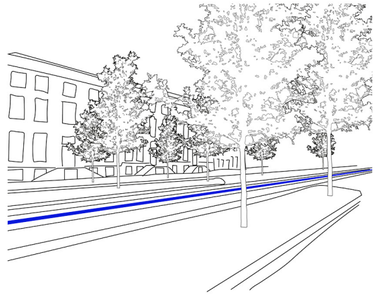
C8. Surface water



More surface water is beneficial for the amount of rainwater that can be stored. The possible rise in the water level through controlled discharge determines the storage.

Awareness	●●○
Water management	●●○
Climate change	
Rainwater	●●○
Heat	●○○
Drought	○○○

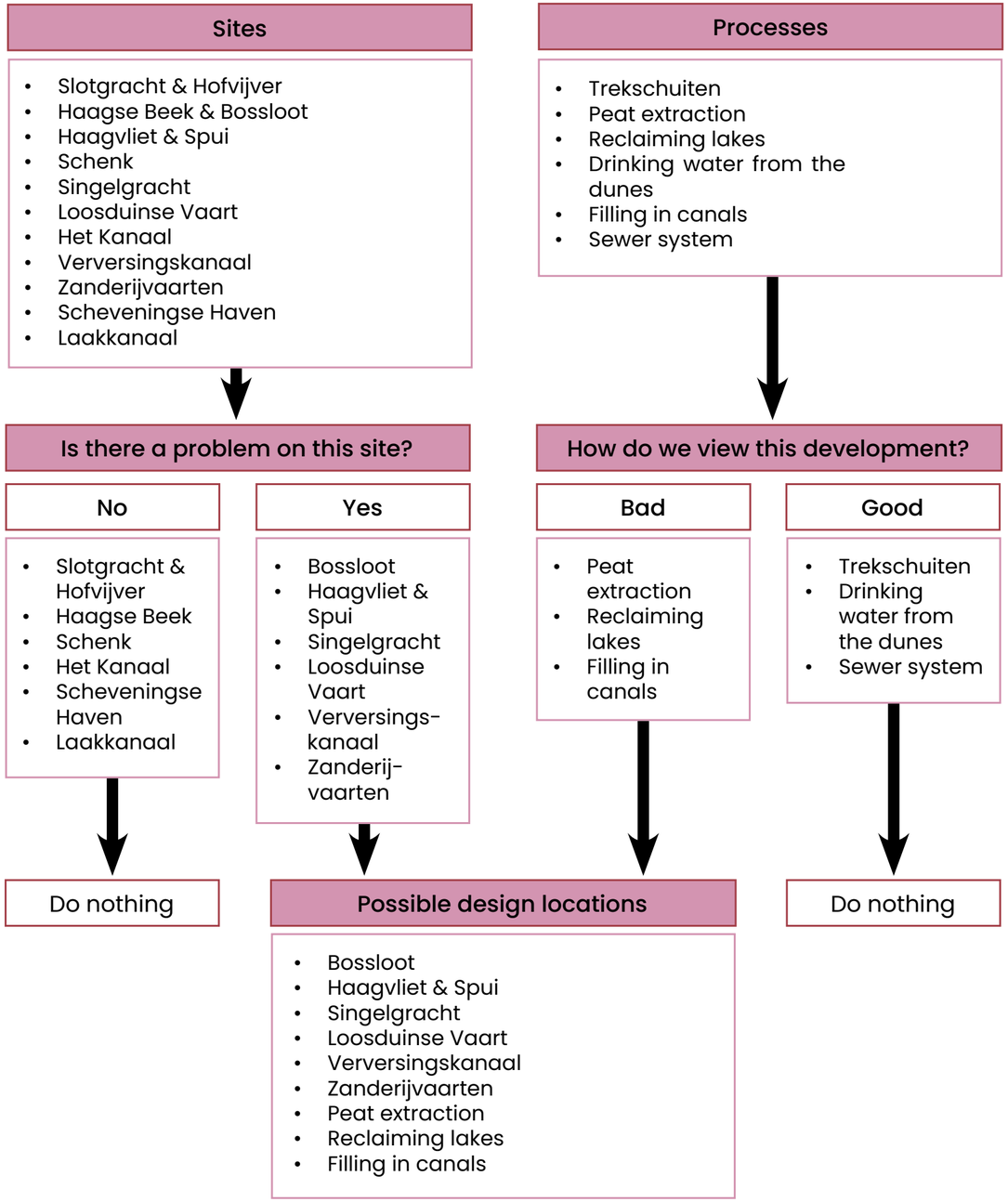
C9. Gutter



A gutter or the inclination of a road can make sure that rainwater does not go directly into the sewer system and thus provide more storage during heavy rainfall.

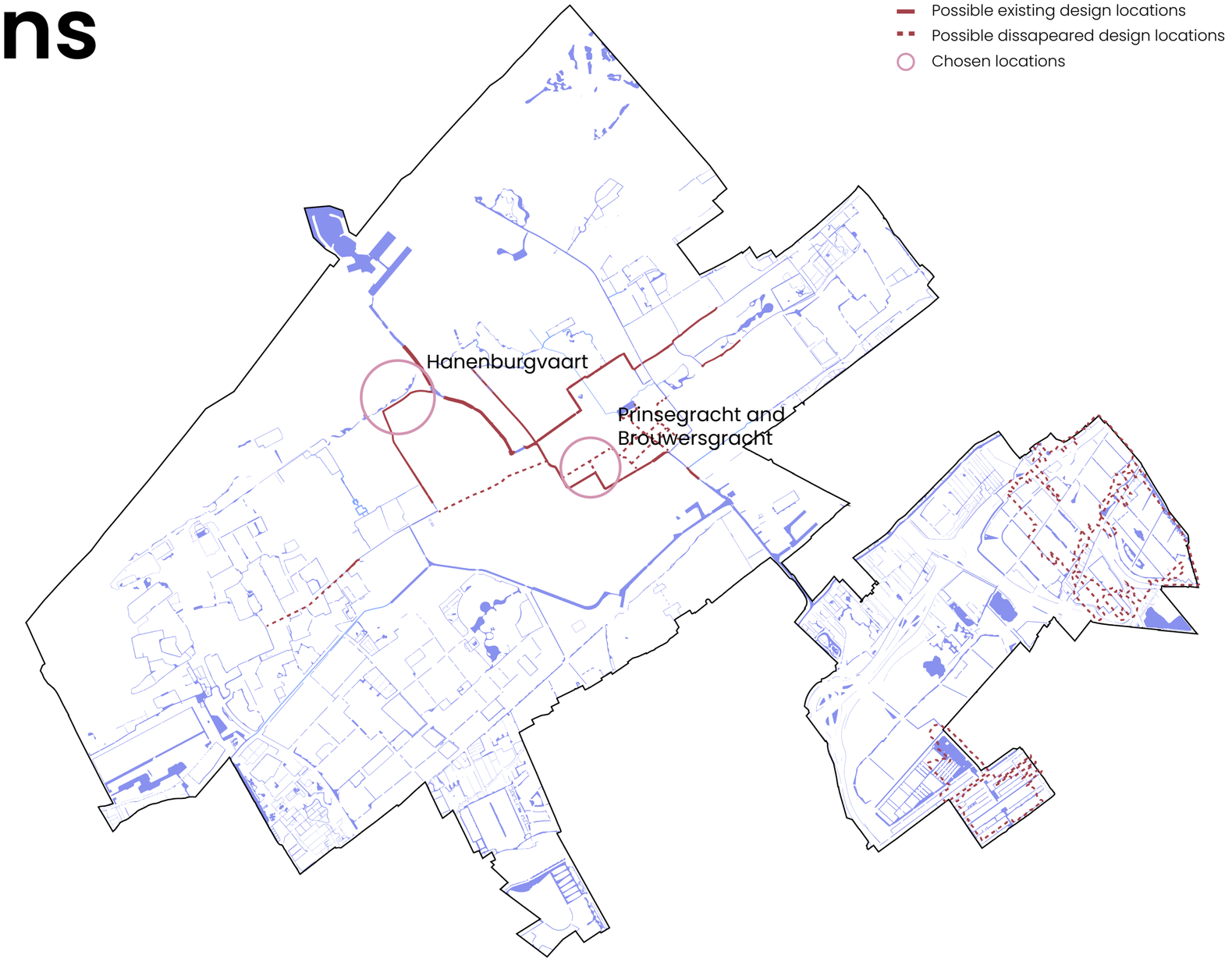
Awareness	●●○
Water management	●●●
Climate change	
Rainwater	●●●
Heat	○○○
Drought	○○○

Choosing a location



Chosen locations

- Process and site
- Different design assignments
- Important sites as the municipality and waterboard showed interest



Design location I: Prinsegracht and Brouwersgracht

Prinsegracht

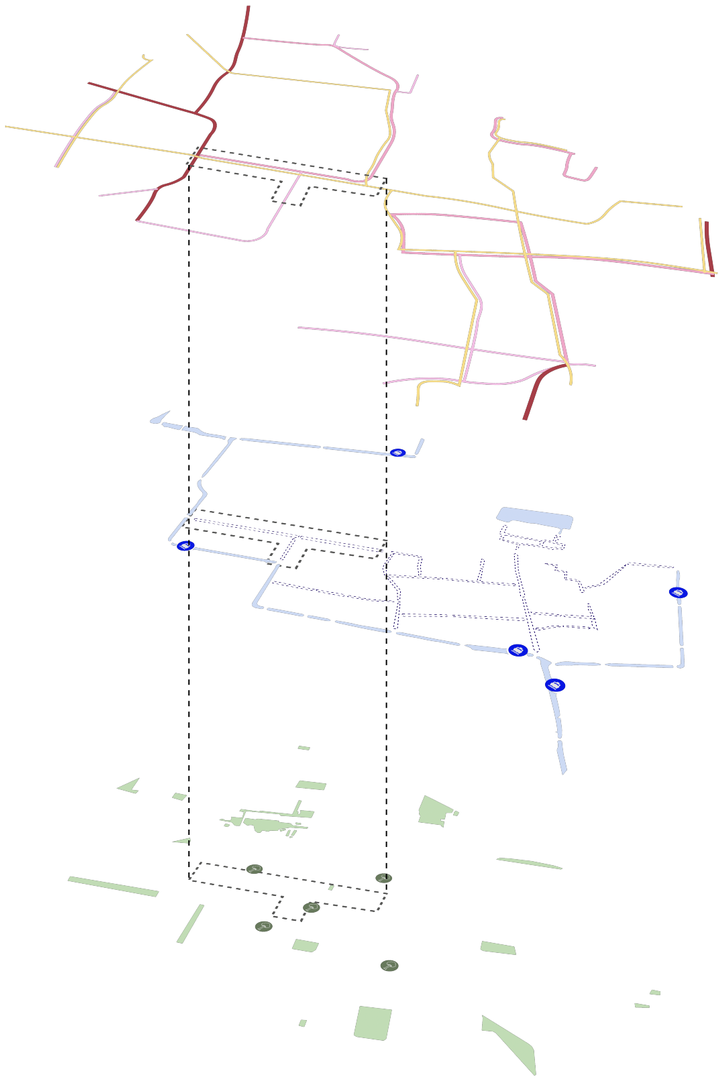
Brouwersgracht

Awareness
Water management
Climate change
- Rainwater
- Heat
- Drought


Google Earth
100 m

Analysis

- Water gone
- Wide street profiles
- 50 km/h
- Little amount of green



Infrastructure

- Main roads
- Neighborhood access roads
- Main routes city center
- Main bicycle routes

Water

- Existing water
- Filled in canals
- Mooring place

Green

- City parks and gardens
- Haagse hofjes

History

- Constructed in 1643
- At the initiative of the city council
- To provide a better connection between the Grote Markt and the Westland for the supply of vegetables and fruit
- To create a location for wealthy merchants, like the successful Amsterdam canal belt

1868

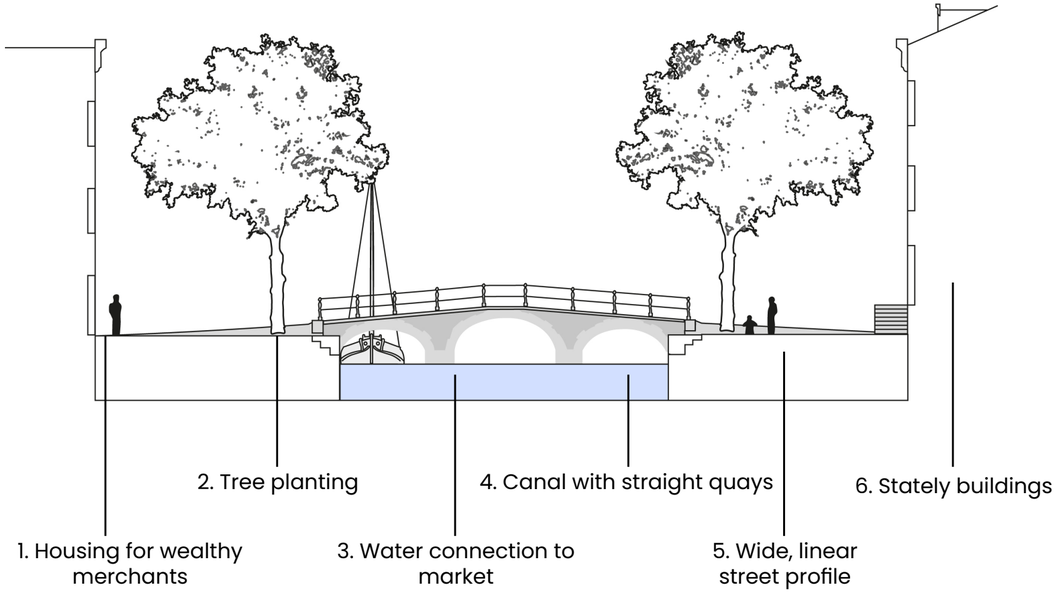
1881

2024

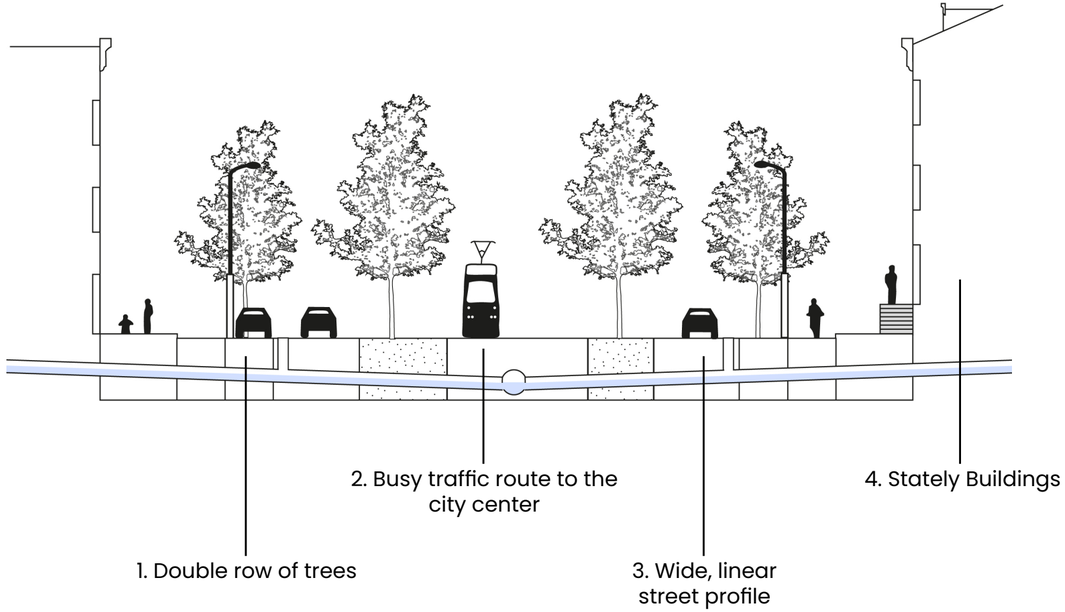
(Besoet, 1755)

Historic and current elements

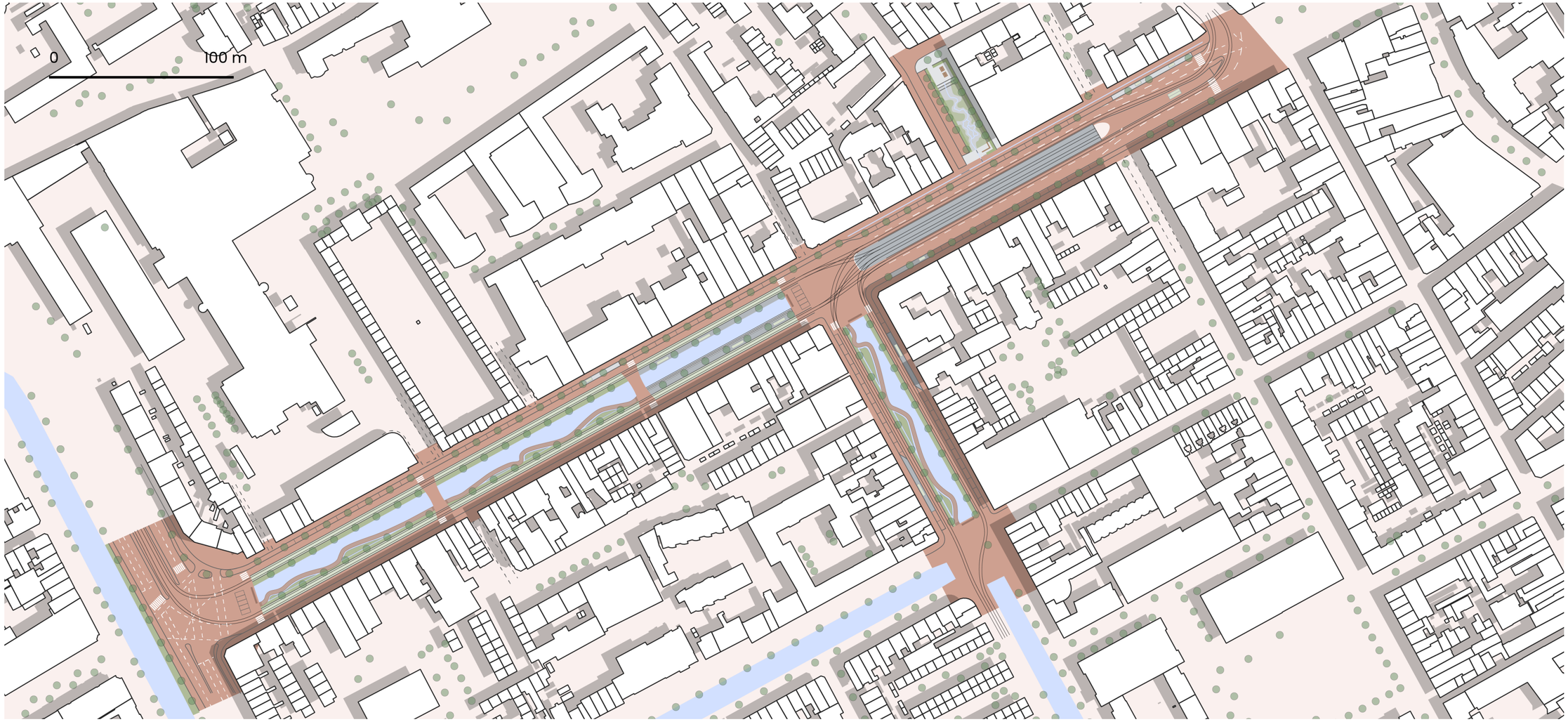
Historic situation



Current situation



The design

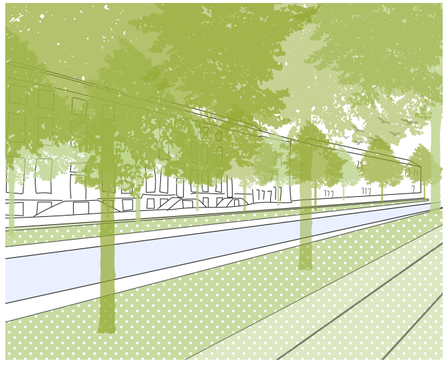


Design implications

- New place for recreation and increase in biodiversity
- More water storage and makes the system less vulnerable
- Speed needs to be reduced

2. Water system

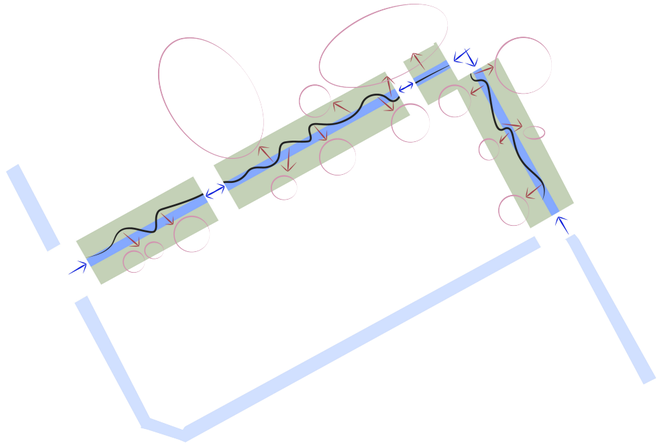
1. Green and recreation



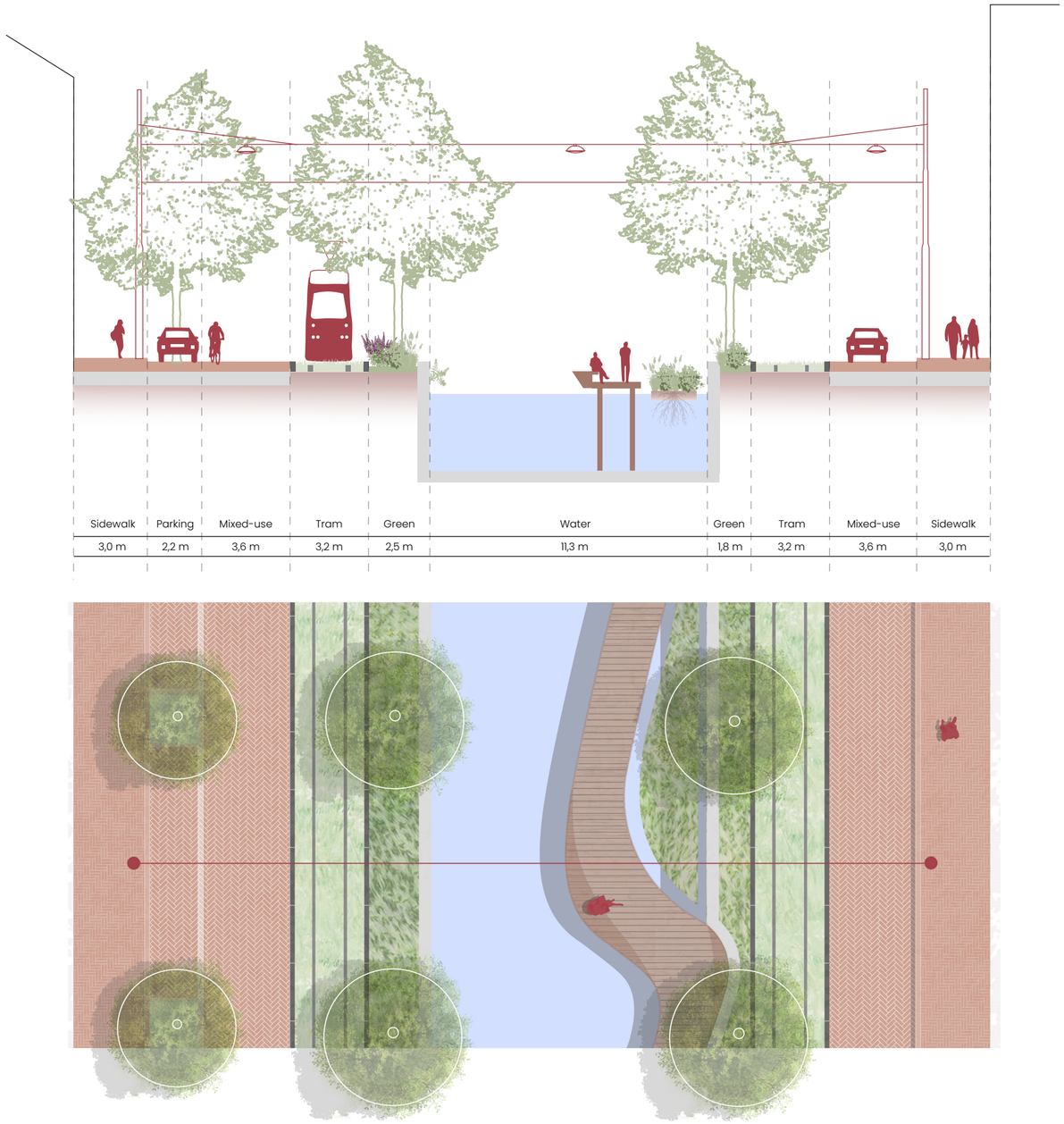
3. Traffic

Boardwalk concept

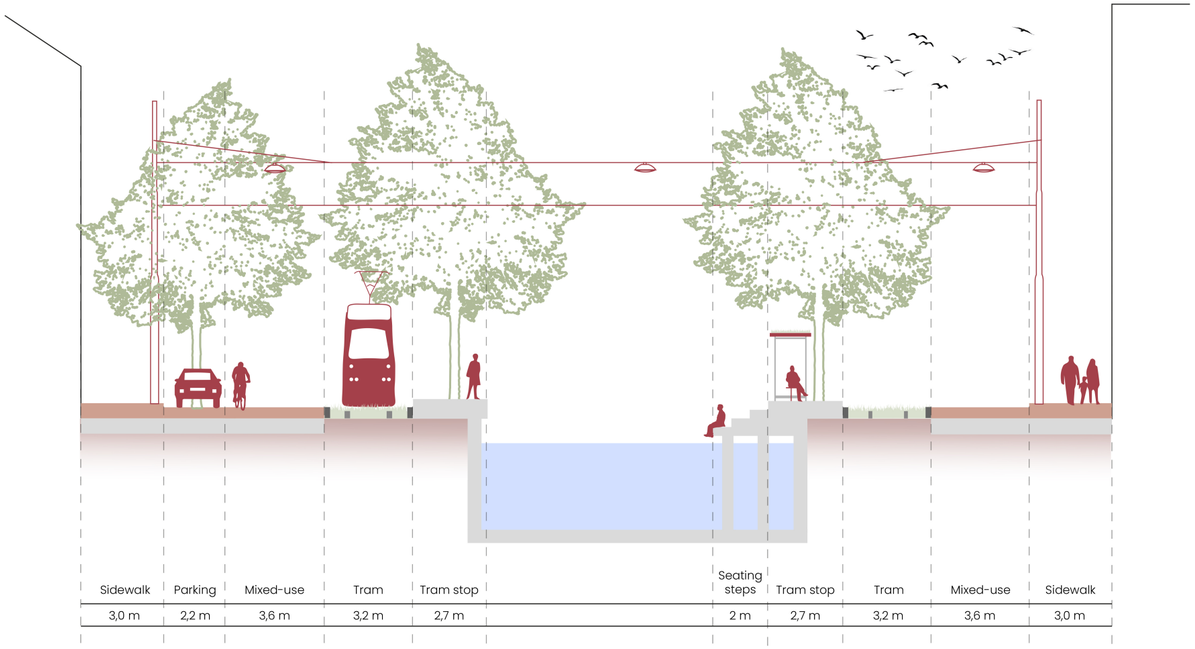
- Many monuments on both streets
- The path’s shape aligns with the locations of these monuments
- On the edges of the water and from benches along the path people can sit near the water and enjoy the view

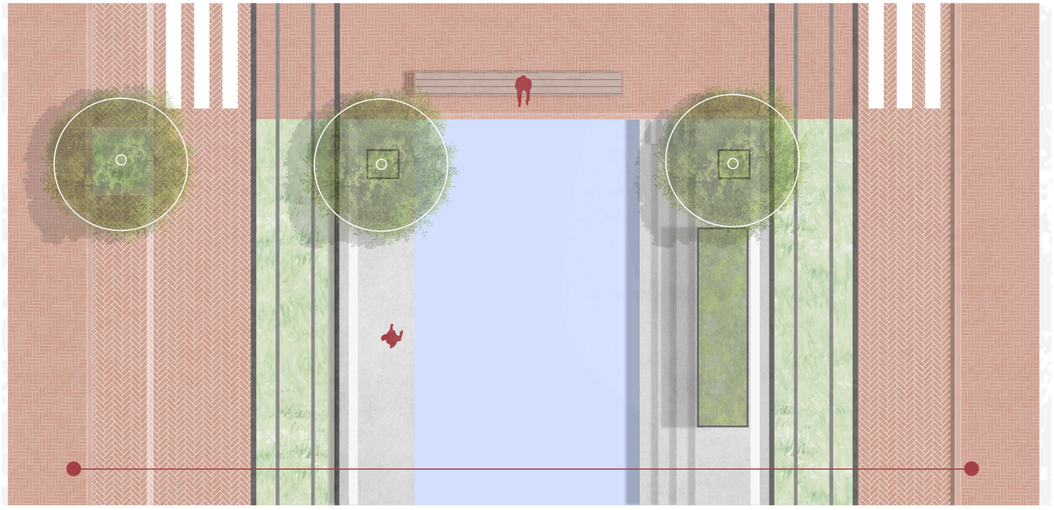


Section


Sidewalk
3,0 m
Parking
2,2 m
Mixed-use
3,6 m
Tram
3,2 m
Green
2,5 m
Water
11,3 m
Green
1,8 m
Tram
3,2 m
Mixed-use
3,6 m
Sidewalk
3,0 m

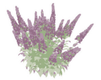
Section tram stop





Detail and planting

Quay plants



Buddleja davidii
Butterfly bush

Campanula rapunculoides
Creeping bellflower

Armeria maritima
Thrift

Geranium sanguineum
Bloody cranesbill

Althaea officinalis
Marsh mallow

Hypericum perforatum
St John's wort

Floatlands

Iris pseudacorus
Yellow iris

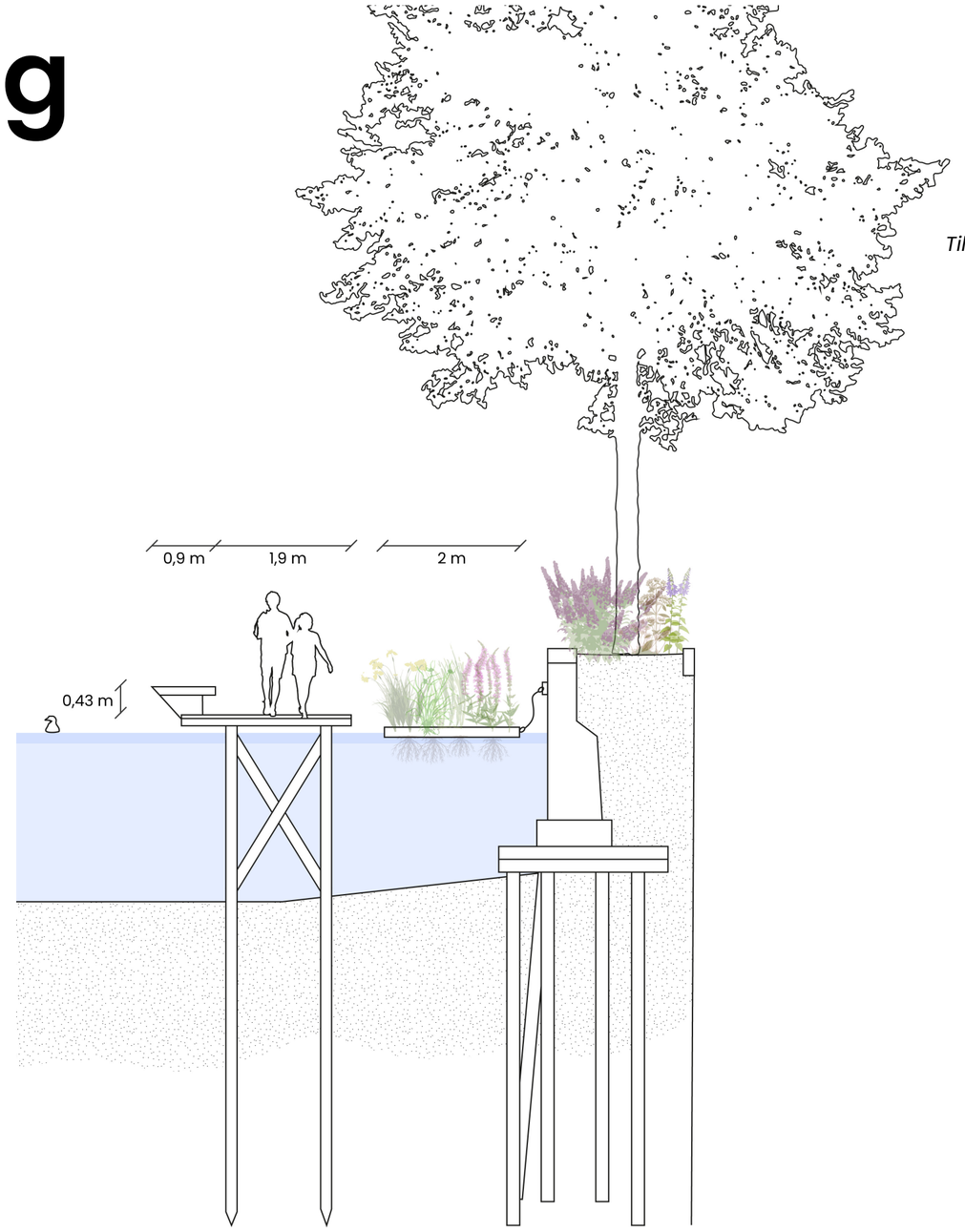
Acorus calamus
Sweet flag

Lythrum salicaria
Purple loosestrife

Alisma plantago-aquatica
European water-plantain

Carex bohemica
Bohemian sedge

Glyceria maxima
Great manna grass



Tilia ×europaea 'Pallida'

The view

The water playground

Conclusion design

- Big improvement for the water system
- Water storage and prevents waterlogging
- Not a big improvement for the drainage capacity
- Better climate adaptation (bigger trees, more green and water)
- Strengthening the connection between residents and water ensures that people become more involved and aware
- Heritage used in a literal way and figurative way

Awareness ●●●
Water management ●●○
Climate change
Rainwater ●●●
Heat ●●○
Drought ●●○

Conclusion thesis

- How can water heritage strengthen the future water management system and its surrounding public space to improve climate adaptation and awareness in The Hague?
- My thesis answers that question
- Provides a method on how to use water heritage for this purpose
- Can also be applied in other Dutch cities
- Climate is changing and eventually actions have to be taken
- History is a valuable tool for designing the future

(Lenskens, 2021)